CRYSTAL OSCILLATOR (Programmable)
OUTPUT: CMOS

NEW

SG - 8018series

- Frequency range : 0.67 MHz ~ 170 MHz (1 ppm Step)
- Supply voltage : 1.62 V ~ 3.63 V
- Function : Output enable (OE) or Standby ($\overline{ST}$)
- Frequency tolerance : ±50 ppm (-40 ºC ~ +105 ºC)
  Include frequency aging(+25 ºC, 10 years)
- Package : 2.5 x 2.0, 3.2 x 2.5, 5.0 x 3.2, 7.0 x 5.0 (mm)
- PLL technology to enable short lead time
- Available field oscillator programmer “SG-Writer II”

Pb Free RoHS Compliant

Product Number (please contact us)
SG-8018CA: X1G005571xxxx00
SG-8018CB: X1G005581xxxx00
SG-8018CE: X1G005591xxxx00
SG-8018CG: X1G005601xxxx00

CG 2.5 x 2.0mm | CE 3.2 x 2.5mm | CB 5.0 x 3.2mm | CA 7.0 x 5.0mm

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 ~ 1.98 V	1.98 V ~ 2.20 V	2.20 V ~ 2.80 V	2.70 V ~ 3.63 V		
Output frequency range	f_O	0.67 MHz ~ 170 MHz					
Storage temperature	T_stg	-40 ºC ~ +125 ºC				Storage as single product.	
Operating temperature	T_use	-40 ºC ~ +105 ºC				-	
Frequency tolerance*1	f_tol	J: ±50 × 10^{-6}				T_use = -40 ºC ~ +105 ºC	
Current consumption	I_{CC}	3.2 mA Max.	3.3 mA Max.	3.4 mA Max.	3.5 mA Max.	T_use = +105 ºC	No load, f_O = 20 MHz
		2.7 mA Typ.		2.9 mA Typ.	3.0 mA Typ.	T_use = +25 ºC	
		5.5 mA Max.	5.8 mA Max.	6.7 mA Max.	8.1 mA Max.	T_use = +105 ºC	No load, f_O = 170 MHz
		4.7 mA Typ.		5.7 mA Typ.	6.8 mA Typ.	T_use = +25 ºC	
Output disable current	I_dis	3.2 mA Max.	3.2 mA Max.	3.3 mA Max.	3.5 mA Max.	OE = GND, f_O = 170 MHz	
Standby current	I_std	0.9 µA Max.	1.0 µA Max.	1.5 µA Max.	2.5 µA Max.	T_use = +105 ºC	$\overline{ST}$ = GND
		0.3 µA Typ.	0.4 µA Typ.	0.5 µA Typ.	1.1 µA Typ.	T_use = +25 ºC	
Symmetry	SYM	45 % ~ 55 %				50 % V_{CC} Level	
Output voltage (DC characteristics)	V_{OH}	90 % V_{CC} Min.				I_{OH}/I_{OL} Conditions [mA]	
	V_{OL}	10 % V_{CC} Max.				*A: 1.62 V ~ 1.98 V, *B: 1.98 V ~ 2.20 V, *C: 2.20 V ~ 2.80 V, *D: 2.70 V ~ 3.63 V	
Output load condition	L_CMOS	15 pF Max.				-	
Input voltage	V_{IH}	70 % V_{CC} Min.				OE or $\overline{ST}$	
	V_{IL}	30 % V_{CC} Max.					
Rise and Fall time	Default	3.0 ns Max.				f_O > 40 MHz	20 % - 80 % V_{CC}, L_CMOS = 15 pF
		6.0 ns Max.				f_O ≤ 40 MHz	
	Fast	3.0 ns Max.				f_O = 0.67 MHz ~ 170 MHz	
	Slow	10.0 ns Max.				f_O = 0.67 MHz ~ 20 MHz	
Disable Time	t_stp	1 µs Max.				Measured from the time OE or $\overline{ST}$ pin crosses 30 % V_{CC}	
Enable Time	t_sta	1 µs Max.				Measured from the time OE pin crosses 70 % V_{CC}	
Resume Time	t_res	3 ms Max.				Measured from the time $\overline{ST}$ pin crosses 70 % V_{CC}	
Start-up time	t_str	3 ms Max.				Measured from the time V_{CC} reaches its rated minimum value, 1.62 V	
Frequency aging	f_aging	This is included in frequency tolerance specification.				+25 °C, 10 years	

I_{OH}/I_{OL} Conditions					[mA]
Rise/Fall time	V_{CC}	*A	*B	*C	*D
Default (f_O > 40 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 ≤ 40 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

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

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.
	$\overline{ST}$	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-8018CG 170.000000MHz T J H P A
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

①Model, ②Package type,
③Frequency, ④Supply voltage,
⑤Frequency tolerance, ⑥Operating temperature,
⑦Function, ⑧Rise/Fall time

②Package type
CA: 7.0 mm x 5.0 mm
CB: 5.0 mm x 3.2 mm
CE: 3.2 mm x 2.5 mm
CG: 2.5 mm x 2.0 mm

④Supply voltage
T: 1.8 V ~ 3.3 V Typ.

⑤Frequency tolerance
J: 50 x 10^{-6}

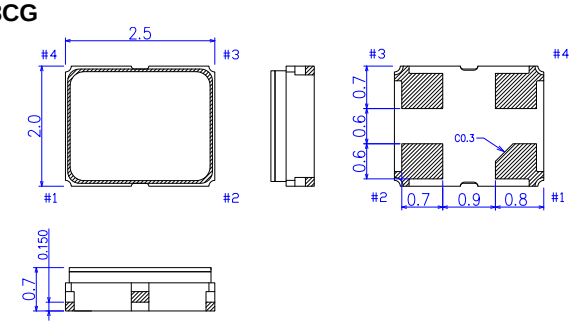
⑥Operating temperature
H: -40 °C ~ +105 °C

⑦Function
P: Output Enable
S: Standby

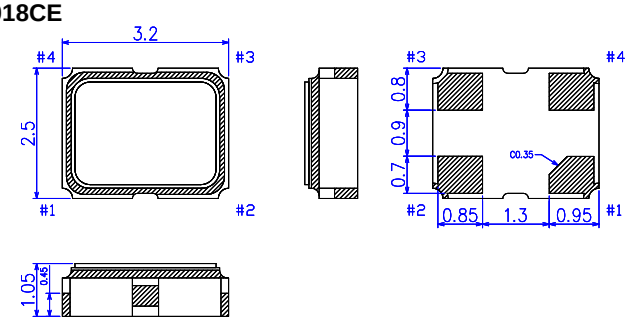
⑧ Rise/Fall time
A: Default
B: Fast
C: Slow

External dimensions (Unit: mm)

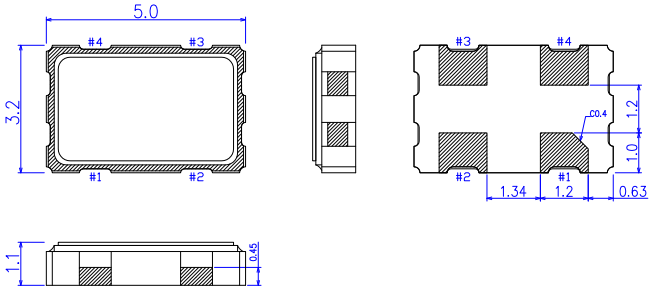
SG-8018CG



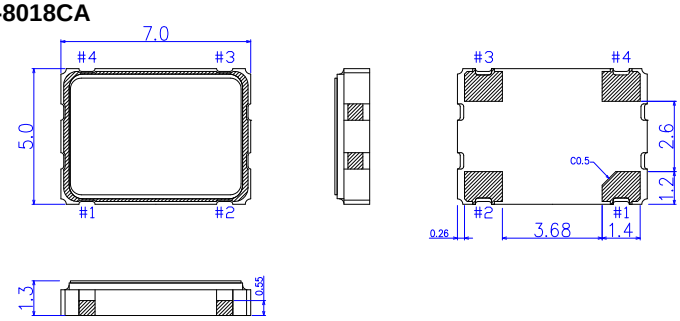
SG-8018CE



SG-8018CB

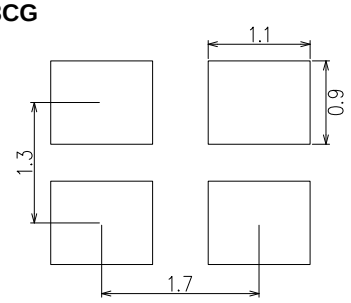


SG-8018CA

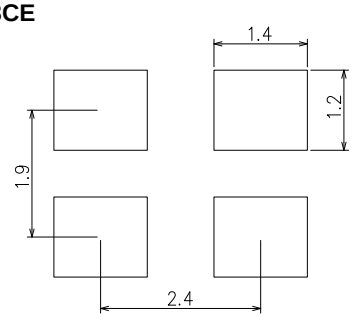


Footprint (Recommended) (Unit: mm)

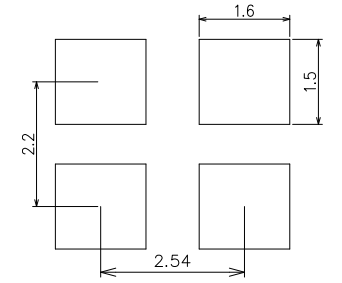
SG-8018CG



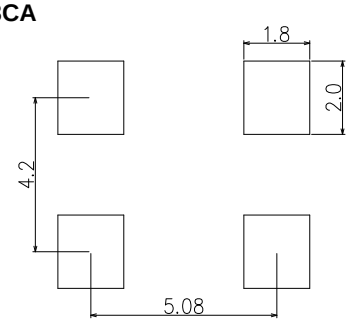
SG-8018CE



SG-8018CB



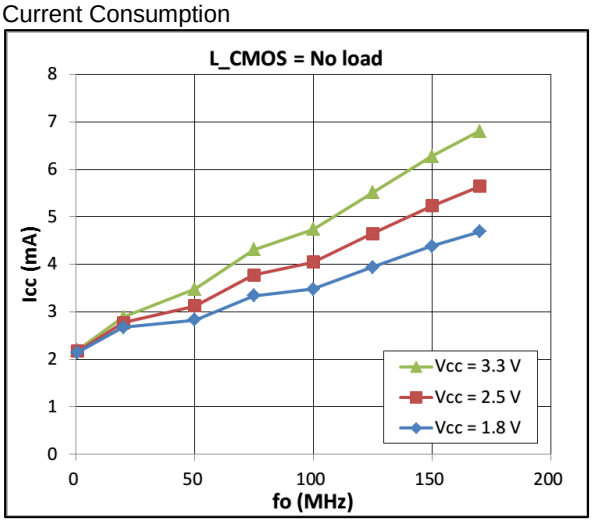
SG-8018CA

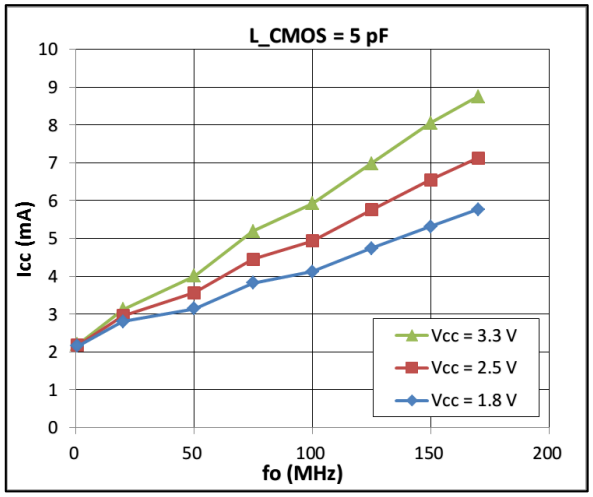


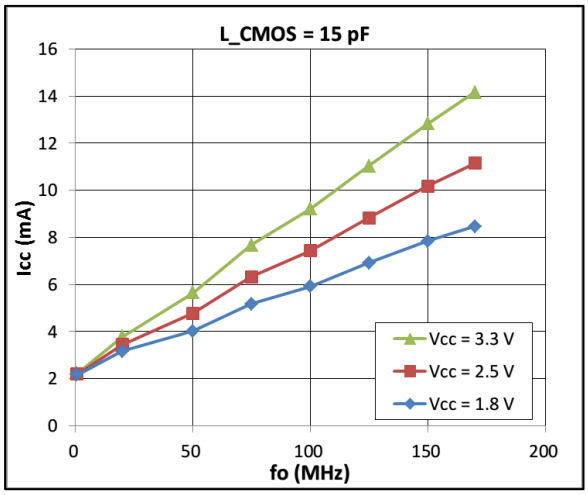
■Notes:
In order to achieve optimum jitter performance, the 0.1 µF capacitor between V_{CC} and GND should be placed. It is also recommended that the capacitors are placed on the device side of the PCB, as close to the device as possible and connected together with short wiring pattern.

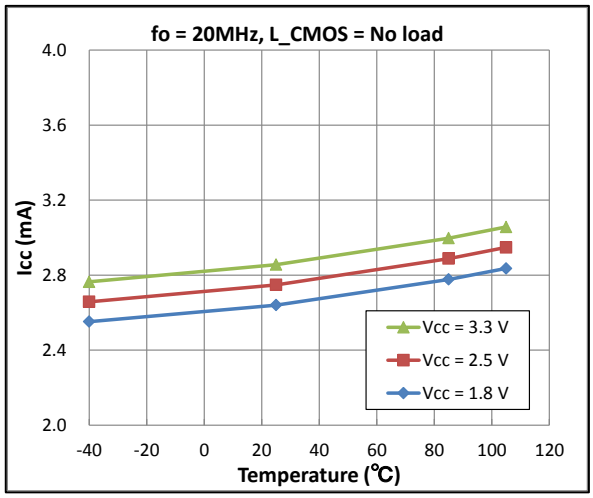
Specification Graph（Typical supplemental specification. Unless otherwise specified T_use = 25 ℃, L_CMOS = 15pF）

Current Consumption

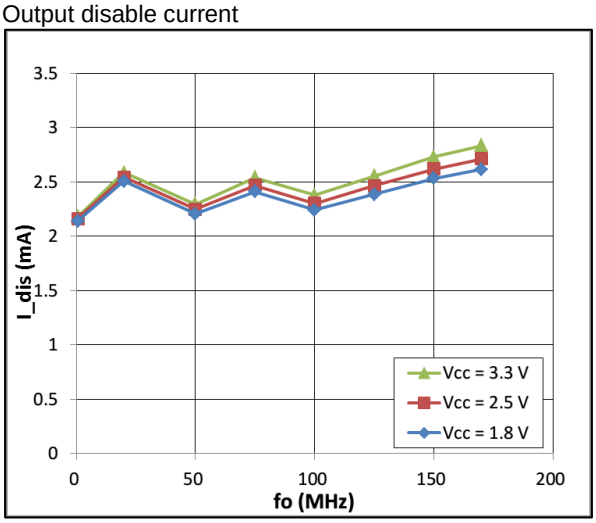




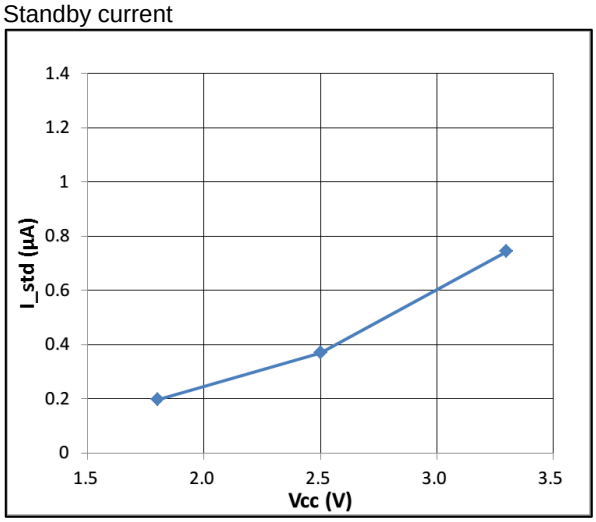




Output disable current



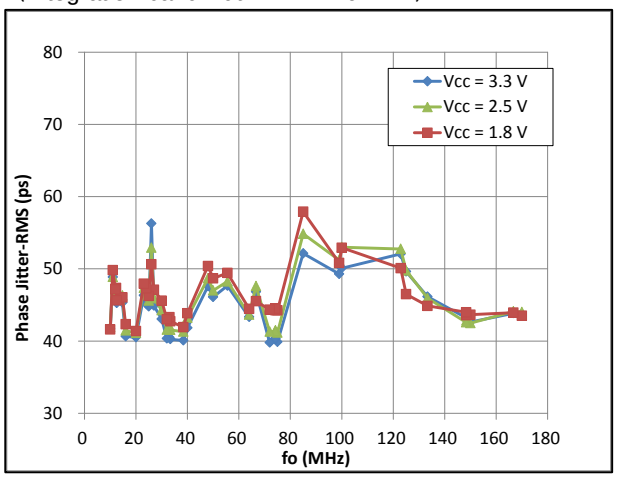
Standby current



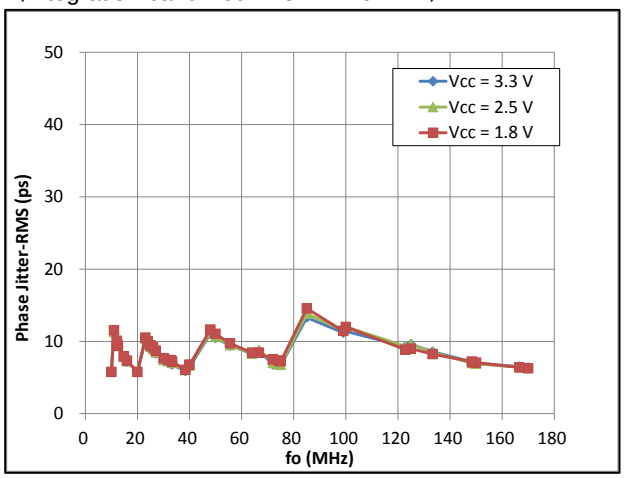
■Notes:

Specification Graph（Typical supplemental specification. Unless otherwise specified T_use = 25 ℃, L_CMOS = 15pF）

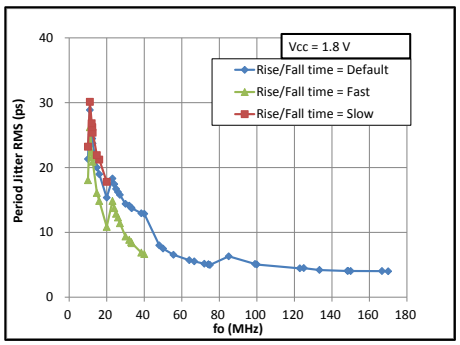
Phase Jitter RMS
（Integration bandwidth 12 k－20 MHz）

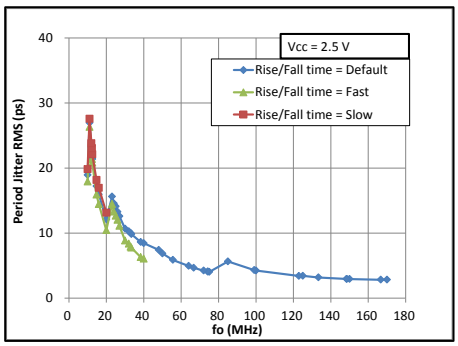


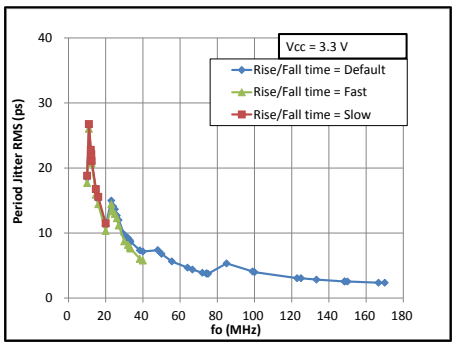
Phase Jitter RMS
（Integration bandwidth 1.8 M－20 MHz）



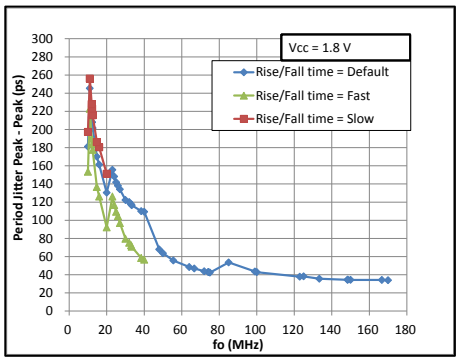
Period Jitter RMS

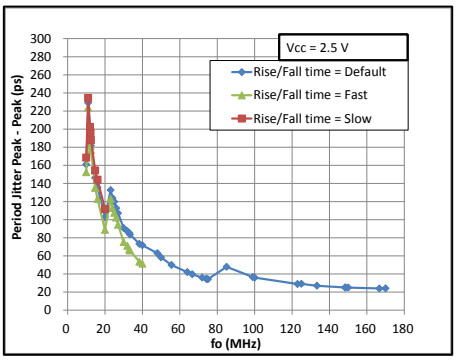


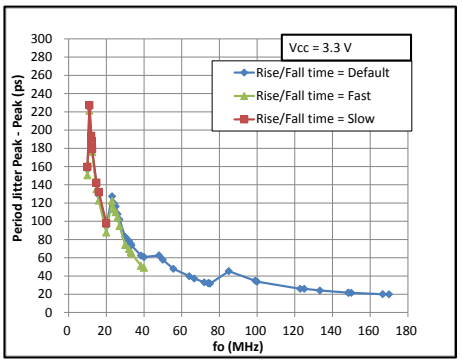




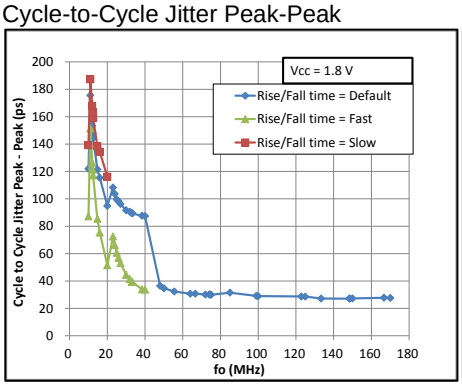
Period Jitter Peak-Peak

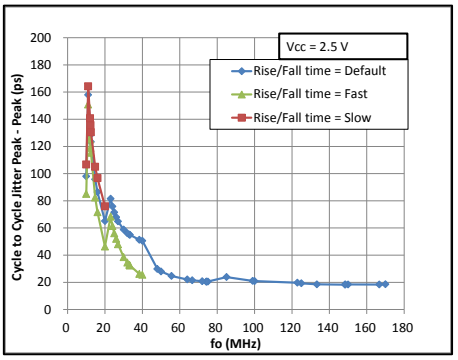


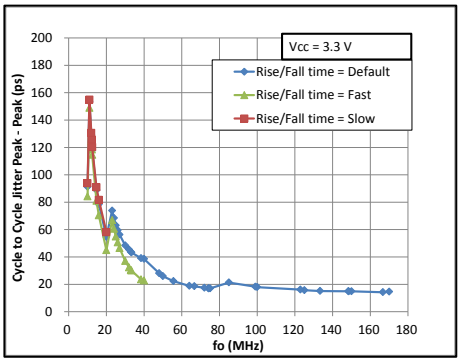




Cycle-to-Cycle Jitter Peak-Peak



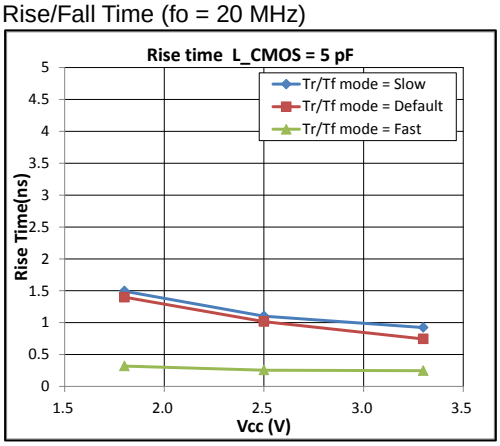


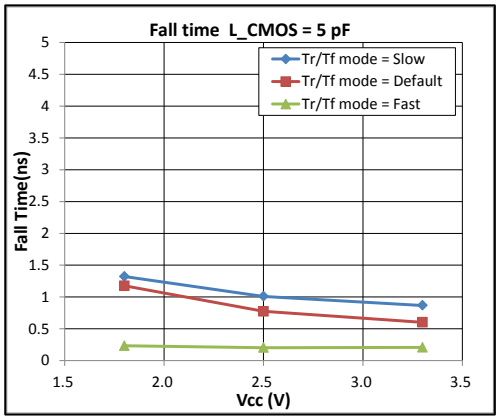


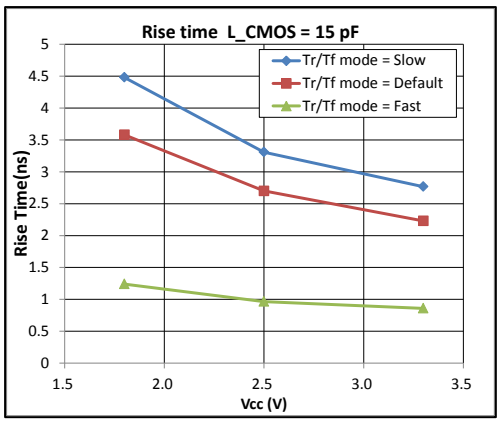
■Notes:

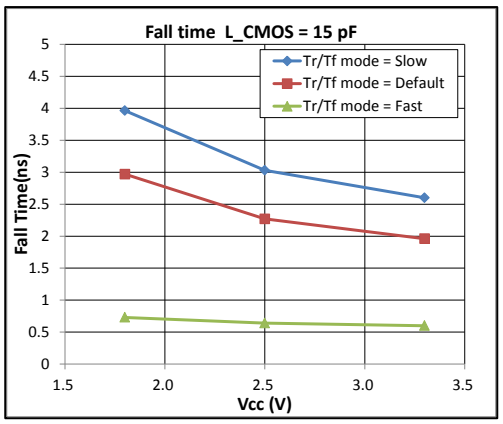
Specification Graph（Typical supplemental specification. Unless otherwise specified T_use = 25 ℃, L_CMOS = 15pF）

Rise/Fall Time (fo = 20 MHz)





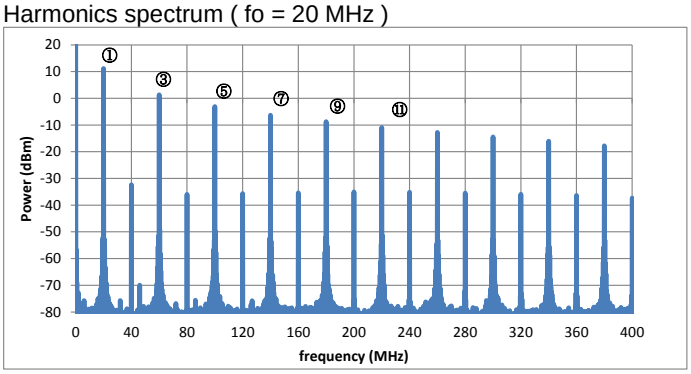




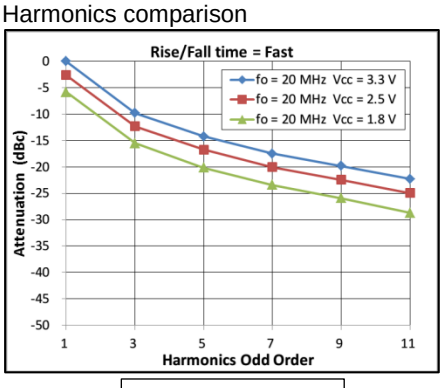
■Notes:

frequency	slow	default	fast
0.67 M – 20 M	See Slow	See Default	See Fast
20 M – 40 M	-	See Default	See Fast
40 M – 170 M	-	See Fast	See Fast

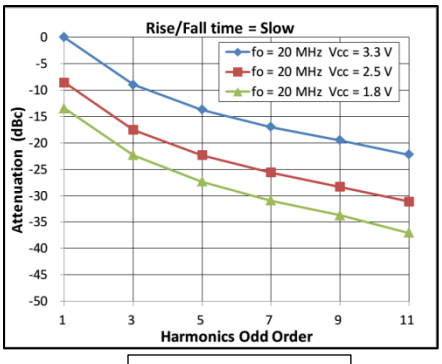
Harmonics spectrum (fo = 20 MHz)



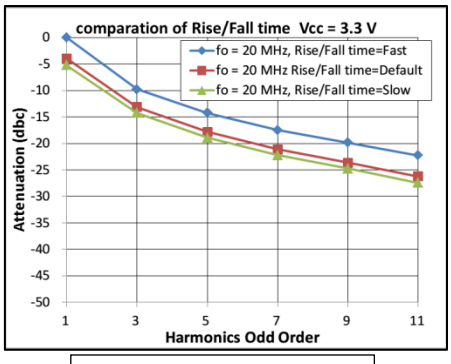
Harmonics comparison



Normalize to Vcc = 3.3V.



Normalize to Vcc = 3.3V.



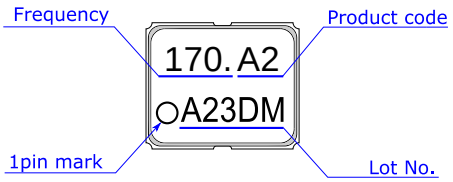
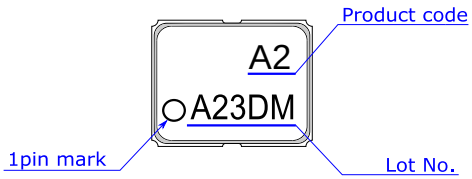
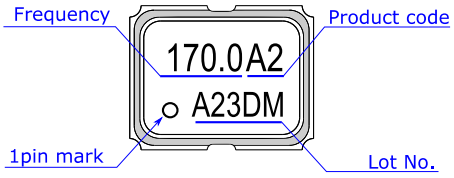
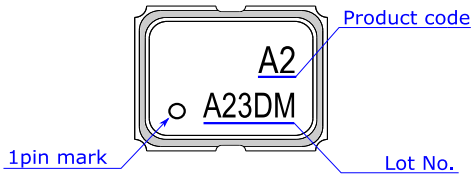
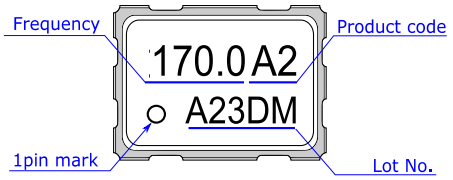
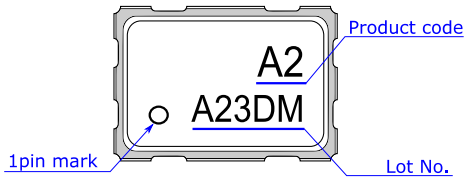
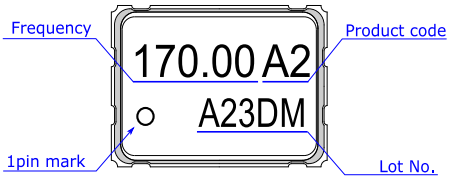
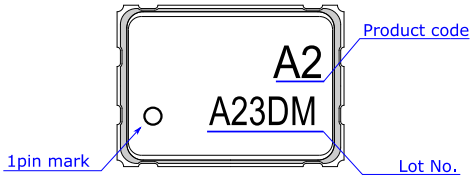
Normalize to Rise/Fall time = “Fast”.

■Notes:

ESD Rating

Test items	Breakdown voltage
Human Body Model (HBM)	2000V
Machine Model (MM)	250V
Charged Device Model (CDM)	750V

Device Marking (Standard specification)

Model	Factory Programmed Part Marking	Field Programmable Part Marking (Blank Samples)
SG-8018CG		
SG-8018CE		
SG-8018CB		
SG-8018CA		

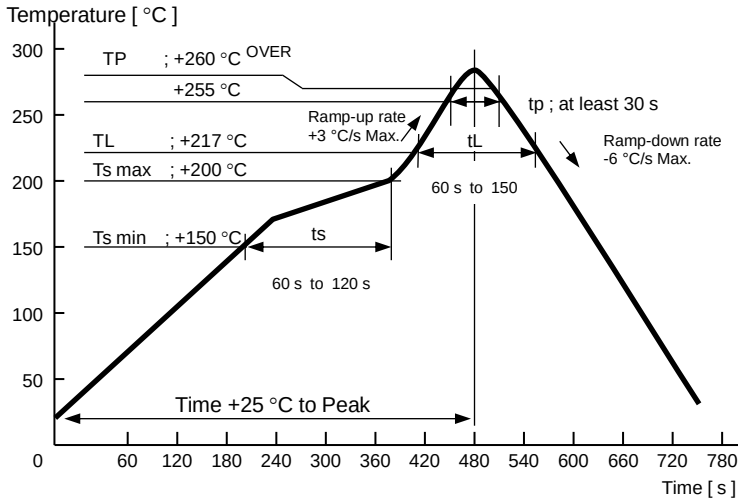
Simulation Model

- IBIS Model is available upon request. Please contact us.
  Information Required: Oscillator operating condition (i.e. Power Supply, Rise/Fall Time, Temperature)

Device Material & Environmental Information

Model	Package Dimensions	# of Pins	Reference Weight (Typ.)	Terminal Material	Terminal Plating	Complies With EU RoHS	Pb Free	MSL Rating	Peak Temp. (Max)
SG-8018CG	2.5 x 2.0 x 0.7 mm	4	13 mg	W	Au	Yes	Yes	1	260°C
SG-8018CE	3.2 x 2.5 x 1.0 mm	4	25 mg	W	Au	Yes	Yes	1	260°C
SG-8018CB	5.0 x 3.2 x 1.1 mm	4	51 mg	W	Au	Yes	Yes	1	260°C
SG-8018CA	7.0 x 5.0 x 1.3 mm	4	143 mg	W	Au	Yes	Yes	1	260°C

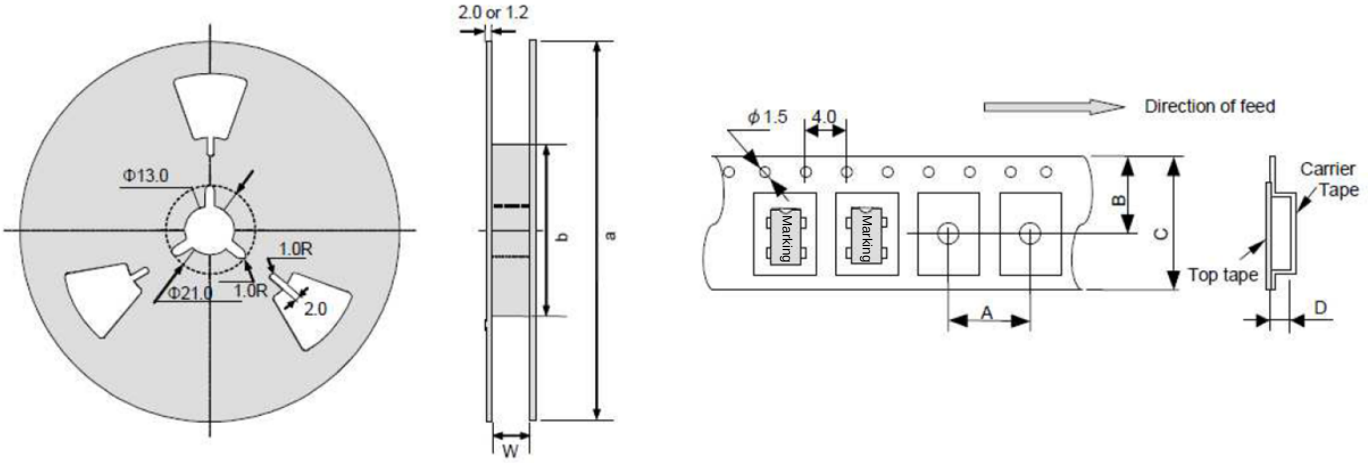
SMD products Reflow profile(example)
The availability of the heat resistance for reflow conditions of JEDEC-STD-020D.01 is judged individually. Please inquire.



Pb Free	● Pb free.
RoHS Compliant	● 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.)

Standard Packing Specification

SMD products are packed in the shipping carton as below table in accordance with taping standards EIA-481 and IEC-60286



Standard Packing Quantity & Dimension(Unit mm)

Model	Quantity (pcs/Reel)	Reel Dimension			Career Tape Dimension				Direction of Feed (L= Left Direction)
		a	b	W	A	B	C	D	
SG-8018CG	3000	Φ180	Φ60	9	4	5.25	8	1.15	L
SG-8018CE	2000	Φ180	Φ60	9	4	5.25	8	1.4	L
SG-8018CB	1000	Φ180	Φ60	13	8	7.25	12	1.4	L
SG-8018CA	1000	Φ254	Φ100	17.5	8	9.25	16	2.3	L

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 ISO/TS 16949 certification that is requested strongly by major automotive manufacturers as standard.

ISO/TS16949 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	►Pb free.
RoHS Compliant	►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.)
For Automotive	►Designed for automotive applications such as Car Multimedia, Body Electronics, Remote Keyless Entry etc.
Automotive Safety	►Designed for automotive applications related to driving safety (Engine Control Unit, Air Bag, ESC etc).

Notice

- This material is subject to change without notice.
- Any part of this material may not be reproduced or duplicated in any form or any means without the written permission of Seiko Epson.
- The information about applied data, circuitry, software, usage, etc. written in this material is intended for reference only. Seiko Epson does not assume any liability for the occurrence of customer damage or infringing on any patent or copyright of a third party. This material does not authorize the licensing for any patent or intellectual copyrights.
- When exporting the products or technology described in this material, you should comply with the applicable export control laws and regulations and follow the procedures required by such laws and regulations.
- You are requested not to use the products (and any technical information furnished, if any) for the development and/or manufacture of weapon of mass destruction or for other military purposes. You are also requested that you would not make the products available to any third party who may use the products for such prohibited purposes.
- These products are intended for general use in electronic equipment. When using them in specific applications that require extremely high reliability, such as the applications stated below, you must obtain permission from Seiko Epson in advance.
  / Space equipment (artificial satellites, rockets, etc.) / Transportation vehicles and related (automobiles, aircraft, trains, vessels, etc.) / Medical instruments to sustain life / Submarine transmitters / Power stations and related / Fire work equipment and security equipment / traffic control equipment / and others requiring equivalent reliability.
- All brands or product names mentioned herein are trademarks and/or registered trademarks of their respective.