

CRYSTAL OSCILLATOR (Programmable)
SPREAD SPECTRUM
OUTPUT: CMOS



Product Number
X1G005281xxxx00

SG-9101CGA

- Frequency range : 0.67 MHz to 170 MHz (1×10^{-6} Step)
- Supply voltage : 1.62 V to 3.63 V
- Function : Output enable (OE) or Standby (ST)
- Down or Center spread modulation
- Configurable spreading
 - 3 modulation profile (Hershey-kiss, Sine-wave, Triangle),
 - 4 modulation frequency, 6 spread percentage
- Package : 2.5 × 2.0 mm
- PLL technology to enable short lead time
- Conform to AEC-Q100



Specifications (characteristics)

Item	Symbol	Specifications	Conditions/Remarks	
Supply voltage	V_{CC}	1.80 V Typ. 1.62 V to 1.98 V 1.98 V to 2.20 V 2.20 V to 2.80 V 2.70 V to 3.63 V	2.50 V Typ. 3.30 V Typ.	
Output frequency range	f_o	0.67 MHz to 170 MHz		
Storage temperature	T_{stg}	-40 °C to +125 °C		
Operating temperature	T_{use}	J: -40 °C to +125 °C H: -40 °C to +105 °C		
Frequency tolerance ¹	f_{tol}	$\pm 100 \times 10^{-6}$, $\pm 50 \times 10^{-6}$		
Current consumption	I_{CC}	3.5 mA Max. 3.6 mA Max. 3.7 mA Max. 3.8 mA Max.	$T_{use} = +125 \text{ °C}$	
		3.4 mA Max. 3.5 mA Max. 3.6 mA Max. 3.7 mA Max.	$T_{use} = +105 \text{ °C}$	
		2.9 mA Typ.	3.0 mA Typ. 3.2 mA Typ.	$T_{use} = +25 \text{ °C}$
		5.8 mA Max. 6.1 mA Max. 7.0 mA Max. 8.4 mA Max.	$T_{use} = +125 \text{ °C}$	
		5.7 mA Max. 6.0 mA Max. 6.9 mA Max. 8.3 mA Max.	$T_{use} = +105 \text{ °C}$	
Output disable current	I_{dis}	4.9 mA Typ. 5.9 mA Typ. 7.0 mA Typ.	$T_{use} = +25 \text{ °C}$	
Standby current	I_{std}	3.5 mA Max. 3.5 mA Max. 3.6 mA Max. 3.8 mA Max.	$T_{use} = +125 \text{ °C}$	
		3.4 mA Max. 3.4 mA Max. 3.5 mA Max. 3.7 mA Max.	$T_{use} = +105 \text{ °C}$	
		2.3 μA Max. 2.5 μA Max. 3.0 μA Max. 4.2 μA Max.	$T_{use} = +125 \text{ °C}$	
Symmetry	SYM	45 % to 55 %		
		50 % V_{CC} Level		
Output voltage (DC characteristics)	V_{OH}	90 % V_{CC} Min.		
	V_{OL}	10 % V_{CC} Max.		
Output load condition	L_{CMOS}	15 pF Max.		
Input voltage	V_{IH}	70 % V_{CC} Min.		
	V_{IL}	30 % V_{CC} Max.		
Rise and Fall time	Default	tr/TF	3.0 ns Max.	$f_o > 40 \text{ MHz}$
			6.0 ns Max.	$f_o \leq 40 \text{ MHz}$
			3.0 ns Max.	$f_o = 0.67 \text{ MHz} \sim 170 \text{ MHz}$
			10.0 ns Max.	$f_o = 0.67 \text{ MHz} \sim 20 \text{ MHz}$
Disable Time	t_{stp}	1 μs Max.		
Enable Time	t_{sta}	1 μs Max.		
Resume Time	t_{res}	3 ms Max.		
Start-up time	t_{str}	3 ms Max.		
Frequency aging	f_{aging}	This is included in frequency tolerance specification.		

I_{OH}/I_{OL} Conditions [mA]					
Rise/Fall time	V_{CC}	*A	*B	*C	*D
Default ($f_o > 40 \text{ MHz}$), Fast	I_{OH}	-2.5	-3.5	-4.0	-5.0
	I_{OL}	2.5	3.5	4.0	5.0
Default ($f_o \leq 40 \text{ MHz}$)	I_{OH}	-1.5	-2.0	-2.5	-3.0
	I_{OL}	1.5	2.0	2.5	3.0
Slow	I_{OH}	-1.0	-1.5	-2.0	-2.5
	I_{OL}	1.0	1.5	2.0	2.5

*A : 1.62 V to 1.98 V, *B : 1.98 V to 2.20 V,
*C : 2.20 V to 2.80 V, *D : 2.70 V to 3.63 V

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

Pin description

Pin	Name	I/O type	Function
1	OE	Input	Output enable High: Specified frequency output from OUT pin Low: Out pin is low (weak pull down), only output driver is disabled.
	ST	Input	Standby High: Specified frequency output from OUT pin Low: Out pin is low (weak pull down), 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



Product Name

SG-9101CGA 170.000000MHz C 20 P J A A A
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

- ① Model
- ② Package type
- ③ Frequency
- ④ Spread type
- ⑤ Spread width
- ⑥ Function
- ⑦ Operating temperature / Frequency tolerance
- ⑧ Modulation frequency
- ⑨ Spread profile
- ⑩ Rise/Fall time

② Package Type
CG 2.5 mm × 2.0 mm

④ Spread type
C Center spread
D Down spread

⑤ Spread width	
Center spread	Down spread
02 ±0.25 %	
05 ±0.5 %	-0.5 %
07 ±0.75 %	
10 ±1.0 %	-1.0 %
15 ±1.5 %	-1.5 %
20 ±2.0 %	-2.0 %
30	-3.0 %
40	-4.0 %

⑧ Modulation frequency	
A	25.4 kHz (default)
B	12.7 kHz
C	8.5 kHz
D	6.3 kHz

⑨ Spread profile	
A	Hershey-kiss (default)
B	Sine-wave
C	Triangle

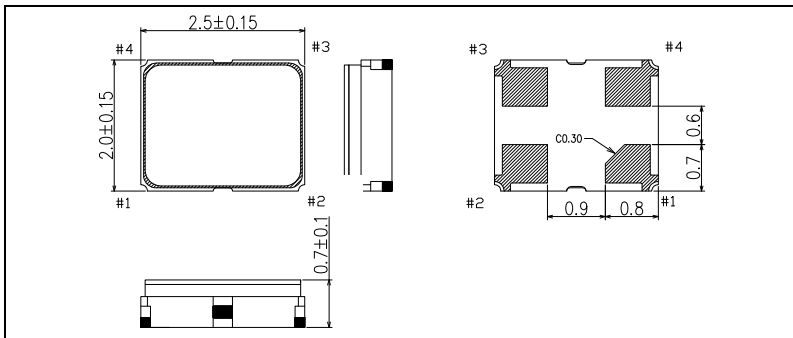
⑥ Function	
P	Output enable
S	Standby

⑩ Rise/Fall time	
A	Default
B	Fast
C	Slow

⑦ Operating temp. / Freq. tolerance	
J	-40 °C to +125 °C / ±100 × 10 ⁻⁶
H	-40 °C to +105 °C / ±50 × 10 ⁻⁶

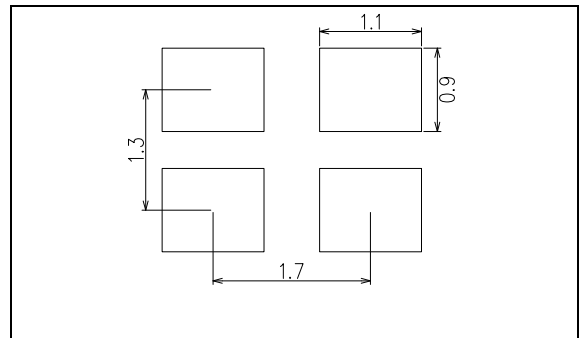
External dimensions

(Unit: mm)



Footprint (Recommended)

(Unit: mm)



Notes:

In order to achieve optimum jitter performance, the 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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	► Designed for automotive applications such as Car Multimedia, Body Electronics, Remote Keyless Entry etc.
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