

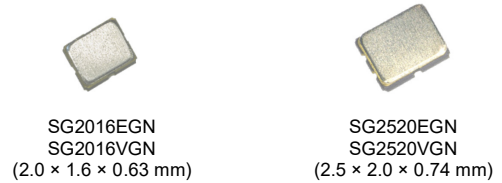
**CRYSTAL OSCILLATOR (SPXO)**  
**OUTPUT : LV-PECL, LVDS**

**Product Number**  
**SG2016EGN: X1G006131xxx15**  
**SG2016VGN: X1G006111xxx15**  
**SG2520EGN: X1G005881xxx15**  
**SG2520VGN: X1G005901xxx15**

# SG2016EGN / VGN

# SG2520EGN / VGN

- Frequency range : 25 MHz to 500 MHz
- Supply voltage : 1.8 V Typ. (LVDS only) / 2.5 V Typ. / 3.3 V Typ.
- Frequency tolerance :  $\pm 25 \times 10^{-6}$ ,  $\pm 50 \times 10^{-6}$
- Operating temperature : -40 °C to +85 °C, -40 °C to +105 °C
- Function : Output enable (OE) or Standby ( $\overline{ST}$ )
- Phase jitter : 50 fs Max. (391 MHz <  $f_o \leq 500$  MHz,  $V_{CC} = 2.5$  V, 3.3 V)


**Specifications (characteristics)**

| Item                        | Symbol           | Specifications                                                   |                            |                        | Conditions / Remarks                                                                                                                       |                                                                       |
|-----------------------------|------------------|------------------------------------------------------------------|----------------------------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
|                             |                  | LV-PECL                                                          | LVDS                       |                        |                                                                                                                                            |                                                                       |
|                             |                  | SG2016EGN / SG2520EGN                                            | SG2016VGN / SG2520VGN      |                        |                                                                                                                                            |                                                                       |
| Output frequency range      | f <sub>o</sub>   | 25 MHz to 500 MHz                                                |                            |                        | Please contact us for available frequencies.                                                                                               |                                                                       |
| Supply voltage              | V <sub>CC</sub>  | C: 3.3 V ± 5 %<br>D: 2.5 V ± 5 %                                 |                            | E: 1.8 V ± 5 %         |                                                                                                                                            |                                                                       |
| Storage temperature range   | T <sub>stg</sub> | -55 °C to +125 °C                                                |                            |                        |                                                                                                                                            |                                                                       |
| Operating temperature range | T <sub>use</sub> | G: -40 °C to +85 °C, H: -40 °C to +105 °C                        |                            |                        |                                                                                                                                            |                                                                       |
| Frequency tolerance         | f <sub>tol</sub> | D: ±25 × 10 <sup>-6</sup> Max.<br>J: ±50 × 10 <sup>-6</sup> Max. |                            |                        | Includes initial frequency tolerance, frequency / temperature characteristics, frequency / voltage coefficient and 10 years aging (+25 °C) |                                                                       |
| Current consumption         | I <sub>CC</sub>  | 60 mA Max.                                                       | —                          |                        | OE or $\overline{ST}$ = V <sub>CC</sub> , L ECL = 50 Ω                                                                                     |                                                                       |
|                             |                  | —                                                                | 25 mA / 30 mA / 25 mA Max. | 25 mA / — / 25 mA Max. | 25 MHz ≤ f <sub>o</sub> < 212 MHz                                                                                                          | OE or $\overline{ST}$ = V <sub>CC</sub> ,<br>Output option: A / B / C |
|                             |                  |                                                                  | 28 mA / 35 mA / 28 mA Max. |                        | 212 MHz ≤ f <sub>o</sub> < 392 MHz                                                                                                         |                                                                       |
|                             |                  |                                                                  | 28 mA / 35 mA / 30 mA Max. |                        | 392 MHz ≤ f <sub>o</sub> ≤ 500 MHz                                                                                                         |                                                                       |
| Disable current             | I <sub>dis</sub> | 35 mA Max.                                                       | 20 mA Max.                 |                        | OE = GND                                                                                                                                   |                                                                       |
| Stand-by current            | I <sub>std</sub> | 30 µA Max.                                                       |                            |                        | $\overline{ST}$ = GND, T <sub>use</sub> Max. = +85 °C                                                                                      |                                                                       |
| Symmetry                    | SYM              | 60 µA Max.                                                       |                            |                        | $\overline{ST}$ = GND, T <sub>use</sub> Max. = +105 °C                                                                                     |                                                                       |
|                             |                  | 45 % to 55 %                                                     |                            |                        | At output crossing point                                                                                                                   |                                                                       |
| Output voltage (LV-PECL)    | V <sub>OH</sub>  | V <sub>CC</sub> - 1.1 V Min.                                     | —                          |                        | Output option: A, DC characteristic                                                                                                        |                                                                       |
|                             | V <sub>OL</sub>  | V <sub>CC</sub> - 1.5 V Max.                                     |                            |                        |                                                                                                                                            |                                                                       |
| Differential swing          | V <sub>SW</sub>  | 0.8 V to 2.0 V                                                   | 500 mV to 900 mV           | 500 mV to 900 mV       | Output option: A                                                                                                                           |                                                                       |
|                             |                  | —                                                                | 800 mV to 1 600 mV         | —                      | Output option: B                                                                                                                           |                                                                       |
|                             |                  | —                                                                | 600 mV to 1 200 mV         | 600 mV to 1 200 mV     | Output option: C                                                                                                                           |                                                                       |
| Output voltage (LVDS)       | V <sub>OD</sub>  | —                                                                | 250 mV to 450 mV           | 250 mV to 450 mV       | Output option: A                                                                                                                           | Differential output voltage,<br>V <sub>OD1</sub> , V <sub>OD2</sub>   |
|                             |                  | —                                                                | 400 mV to 800 mV           | —                      | Output option: B                                                                                                                           |                                                                       |
|                             |                  | —                                                                | 300 mV to 600 mV           | 300 mV to 600 mV       | Output option: C                                                                                                                           |                                                                       |
|                             | dV <sub>OD</sub> | —                                                                | 50 mV Max.                 |                        | dV <sub>OD</sub> =   V <sub>OD1</sub> - V <sub>OD2</sub>                                                                                   |                                                                       |
|                             | V <sub>OS</sub>  | —                                                                | 1.15 V to 1.35 V           | 0.65 V to 0.85 V       | Offset voltage, V <sub>OS1</sub> , V <sub>OS2</sub>                                                                                        |                                                                       |
|                             | dV <sub>OS</sub> | —                                                                | 50 mV Max.                 |                        | dV <sub>OS</sub> =   V <sub>OS1</sub> - V <sub>OS2</sub>                                                                                   |                                                                       |
| Output load condition       | L ECL            | 50 Ω                                                             | —                          |                        | Terminated to V <sub>CC</sub> - 2.0 V                                                                                                      |                                                                       |
|                             | L LVDS           | —                                                                | 100 Ω                      |                        | Connected between OUT and $\overline{OUT}$                                                                                                 |                                                                       |
| Input voltage               | V <sub>IH</sub>  | 70 % V <sub>CC</sub> Min.                                        |                            |                        | OE or $\overline{ST}$ terminal                                                                                                             |                                                                       |
|                             | V <sub>IL</sub>  | 30 % V <sub>CC</sub> Max.                                        |                            |                        |                                                                                                                                            |                                                                       |
| Rise/Fall times             | tr/tf            | 0.35 ns Max.                                                     |                            |                        | LV-PECL: 20 % - 80 % (V <sub>OH</sub> - V <sub>OL</sub> )<br>LVDS: 20 % - 80 % differential output peak to peak                            |                                                                       |
| Start-up time               | t <sub>str</sub> | 10 ms Max.                                                       |                            |                        | t = 0 at 90 % V <sub>CC</sub>                                                                                                              |                                                                       |
| Phase jitter                | tp <sub>J</sub>  | 250 fs Max.                                                      | 250 fs Max.                | 400 fs Max.            | 25 MHz ≤ f <sub>o</sub> < 100 MHz                                                                                                          | Offset frequency<br>fo < 50 MHz:<br>12 kHz to 5 MHz                   |
|                             |                  | 90 fs Max.                                                       | 100 fs Max.                | 130 fs Max.            | 100 MHz ≤ f <sub>o</sub> ≤ 156 MHz                                                                                                         |                                                                       |
|                             |                  | 70 fs Max.                                                       | 60 fs Max.                 | 70 fs Max.             | 156 MHz < f <sub>o</sub> ≤ 212 MHz                                                                                                         | fo ≥ 50 MHz:<br>12 kHz to 20 MHz                                      |
|                             |                  | 60 fs Max.                                                       | 50 fs Max.                 | 60 fs Max.             | 212 MHz < f <sub>o</sub> ≤ 391 MHz                                                                                                         |                                                                       |
|                             |                  | 50 fs Max.                                                       |                            |                        | 391 MHz < f <sub>o</sub> ≤ 500 MHz                                                                                                         |                                                                       |

**Product Name** **SG2016 EGN 156.250000MHz C D H P Z A**
**(Standard form)**
**① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨**
**①Model ②Output (E: LV-PECL, V: LVDS) ③Frequency ④Supply voltage ⑤Frequency tolerance**
**⑥Operating temperature ⑦Function ⑧Output disable type (Z: High impedance) ⑨Output option**

| ④Supply voltage |            |
|-----------------|------------|
| C               | 3.3 V Typ. |
| D               | 2.5 V Typ. |
| E*              | 1.8 V Typ. |

| ⑤Freq. tolerance |                         |
|------------------|-------------------------|
| D                | $\pm 25 \times 10^{-6}$ |
| J                | $\pm 50 \times 10^{-6}$ |

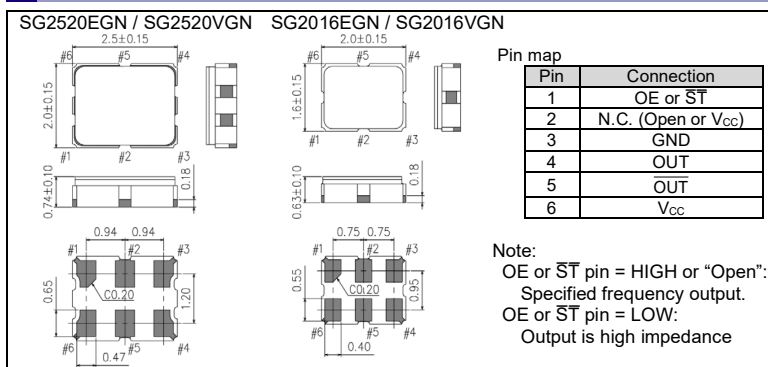
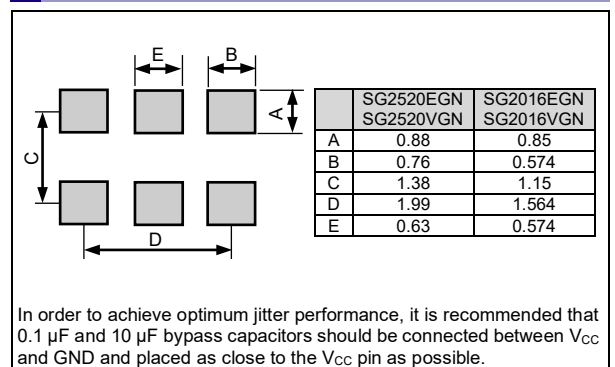
| ⑥Operating temp. |                   |
|------------------|-------------------|
| G                | -40 °C to +85 °C  |
| H                | -40 °C to +105 °C |

| ⑦Function |                 |
|-----------|-----------------|
| P         | OE              |
| S         | $\overline{ST}$ |

| ⑨Output option |                       |                             |
|----------------|-----------------------|-----------------------------|
|                | SG2016EGN / SG2520EGN | SG2016VGN / SG2520VGN       |
| A              | Default               | $V_{OD} = 250$ mV to 450 mV |
| B*             | —                     | $V_{OD} = 400$ mV to 800 mV |
| C              | —                     | $V_{OD} = 300$ mV to 600 mV |

\* "E" is only for SG2016VGN and SG2520VGN

\*Not available for  $V_{CC} = 1.8$  V Typ.

**External dimensions**
**(Unit:mm)**

**Footprint (Recommended)**
**(Unit:mm)**


► 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 general equipment.                                                                                                                                                                                    |
|  | ► Designed for automotive applications related to driving and safety.                                                                                                                                                           |

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