

CRYSTAL OSCILLATOR (Programmable)  
SPREAD SPECTRUM  
OUTPUT: CMOS



Product Number  
**SG-9101CA: X1G005301xxxx00**  
**SG-9101CB: X1G005311xxxx00**  
**SG-9101CE: X1G005321xxxx00**  
**SG-9101CG: X1G005291xxxx00**

## SG-9101 series

- Frequency range : 0.67 MHz to 170 MHz (1 ppm Step)
- Supply voltage : 1.62 V to 3.63 V
- Function : Output enable (OE) or Standby ( $\overline{ST}$ )
- Configurable spread spectrum settings:  
2 kinds of spread type, 6 kinds of spread width  
4 kinds of modulation frequency, 3 kinds of spread profile
- PLL technology to enable short lead time
- Available field oscillator programmer "SG-Writer II"



### Specifications (characteristics)

| Item                                        | Symbol                                      | Specifications                                         |                        |                        |                                              | Conditions/Remarks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
|---------------------------------------------|---------------------------------------------|--------------------------------------------------------|------------------------|------------------------|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|---------------------------------------------|--|------|--|--|--|----------------|----------|----|----|----|----|---------------------------------------------|-----------------|------|------|------|------|-----------------|-----|-----|-----|-----|---------------------------------------|-----------------|------|------|------|------|-----------------|-----|-----|-----|-----|------|-----------------|------|------|------|------|-----------------|-----|-----|-----|-----|
| Supply voltage                              | $V_{CC}$                                    | 1.80 V Typ.                                            |                        | 2.50 V Typ.            | 3.30 V Typ.                                  | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
|                                             |                                             | 1.62 V to 1.98 V                                       | 1.98 V to 2.20 V       | 2.20 V to 2.80 V       | 2.70 V to 3.63 V                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
| Output frequency range                      | $f_o$                                       | 0.67 MHz to 170 MHz                                    |                        |                        |                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
| Storage temperature                         | $T_{stg}$                                   | -40 °C to +125 °C                                      |                        |                        |                                              | Storage as single product.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
| Operating temperature                       | $T_{use}$                                   | -40 °C to +85 °C                                       |                        |                        |                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
|                                             |                                             | -40 °C to +105 °C                                      |                        |                        |                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
| Frequency tolerance <sup>*1</sup>           | $f_{tol}$                                   | $\pm 50 \times 10^{-6}$                                |                        |                        |                                              | Average frequency of 1s gate time.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
| Current consumption                         | $I_{CC}$                                    | 3.4 mA Max.                                            | 3.5 mA Max.            | 3.6 mA Max.            | 3.7 mA Max.                                  | $T_{use} = +105 \text{ °C}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | No load, $f_o = 20 \text{ MHz}$                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
|                                             |                                             | 2.9 mA Typ.                                            |                        | 3.0 mA Typ.            | 3.2 mA Typ.                                  | $T_{use} = +25 \text{ °C}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
|                                             |                                             | 5.7 mA Max.                                            | 6.0 mA Max.            | 6.9 mA Max.            | 8.3 mA Max.                                  | $T_{use} = +105 \text{ °C}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | No load, $f_o = 170 \text{ MHz}$                     |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
|                                             |                                             | 4.9 mA Typ.                                            |                        | 5.9 mA Typ.            | 7.0 mA Typ.                                  | $T_{use} = +25 \text{ °C}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
| Output disable current                      | $I_{dis}$                                   | 3.4 mA Max.                                            | 3.4 mA Max.            | 3.5 mA Max.            | 3.7 mA Max.                                  | OE = GND, $f_o = 170 \text{ MHz}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
| Standby current                             | $I_{std}$                                   | 0.9 $\mu\text{A}$ Max.                                 | 1.0 $\mu\text{A}$ Max. | 1.5 $\mu\text{A}$ Max. | 2.5 $\mu\text{A}$ Max.                       | $T_{use} = +105 \text{ °C}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | $\overline{ST} = \text{GND}$                         |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
|                                             |                                             | 0.3 $\mu\text{A}$ Typ.                                 | 0.4 $\mu\text{A}$ Typ. | 0.5 $\mu\text{A}$ Typ. | 1.1 $\mu\text{A}$ Typ.                       | $T_{use} = +25 \text{ °C}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
| Symmetry                                    | SYM                                         | 45 % to 55 %                                           |                        |                        |                                              | 50 % $V_{CC}$ Level                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
| Output voltage<br>(DC characteristics)      | $V_{OH}$                                    | 90 % $V_{CC}$ Min.                                     |                        |                        |                                              | <table border="1"> <thead> <tr> <th colspan="2">I<sub>OH</sub>/I<sub>OL</sub> Conditions</th> <th colspan="4">[mA]</th> </tr> <tr> <th>Rise/Fall time</th> <th><math>V_{CC}</math></th> <th>*A</th> <th>*B</th> <th>*C</th> <th>*D</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Default (<math>f_o &gt; 40 \text{ MHz}</math>),<br/>Fast</td> <td>I<sub>OH</sub></td> <td>-2.5</td> <td>-3.5</td> <td>-4.0</td> <td>-5.0</td> </tr> <tr> <td>I<sub>OL</sub></td> <td>2.5</td> <td>3.5</td> <td>4.0</td> <td>5.0</td> </tr> <tr> <td rowspan="2">Default (<math>f_o \leq 40 \text{ MHz}</math>)</td> <td>I<sub>OH</sub></td> <td>-1.5</td> <td>-2.0</td> <td>-2.5</td> <td>-3.0</td> </tr> <tr> <td>I<sub>OL</sub></td> <td>1.5</td> <td>2.0</td> <td>2.5</td> <td>3.0</td> </tr> <tr> <td rowspan="2">Slow</td> <td>I<sub>OH</sub></td> <td>-1.0</td> <td>-1.5</td> <td>-2.0</td> <td>-2.5</td> </tr> <tr> <td>I<sub>OL</sub></td> <td>1.0</td> <td>1.5</td> <td>2.0</td> <td>2.5</td> </tr> </tbody> </table> |                                                      | I <sub>OH</sub> /I <sub>OL</sub> Conditions |  | [mA] |  |  |  | Rise/Fall time | $V_{CC}$ | *A | *B | *C | *D | Default ( $f_o > 40 \text{ MHz}$ ),<br>Fast | I <sub>OH</sub> | -2.5 | -3.5 | -4.0 | -5.0 | I <sub>OL</sub> | 2.5 | 3.5 | 4.0 | 5.0 | Default ( $f_o \leq 40 \text{ MHz}$ ) | I <sub>OH</sub> | -1.5 | -2.0 | -2.5 | -3.0 | I <sub>OL</sub> | 1.5 | 2.0 | 2.5 | 3.0 | Slow | I <sub>OH</sub> | -1.0 | -1.5 | -2.0 | -2.5 | I <sub>OL</sub> | 1.0 | 1.5 | 2.0 | 2.5 |
|                                             | I <sub>OH</sub> /I <sub>OL</sub> Conditions |                                                        | [mA]                   |                        |                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
| Rise/Fall time                              | $V_{CC}$                                    | *A                                                     | *B                     | *C                     | *D                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
| Default ( $f_o > 40 \text{ MHz}$ ),<br>Fast | I <sub>OH</sub>                             | -2.5                                                   | -3.5                   | -4.0                   | -5.0                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
|                                             | I <sub>OL</sub>                             | 2.5                                                    | 3.5                    | 4.0                    | 5.0                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
| Default ( $f_o \leq 40 \text{ MHz}$ )       | I <sub>OH</sub>                             | -1.5                                                   | -2.0                   | -2.5                   | -3.0                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
|                                             | I <sub>OL</sub>                             | 1.5                                                    | 2.0                    | 2.5                    | 3.0                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
| Slow                                        | I <sub>OH</sub>                             | -1.0                                                   | -1.5                   | -2.0                   | -2.5                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
|                                             | I <sub>OL</sub>                             | 1.0                                                    | 1.5                    | 2.0                    | 2.5                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
| $V_{OL}$                                    | 10 % $V_{CC}$ Max.                          |                                                        |                        |                        |                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
| Output load condition                       | $L_{CMOS}$                                  | 15 pF Max.                                             |                        |                        |                                              | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
| Input voltage                               | $V_{IH}$                                    | 70 % $V_{CC}$ Min.                                     |                        |                        |                                              | OE or $\overline{ST}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
|                                             | $V_{IL}$                                    | 30 % $V_{CC}$ Max.                                     |                        |                        |                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
| Rise time<br>/Fall time                     | Default<br>Fast<br>Slow                     | $t_{r}/t_f$                                            | 3.0 ns Max.            |                        | $f_o > 40 \text{ MHz}$                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 20 % - 80 % $V_{CC}$ ,<br>$L_{CMOS} = 15 \text{ pF}$ |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
|                                             |                                             |                                                        | 6.0 ns Max.            |                        | $f_o \leq 40 \text{ MHz}$                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
|                                             |                                             |                                                        | 3.0 ns Max.            |                        | $f_o = 0.67 \text{ MHz to } 170 \text{ MHz}$ |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
|                                             |                                             |                                                        | 10.0 ns Max.           |                        | $f_o = 0.67 \text{ MHz to } 20 \text{ MHz}$  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
| Output disable time (OE)                    | $t_{stp\_oe}$                               | 1 $\mu\text{s}$ Max.                                   |                        |                        |                                              | Measured from the time OE or $\overline{ST}$ pin crosses 30 % $V_{CC}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
| Output disable time (ST)                    | $t_{stp\_st}$                               | 1 $\mu\text{s}$ Max.                                   |                        |                        |                                              | Measured from the time OE pin crosses 70 % $V_{CC}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
| Output enable time (OE)                     | $t_{sta\_oe}$                               | 1 $\mu\text{s}$ Max.                                   |                        |                        |                                              | Measured from the time OE pin crosses 70 % $V_{CC}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
| Output enable time (ST)                     | $t_{sta\_st}$                               | 3 ms Max.                                              |                        |                        |                                              | Measured from the time $\overline{ST}$ pin crosses 70 % $V_{CC}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
| Start-up time                               | $t_{str}$                                   | 3 ms Max.                                              |                        |                        |                                              | Measured from the time $V_{CC}$ reaches its rated minimum value, 1.62 V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |
| Frequency aging                             | $f_{age}$                                   | This is included in frequency tolerance specification. |                        |                        |                                              | +25 °C, first year                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                      |                                             |  |      |  |  |  |                |          |    |    |    |    |                                             |                 |      |      |      |      |                 |     |     |     |     |                                       |                 |      |      |      |      |                 |     |     |     |     |      |                 |      |      |      |      |                 |     |     |     |     |

\*1 Frequency tolerance includes initial frequency tolerance, frequency / temperature characteristics, frequency / voltage coefficient, frequency / load coefficient and frequency aging (+25 °C, 1 year).

### Pin description

| Pin | Name            | I/O type | Function      |                                                                                                                                                                                          |
|-----|-----------------|----------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | OE              | Input    | Output enable | High <sup>*2</sup> : Specified frequency output from OUT pin<br>Low: Out pin is low (weak pull down), only output driver is disabled.                                                    |
|     | $\overline{ST}$ | Input    | Standby       | High <sup>*2</sup> : Specified frequency output from OUT pin<br>Low: Out pin is low (weak pull down),<br>Device goes to standby mode. Supply current reduces to the least as $I_{std}$ . |
| 2   | GND             | Power    | Ground        |                                                                                                                                                                                          |
| 3   | OUT             | Output   | Clock output  |                                                                                                                                                                                          |
| 4   | $V_{CC}$        | Power    | Power supply  |                                                                                                                                                                                          |

\*2 Please do not use the OE/ST terminal in the open state.



Product Name

SG-9101CG 170.000000MHz C 20 P H A A A  
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

- ① Model
- ② Package type
- ③ Frequency
- ④ Spread type
- ⑤ Spread width
- ⑥ Function
- ⑦ Operating temperature
- ⑧ Modulation frequency
- ⑨ Spread profile
- ⑩ Rise/Fall time

| ② Package type |                 |
|----------------|-----------------|
| CG             | 2.5 mm × 2.0 mm |
| CE             | 3.2 mm × 2.5 mm |
| CB             | 5.0 mm × 3.2 mm |
| CA             | 7.0 mm × 5.0 mm |

| ④ Spread type |               |
|---------------|---------------|
| C             | Center spread |
| D             | Down spread   |

| ⑤ Spread width |               |             |
|----------------|---------------|-------------|
|                | Center spread | Down spread |
| 02             | ±0.25 %       |             |
| 05             | ±0.5 %        | -0.5 %      |
| 07             | ±0.75 %       |             |
| 10             | ±1.0 %        | -1.0 %      |
| 15             | ±1.5 %        | -1.5 %      |
| 20             | ±2.0 %        | -2.0 %      |
| 30             |               | -3.0 %      |
| 40             |               | -4.0 %      |

| ⑧ Modulation frequency |                    |
|------------------------|--------------------|
| A                      | 25.4 kHz (Default) |
| B                      | 12.7 kHz           |
| C                      | 8.5 kHz            |
| D                      | 6.3 kHz            |

| ⑨ Spread profile |                        |
|------------------|------------------------|
| A                | Hershey-kiss (Default) |
| B                | Sine-wave              |
| C                | Triangle               |

| ⑥ Function |               |
|------------|---------------|
| P          | Output enable |
| S          | Standby       |

| ⑩ Rise/Fall time |         |
|------------------|---------|
| A                | Default |
| B                | Fast    |
| C                | Slow    |

| ⑦ Operating temperature |                   |
|-------------------------|-------------------|
| G                       | -40 °C to +85 °C  |
| H                       | -40 °C to +105 °C |

External dimensions

(Unit: mm)



Footprint (Recommended)

(Unit: mm)



Notes:

In order to achieve optimum jitter performance, the 0.1 μF capacitor between V<sub>CC</sub> and GND should be placed. It is also recommended that the capacitors are placed on the device side of the PCB, as close to the device as possible and connected together with short wiring pattern.

## 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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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.

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### ► 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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