

**CRYSTAL OSCILLATOR (SPXO)**  
**OUTPUT : HCSSL**



**Product Number**  
**SG2016HHN: X1G006231xxxx15**  
**SG2520HHN: X1G005931xxxx15**

**SG2016HHN / SG2520HHN**

- Frequency range : 25 MHz to 500 MHz
- Supply voltage : 2.5 V Typ. / 3.3 V Typ.
- Frequency tolerance :  $\pm 20 \times 10^{-6}$
- Operating temperature : -40 °C to +85 °C, -40 °C to +105 °C
- Function : Output enable (OE) or Standby ( $\overline{ST}$ )
- Phase jitter : 90 fs Max. (100 MHz < fo ≤ 156 MHz, Vcc = 2.5 V, 3.3 V)
- PCIe Gen5,6 Jitter specification compliant



**Specifications (characteristics)**

Item	Symbol	Specifications	Conditions / Remarks
Output frequency range	fo	25 MHz to 500 MHz	Please contact us for available frequencies.
Supply voltage	Vcc	D: 2.5 V ± 5 %, C: 3.3 V ± 5 %	
Storage temperature range	T_stg	-55 °C to +125 °C	
Operating temperature range	T_use	G: -40 °C to +85 °C, H: -40 °C to +105 °C	
Frequency tolerance	f_tol	C: $\pm 20 \times 10^{-6}$ Max.	Includes initial frequency tolerance, frequency / temperature characteristics, frequency / voltage coefficient and 10 years aging (+25 °C)
Current consumption	Icc	35 mA Max. 40 mA Max.	25 MHz ≤ fo < 212 MHz   OE or $\overline{ST}$ = Vcc, 212 MHz ≤ fo < 500 MHz   L_HCSL = 50 Ω
Disable current	I_dis	25 mA Max. 30 μA Max.	OE = GND $\overline{ST}$ = GND, T_use Max. = +85 °C
Stand-by current	I_std	60 μA Max.	$\overline{ST}$ = GND, T_use Max. = +105 °C
Symmetry	SYM	45 % to 55 %	At output crossing point
Output voltage	VOH	0.5 V to 0.7 V	25 MHz ≤ fo ≤ 212 MHz   Output option: A
		0.4 V to 0.65 V	212 MHz < fo ≤ 500 MHz
		0.6 V to 0.8 V	25 MHz ≤ fo ≤ 212 MHz   Output option: B
		0.5 V to 0.75 V	212 MHz < fo ≤ 500 MHz
	VOL	-0.15 V to +0.15 V	
Differential swing	Vsw	0.7 V to 1.4 V	Output option: A
		0.8 V to 1.6 V	Output option: B
Crossing voltage	Vcr	0.25 V to 0.55 V	
Rise time / Fall time	tr/tf	0.7 ns Max.	20 % - 80 % (VOH - VOL)
Differential output rise slew rate / fall slew rate	Rr/Rf	2 V/ns to 10 V/ns	Between -0.15 V and 0.15 V of differential output
Output load condition	L_HCSL	50 Ω	
Input voltage	VIH	70 % Vcc Min.	OE or $\overline{ST}$ terminal
	VIL	30 % Vcc Max.	
Output enable time	tsta_oe	500 ns Max.	t = 0 at OE = 70 % Vcc
	tsta_st	10 ms Max.	t = 0 at $\overline{ST}$ = 70 % Vcc
Output disable time	tstp_oe	100 ns Max.	t = 0 at OE = 30 % Vcc
	tstp_st	100 ns Max.	t = 0 at $\overline{ST}$ = 30 % Vcc
Start-up time	t_str	10 ms Max.	t = 0 at 90 % Vcc
Phase jitter	tpj	200 fs Max.	25 MHz ≤ fo < 100 MHz   Offset frequency fo < 50 MHz: 12 kHz to 5 MHz
		90 fs Max.	100 MHz ≤ fo ≤ 156 MHz
		70 fs Max.	156 MHz < fo ≤ 212 MHz
		60 fs Max.	212 MHz < fo ≤ 391 MHz
		50 fs Max.	391 MHz < fo ≤ 500 MHz   fo ≥ 50 MHz: 12 kHz to 20 MHz
Jitter	tc-c	60 ps Max.	Cycle to cycle jitter (Peak to Peak)
PCIe jitter limits for CC architecture	-	0.1 ps Max.	For PCIe Gen5
		0.06 ps Max.	For PCIe Gen6

**Product name**

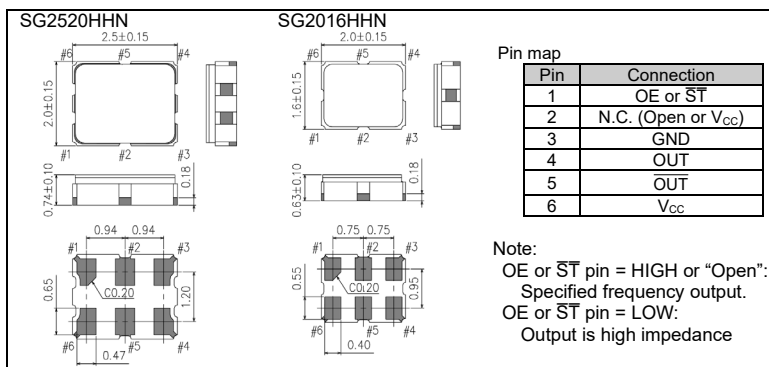
Product Name SG2016HHN 100.000000MHz C C H P Z A  
 (Standard form) a b c d e f g h i

- a: Model b: Output (H: HCSSL) c: Frequency d: Supply voltage e: Frequency tolerance  
 f: Operating temperature g: Function h: Output disable type (Z: High impedance) i: Output option

d: Supply voltage	e: Freq. tolerance	f: Operating temp.	g: Function	i: Output option
C   3.3 V Typ.	C   $\pm 20 \times 10^{-6}$	G   -40 °C to +85 °C	P   OE	A   Vsw = 0.7 V to 1.4 V
D   2.5 V Typ.		H   -40 °C to +105 °C	S   $\overline{ST}$	B   Vsw = 0.8 V to 1.6 V

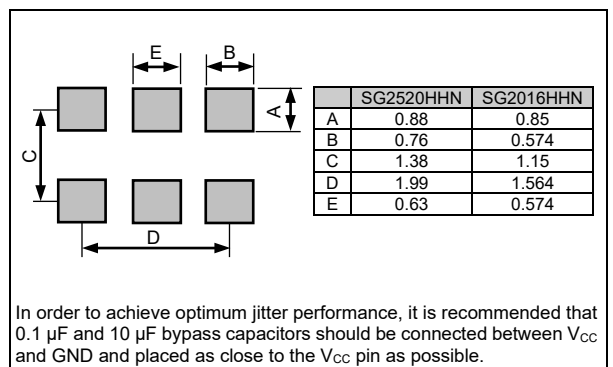
**External dimensions**

(Unit:mm)



**Footprint (Recommended)**

(Unit:mm)



► Explanation of the mark that are using it for the catalog

	<p>► Pb free.</p>
	<p>► Complies with EU RoHS directive.          *About the products without the Pb-free mark.          Contains Pb in products exempted by EU RoHS directive.          (Contains Pb in sealing glass, high melting temperature type solder or other.)</p>
	<p>► Designed for automotive general equipment.</p>
	<p>► Designed for automotive applications related to driving and safety.</p>

NOTICE : PLEASE READ CAREFULLY BELOW BEFORE THE USE OF THIS DOCUMENT

1. The content of this document is subject to change without notice. Before purchasing or using Epson products, please contact with sales representative of Seiko Epson Corporation ("Epson") for the latest information and be always sure to check the latest information published on Epson's official web sites and resources.
2. This document may not be copied, reproduced, or used for any other purposes, in whole or in part, without Epson's prior consent.
3. Information provided in this document including, but not limited to application circuits, programs and usage, is for reference purpose only. Epson makes no guarantees against any infringements or damages to any third parties' intellectual property rights or any other rights resulting from the information. This document does not grant you any licenses, any intellectual property rights or any other rights with respect to Epson products owned by Epson or any third parties.
4. Epson has prepared this document carefully to be accurate and dependable, but Epson does not guarantee that the information is always accurate and complete. Epson assumes no responsibility for any damages you incurred due to any misinformation in this document.
5. Epson products listed in this document and our associated technologies shall not be used in any equipment or systems that laws and regulations in Japan or any other countries prohibit to manufacture, use or sell. Furthermore, Epson products and our associated technologies shall not be used for the purposes of military weapons development (e.g. mass destruction weapons), military use, or any other military applications. If exporting Epson products or our associated technologies, please be sure to comply with the Foreign Exchange and Foreign Trade Control Act in Japan, Export Administration Regulations in the U.S.A (EAR) and other export-related laws and regulations in Japan and any other countries and to follow their required procedures.
6. Epson assumes no responsibility for any damages (whether direct or indirect) caused by or in relation with your non-compliance with the terms and conditions in this document or for any damages (whether direct or indirect) incurred by any third party that you give, transfer or assign Epson products.
7. For more details or other concerns about this document, please contact our sales representative.
8. Company names and product names listed in this document are trademarks or registered trademarks of their respective companies.

● Disclaimer

1. Epson products are designed for use in general electronic equipment applications that do not require extremely high reliability or safety.
2. Epson does not represent or warrant that its products will not cause a failure for any particular application, except for cases where the failure is a direct result caused by defects in materials and workmanship of this product.  
 If a product fails due to defects in materials and workmanship, to the maximum extent permitted by law, we will, at our sole discretion, refund or replace the affected product.
3. When products for used directly or indirectly in certain devices or applications (ex. Nuclear power, aerospace, infrastructure facilities, medical equipment, etc.) which are connected to or affect safety of human life or property, Customer is solely responsible for determining if the products and respective specifications are suitable for the intended use in particular customer applications.  
 Customer shall implement necessary and proper safety design and measures (including redundant design, malfunction prevention design, etc.) to ensure reliability and safety before using the products in/with customer's Equipment.
4. For the products designed for automotive applications, the products comply with AEC-Q100 or AEC-Q200.  
 Products do not comply with ISO 26262 (Products are not categorized to ASIL A, B, C and D).
5. No dismantling, analysis, reverse engineering, modification, alteration, adaptation, reproduction, etc., of Epson products is allowed.  
 Furthermore, any defects caused by this are not covered by the warranty.

©Seiko Epson Corporation 2025