SEIKO EPSON CORPORATION

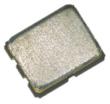
CRYSTAL OSCILLATOR
OUTPUT: CMOS

Product Number
SG2016CBA: X1G006311xxxx15
SG2520CBA: X1G006301xxxx15

SG2016CBA / SG2520CBA

- Frequency : 5 standard frequencies (75 MHz to 170 MHz)
- Supply voltage : 1.62 V to 3.63 V
- Function : Output enable (OE/$\overline{OE}$) or Standby ($\overline{ST}$/ST)
- Frequency tolerance : ±15 × 10^{-6} (-40 ºC to +105 ºC)
  ±25 × 10^{-6}, ±50 × 10^{-6} (-40 ºC to +125 ºC)
- Phase jitter : 0.3 ps Typ., 0.6 ps Max. (Offset frequency: 12 kHz to 20 MHz)
- Utilizing Epson's low noise Integer-N PLL technology
- AEC-Q100 compliant

SG2016CBA
2.0 × 1.6 × 0.6 mm



SG2520CBA
2.5 × 2.0 × 0.74 mm

Specifications (characteristics)

Item	Symbol	Specifications			Conditions/Remarks	
Supply voltage	V_{CC}	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	fo	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_stg	-55 °C to +125 °C			Storage as single product.	
Operating temperature	T_use	H: -40 °C to +105 °C				
		J: -40 °C to +125 °C				
Frequency tolerance*1	f_tol	B:	±15 × 10^{-6}		Includes 1 year aging	T_use = -40 °C to +105 °C
			±20 × 10^{-6}		Includes 10 years aging	
		D:	±25 × 10^{-6}		Includes 1 year aging	T_use = -40 °C to +125 °C
			±30 × 10^{-6}		Includes 10 years aging	
		J:	±50 × 10^{-6}		Includes 1 year aging	T_use = -40 °C to +125 °C
			±55 × 10^{-6}		Includes 10 years aging	
Current consumption	I_{CC}	6.8 mA Typ.	7.6 mA Typ.	8.7 mA Typ.	75 MHz ≤ fo ≤ 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 < fo ≤ 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 < fo ≤ 170 MHz	
		12.0 mA Max.	13.9 mA Max.	16.6 mA Max.		
Output disable current	I_dis	6.1 mA Typ.	6.2 mA Typ.	6.3 mA Typ.	OE = GND $\overline{OE}$ = V_{CC}	
		10.0 mA Max.	10.0 mA Max.	10.0 mA Max.		
Standby current	I_std	0.3 µA Typ.	0.4 µA Typ.	0.5 µA Typ.	$\overline{ST}$ = GND ST = V_{CC}	
		15.0 µA Max.	15.0 µA Max.	15.0 µA Max.		
Symmetry	SYM	45 % to 55 %			50 % V_{CC} Level, L_CMOS ≤ 15 pF	
Output voltage (DC characteristics)	V_{OH}	90 % V_{CC} Min.			Output current*2 / I_{OH} / I_{OL} 125 MHz < fo ≤ 170 MHz / -2.0 mA / 2.0 mA 75 MHz ≤ fo ≤ 125 MHz / -1.0 mA / 1.0 mA	
	V_{OL}	10 % V_{CC} Max.				
Output load condition	L_CMOS	15 pF Max.				
Input voltage	V_{IH}	70 % V_{CC} Min.			Pin 1	
	V_{IL}	30 % V_{CC} Max.				
Rise/Fall time*2	tr/tf	2.0 ns Max.			125 MHz < fo ≤ 170 MHz	20 % - 80 % V_{CC}, L_CMOS = 15 pF
		2.5 ns Max.			75 MHz ≤ fo ≤ 125 MHz	
Output disable time (OE) Output disable time (ST)	tstp_oe tstp_st	1 µs Max.			Measured from the time OE or $\overline{ST}$ pin crosses 30 % V_{CC} or measured from the time $\overline{OE}$ or ST pin crosses 70 % V_{CC}	
Output enable time (OE)	tsta_oe	100 ns + 2 clock cycle Max.			Measured from the time OE pin crosses 70 % V_{CC} or measured from the time $\overline{OE}$ pin crosses 30 % V_{CC}	
Output enable time (ST)	tsta_st	3 ms Max.			Measured from the time $\overline{ST}$ pin crosses 70 % V_{CC} or measured from the time ST pin crosses 30 % V_{CC}	
Start-up time	t_str	3 ms Max.			Measured from the time V_{CC} reaches its rated minimum value, 1.62 V	
Phase Jitter	t_{PJ}	0.3 ps Typ., 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_{OH}/I_{OL} and Rise/Fall time specifications are dependent on programmed frequency.

Pin description

Pin	Name	I/O type	Function		
1	OE	Input	Output Enable	High[*1] 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[*2] 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[*1 *3]:	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[*2 *3]:	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_{CC}	Power	Power supply		

*1 If fixing it at High, please connect to V_{CC} 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

SG2016CBA 156.250000MHz T J J P A
a b c d e f g h

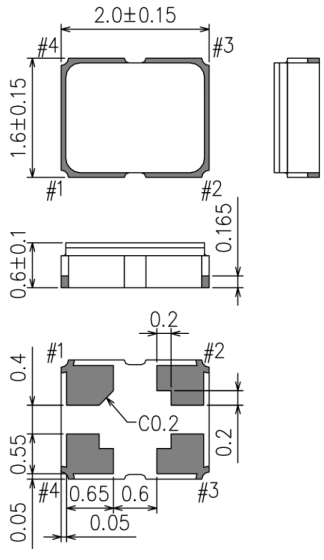
a: Model b: Output (C: CMOS)
c: Frequency d: Supply voltage (T: 1.8 V to 3.3 V Typ.)
e: Frequency tolerance f: Operating temperature
g: Function h: Internal identification code (“A” is default)

e: Frequency tolerance / f: Operating temperature	
BH	±15 × 10^{-6} / -40 °C to +105 °C
DJ	±25 x 10^{-6} / -40 °C to +125 °C
JJ	±50 x 10^{-6} / -40 °C to +125 °C

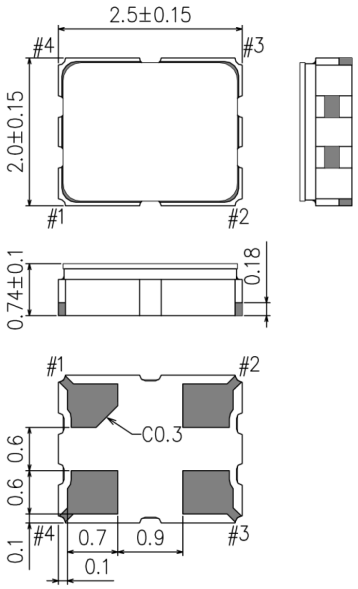
g: Function	
P	Output Enable (OE)
Q	Output Enable ($\overline{OE}$)
S	Standby ($\overline{ST}$)
T	Standby (ST)

External dimensions (Unit: mm)

SG2016CBA

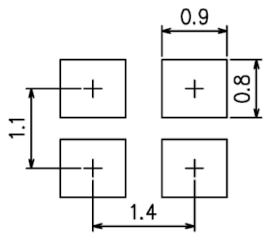


SG2520CBA

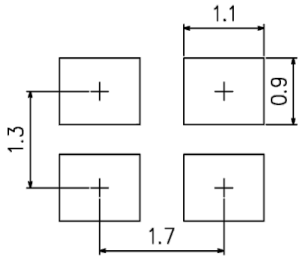


Footprint (Recommended) (Unit: mm)

SG2016CBA



SG2520CBA



■Notes:
In order to achieve optimum jitter performance, the 0.01 µF to 0.1 µF capacitor between V_{CC} 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.

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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.)
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