Crystal oscillator

Epson Toyocom

CRYSTAL OSCILLATOR PROGRAMMABLE

SG-8002LB series

- •Frequency range Supply voltage
- : 1 MHz to 125 MHz : 3.3 V or 5.0 V
- : Output enable(OE) or Standby(ST)
- Function
- Thickness
- : 1.2 mm Max. •Short mass production lead time by PLL technology.

•SG-Writer available to purchase.

Please contact Epson Toyocom or local sales representative.



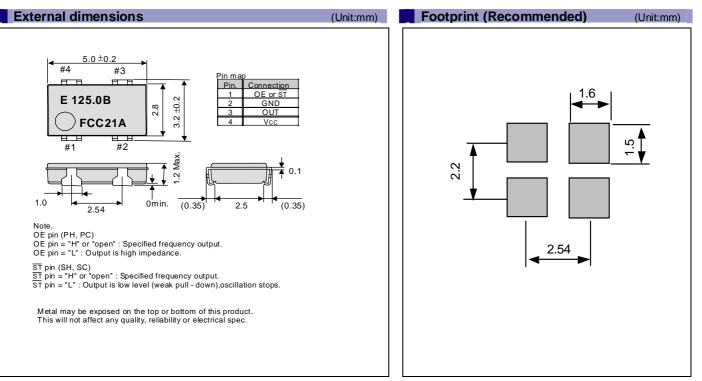
Specifications (characteristics)

ltem		Symbol	Specifications *2		Remarks	
			PH/SH	PC / SC	Remarks	
Output frequency range		fo	1 MHz to 80 MHz	—	Vcc=4.5 V to 5.5 V	
			—	1 MHz to 125 MHz	Vcc=3.0 V to 3.6 V	
			—	1 MHz to 66.7 MHz	Vcc=2.7 V to 3.6 V	
Supply voltage	•	Vcc	4.5 V to 5.5 V 2.7 V to 3.6 V			
Temperature	Storage temperature	T_stg	-40 °C to	o +125 ℃	Store as bare product after unpacking	
range	Operating temperature	T_use	-20 °C to +70 °C (-40 °C to +85 °C)		Refer to "Outline specifications" (Frequency range)	
			B: ±50 × 10 ⁻⁶ ,C: ±100 × 10 ⁻⁶		-20 °C to +70 °C	
Frequency tole	erance	f_tol	M: ±100 × 10 ⁻⁶ *3		-40 °C to +85 °C	
			L: $\pm 50 \times 10^{-6}$		-40 °C to +85 °C, Vcc ±5 % *3	
Current consu	motion	lcc	30 mA Max.	_	No load condition, fo=80 MHz	
Current consu	Inplion	ICC	—	28 mA Max.	No load condition, fo=125 MHz	
Disable current		ا مانه	25 mA Max.	_	P Type only, fo=80 MHz	
Disable curren	L	I_dis	—	16 mA Max.	P Type only, fo=125 MHz	
Stand-by curre	nt	L_std	50 μA Max.		S Type only, ST =GND	
Symmetry *1		SYM	40 % to 60 %	—	50 % Vcc, L_CMOS=15 pF, ≤80 MHz	
			45 % to 55 %	_	50 % Vcc, L_CMOS=25 pF, ≤50 MHz	
			—	40 % to 60 %	50 % Vcc, L_CMOS=15 pF, Vcc=3.0 V to 3.6 V, ≤125 MHz	
			—	40 % to 60 %	50 % Vcc, L_CMOS=15 pF, Vcc=2.7 V to 3.6 V, ≤66.7 MHz	
			—	45 % to 55 %	50 % Vcc, L_CMOS=15 pF, Vcc=3.0 V to 3.6 V, ≤40 MHz	
High output vo	Itage	Voн	Vcc-0.4 V Min.		юн=-16 mA(PH,SH),-8 mA(PC,SC)	
Low output voltage		Vol	0.4 V Max.		IOL = 16 mA(PH,SH), 8 mA(PC,SC)	
Output load condition(CMOS) *1		L_CMOS	15 pF Max.		Max. frequency and Max. supply voltage	
Output enable / disable		VIH	2.0 V Min.	70 % Vcc Min.	ST terminal or OE terminal	
input voltage		VIL	0.8 V Max. 20 % Vcc Max.			
Rise time / Fall time *1		tr / tf	3 ns Max.		20 % Vcc to 80 % Vcc level, L_CMOS=Max.	
Start-up time		t_str	10 ms Max.		Time at minimum supply voltage to be 0 s	
Frequency aging		f_aging	\pm 5 $ imes$ 10 ^{.6} / year Max.		+25 °C, Vcc=5.0 V/ 3.3 V (PC / SC) First year	

Operating temperature (-40 °C to +85 °C), the available frequency, symmetry and output load conditions, please refer to "Outline specifications" page. PLL-PLL connection & Jitter specification, please refer to "Jitter specifications and characteristics chart" page.

*2

*3 PH,SH for "M" tolerance and "L" tolerance will be available up to 27 MHz. Checking possible by the Frequency checking program.





SG-8002 Series_ Outline of specifications

ltem		Current Consump	Supply	Output load condition	Output rise time	Symmetry	Function	
Model		tion	Voltage		Output fall time			
SG-8002LB	PH SH	30 m.A Max.	4.5 V to 5.5 V	15 pF	3.0 ns Max. (20 % V∞ to 80 % V∞,L_CMOS=Max.)	40 % to 60 %(50 % V∞, L_CMOS=15 pF, fi≤80 MHz/-40 °C to+85 °C)	OE ST	
(SOJ 4-pin)		28 m.A Max.	3.0 V to 3.6 V (2.7 V to 3.6 V)	15 pF	3.0 ns Max. (20 % Vcc to 80 % Vcc, L_CMOS=Max.)	45 % to 55 %(50 % V∞, L_CMOS=15 pF, V∞=3.0 V to 3.6 V, fi∞40 MHz) 40 % to 60 %(50 % V∞, L_CMOS=15 pF, V∞=3.0 V to 3.6 V, fi∞125 MHz) ↑ (50 % V∞, L_CMOS=15 pF, V∞=2.7 V to 3.6 V, fi∞66.7 MHz)	OE ST	
SG-8002CA (SON)	PT	-	45V1055V	5 TTL+15 pF (fo≤125 MHz/-20 °C to+70 °C) 25 pF (fo≤66.7 MHz/-20 °C to+70 °C) 5 TTL+15 pF (fo≤40 MHz/-40 °C to +85 °C)	2.0 ns Max. (0.8 V to 2.0 V,L_CMOS or L_TTL=Max.) 4.0 ns Max.	45 % to 55 %(1.4 V, L_TTL=5 TTL+15 pF, f∞56.7 MHz/-20 °C to +70 °C) ↑ (1.4 V, L_TTL=5 TTL+15 pF, f∞40.0 MHz/-40 °C to +85 °C) 40 % to 60 %(1.4 V, L_TTL=5 TTL+15 pF, f∞125 MHz/-20 °C to +70 °C)	OE	
SG-8002JA	ST	45 m.A Max.		15 pF(fc≤55 MHz/-40 °C to +85 °C)	(0.4 V to 2.4 V,L_CMOS or L_TTL=Max.)	↑ (1.4 V, L_CMOS=25 pF, fi∞66.7 MHz/20 °C to +70 °C) ↑ (1.4 V, L_CMOS=15 pF, fi∞55.0 MHz/40 °C to +85 °C) 45 % to 55 %(50 % Vcc, L CMOS=25 pF, fi∞66.7 MHz/20 °C to +70 °C)		
(SOJ 4-pin) SG-8002DB (DIP 14-pin)	PH SH			25 pF (fcs125 MHz/-20 °C to+70 °C) 50 pF (fcs66.7 MHz/-20 °C to+70 °C) 15 pF (fcs55 MHz/-40 °C to+85 °C) 25 pF (fcs40 MHz/-40 °C to+85 °C)	3.0 ns Max. (20 % V∞ to 80 % V∞,L_CMOS≤25) 4.0 ns Max. (20 % V∞ to 80 % V∞,L_CMOS=Max.)			
SG-8002DC (DIP 8-pin)	PC SC	28 m.A Max.	3.0 V to 3.6 V (2.7 V to 3.6 V)	15 pF (fi∞66.7 MHz/2.7 to 3.6 V) 15 pF (fi∞125 MHz/3.0 to 3.6 V) 30 pF (fi∞40 MHz/3.0 to 3.6 V)	3.0 ns Max. (20 % V∞ to 80 % V∞,L_CMOS≤15) 4.0 ns Max.	1 (50 % Voc, L _CMOS=15 pr, 10:53.0 km2/40 € 10 + 56 € 7.540 MHz) 45 % to 55 %(50 % Voc, L_CMOS=30 pr, Voc=3.0 V to 3.6 V, fix40 MHz) 40 % to 60 %(50 % Voc, L_CMOS=15 pr, Voc=3.0 V to 3.6 V, fix4125 MHz) 1 (50 % Voc, L_CMOS=15 pr, Voc=2.7 V to 3.6 V, fix46 6.7 MHz)	OE ST	
	PT			5TTL + 15 pF (fo≤90 MHz/-20 to+70 °C) 15 pF (fo≤125 MHz/-20 °C to +70 °C)	(20 % V∞ to 80 % V∞,L_CMOS=Max.) 2.0 ns Max. (0.8 V to 2.0 V,L_CMOS or L_TTL=Max.)	45 % to 55 %(1.4 V,L_TTL=5 TTL+15 pF, fi≤66.7 MHz/-20 °C to+70 °C) 40 % to 60 %(1.4 V,L_TTL=5 TTL+15 pF, fi≤90.0 MHz/-20 °C to+70 °C)		
	ST	45 mA Max. 4.5 V to 5.5 V	25 pF (f₀≤66.7 MHz/-20 °C to+70 °C)	4.0 ns Max. (0.4 V to 2.4 V,L_CMOS or L_TTL=Max.)	↑ (1.4 V,L_OMOS=25 pF, fcs66.7 MHz/-20 °C to +70 °C) ↑ (1.4 V,L_OMOS=15 pF, fc≤125 MHz/-20 °C to +70 °C)			
SG-8002JC (SOJ 4-pin)	PH SH		15 pF (f₀≤125 MHz/-20 °C to+70 °C) 25 pF (f₀≤90 MHz/-20 °C to+70 °C) 50 pF (f₀≤66.7 MHz/-20 °C to+70 °C)	3.0 ns Max. (20 % V∞ to 80 % V∞,L_CMOS≤25) 4.0 ns Max. (20 % V∞ to 80 % V∞,L_CMOS=Max.)	45 % to 55 %(50 % Vcc, L_CMOS=25 pF, fss66.7 MHz/-20 °C to +70 °C) 40 % to 60 %(50 % Vcc, L_CMOS=15 pF, fss125 MHz/-20 °C to +70 °C) ↑ (50 % Vcc, L_CMOS=25 pF, fss90 MHz/-20 °C to +70 °C) ↑ (50 % Vcc, L_CMOS=50 pF, fss50 MHz/-20 °C to +70 °C)			
	PC _{28 r} SC ^{Ma}		3.0 V to 3.6 V (2.7 V to 3.6 V)	15 pF (fi∞66.7 MHz/2.7 to 3.6 V) 15 pF (fi∞125 MHz/3.0 to 3.6 V) 30 pF (fi∞40 MHz/3.0 to3.6 V)	3.0 ns Max. (20 % V∞ to 80 % V∞,L_CMOS≤15) 4.0 ns Max.	1 (30 % Vo; L_CMOS=30 pF; Vo; 3.0 Vto 3.6 V, fo:40 MHz) 45 % to 55 %(50 % Vo;, L_CMOS=30 pF; Vo;=3.0 Vto 3.6 V, fo:40 MHz) 40 % to 60 %(50 % Vo;, L_CMOS=15 pF; Vo;=3.0 Vto 3.6 V, fo:4125 MHz) 1 (50 % Vo;, L_CMOS=15 pF; Vo;=2.7 V to 3.6 V, fo:46.7 MHz)	OE ST	
	PT			15 pF (fi≪125 MHz/-20 °C to +70 °C) 25 pF (fi≪66.7 MHz/-20 °C to+70 °C)	(20 % V∞ to 80 % V∞ ,L_CMOS=Max.) 2.0 ns Max. (0.8 V to 2.0 V,L_CMOS≤25)	45 % to 55 %(1.4 V, L_TTL=5 TTL+15 pF, fi≤66.7 MHz/-20 °C to +70 °C) 40 % to 60 %(1.4 V, L_TTL=5 TTL+15 pF, fi≤60.7 MHz/-20 °C to +70 °C) 1 (1.4 V, L_CMOS=25 pF, fi≤66.7 MHz/-20 °C to +70 °C)	OE	
SG-8002JF (SOJ 4-pin)	ST	45 mA 4.5 V to 5.5 V Max.	5TTL + 15 pF (f₀≤ 90 MHz/-20 °C to +70 °C) 15 pF (f₀≤40 MHz/-40 °C to +85 °C)	4.0 ns Max. (0.4 V to 2.4 V,L_CMOS or L_TTL=Max.)	↑ (1.4 V, L_CMOS=15 pF, fi≤125 MHz/-20 °C to +70 °C) ↑ (1.4 V, L_CMOS=15 pF, fi≤40 MHz/-40 °C to +85 °C) 45 % to 55 %(50 % V∞, L_CMOS=25 pF, fi≤66.7 MHz/-20 °C to +70 °C) 40 % to 60 %(50 % V∞, L_CMOS=25 pF, fi≤90.0 MHz/-20 °C to +70 °C) ↑ (50 % V∞, L_CMOS=50 pF, fi≤50.0 MHz/-20 °C to+70 °C) t (50 % V∞, L_CMOS=50 pF, fi≤50.0 MHz/-20 °C to+70 °C)			
	PH		15 pF (fi≤125 MHz/-20 °C to+70 °C) 25 pF (fi≤90 MHz/-20 °C to+70 °C) 50 pF (fi≤50 MHz/-20 °C to+70 °C)	3.0 ns Max. (20 % Vcc to 80 % Vcc,L_CMOS≤25) 4.0 ns Max.				
	SH			15 pF (f₀≤40 MHz/-40 °C to+85 °C)			(20 % V∞ to 80 % V∞,L_CMOS=Max.) 3.0 ns Max.	
	PC SC	28 m.A Max.	3.0 V to 3.6 V (2.7 V to 3.6 V)	15 pF(fi≤66.7 MHz/2.7 to 3.6 V) 15 pF(fi≤125 MHz/3.0 to 3.6 V) 30 pF(fi≤40 MHz/3.0 to 3.6 V)	3.0 ns Max. (20 % V∞ to 80 % V∞,L_CMOS≤15) 4.0 ns Max. (20 % V∞ to 80 % V∞,L_CMOS=Max.)	45 % to 35 %(50 % V∞, CL=30 pF, V∞=3.0 V to 3.6 V, to≤40 MHZ) 40 % to 60 %(50 % V∞, CL=15 pF, V∞=3.0 V to 3.6 V, ft≤125 MHz) ↑ (50 % V∞, CL=15 pF, V∞=2.7 V to 3.6 V, ft≤66.7 MHz)	OE ST	
SG-8002CE (SON)	PT			5 TTL+15 pF (fo≤125 MHz/-20 °C to + 70 °C)	2.0 ns Max. (0.8 V to 2.0 V,L_TTL=Max.)	45 % to 55 %(1.4 V, L_TTL=5 TTL+15 pF, fi≤66.7 MHz/-20 °C to +70 °C) ↑ (1.4 V, L_TTL=5 TTL+15 pF, fi≤27.0 MHz/-40 °C to + 85 °C)	OE	
	ST PH	40 mA Max. 4.5 V to 5.5 V	5 TTL+15 pF (fo≤27 MHz/-40 °C to +85 °C) 15 pF (fo≤125 MHz/-20 °C to +70 °C)	4.0 ns Max. (0.4 V to 2.4 V,L_TTL=Max.)	40 % to 60 %(1.4 V, L_TTL=5 TTL+15 pF, fs≤125 MHz/-20 °C to +70 °C) 45 % to 55 %(50 % V∞, L_CMOS=25 pF, fs≤6.7 MHz/-20 °C to +70 °C)	ST OE		
	SH	1		25 pF (fs≤100 MHz/-20 °C to +70 °C) 25 pF (fs≤100 MHz/-20 °C to +85 °C)	3.0 ns Max. (20 % V∞ to 80 % V∞ ,L_CMOS=Max.)	↑ (50 % Vcc, L_CMOS=25 pF, f₀≤27.0 MHz/-40 °C to + 85 °C) 40 % to 60 %(50 % Vcc, L_CMOS=15 pF, f₀≤125 MHz/-20 °C to +70 °C)		
	PC SC	28 m.A Max.	3.0 V to 3.6 V (2.7 V to 3.6 V)	15 pF (fً∞≤66.7 MHz/2.7 to 3.6 V) 15 pF (fُ∞≤125 MHz/3.0 to 3.6 V)	3.0 ns Max. (20 % V∞ to 80 % V∞, L_CMOS=Max.)	45 % to 55 %(50 % V∞, L_CMOS=15 pF, V∞=3.0 V to 3.6 V, f∞=40 MHz) 40 % to 60 %(50 % V∞, L_CMOS=15 pF, V∞=3.0 V to 3.6 V, f∞=125 MHz) ↑ (50 % V∞, L_OMOS=15 pF, V∞=2.7 V to 3.6 V, f∞=66.7 MHz)	OE ST	

► TABLE OF FREQUENCY RANGE

Model		Supply voltage	Frequency tolerance Operating Temperature	Frequency 1	/ MHz	50 MHz	100 M Hz	125 MHz
SG-8002CE	PT/ ST	4.5 V to 5.5 V	B,C	1.0 MHz				125 MHz
	PH/ SH		М	1.0 MHz		27 MHz		
	PC/SC	3.0 V to 3.6 V (2.7 V to 3.6 V)	B,C,M	1.0 MHz	*2.7 \	/ to 3.6 V : 1.0 MHz t	o 66.7 MHz	125 MHz
	DUVOU	5.0 V±0.5 V	B,C	1.0 MHz			80 MH z	
	PH/ SH		M,L	1.0 MHz		27 MHz		
SG-8002LB	PC/SC	3.3 V±0.3 V	B,C,M,L	1.0 MHz	*2.7 V	′ to 3.6 V : 1.0 MHz to	0 66.7 MHz	125 MHz
	PT/ST		B,C	1.0 MHz				125 MHz
00 0000 15	PH/ SH	4.5 V to 5.5 V	М	1.0 MHz		40 MHz		
SG-8002JF	PC SC	3.0 V to 3.6 V (2.7 V to 3.6 V)	B,C,M	1.0 MHz	*2.7 \	/ to 3.6 V : 1.0 MHz t	o 66.7 MHz	125 MHz
SG-8002CA	PT/ST		B,C	1.0 MHz				125 MHz
SG-8002JA	JA PH/SH	4.5 V to 5.5 V	М	1.0 MHz		55 MH z		
SG-8002DB SG-8002DC	PC/SC	3.0 V to 3.6 V (2.7 V to 3.6 V)	B,C,M	1.0 MHz	*2.7 \	/ to 3.6 V : 1.0 MHz t	o 66.7 MHz	125 MHz
SG-8002JC	PT/ST PH/SH	4.5 V to 5.5 V	B C	1.0 MHz				125 MHz
	PC/SC	3.0 V to 3.6 V (2.7 V to 3.6 V)	B C	1.0 MHz	*2.7	/ to 3.6 V : 1.0 MHz t	o 66.7 MHz	125 MHz

Frequency tolerance : B:±50×10⁻⁶(-20 °C to +70 °C), C:±100×10⁻⁶ (-20 °C to +70 °C), M:±100×10⁻⁶ (-40 °C to +85 °C), L:±50×10⁻⁶ (-40 °C to +85 °C)



SG / HG-8002 series_ Jitter specifications and characteristics chart

■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)

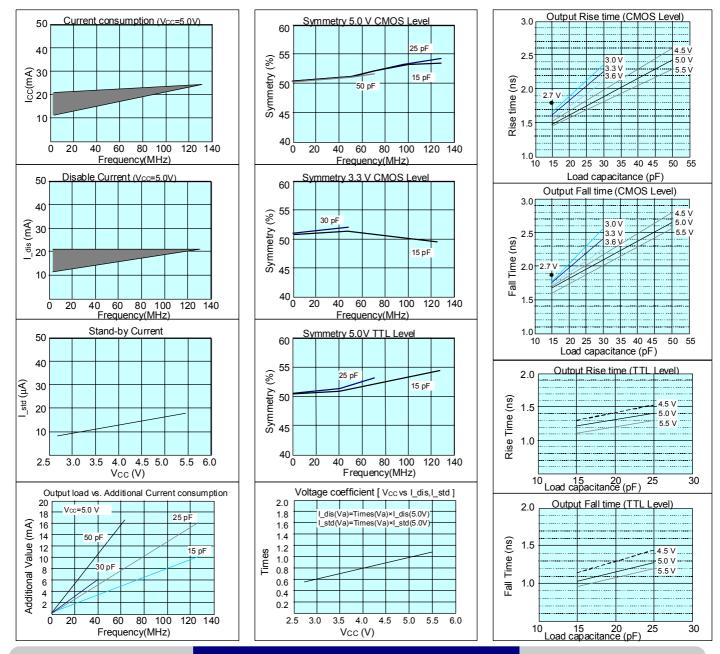
Jitter Specifications

Model	Supply Voltage	Jitter Item	Specifications	Remarks
PT / PH ST / SH	5.0 V ±0.5 V	Cycle to cycle	150 ps Max.	33 MHz \leq fo \leq 125 MHz, L_CMOS=15 pF
			200 ps Max.	1.0 MHz \leq fo < 33 MHz, L CMOS=15 pF
		Peak to peak	200 ps Max.	33 MHz \leq fo \leq 125 MHz, L_CMOS=15 pF
			250 ps Max.	1.0 MHz ≤ fo < 33 MHz, L_CMOS=15 pF
SC / PC	3.3 V ±0.3 V	Cycle to cycle	200 ps Max.	1.0 MHz \leq fo \leq 125 MHz, L_CMOS=15 pF
		$C \qquad 3.3 \vee \pm 0.3 \vee$	Peak to peak	250 ps Max.

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 % Vcc to 90 % Vcc) of power source should be more than 150 μ s.

■SG-8002 series Characteristics chart



http://www.epsontoyocom.co.jp

"QMEMS" EPSON TOYOCOM

In order to meet customer needs in a rapidly advancing digital, broadband and ubiquitous society, we are committed to offering products that are one step ahead of the market and a rank above the rest in quality. To achieve our goals, we follow a "3D (three device) strategy" designed to drive both horizontal and vertical growth. We will to grow our three device categories of "Timing Devices", "Sensing Devices" and "Optical Devices", and expand vertical growth through a combination of products from these categories.

A Quartz MEMS is any high added value quartz device that exploits the characteristics of quartz crystal material but that is produced using MEMS (micro-electro-mechanical system) processing technology.

Market needs are advancing faster than previously imagined toward smaller, more stable crystal products, but we will stay ahead of the curve by rolling out products that exceed market speed and quality requirements. We want to further accelerate the 3D strategy by QMEMS. Quartz devices have become crucial in the network environment where products are increasingly intended for broadband, ubiquitous applications and where various types of terminals can transfer information almost immediately via LAN and WAN on a global scale. Epson Toyocom Corporation addresses every single aspect within a network environment. The new corporation offers "Digital Convergence" solutions to problems arising with products for consumer use, such as, core network systems and automotive systems.



PROMOTION OF ENVIRONMENTAL MANAGEMENT SYSTEM CONFORMING TO INTERNATIONAL STANDARDS

At Epson Toyocom, 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.

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 laver and global deforestation

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.

WORKING FOR HIGH QUALITY

In order provide high quality and reliable products and services than meet customer needs,

Epson Toyocom 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.

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

 $\rm ISO/TS$ 16949 is a global standard based on QS-9000, a severe standard corresponding to the requirements from the automobile industry.

Explanation of the mark that are using it for the catalog

Pb Free	 ▶ Pb free. ▶ Complies with EU RoHS directive.
Rolls	 Pb free terminal designed. Contains Pb in products exempted by RoHS directive. (Contains Pb in sealing glass, high melting temperature type solder or other.) Complies with EU RoHS directive.
For Automotive	► The products have been designed for high reliability applications such as Automotive.

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- 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 Epson Toyocom 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.
- In this new crystal master for Epson Toyocom, product codes and markings will remain as previously identified prior to the merger. Due to the on-going strategy of gradual unification of part numbers, please review product codes and markings, as they will change during the course of the coming months.

We apologize for the inconvenience, but we will eventually have a unified part numbering system for Epson Toyocom that will be user friendly.