CRYSTAL OSCILLATOR (SPXO)

OUTPUT : HCSL

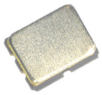
Pb Free RoHS Compliant

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 : ±20 × 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, V_{CC} = 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	fo	25 MHz to 500 MHz	Please contact us for available frequencies.	
Supply voltage	V_{CC}	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: ±20 × 10^{-6} Max.	Includes initial frequency tolerance, frequency / temperature characteristics, frequency / voltage coefficient and 10 years aging (+25 °C)	
Current consumption	I_{CC}	35 mA Max.	25 MHz ≤ fo < 212 MHz	OE or $\overline{ST}$ = V_{CC}, L_HCSL = 50 Ω
		40 mA Max.	212 MHz ≤ fo < 500 MHz	
Disable current	I_dis	25 mA Max.	OE = GND	
Stand-by current	I_std	30 µA Max.	$\overline{ST}$ = GND, T_use Max. = +85 °C	
		60 µA Max.	$\overline{ST}$ = GND, T_use Max. = +105 °C	
Symmetry	SYM	45 % to 55 %	At output crossing point	
Output voltage	V_{OH}	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	
	V_{OL}	-0.15 V to +0.15 V		
Differential swing	V_{SW}	0.7 V to 1.4 V	Output option: A	
		0.8 V to 1.6 V	Output option: B	
Crossing voltage	V_{CR}	0.25 V to 0.55 V		
Rise time / Fall time	tr/tf	0.7 ns Max.	20 % - 80 % (V_{OH} - V_{OL})	
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	V_{IH}	70 % V_{CC} Min.	OE or $\overline{ST}$ terminal	
	V_{IL}	30 % V_{CC} Max.		
Output enable time	tsta_oe	500 ns Max.	t = 0 at OE = 70 % V_{CC}	
	tsta_st	10 ms Max.	t = 0 at $\overline{ST}$ = 70 % V_{CC}	
Output disable time	tstp_oe	100 ns Max.	t = 0 at OE = 30 % V_{CC}	
	tstp_st	100 ns Max.	t = 0 at $\overline{ST}$ = 30 % V_{CC}	
Start-up time	t_str	10 ms Max.	t = 0 at 90 % V_{CC}	
Phase jitter	t_{PJ}	200 fs Max.	25 MHz ≤ fo < 100 MHz	Offset frequency fo < 50 MHz: 12 kHz to 5 MHz; fo ≥ 50 MHz: 12 kHz to 20 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_{c-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 (Standard form): SG2016 HHN (a, b) 100.000000MHz (c) C C H P Z A (d e f g h i)

a: Model b: Output (H: HCSL) 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	±20 × 10^{-6}

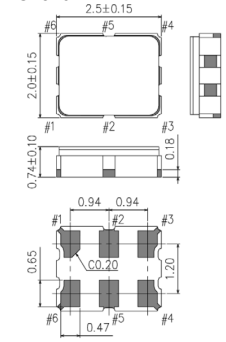
f: Operating temp.	
G	-40 °C to +85 °C
H	-40 °C to +105 °C

g: Function	
P	OE
S	$\overline{ST}$

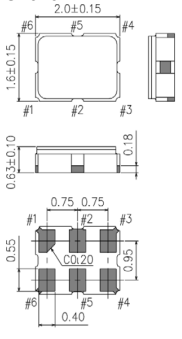
i: Output option	
A	V_{SW} = 0.7 V to 1.4 V
B	V_{SW} = 0.8 V to 1.6 V

External dimensions (Unit:mm)

SG2520HHN



SG2016HHN

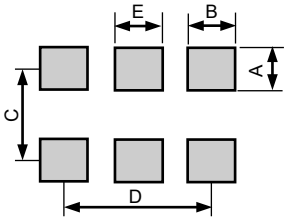


Pin map

Pin	Connection
1	OE or $\overline{ST}$
2	N.C. (Open or V_{CC})
3	GND
4	OUT
5	$\overline{OUT}$
6	V_{CC}

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

Footprint (Recommended) (Unit:mm)



	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 µF and 10 µF bypass capacitors should be connected between V_{CC} and GND and placed as close to the V_{CC} 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.

WORKING FOR HIGH QUALITY

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.

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

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

	►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.
	►Designed for automotive applications related to driving safety (Engine Control Unit, Air Bag, ESC etc).