Low Phase Jitter Crystal Oscillator: SG2016HGN/SG2520HGN

Features

Crystal oscillator (SPXO)

25 MHz to 500 MHz Frequency range (fo):

HCSL Output:

2.5 V Typ. / 3.3 V Typ. Supply voltage: Frequency tolerance: $\pm 25 \times 10^{-6} / \pm 50 \times 10^{-6}$ Operating temperature: -40 °C to +105 °C

60 fs Typ. (fo = 100 MHz) Low phase jitter:

PCIe Gen5, 6 jitter specification compliant



Applications

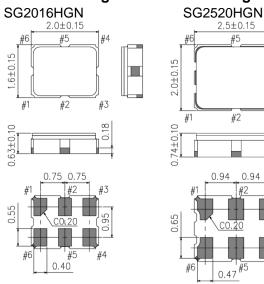
Communication equipment using PCIe Gen5 or 6 (SSD, Network card, etc)

Description

Epson's SG2016HGN / SG2520HGN, SG2016HHN / SG2520HHN product family supports HCSL (High Speed Current Steering Logic) and meets timing compliance jitter requirements up to PCIe Gen6. With 90 ps maximum phase jitter, and supporting frequencies from 25 MHz to 500 MHz, the product group covers the system requirements of most networking, data center and communication applications.

0.94

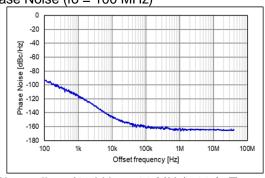
Outline Drawing and Terminal Assignment



Pin	Connection			
1	OE/ST			
2	N.C. (Open or V _{CC})			
3	GND			
4	ОИТ			
5	ŌŪŦ			
6	V _{CC}			

Typical Performance

Phase Noise (fo = 100 MHz)



Phase Jitter (12 kHz to 20 MHz): 60 fs Typ.

[1] Product Number / Product Name

(1-1) Product Number

SG2016HGN: X1G006221xxxx15 SG2520HGN: X1G005891xxxx15

(Please contact Epson for details)

(1-2) Product Name (Standard Form)

SG2016 HGN 100.000000MHz <u>C J G P Z A</u> 1 456789

1)Model

2 Output (H: HCSL)

3Frequency

4 Supply voltage

5Frequency tolerance

6Operating temperature

(7) Function

®Output disable status (Z: High impedance)

9Output option

	4 Supply voltage					
D 2.5 V Typ.						
	С	3.3 V Typ.				

⑤Fi	5 Frequency tolerance					
D	±25 × 10 ⁻⁶					
J	$\pm 50 \times 10^{-6}$					

⑥Operating temperature						
G	-40 °C to +85 °C					
Н	-40 °C to +105 °C					

7 Function						
Р	Output Enable					
S	Standby					

8	0						
$ 9\rangle$ O	Output option						
	$V_{SW} = 0.7 \text{ V to } 1.4 \text{ V}$						
В	$V_{SW} = 0.8 \text{ V to } 1.6 \text{ V}$						

[2] Absolute Maximum Ratings

Parameter	Symbol	Specification			Unit	Conditions
Falametei	Syllibol	Min.	Тур.	Max.	Offic	Conditions
Maximum supply voltage	V_{CC}	-0.3	-	4.0	V	
Input voltage	Vin	-0.3	-	$V_{CC} + 0.5$	V	OE/ST terminal
Storage temperature range	T_stg	-55	-	+125	°C	

[3] Operating Range

Doromotor	Symbol	Specification			Unit	Conditions
Parameter		Min.	Тур.	Max.	Offic	Conditions
Supply voltage	V _{cc}	2.375	2.5	2.625	V	
	v cc	3.135	3.3	3.465	V	
Supply voltage	GND	0.0	0.0	0.0	V	
Operating temperature range	T_use	-40	+25	+85	°C	
		-40	+25	+105	°C	
HCSL load condition	L_HCSL		50		Ω	

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^{*} Power supply startup time (0 %V_{CC}→90 %V_{CC}) should be more than 150 μs * A 0.1 μF and a 10 μF bypass capacitor should be connected between V_{CC} and GND pins located close to the device

[4] Frequency Characteristics

(Unless stated otherwise [3] Operating Range)

Doromotor	Cympol	Specification			Linit Co	Conditions
Parameter	Symbol	Min.	Тур.	Max.	Unit	Conditions
Output frequency *1	fo	25	-	500	MHz	
Frequency tolerance *2	f tol	-25	-	+25	×10 ⁻⁶	
	f_tol	-50	-	+50	×10 ⁻⁶	

^{*1} Please contact Epson for available frequencies

[5] Electrical Characteristics

(Unless stated otherwise [3] Operating Range)

5 J Electrical Characteristics				•	stated offi	erwise [3] Operating Range
Parameter	Symbol	Specification			Unit	Conditions
i arameter	Symbol	Min.	Тур.	Max.	Offic	Conditions
Startup time	t_str	-	-	10	ms	t = 0 at 90 % V _{CC}
Current consumption	I _{cc}	-	-	35	mA	fo ≤ 212 MHz
Current consumption	'CC	-	-	40	mA	fo > 212 MHz
Disable current	I_dis	-	-	25	mA	OE = GND
Stand-by current	l_std	-	-	30	μΑ	ST = GND, T_use Max. = +85 °
Staria by Sarrein	1_3(d	-	-	60	μΑ	ST = GND, T_use Max. = +105 °
Rise time / Fall time	tr / tf	-	-	0.7	ns	20 % - 80 % (V _{OH} - V _{OL})
Differential output rise slew rate	Rr / Rf	2	-	10	V/ns	Between -0.15 V and 0.15 V of differential output
Symmetry	SYM	45	50	55	%	At output crossing point
		0.5	-	0.7	V	Output option: A, fo ≤ 212 MH
	V _{OH}	0.4	-	0.65	V	Output option: A, fo > 212 MH
Output voltage	VOH	0.6	-	8.0	V	Output option: B, fo ≤ 212 MH
		0.5	-	0.75	V	Output option: B, fo > 212 MH
	V _{OL}	-0.15	-	0.15	V	
Differential swing	V.	0.7	-	1.4	V	Output option: A
Differential swing	V _{SW}	0.8	-	1.6	V	Output option: B
Input voltage	V_{IH}	70 % V _{CC}	-	-	V	OE/ST terminal
input voitage	V_{IL}	-	-	30 % V _{CC}	V	
Output disable time (OE)	tstp_oe	-	-	100	ns	Measured from the time OE pin crosses 30 % V _{CC}
Output disable time (ST)	tstp_st	-	-	100	ns	Measured from the time ST pin crosses 30 % V _{CC}
Output enable time (OE)	tsta_oe	-	_	500	ns	Measured from the time OE pin crosses 70 % V _{CC}
Output enable time (ST)	tsta_st	-	-	10	ms	Measured from the time ST pin crosses 70 % V _{CC}
		-	-	200	fs	fo < 100 MHz
Phase jitter		-	-	90	fs	100 MHz ≤ fo ≤ 156 MHz
Offset frequency fo < 50 MHz: 12 kHz to 5 MHz	t_{PJ}	-	-	70	fs	156 MHz < fo ≤ 212 MHz
fo ≥ 50 MHz: 12 kHz to 20 MHz		-	-	60	fs	212 MHz < fo ≤ 391 MHz
		-	-	50	fs	fo > 391 MHz
	t _{p-p}	-	-	60	ps	Peak to Peak Jitter
Jitter	t _{c-c}	-	-	60	ps	Cycle to cycle jitter (Peak to Peak)
PCIe jitter limits for CC	_	-	-	0.1	ps	For PCIe Gen5
architecture	-	-	_	0.06	ps	For PCIe Gen6

[6] Thermal resistance (For reference only)

Parameter	Symbol	Specification			Unit	Conditions
	Symbol	Min.	Тур.	Max.	Offic	Conditions
Junction temperature	Tj	-	-	+140	°C	
Junction to case	θјс	-	114	-	°C/W	SG2016HGN
	Ojc	1	122	-	°C/W	SG2520HGN
Junction to ambient	θја	-	243	-	°C/W	SG2016HGN
	Uja	-	155	-	°C/W	SG2520HGN

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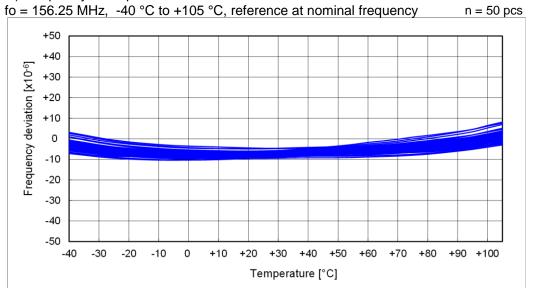
^{*2} Frequency tolerance includes Initial frequency tolerance, Frequency / temperature characteristics, Frequency / voltage coefficient and aging (10 years, +25 °C).

^{*} Aging is estimated from environmental reliability tests; expected amount of the frequency variation. This does not intend to guarantee the product-life cycle.

[7] Typical Performance Characteristics (For reference only)

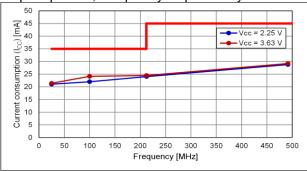
The following data shows typical performance characteristics

(7-1) Frequency / Temperature Characteristics

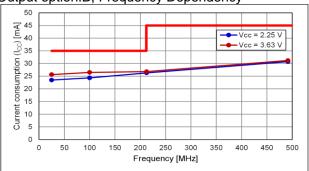


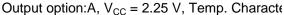
(7-2) Current Consumption

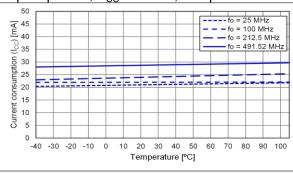
Output option: A, Frequency Dependency



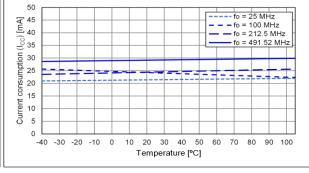
Output option:B, Frequency Dependency

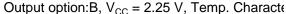


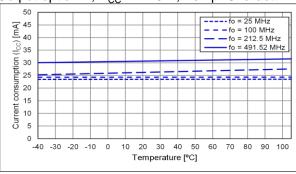




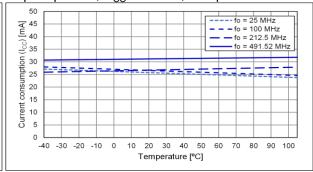
Output option:A, V_{CC} = 3.63 V, Temp. Characteristic



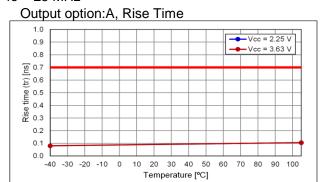


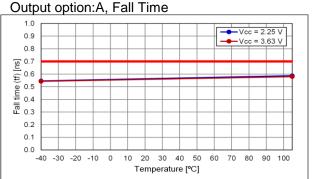


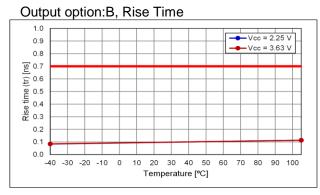
Output option:B, V_{CC} = 3.63 V, Temp. Characteristic

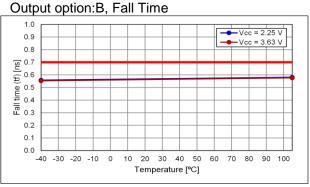


(7-3) Rise Time / Fall Time Temperature Characteristic fo = 25 MHz

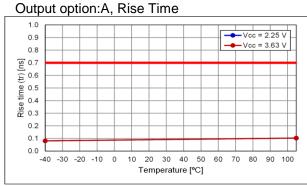


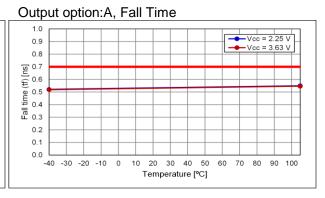


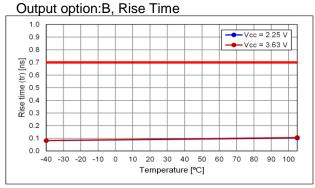


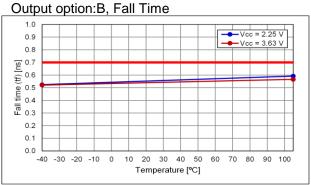


fo = 100 MHz



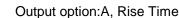


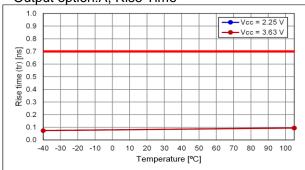




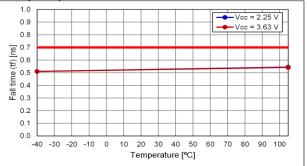
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fo = 212.5 MHz

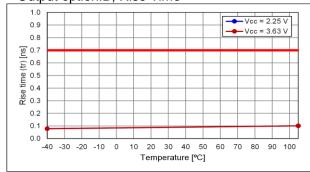




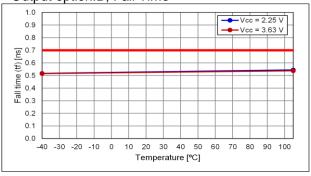
Output option:A, Fall Time



Output option:B, Rise Time

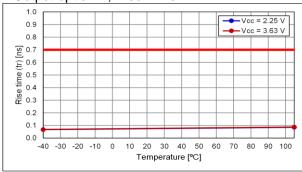


Output option:B, Fall Time

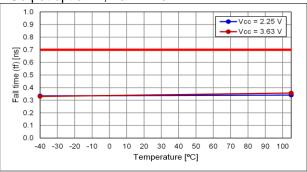


fo = 491.52 MHz

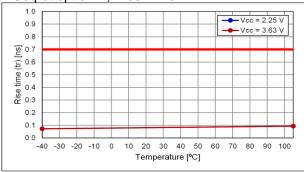
Output option: A, Rise Time



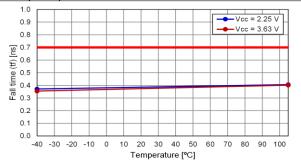
Output option:A, Fall Time



Output option:B, Rise Time



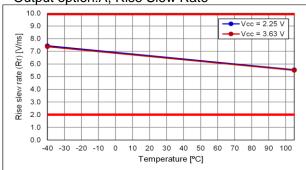
Output option:B, Fall Time



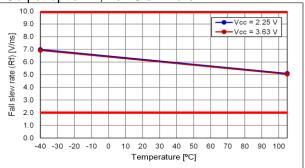
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(7-4) Differential Output Rise Slew Rate / Fall Slew Rate Temperature Characteristic fo = 25 MHz

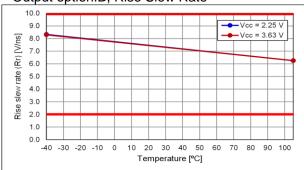




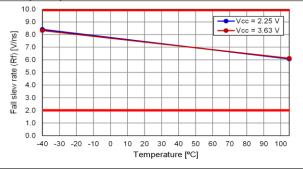
Output option: A, Fall Slew Rate



Output option:B, Rise Slew Rate

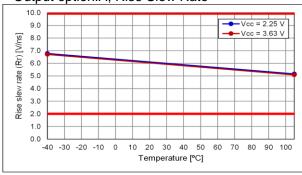


Output option:B, Fall Slew Rate

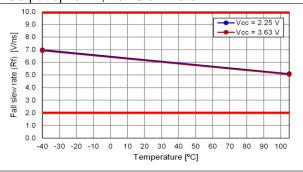


fo = 100 MHz

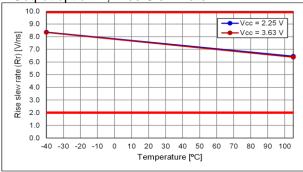
Output option: A, Rise Slew Rate



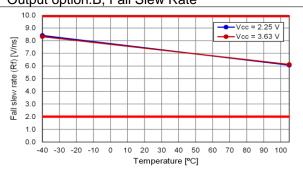
Output option: A, Fall Slew Rate



Output option:B, Rise Slew Rate

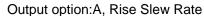


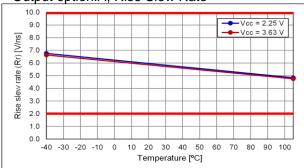
Output option:B, Fall Slew Rate



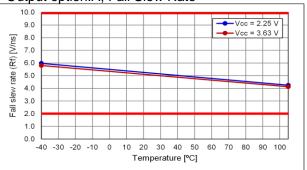
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fo = 212.5 MHz

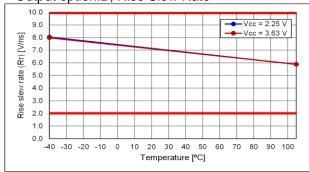




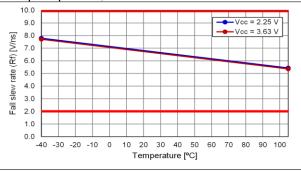
Output option: A, Fall Slew Rate



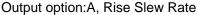
Output option:B, Rise Slew Rate

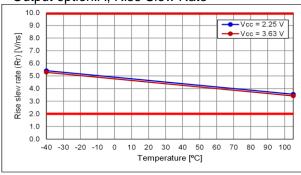


Output option:B, Fall Slew Rate

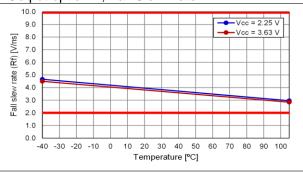


fo = 491.52 MHz

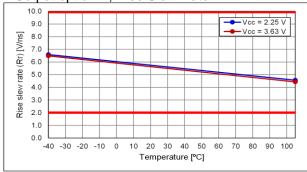




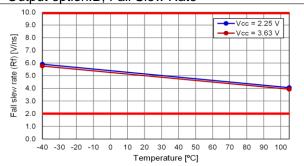
Output option:A, Fall Slew Rate



Output option:B, Rise Slew Rate



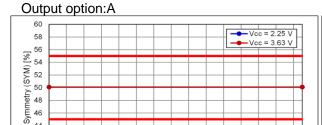
Output option:B, Fall Slew Rate



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(7-5) Symmetry Temperature Characteristic

fo = 25 MHz



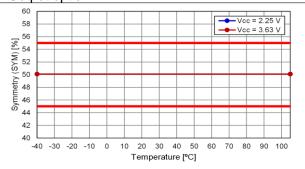
10 20 30 40 50

Temperature [°C]

60

70 80 90 100

Output option:B

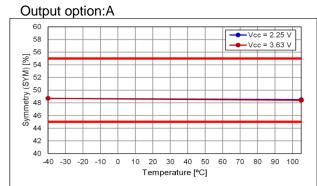


fo = 100 MHz

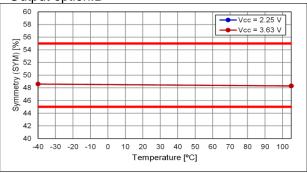
-40 -30 -20 -10 0

44

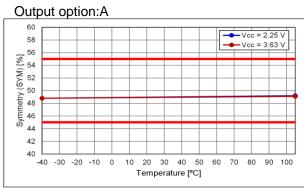
42



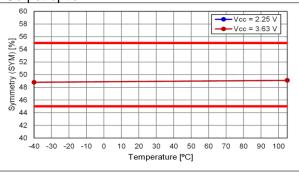
Output option:B



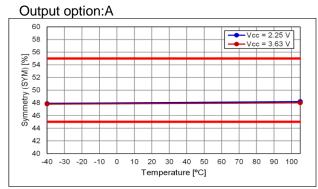
fo = 212.5 MHz



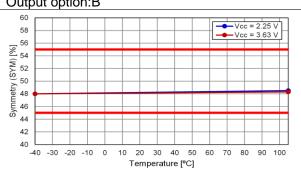
Output option:B



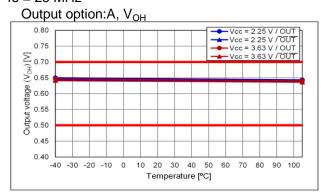
fo = 491.52 MHz

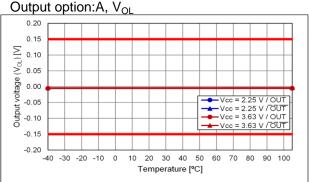


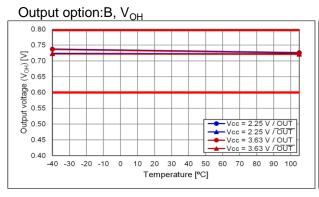
Output option:B

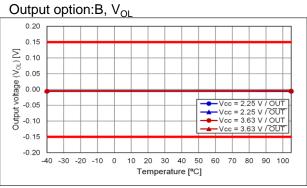


(7-6) Output Voltage Temperature Characteristic fo = 25 MHz

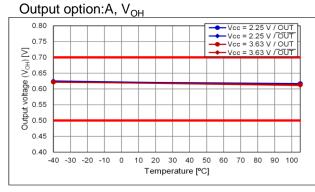


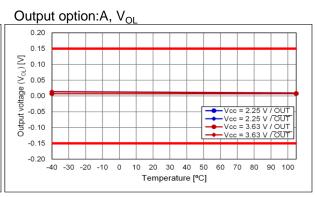


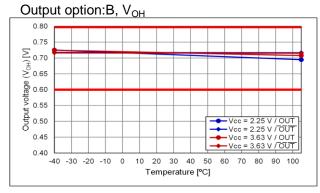


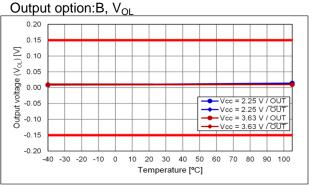


fo = 100 MHz

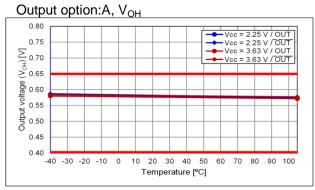


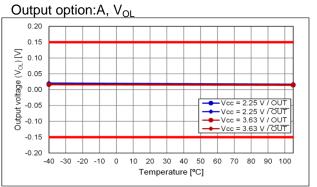


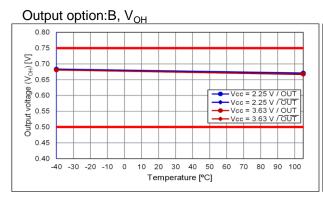


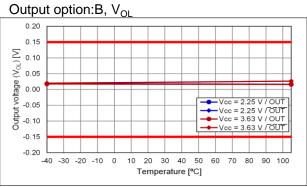


fo = 212.5 MHz

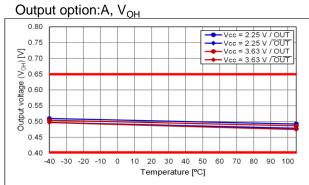


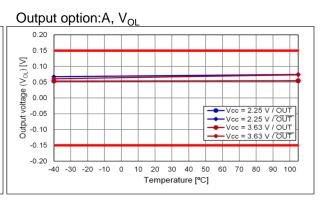


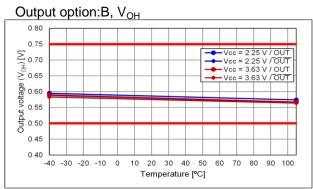


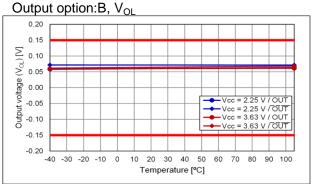


fo = 491.52 MHz



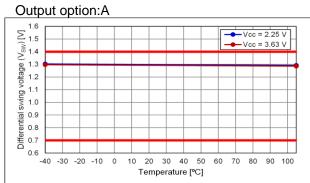


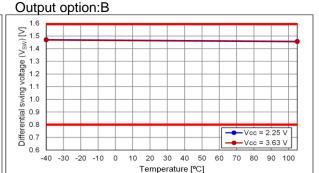




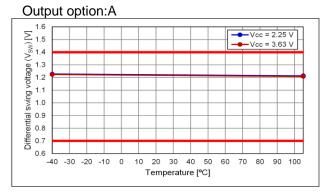
(7-7) Differential Swing Temperature Characteristic

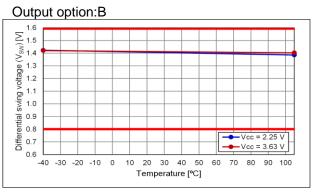
fo = 25 MHz



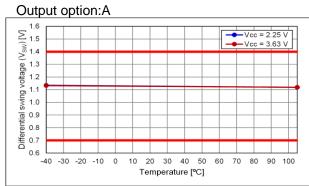


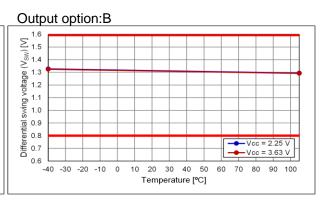
fo = 100 MHz



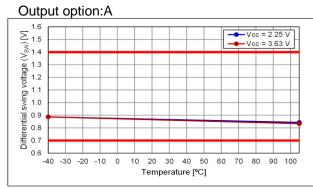


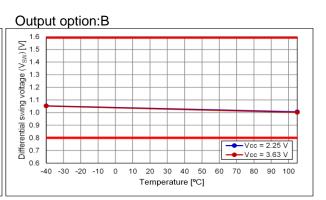
fo = 212.5 MHz





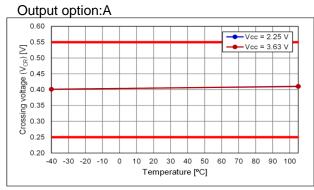
fo = 491.52 MHz

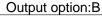


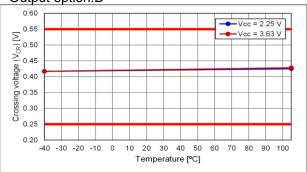


(7-8) Crossing Voltage Temperature Characteristic

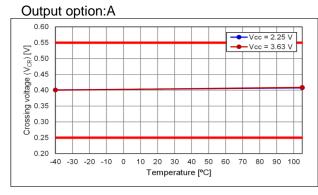
fo = 25 MHz



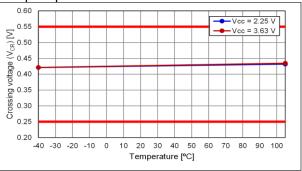




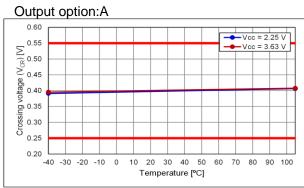
fo = 100 MHz



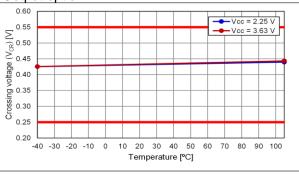
Output option:B



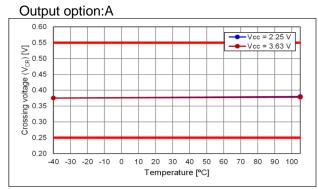
fo = 212.5 MHz



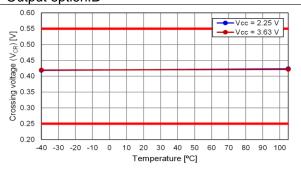
Output option:B



fo = 491.52 MHz

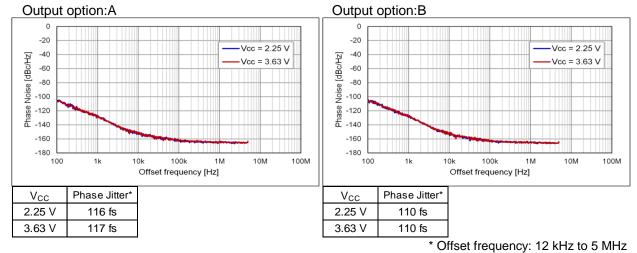


Output option:B



(7-9) Phase Noise and Phase Jitter

fo = 25 MHz

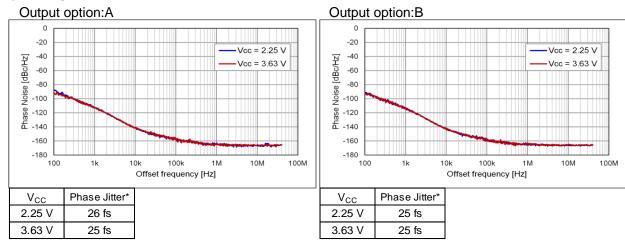


fo = 100 MHz

Output option:A Output option:B -20 -20 Vcc = 2.25 V Vcc = 2.25 V -40 -40 Noise [dBc/Hz] Noise [dBc/Hz] Vcc = 3.63 V Vcc = 3.63 V -60 -60 -80 -80 -100 -100 Nase -120 -140 Phase N -160 -160 -180 -180 100 100M 100 100M 100k 10M 100k Offset frequency [Hz] Offset frequency [Hz] Phase Jitter* Phase Jitter* V_{CC} V_{CC} 2.25 V 60 fs 2.25 V 58 fs 3.63 V 61 fs 3.63 V 59 fs

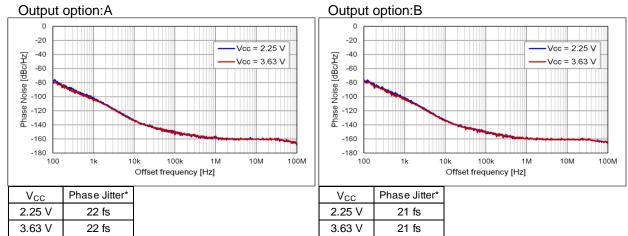
* Offset frequency: 12 kHz to 20 MHz

fo = 212.5 MHz



* Offset frequency: 12 kHz to 20 MHz

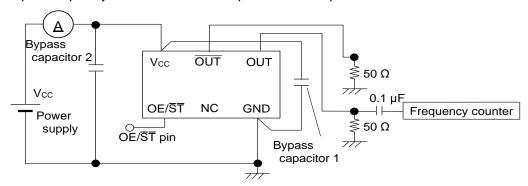
fo = 491.52 MHz



* Offset frequency: 12 kHz to 20 MHz

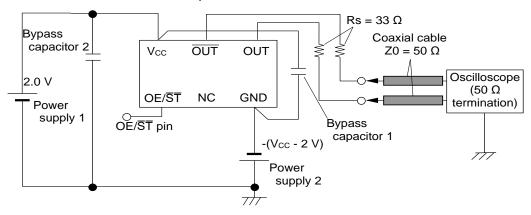
[8] Test Circuit

(8-1) Output Frequency and Current Consumption Test Setup



^{*} To measure Disable current or Stand-by current, OE/ST terminal is connected to GND

(8-2) Waveform Observation Test Setup



* Each output trace should be same length

(8-3) Conditions

- (1) Oscilloscope
 - The bandwidth should be a minimum of 5 times the measurement frequency
- (2) A 0.1 μ F and a 10 μ F bypass capacitor should be connected between V_{CC} and GND pins located close to the device
- (3) Use a current meter with a low internal impedance
- (4) Power Supply

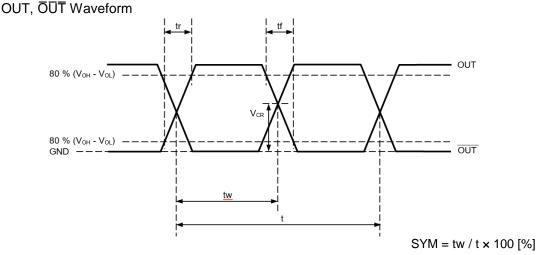
Power supply startup time (0 % $V_{CC} \rightarrow 90$ % V_{CC}) should be more than 150 µs Power supply impedance should be as low as possible

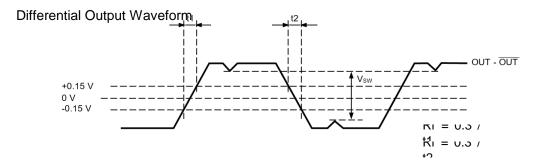
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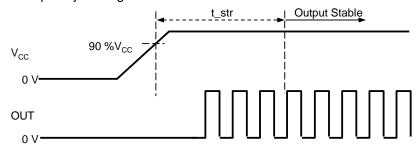
(8-4) Timing Chart

(1) Output Waveform and Level



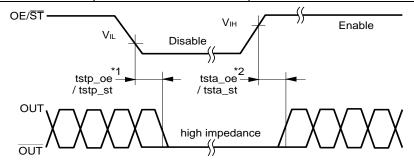


(2) Output Frequency Timing



(3) OE/ST Function and Timing

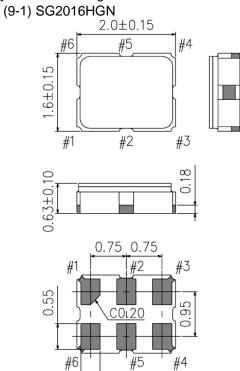
٠.		9	
	OE/ST Terminal	Osc. Circuit	Output status
	"H" or OPEN	Oscillation	Specified frequency is output: Enable
	"I"	OE: Oscillation	Output hasamas high impadance: Disable
	L	ST: Oscillation stop	Output becomes high impedance: Disable

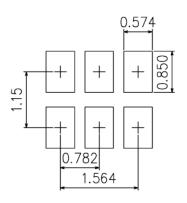


- *1 The period from $OE/\overline{ST} = V_{IL}$ to OUT = High impedance (Disable)
- *2 The period from $OE/\overline{ST} = V_{IH}$ to OUT = Enable
- * OE/ST terminal voltage level should not exceed supply voltage when using OE/ST function.

 Please note that OE/ST rise time should not exceed supply voltage rise time at the start-up.

[9] Outline Drawing and Recommended Footprint





Units: mm

For stable operation, it is recommended that $0.1~\mu F$ and $10~\mu F$ bypass capacitors should be connected between V_{CC} and GND and placed $\,$ as close to the $\ensuremath{V_{\text{CC}}}$ pin as possible.

Terminal coating: Au plating

Reference Weight Typ.: 7.6 mg

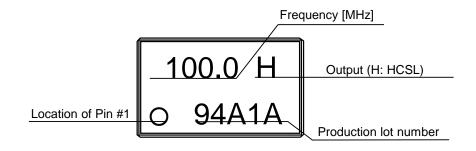
0.40

Terminal Assignment

#6

Pin #	Connection	Function				
	OE/ST	OE/ST terminal / active high				
#1			OE/ST Terminal	Osc. Circuit	Output status	
			"H" or OPEN	Oscillation	Specified frequency is output: Enable	
			"L"	OE: Oscillation	Output becomes high impedance: Disable	
				ST: Oscillation stop		
#2	NC					
#3	GND	GND terminal				
#4	OUT	Output terminal (Positive)				
#5	ŌŪŦ	Output terminal (Negative)				
#6	V _{CC}	V _{CC} terminal				

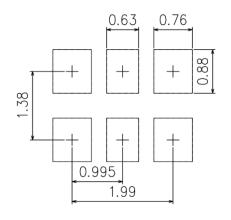
Marking



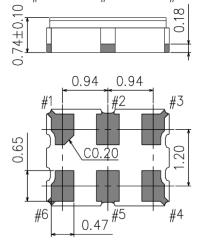
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(9-2) SG2520HGN 2.5±0.15 2.0 ± 0.15 #1 #2 #3

0.18



Units: mm



For stable operation, it is recommended that $0.1~\mu\text{F}$ and $10~\mu\text{F}$ bypass capacitors should be connected between V_{CC} and GND and placed $\,$ as close to the $\ensuremath{V_{\text{CC}}}$ pin as possible.

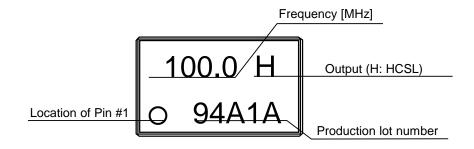
Terminal coating: Au plating

Reference Weight Typ.: 11.8 mg

Terminal Assignment

Pin #	Connection	Function				
#1	OE/ST	OE/ST terminal / active high				
			OE/ST Terminal	Osc. Circuit	Output status	
			"H" or OPEN	Oscillation	Specified frequency is output: Enable	
			"L"	OE: Oscillation	Output becomes high impedance: Disable	
				ST: Oscillation stop		
#2	NC	-				
#3	GND	GND terminal				
#4	OUT	Output terminal (Positive)				
#5	ŌŪŦ	Output terminal (Negative)				
#6	V _{CC}	V _{CC} terminal				

Marking

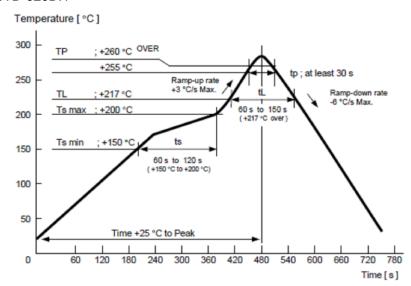


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[10] Moisture Sensitivity Level

Parameter	Specification	Conditions
MSL	LEVEL 1	IPC/JEDEC J-STD-020D.1

[11] Reflow Profile IPC/JEDEC J-STD-020D.1



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[12] Packing Information

(12-1) SG2016HGN

(1) Packing Quantity

The last two digits of the Product Number (X1G006221xx) are a code that defines the packing quantity. The standard is "15" for a 2 000 pcs/Reel.

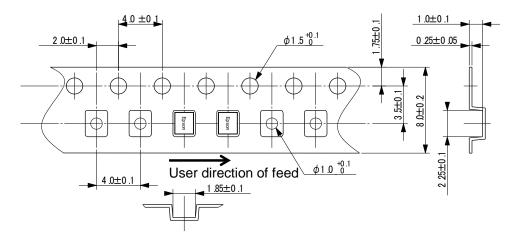
(2) Taping Specification

Subject to EIA-481, IEC-60286 and JIS C0806

1) Tape Dimensions

Carrier Tape Material: Black conductive PS (Polystyrene)

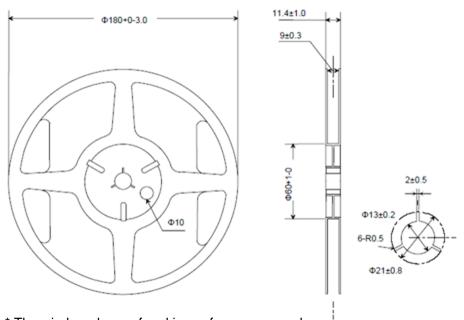
Top Tape Material: Antistatic PET (Polyethylene Terephthalate) + PE (Polyethylene)



Units: mm

2) Reel Dimensions

Reel Material: Black conductive PS (Polystyrene)



Units: mm

* The window shape of reel is a reference example

3) Storage Environment

We recommend to keep at normal temperature and normal humidity in a packed condition.

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(12-2) SG2520HGN

(1) Packing Quantity

The last two digits of the Product Number (X1G005891xxxxxxx) are a code that defines the packing quantity. The standard is "15" for a 2 000 pcs/Reel.

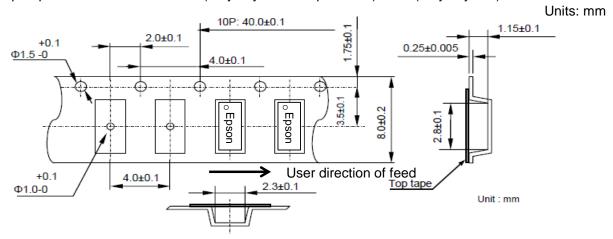
(2) Taping Specification

Subject to EIA-481, IEC-60286 and JIS C0806

1) Tape Dimensions

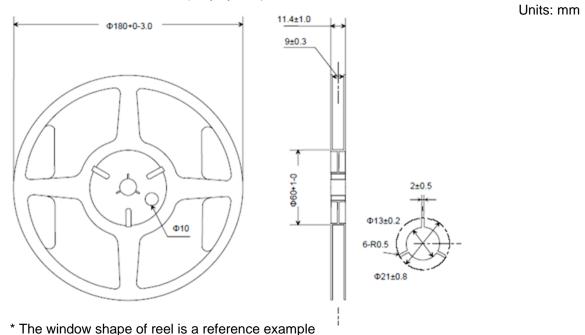
Carrier Tape Material: Black conductive PS (Polystyrene)

Top Tape Material: Antistatic PET (Polyethylene Terephthalate) + PE (Polyethylene)



2) Reel Dimensions

Reel Material: Black conductive PS (Polystyrene)



3) Storage Environment

We recommend to keep at normal temperature and normal humidity in a packed condition.

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[13] Handling Precautions

Prior to using this product, please carefully read the section entitled "Precautions" on our Web site (https://www5.epsondevice.com/en/information/#precaution) for instructions on how to handle and use the product properly to ensure optimal performance of the product in your equipment.

Before using the product under any conditions other than those specified therein,

please consult with us to verify and confirm that the performance of the product will not be negatively affected by use under such conditions.

In addition to the foregoing precautions, in order to avoid the deteriorating performance of the product, we strongly recommend that you DO NOT use the product under ANY of the following conditions:

- (1) Do not expose this product to excessive mechanical shock or vibration.
- (2) This product can be damaged by mechanical shock during the soldering process depending on the equipment used, process conditions, and any impact forces experienced. Always follow appropriate procedures, particularly when changing the assembly process in any way and be sure to follow applicable process qualification standards before starting production.
- These devices are sensitive to ESD, use appropriate precautions during handling, assembly, test, shipment, and installation.
- The use of ultrasonic technology for cleaning, bonding, etc. can damage the Xtal unit inside this product. Please carefully check for this consideration before using ultrasonic equipment for volume production with this product.
- (5) Noise and ripple on the power supply may have undesirable affects on operation and cause degradation of phase noise characteristics. Evaluate the operation of this device with appropriate power supplies carefully before use.
- (6) When applying power, ensure that the supply voltage increases monotonically for proper operation. On power down, do not reapply power until the supplies, bypass capacitors, and any bulk capacitors are completely discharged since that may cause the unit to malfunction.
- (7) Aging specifications are estimated from environmental reliability tests and expected frequency variation over time. They do not provide a guarantee of aging over the product lifecycle.
- The metal cap on top of the device is directly connected to the GND terminal (pin #2). Take necessary precautions to prevent any conductor not at ground potential from contacting the cap as that could cause a short circuit to GND.
- (9) To avoid any issues due to interference of other signal lines, please take care not to place signal lines near the product as this may have an adverse affect on the performance of the product.
- (10) A bypass capacitor of the recommended value(s) must be connected between the V_{CC} and GND terminals of the product. Whenever possible, mount the capacitor(s) on the same side of the PCB and as close to the product as possible to keep the routing traces short.
- (11) Power supply connections to V_{CC} and GND pins should be routed as thick as possible while keeping the high frequency impedance low in order to get the best performance.
- (12) The use of a filter or similar element in series with the power supply connections to protect from electromagnetic radiation noise may increase the high frequency impedance of the power supply line and may cause the oscillator to not operate properly. Please verify the design to ensure sufficient operational margin prior to use.
- (13) Keep PCB routing from the output terminal(s) to the load as short as possible for best performance.
- (14) The Enable (OE or ST) input terminal is high impedance and so susceptible to noise. Connect it to a low impedance source when used and when not used it is recommended to connect it to Vcc for active high inputs and GND for active low inputs.
- (15) Do not short the output to GND as that will damage the product. Always use with an appropriate load resistor connected.
- (16) This product should be reflowed no more than 3 times. If rework is needed after reflow, please correct it with a soldering iron with the tip set for a temperature of +350 °C or less and only contact each terminal once and for no more than 5 seconds. If this product is mounted on the bottom of the board during a reflow please check that it soldered down properly afterwards.

[Availa	[Availability of mounting conditions]				
Refle	ow on the board	Avallable			
		The parts may fall.			
Reflo	ow under the board	Please judge whether it is possible to implement.			
solde	ering pot/bath (Dip ering system, Flow ering system)	Not Avallable			
Sold	ering iron	Avallable			

- (17) Product failures during the warranty period only apply when the product is used according to the recommended operating conditions described in the specifications. Products that have been opened for analysis or damaged will not be covered. It is recommended to store and use in normal temperature and humidity environments described in the specifications to ensure frequency accuracy and prevent moisture condensation. If the product is stored for more than one year, please confirm the pin solderability prior to use.
- (18) If the oscillation circuit is exposed to condensation, the frequency may change or oscillation may stop. Do not use in any conditions where condensation occurs.
- (19) Do not store or use the product in an environment where it can be exposed to chemical substances that are corrosive to metal or plastics such as salt water, organic solvents, chemical gasses, etc. Do not use the product when it is exposed to sunlight, dust, corrosive gasses, or other materials for long periods of time.
- (20) When using water-soluble solder flux make sure to completely remove the flux residue after soldering. Pay particular attention when the residues contain active halogens which will negatively affect the product and its performance.
- (21) Terminals on the side of the product are internally connected to the IC, be careful not to cause short-circuits or reduce the insulation resistance of them in any way.
- (22) Should any customer use the product in any manner contrary to the precautions and/or advice herein, such use shall be done at the customer's own risk.

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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.

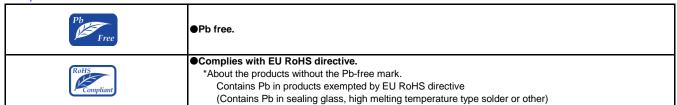
All of our major manufacturing and non-manufacturing sites, in Japan and overseas, completed the acquisition of ISO 14001 certification. ISO 14000 is an international standard for environmental management that was established by the International Standards Organization in 1996 against the background 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 manufacturers as standard.

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

Explanation of marks used in this datasheet



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