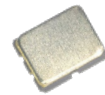


**CRYSTAL OSCILLATOR (SPXO)**
**OUTPUT : HCSSL**

**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 (ST)
- Phase jitter : 90 fs Max. (100 MHz < fo ≤ 156 MHz, V<sub>CC</sub> = 2.5 V, 3.3 V)
- PCIe Gen5,6 Jitter specification compliant


**SG2016HHN**  
(2.0 × 1.6 × 0.63 mm)

**SG2520HHN**  
(2.5 × 2.0 × 0.74 mm)

**Specifications (characteristics)**

Item	Symbol	Specifications	Conditions / Remarks
Output frequency range	f <sub>o</sub>	25 MHz to 500 MHz	Please contact us for available frequencies.
Supply voltage	V <sub>CC</sub>	D: 2.5 V ± 5 %, C: 3.3 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>	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	I <sub>CC</sub>	35 mA Max. 40 mA Max.	25 MHz ≤ fo < 212 MHz 212 MHz ≤ fo < 500 MHz
Disable current	I <sub>dis</sub>	25 mA Max.	OE = GND
Stand-by current	I <sub>std</sub>	30 μA Max. 60 μA Max.	ST = GND, T <sub>use</sub> Max. = +85 °C ST = GND, T <sub>use</sub> Max. = +105 °C
Symmetry	SYM	45 % to 55 %	At output crossing point
Output voltage	V <sub>OH</sub>	0.5 V to 0.7 V	25 MHz ≤ fo < 212 MHz
		0.4 V to 0.65 V	212 MHz ≤ fo < 500 MHz
		0.6 V to 0.8 V	25 MHz ≤ fo < 212 MHz
		0.5 V to 0.75 V	212 MHz ≤ fo < 500 MHz
Differential swing	V <sub>sw</sub>	0.7 V to 1.4 V	Output option: A
		0.8 V to 1.6 V	Output option: B
Crossing voltage	V <sub>CR</sub>	0.25 V to 0.55 V	
Rise time / Fall time	tr/tf	0.7 ns Max.	20 % - 80 % (V <sub>OH</sub> - V <sub>OL</sub> )
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 <sub>HCSSL</sub>	50 Ω	
Input voltage	V <sub>IH</sub>	70 % V <sub>CC</sub> Min.	OE or ST terminal
	V <sub>IL</sub>	30 % V <sub>CC</sub> Max.	
Output enable time	t <sub>sta_oe</sub>	500 ns Max.	t = 0 at OE = 70 % V <sub>CC</sub>
	t <sub>sta_st</sub>	10 ms Max.	t = 0 at ST = 70 % V <sub>CC</sub>
Output disable time	t <sub>stp_oe</sub>	100 ns Max.	t = 0 at OE = 30 % V <sub>CC</sub>
	t <sub>stp_st</sub>	100 ns Max.	t = 0 at ST = 30 % V <sub>CC</sub>
Start-up time	t <sub>str</sub>	10 ms Max.	t = 0 at 90 % V <sub>CC</sub>
Phase jitter	t <sub>pj</sub>	200 fs Max.	25 MHz ≤ fo < 100 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
Jitter	t <sub>cc</sub>	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

C | 3.3 V Typ.  
D | 2.5 V Typ.

e: Freq. tolerance

C |  $\pm 20 \times 10^{-6}$ 

f: Operating temp.

G | -40 °C to +85 °C  
H | -40 °C to +105 °C

g: Function

P | OE  
S | ST

i: Output option

A | V<sub>sw</sub> = 0.7 V to 1.4 V  
B | V<sub>sw</sub> = 0.8 V to 1.6 V

**External dimensions**

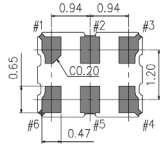
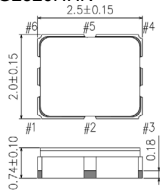
(Unit:mm)

**Footprint (Recommended)**

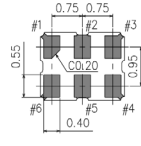
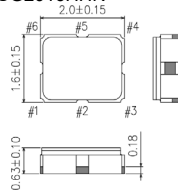
(Unit:mm)



SG2520HHN



SG2016HHN

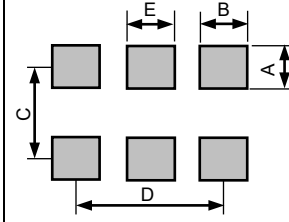


Pin map

Pin	Connection
1	OE or ST
2	N.C. (Open or V <sub>CC</sub> )
3	GND
4	OUT
5	OUT
6	V <sub>CC</sub>

Note:

OE or  $\overline{ST}$  pin = HIGH or "Open":  
Specified frequency output.  
OE or  $\overline{ST}$  pin = LOW:  
Output is high impedance



	SG2520HHN	SG2016HHN
A	0.88	0.85
B	0.76	0.574
C	1.38	1.15
D	1.99	1.564
E	0.63	0.574

In order to achieve optimum jitter performance, it is recommended that 0.1  $\mu$ F and 10  $\mu$ F bypass capacitors should be connected between V<sub>CC</sub> and GND and placed as close to the V<sub>CC</sub> pin as possible.

## 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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IATF 16949 is the international standard that added the sector-specific supplemental requirements for automotive industry based on ISO9001.

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	► Pb free.
	► 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.)
	► Designed for automotive applications such as Car Multimedia, Body Electronics, Remote Keyless Entry etc.
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