

HIGH-FREQUENCY CRYSTAL OSCILLATOR

SG - 8002LA/LB series

Product number (please contact us)

SG-8002LA : Q3324LAXx0xxx00
 SG-8002LB : Q3323LBxx0xxx00

- Frequency range : 1 MHz to 125 MHz
- Operating voltage : 3.3 V or 5.0 V
- Function : Output enable(OE) or Standby(\overline{ST})
- Thickness : 1.15 mm Typ.(SG-8002LA)
- Lead(Pb)-free : Complies with EU RoHS directive (Lead free completely)
- Short mass production lead time by PLL technology.
- SG-Writer available to purchase. Please contact EPSON or local sales representative.



SG-8002LA	SG-8002LB
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Actual size

Specifications (characteristics)

Item	Symbol	Specifications *2		Remarks
		PH / SH	PC / SC	
Output frequency range	fo	1 MHz to 80 MHz	—	VDD=4.5 V to 5.5 V
		—	1 MHz to 125 MHz	VDD=3.0 V to 3.6 V
		—	1 MHz to 66.7 MHz	VDD=2.7 V to 3.6 V
Operating voltage	VDD	4.5 V to 5.5 V	2.7 V to 3.6 V	
		-40 °C to +125 °C		Stored as bare product after unpacking
Temperature range	Storage temperature	-40 °C to +125 °C		Refer to Application guide. "Frequency range"
	Operating temperature	-20 °C to +70 °C (-40 °C to +85 °C)		B, C: -20 °C to +70 °C
Frequency stability	Δf/fo	B: ±50 × 10 ⁻⁶ , C: ±100 × 10 ⁻⁶		M: -40 °C to +85 °C
		M: ±100 × 10 ⁻⁶ *3		L: -40 °C to +85 °C VDD ±5 %
		—	L: ±50 × 10 ⁻⁶	—
Current consumption	IOP	30 mA Max.	—	No load condition, fo=80 MHz
		—	28 mA Max.	No load condition, fo=125 MHz
Output disable current	IOE	25 mA Max.	—	P Type only, fo=80 MHz
		—	16 mA Max.	P Type only, fo=125 MHz
Standby current	IST	50 μA Max.		S Type only, ST=GND
		40 % to 60 %	—	50 % VDD, CL=15 pF, ≤80 MHz
Duty *1	tw/t	45 % to 55 %	—	50 % VDD, CL=25 pF, ≤50 MHz
		—	40 % to 60 %	50 % VDD, CL=15 pF, VDD=3.0 V to 3.6 V, ≤125 MHz
		—	40 % to 60 %	50 % VDD, CL=15 pF, VDD=2.7 V to 3.6 V, ≤66.7 MHz
		—	45 % to 55 %	50 % VDD, CL=15 pF, VDD=3.0 V to 3.6 V, ≤40 MHz
High output voltage	VOH	VDD-0.4 V Min.		I _{OH} =-16 mA(PH,SH), -8 mA(PC,SC)
Low output voltage	VOL	0.4 V Max.		I _{OL} = 16 mA(PH,SH), 8 mA(PC,SC)
Output load condition *1	CL	15 pF Max.		Max. frequency and Max. operating voltage
Output enable / disable input voltage	V _{IH}	2.0 V Min.	70 % VDD Min.	ST, OE terminal
	V _{IL}	0.8 V Max.	20 % VDD Max.	ST, OE terminal
Output rise and fall time *1	t _r / t _f	3 ns Max.		20 % VDD to 80 % VDD level, CL=Max.
Oscillation start up time	t _{OSC}	10 ms Max.		Time at minimum operating voltage to be 0 s
Aging	fa	±5 × 10 ⁻⁶ / year Max.		T _a =+25 °C, VDD=5.0 V / 3.3 V (PC / SC) First year

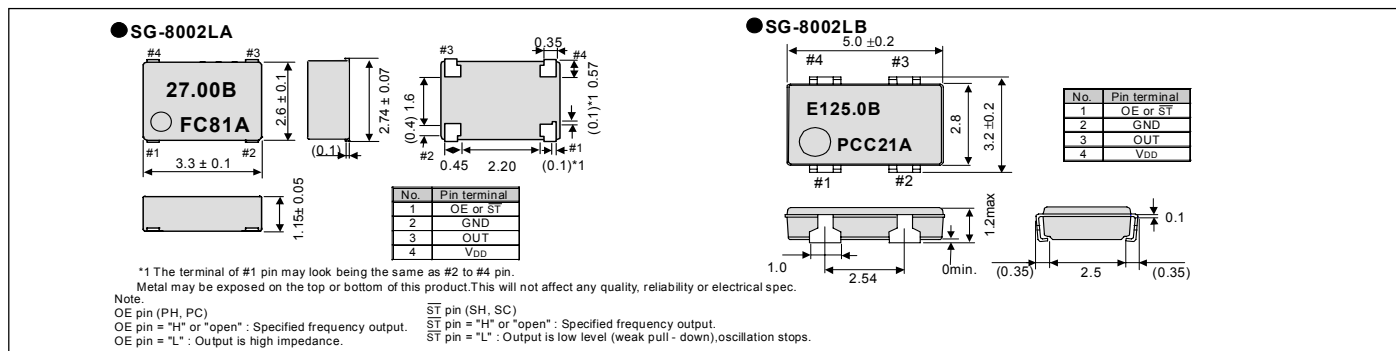
*1 Operating temperature (-40 °C to +85 °C), the available frequency, duty and output load conditions, please refer to Page 40.

*2 PLL-PLL connection & Jitter specification, please refer to Page 41.

*3 PH,SH for "M" stability and "L" stability will be available up to 27 MHz.

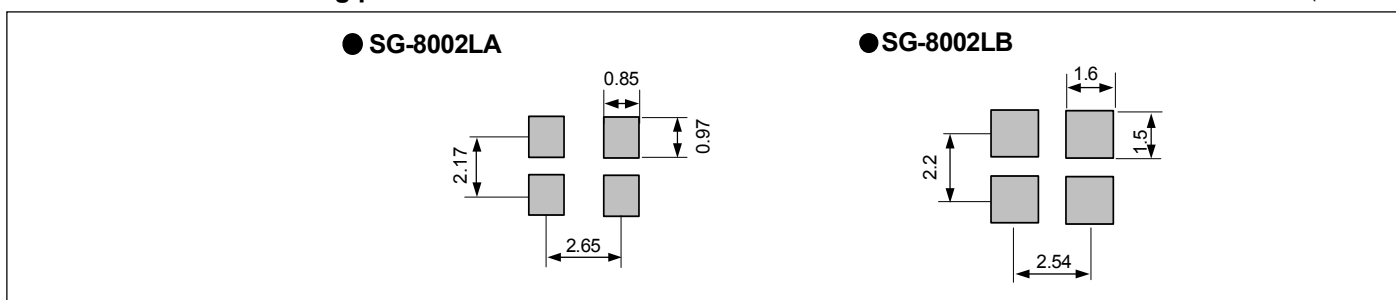
External dimensions

(Unit:mm)



Recommended soldering pattern

(Unit:mm)



SG-8002 Series Specifications

Page	Model	Item	Current Consumption	Operating Voltage	Output load condition	Output rise time Output fall time	Duty	Function
36	SG-8002LA (SON 4-pin)	PH	35 mA Max.	4.5 V to 5.5 V	15 pF	3.0 ns Max. (20 % V _{DD} to 80 % V _{DD} , CL=Max.)	40 % to 60 % (50 % V _{DD} , CL=15 pF, f _{OS} 80 MHz/-40 °C to +85 °C)	OE
		SH						ST
	SG-8002LB (SOJ 4-pin)	PC	28 mA Max.	3.0 V to 3.6 V (2.7 V to 3.6 V)	15 pF	3.0 ns Max. (20 % V _{DD} to 80 % V _{DD} , CL=Max.)	45 % to 55 % (50 % V _{DD} , CL=15 pF, V _{DD} =3.0 V to 3.6 V, f _{OS} 40 MHz) 40 % to 60 % (50 % V _{DD} , CL=15 pF, V _{DD} =3.0 V to 3.6 V, f _{OS} 125 MHz) ↑ (50 % V _{DD} , CL=15 pF, V _{DD} =2.7 V to 3.6 V, f _{OS} 66.7 MHz)	OE
		SC						ST
37 38 39	SG-8002CA (DCC)	PT	45 mA Max.	4.5 V to 5.5 V	5 TTL+15 pF (f _{OS} 125MHz/-20 °C to +70 °C) 25 pF (f _{OS} 66.7 MHz/-20 °C to +70 °C)	2.0 ns Max. (0.8 V to 2.0 V, CL=Max.)	45 % to 55 % (1.4 V, CL=5 TTL+15 pF, f _{OS} 66.7 MHz/-20 °C to +70 °C) ↑ (1.4 V, CL=5 TTL+15 pF, f _{OS} 40.0 MHz/-40 °C to +85 °C)	OE
		ST			4.0 ns Max. (0.4 V to 2.4 V, CL=Max.)	40 % to 60 % (1.4 V, CL=5 TTL+15 pF, f _{OS} 125 MHz/-20 °C to +70 °C) ↑ (1.4 V, CL=25 pF, f _{OS} 66.7 MHz/-20 °C to +70 °C) ↑ (1.4 V, CL=15 pF, f _{OS} 55.0 MHz/-40 °C to +85 °C)	ST	
	SG-8002JA (SOJ 4-pin)	PH	25 pF (f _{OS} 125 MHz/-20 °C to +70 °C) 50 pF (f _{OS} 66.7 MHz/-20 °C to +70 °C)	3.0 ns Max. (20 % V _{DD} to 80 % V _{DD} , CL=25)	45 % to 55 % (50 % V _{DD} , CL=25 pF, f _{OS} 66.7 MHz/-20 °C to +70 °C) ↑ (50 % V _{DD} , CL=25 pF, f _{OS} 40.0 MHz/-40 °C to +85 °C)	OE		
		SH	15 pF (f _{OS} 55 MHz/-40 °C to +85 °C) 25 pF (f _{OS} 40 MHz/-40 °C to +85 °C)	4.0 ns Max. (20 % V _{DD} to 80 % V _{DD} , CL=Max.)	40 % to 60 % (50 % V _{DD} , CL=50 pF, f _{OS} 66.7 MHz/-20 °C to +70 °C) ↑ (50 % V _{DD} , CL=15 pF, f _{OS} 55.0 MHz/-40 °C to +85 °C)	ST		
	SG-8002DC (DIP 8-pin)	PC	28 mA Max.	3.0 V to 3.6 V (2.7 V to 3.6 V)	15 pF (f _{OS} 66.7 MHz/2.7 to 3.6 V) 15 pF (f _{OS} 125 MHz/3.0 to 3.6 V)	3.0 ns Max. (20 % V _{DD} to 80 % V _{DD} , CL=15)	45 % to 55 % (50 % V _{DD} , CL=30 pF, V _{DD} =3.0 V to 3.6 V, f _{OS} 40 MHz) 40 % to 60 % (50 % V _{DD} , CL=15 pF, V _{DD} =3.0 V to 3.6 V, f _{OS} 125 MHz) ↑ (50 % V _{DD} , CL=15 pF, V _{DD} =2.7 V to 3.6 V, f _{OS} 66.7 MHz)	OE
		SC			30 pF (f _{OS} 40 MHz/3.0 to 3.6 V)	4.0 ns Max. (20 % V _{DD} to 80 % V _{DD} , CL=Max.)	ST	
38	SG-8002JC (SOJ 4-pin)	PT	45 mA Max.	4.5 V to 5.5 V	5TTL + 15 pF (f _{OS} 90 MHz/-20 to +70 °C) 15 pF (f _{OS} 125 MHz/-20 °C to +70 °C) 25 pF (f _{OS} 66.7 MHz/-20 °C to +70 °C)	2.0 ns Max. (0.8 V to 2.0 V, CL=Max.)	45 % to 55 % (1.4 V, CL=5 TTL+15 pF, f _{OS} 66.7 MHz/-20 °C to +70 °C) 40 % to 60 % (1.4 V, CL=5 TTL+15 pF, f _{OS} 90.0 MHz/-20 °C to +70 °C) ↑ (1.4 V, CL=25 pF, f _{OS} 66.7 MHz/-20 °C to +70 °C) ↑ (1.4 V, CL=15 pF, f _{OS} 125 MHz/-20 °C to +70 °C)	OE
		ST			4.0 ns Max. (0.4 V to 2.4 V, CL=Max.)	ST		
		PH			15 pF (f _{OS} 125 MHz/-20 °C to +70 °C) 25 pF (f _{OS} 90 MHz/-20 °C to +70 °C) 50 pF (f _{OS} 66.7 MHz/-20 °C to +70 °C)	3.0 ns Max. (20 % V _{DD} to 80 % V _{DD} , CL=25)	45 % to 55 % (50 % V _{DD} , CL=25 pF, f _{OS} 66.7 MHz/-20 °C to +70 °C) 40 % to 60 % (50 % V _{DD} , CL=15 pF, f _{OS} 125 MHz/-20 °C to +70 °C) ↑ (50 % V _{DD} , CL=25 pF, f _{OS} 90 MHz/-20 °C to +70 °C) ↑ (50 % V _{DD} , CL=50 pF, f _{OS} 50 MHz/-20 °C to +70 °C)	OE
		SH			4.0 ns Max. (20 % V _{DD} to 80 % V _{DD} , CL=Max.)	ST		
	SG-8002JF (SOJ 4-pin)	PC	28 mA Max.	3.0 V to 3.6 V (2.7 V to 3.6 V)	15 pF (f _{OS} 66.7 MHz/2.7 to 3.6 V) 15 pF (f _{OS} 125 MHz/3.0 to 3.6 V) 30 pF (f _{OS} 40 MHz/3.0 to 3.6 V)	3.0 ns Max. (20 % V _{DD} to 80 % V _{DD} , CL=15)	45 % to 55 % (50 % V _{DD} , CL=30 pF, V _{DD} =3.0 V to 3.6 V, f _{OS} 40 MHz) 40 % to 60 % (50 % V _{DD} , CL=15 pF, V _{DD} =3.0 V to 3.6 V, f _{OS} 125 MHz) ↑ (50 % V _{DD} , CL=15 pF, V _{DD} =2.7 V to 3.6 V, f _{OS} 66.7 MHz)	OE
		SC			4.0 ns Max. (20 % V _{DD} to 80 % V _{DD} , CL=Max.)	ST		
37	SG-8002JF (SOJ 4-pin)	PT	45 mA Max.	4.5 V to 5.5 V	15 pF (f _{OS} 125 MHz/-20 °C to +70 °C) 25 pF (f _{OS} 66.7 MHz/-20 °C to +70 °C) 5TTL + 15 pF (f _{OS} 90 MHz/-20 °C to +70 °C) 15 pF (f _{OS} 40 MHz/-40 °C to +85 °C)	2.0 ns Max. (0.8 V to 2.0 V, CL=25)	45 % to 55 % (1.4 V, CL=5 TTL+15 pF, f _{OS} 66.7 MHz/-20 °C to +70 °C) 40 % to 60 % (1.4 V, CL=5 TTL+15 pF, f _{OS} 90 MHz/-20 °C to +70 °C) ↑ (1.4 V, CL=25 pF, f _{OS} 66.7 MHz/-20 °C to +70 °C) ↑ (1.4 V, CL=15 pF, f _{OS} 125 MHz/-20 °C to +70 °C) ↑ (1.4 V, CL=15 pF, f _{OS} 40 MHz/-40 °C to +85 °C)	OE
		ST			4.0 ns Max. (0.4 V to 2.4 V, CL=Max.)	ST		
		PH			15 pF (f _{OS} 125 MHz/-20 °C to +70 °C) 25 pF (f _{OS} 90 MHz/-20 °C to +70 °C) 50 pF (f _{OS} 50 MHz/-20 °C to +70 °C) 15 pF (f _{OS} 40 MHz/-40 °C to +85 °C)	3.0 ns Max. (20 % V _{DD} to 80 % V _{DD} , CL=25)	45 % to 55 % (50 % V _{DD} , CL=25 pF, f _{OS} 66.7 MHz/-20 °C to +70 °C) 40 % to 60 % (50 % V _{DD} , CL=25 pF, f _{OS} 90.0 MHz/-20 °C to +70 °C) ↑ (50 % V _{DD} , CL=50 pF, f _{OS} 50.0 MHz/-20 °C to +70 °C) ↑ (50 % V _{DD} , CL=15 pF, f _{OS} 125 MHz/-20 °C to +70 °C) ↑ (50 % V _{DD} , CL=15 pF, f _{OS} 40 MHz/-40 °C to +85 °C)	OE
		SH			4.0 ns Max. (20 % V _{DD} to 80 % V _{DD} , CL=Max.)	ST		
	SG-8002JF (SOJ 4-pin)	PC	28 mA Max.	3.0 V to 3.6 V (2.7 V to 3.6 V)	15 pF (f _{OS} 66.7 MHz/2.7 to 3.6 V) 15 pF (f _{OS} 125 MHz/3.0 to 3.6 V) 30 pF (f _{OS} 40 MHz/3.0 to 3.6 V)	3.0 ns Max. (20 % V _{DD} to 80 % V _{DD} , CL=15)	45 % to 55 % (50 % V _{DD} , CL=30 pF, V _{DD} =3.0 V to 3.6 V, f _{OS} 40 MHz) 40 % to 60 % (50 % V _{DD} , CL=15 pF, V _{DD} =3.0 V to 3.6 V, f _{OS} 125 MHz) ↑ (50 % V _{DD} , CL=15 pF, V _{DD} =2.7 V to 3.6 V, f _{OS} 66.7 MHz)	OE
		SC			4.0 ns Max. (20 % V _{DD} to 80 % V _{DD} , CL=Max.)	ST		
35	SG-8002CE (DCC)	PT	40 mA Max.	4.5 V to 5.5 V	5 TTL+15 pF (f _{OS} 125 MHz/-20 °C to +70 °C) 5 TTL+15 pF (f _{OS} 27 MHz/-40 °C to +85 °C)	2.0 ns Max. (0.8 V to 2.0 V, CL=Max.)	45 % to 55 % (1.4 V, CL=5 TTL+15 pF, f _{OS} 66.7 MHz/-20 °C to +70 °C) ↑ (1.4 V, CL=5 TTL+15 pF, f _{OS} 27.0 MHz/-40 °C to +85 °C)	OE
		ST			4.0 ns Max. (0.4 V to 2.4 V, CL=Max.)	40 % to 60 % (1.4 V, CL=5 TTL+15 pF, f _{OS} 125 MHz/-20 °C to +70 °C)	ST	
		PH			15 pF (f _{OS} 125 MHz/-20 °C to +70 °C) 25 pF (f _{OS} 100 MHz/-20 °C to +70 °C) 25 pF (f _{OS} 27 MHz/-40 °C to +85 °C)	3.0 ns Max. (20 % V _{DD} to 80 % V _{DD} , CL=Max.)	45 % to 55 % (50 % V _{DD} , CL=25 pF, f _{OS} 66.7 MHz/-20 °C to +70 °C) ↑ (50 % V _{DD} , CL=25 pF, f _{OS} 27.0 MHz/-40 °C to +85 °C) 40 % to 60 % (50 % V _{DD} , CL=15 pF, f _{OS} 125 MHz/-20 °C to +70 °C)	OE
		SH			4.0 ns Max. (20 % V _{DD} to 80 % V _{DD} , CL=Max.)	ST		
	SG-8002CE (DCC)	PC	28 mA Max.	3.0 V to 3.6 V (2.7 V to 3.6 V)	15 pF (f _{OS} 66.7 MHz/2.7 to 3.6 V) 15 pF (f _{OS} 125 MHz/3.0 to 3.6 V)	3.0 ns Max. (20 % V _{DD} to 80 % V _{DD} , CL=Max.)	45 % to 55 % (50 % V _{DD} , CL=15 pF, V _{DD} =3.0 V to 3.6 V, f _{OS} 40 MHz) 40 % to 60 % (50 % V _{DD} , CL=15 pF, V _{DD} =3.0 V to 3.6 V, f _{OS} 125 MHz) ↑ (50 % V _{DD} , CL=15 pF, V _{DD} =2.7 V to 3.6 V, f _{OS} 66.7 MHz)	OE
		SC			4.0 ns Max. (20 % V _{DD} to 80 % V _{DD} , CL=Max.)	ST		

■SG-8002 series and HG-8002 series

■PLL-PLL connection

Because we use a PLL technology, there are a few cases that the jitter value will increase when SG-8002 is connected to another PLL-oscillator.

In our experience, we are unable to recommend these products for the applications such as telecom carrier use or analog video clock use. Please be careful checking in advance for these application (Jitter specification is Max.250 ps/CL=15 pF)

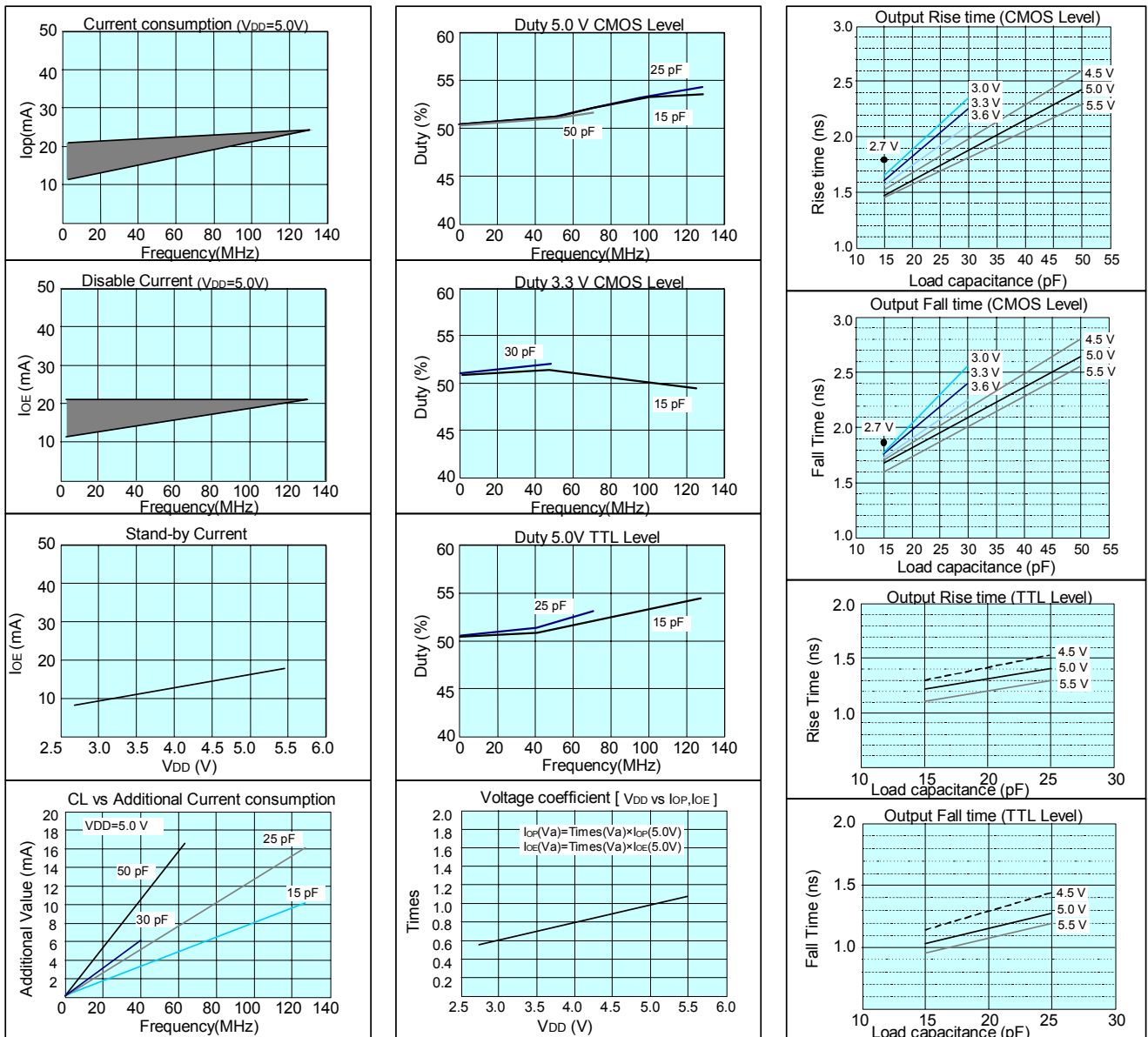
■Remarks on noise management for power supply line

We do not recommend inserting filters or other devices in the power supply line as the counter measure of EMI noise reduction. This device insertion might cause high-frequency impedance high in the power supply line and it affects oscillator stable drive. When this measure is required, please evaluate circuitry and device behavior in the circuit and verify that it will not affect oscillation. Start up time (0 % VDD to 90 % VDD) of power source should be more than 150 μ s.

■Jitter Specifications

Model	Operating Voltage	Jitter Item	Specifications	Remarks
PT / PH ST / SH	5 V \pm 0.5 V	Cycle to cycle	150 ps Max.	33 MHz \leq f ₀ \leq 125 MHz, C _L =15 pF
			200 ps Max.	1.0 MHz \leq f ₀ < 33 MHz, C _L =15 pF
		Peak to peak	200 ps Max.	33 MHz \leq f ₀ \leq 125 MHz, C _L =15 pF
			250 ps Max.	1.0 MHz \leq f ₀ < 33 MHz, C _L =15 pF
SC / PC	3.3 V \pm 0.3 V	Cycle to cycle	200 ps Max.	1.0 MHz \leq f ₀ \leq 125 MHz, C _L =15 pF
		Peak to peak	250 ps Max.	1.0 MHz \leq f ₀ \leq 125 MHz, C _L =15 pF

■SG-8002 series Characteristics chart



ENERGY SAVING EPSON

EPSON offers effective savings to its customers through a wide range of electronic devices, such as semiconductors, liquid crystal display (LCD) modules, and crystal devices. These savings are achieved through a sophisticated melding of three different efficiency technologies.

Power saving technology provides low power consumption at low voltages.

Space saving technology provides further reductions in product size and weight through super-precise processing and high-density assembly technology.

Time saving technology shortens the time required for design and development on the customer side and shortens delivery times.

Our concept of Energy Saving technology conserves resources

by blending the essence of these three efficiency technologies. The essence of these technologies is represented in each of the products that we provide to our customers.

In the industrial sector, leading priorities include measures to counter greenhouse effect by reducing CO₂, measures to preserve the global environment, and the development of energy-efficient products. Environmental problems are of global concern, and although the contribution of energy-saving products by our customers through the utilization of our electronic devices, EPSON is committed to the conservation of energy, both for the sake of people and of the planet on which we live.

WORKING WITH ENVIRONMENTAL ISSUES

In 1988, Seiko Epson led in working to abolish CFCs, and perfect abolition of those ozone layer-destroying substances was achieved in 1992. In 1998, the 10th year of start of the CFC-free activity, Seiko Epson set this year as the "Second Environmental Benchmark Year" And established a new corporate General Environment Policy. Seiko Epson is tackling with environmental issues comprehensively.

At the end of Fiscal 1988, Seiko Epson succeeded in abolishing chloric solvents doubted to be harmful to human body. In fiscal 1999, Seiko Epson started the activity with a goal of abolishing lead solder. Pointed out possibility of environmental pollutant.



Co-existence Mark

The environmental mark symbolizing Epson's basic stance of "Co-existence With Nature". The design incorporates a fish, flower, and water, representing mutually supportive co-existence.

PROMOTION OF ENVIRONMENT MANAGEMENT SYSTEM CONFORMING INTERNATIONAL STANDARD

At 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.

In May 2001, all of our major manufacturing and non-manufacturing sites, in Japan and overseas, completed the acquisition of ISO 14001 certification.

In the future, new Group companies will be expected to acquire the certification around the third year of operations.



ISO14000 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

Seiko-Epson quickly began working to acquire company-wide ISO9000 series certification, and has acquired ISO9001 or ISO 9002 certification with all targeted products manufactured in Japanese and overseas plants.

The Quartz Device Operations Division (Ina Japan, EPM and SZE) have acquired QS-9000 certification, which are of higher Level.



QS-9000 is an enhanced standard for quality assurance systems formulated by leading U.S. automobile manufacturers based on the international ISO 9000 series.

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