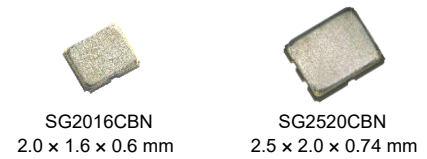


**CRYSTAL OSCILLATOR**  
**OUTPUT: CMOS**

**Product Number**  
**SG2016CBN: X1G006161xxxx16**  
**SG2520CBN: X1G006151xxxx16**

# SG2016CBN / SG2520CBN

- Frequency : 5 standard frequencies
- Frequency range : 75 MHz to 170 MHz
- Supply voltage : 1.62 V to 3.63 V
- Function : Output enable (OE/OE) or Standby (ST/ST)
- Frequency tolerance :  $\pm 15 \times 10^{-6}$  (-40 °C to +105 °C)  
 $\pm 25 \times 10^{-6}$ ,  $\pm 50 \times 10^{-6}$  (-40 °C to +125 °C)
- Phase jitter : 0.6 ps Max. (Offset frequency: 12 kHz to 20 MHz)



## Specifications (characteristics)

Item	Symbol	Specifications			Conditions/Remarks		
Supply voltage	V <sub>CC</sub>	1.80 V Typ.	2.50 V Typ.	3.30 V Typ.			
		1.62 V to 1.98 V	2.25 V to 2.75 V	2.97 V to 3.63 V			
Output frequency range	f <sub>o</sub>	75 MHz to 170 MHz			Please contact us for frequency other than the standard frequencies.		
		76.8 MHz, 100 MHz, 125 MHz, 150 MHz, 156.25 MHz			Standard frequencies.		
Storage temperature	T <sub>stg</sub>	-55 °C to +125 °C			Storage as single product.		
Operating temperature	T <sub>use</sub>	H: -40 °C to +105 °C					
		J: -40 °C to +125 °C					
Frequency tolerance*1	f <sub>tol</sub>	B:	$\pm 15 \times 10^{-6}$	Includes 1 year aging	T <sub>use</sub> = -40 °C to +105 °C		
			$\pm 20 \times 10^{-6}$	Includes 10 years aging			
		D:	$\pm 25 \times 10^{-6}$	Includes 1 year aging	T <sub>use</sub> = -40 °C to +125 °C		
			$\pm 30 \times 10^{-6}$	Includes 10 years aging			
J:	$\pm 50 \times 10^{-6}$	Includes 1 year aging	T <sub>use</sub> = -40 °C to +125 °C				
	$\pm 55 \times 10^{-6}$	Includes 10 years aging					
Current consumption	I <sub>CC</sub>	6.8 mA Typ.	7.6 mA Typ.	8.7 mA Typ.	75 MHz ≤ f <sub>o</sub> ≤ 100 MHz	No load	
		9.1 mA Max.	10.2 mA Max.	11.6 mA Max.			
		7.6 mA Typ.	8.7 mA Typ.	10.0 mA Typ.			100 MHz < f <sub>o</sub> ≤ 125 MHz
		9.8 mA Max.	11.3 mA Max.	13.2 mA Max.			
		8.6 mA Typ.	10.1 mA Typ.	12.3 mA Typ.			125 MHz < f <sub>o</sub> ≤ 170 MHz
12.0 mA Max.	13.9 mA Max.	16.6 mA Max.					
Output disable current	I <sub>dis</sub>	6.1 mA Typ.	6.2 mA Typ.	6.3 mA Typ.	OE = GND OE = V <sub>CC</sub>		
		10.0 mA Max.	10.0 mA Max.	10.0 mA Max.			
Standby current	I <sub>std</sub>	0.3 μA Typ.	0.4 μA Typ.	0.5 μA Typ.	ST = GND ST = V <sub>CC</sub>		
		15.0 μA Max.	15.0 μA Max.	15.0 μA Max.			
Symmetry	SYM	45 % to 55 %			50 % V <sub>CC</sub> Level, L <sub>CMOS</sub> ≤ 15 pF		
Output voltage (DC characteristics)	V <sub>OH</sub>	90 % V <sub>CC</sub> Min.			Output current*2		
					I <sub>OH</sub>	I <sub>OL</sub>	
	V <sub>OL</sub>	10 % V <sub>CC</sub> Max.			125 MHz < f <sub>o</sub> ≤ 170 MHz	2.0 mA	
					75 MHz ≤ f <sub>o</sub> ≤ 125 MHz	-1.0 mA	
Output load condition	L <sub>CMOS</sub>	15 pF Max.					
Input voltage	V <sub>IH</sub>	70 % V <sub>CC</sub> Min.			Pin 1		
	V <sub>IL</sub>	30 % V <sub>CC</sub> Max.					
Rise/Fall time*2	tr/tf	2.0 ns Max.			125 MHz < f <sub>o</sub> ≤ 170 MHz	20 % - 80 % V <sub>CC</sub> , L <sub>CMOS</sub> = 15 pF	
		2.5 ns Max.			75 MHz ≤ f <sub>o</sub> ≤ 125 MHz		
Output disable time (OE) Output disable time (ST)	tstp_oe tstp_st	1 μs Max.			Measured from the time OE or ST pin crosses 30 % V <sub>CC</sub> or measured from the time OE or ST pin crosses 70 % V <sub>CC</sub>		
Output enable time (OE)	tsta_oe	100 ns + 2 clock cycle Max.			Measured from the time OE pin crosses 70 % V <sub>CC</sub> or measured from the time OE pin crosses 30 % V <sub>CC</sub>		
Output enable time (ST)	tsta_st	3 ms Max.			Measured from the time ST pin crosses 70 % V <sub>CC</sub> or measured from the time ST pin crosses 30 % V <sub>CC</sub>		
Start-up time	t <sub>str</sub>	3 ms Max.			Measured from the time V <sub>CC</sub> reaches its rated minimum value, 1.62 V		
Phase Jitter	t <sub>pj</sub>	0.6 ps Max.			Offset frequency: 12 kHz to 20 MHz		

\*1 Frequency tolerance includes initial frequency tolerance, temperature variation, supply voltage variation, reflow drift, load drift and aging (+25 °C, 1 year or 10 years).

\*2 Output current I<sub>OH</sub>/I<sub>OL</sub> and Rise/Fall time specifications are dependent on programmed frequency.

**Pin description**

Pin	Name	I/O type	Function	
1	OE	Input	Output Enable	High <sup>*1</sup> or Open: Specified frequency output from OUT pin Low: OUT pin is low (pull down with 500 kΩ), only output driver is disabled.
	$\overline{OE}$	Input	Output Enable	Low <sup>*2</sup> or Open: Specified frequency output from OUT pin High: OUT pin is low (pull down with 500 kΩ), only output driver is disabled.
	$\overline{ST}$	Input	Standby	High <sup>*1*3</sup> : Specified frequency output from OUT pin Low: OUT pin is low (pull down with 500 kΩ), Device goes to standby mode. Supply current reduces to the least as I_std.
	ST	Input	Standby	Low <sup>*2*3</sup> : Specified frequency output from OUT pin High: OUT pin is low (pull down with 500 kΩ), Device goes to standby mode. Supply current reduces to the least as I_std.
2	GND	Power	Ground	
3	OUT	Output	Clock output	
4	V <sub>CC</sub>	Power	Power supply	

\*1 If fixing it at High, please connect to V<sub>CC</sub> directly.  
 \*2 If fixing it at Low, please connect to GND directly.  
 \*3 If necessary to use Open, please select Output Enable function.

**Product Name**

SG2016CBN 156.250000MHz T J J P A  
 a b c d e f g h

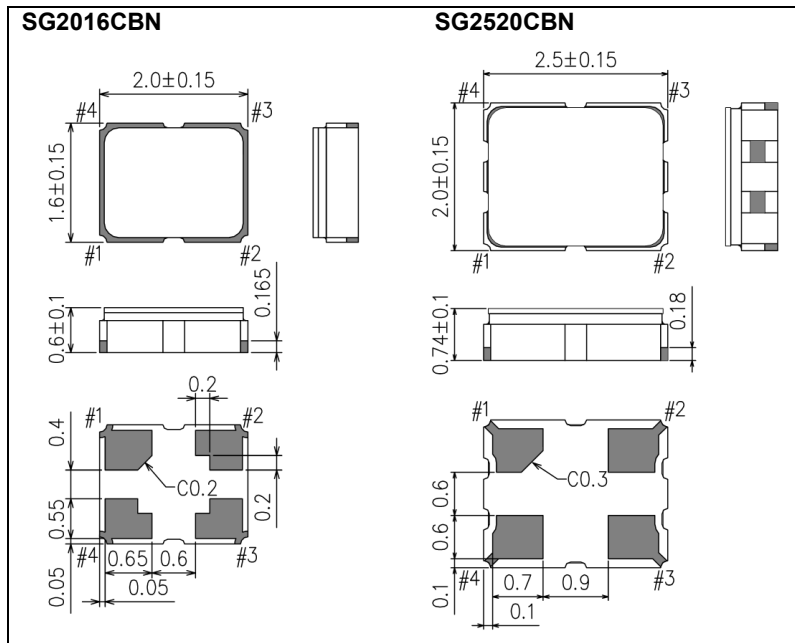
- a: Model b: Output (C: CMOS)
- c: Frequency d: Supply voltage (T: 1.8 V to 3.3 V Typ.)
- e: Frequency tolerance f: Operating temperature
- g: Function h: Internal identification code ("A" is default)

	e: Frequency tolerance / f: Operating temperature
BH	$\pm 15 \times 10^{-6}$ / -40 °C to +105 °C
DJ	$\pm 25 \times 10^{-6}$ / -40 °C to +125 °C
JJ	$\pm 50 \times 10^{-6}$ / -40 °C to +125 °C

g: Function	
P	Output Enable (OE)
Q	Output Enable ( $\overline{OE}$ )
S	Standby ( $\overline{ST}$ )
T	Standby (ST)

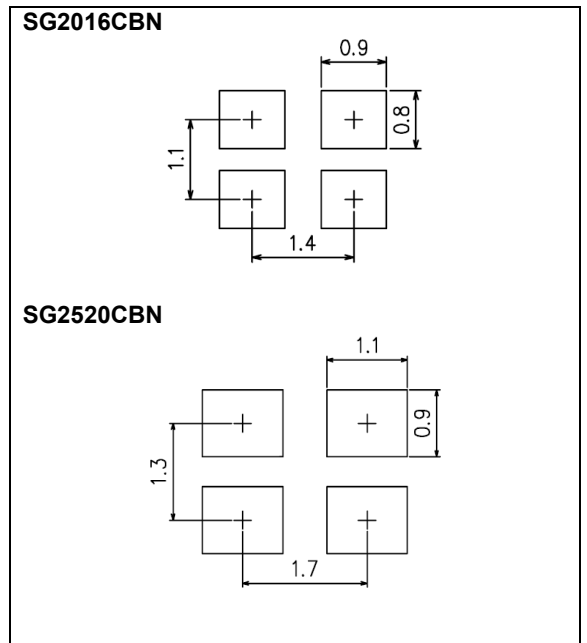
**External dimensions**

(Unit: mm)



**Footprint (Recommended)**

(Unit: mm)



**Notes:**

In order to achieve optimum jitter performance, the 0.01 μF to 0.1 μF capacitor between V<sub>CC</sub> and GND should be placed. It is also recommended that the capacitors are placed on the device side of the PCB, as close to the device as possible and connected together with short wiring pattern.

## PROMOTION OF ENVIRONMENTAL MANAGEMENT SYSTEM CONFORMING TO INTERNATIONAL STANDARDS

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	► 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 ).

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