Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

EPSON
EXCEED YOUR VISION

America

Epson America, Inc.
Headquarter:
3840 Kilroy Airport Way
Long Beach, California 90806-2452 USA
Phone: +1-562-290-4677

San Jose Office:
214 Devcon Drive
San Jose, CA 95112 USA
Phone: +1-800-228-3964 or +1-408-922-0200

Europe

Epson Europe Electronics GmbH
Riesstrasse 15, 80992 Munich, Germany
Phone: +49-89-14005-0 FAX: +49-89-14005-110

Asia

Epson (China) Co., Ltd.
4th Floor, Tower 1 of China Central Place, 81 Jianguo Road, Chaoyang District, Beijing 100025 China
Phone: +86-10-8522-1199 FAX: +86-10-8522-1120

Shanghai Branch
Room 1701 & 1704, 17 Floor, Greenland Center II,
562 Dong An Road, Xu Hui District, Shanghai, China
Phone: +86-21-5330-4888 FAX: +86-21-5423-4677

Shenzhen Branch
Room 804-805, 8 Floor, Tower 2, Ali Center, No.3331
Keyuan South RD(Shenzhen bay), Nanshan District, Shenzhen 518054, China
Phone: +86-10-3299-0588 FAX: +86-10-3299-0560

Epson Taiwan Technology & Trading Ltd.
15F., No. 100, Songren Rd., Sinyi Dist., Taipei City 110. Taiwan
Phone: +886-2-8786-6688

Epson Singapore Pte., Ltd.
1 HarbourFront Place, #03-02 HarbourFront Tower One, Singapore 098633
Phone: +65-6586-5500 FAX: +65-6271-3182

Seiko Epson Corp.
Korea Office
19F, KLI 63 Bldg., 60 Yoido-dong, Youngdeungpo-Ku, Seoul 150-763, Korea
Phone: +82-2-784-6027 FAX: +82-2-767-3677

SEIKO EPSON CORP.
SALES & MARKETING DIVISION

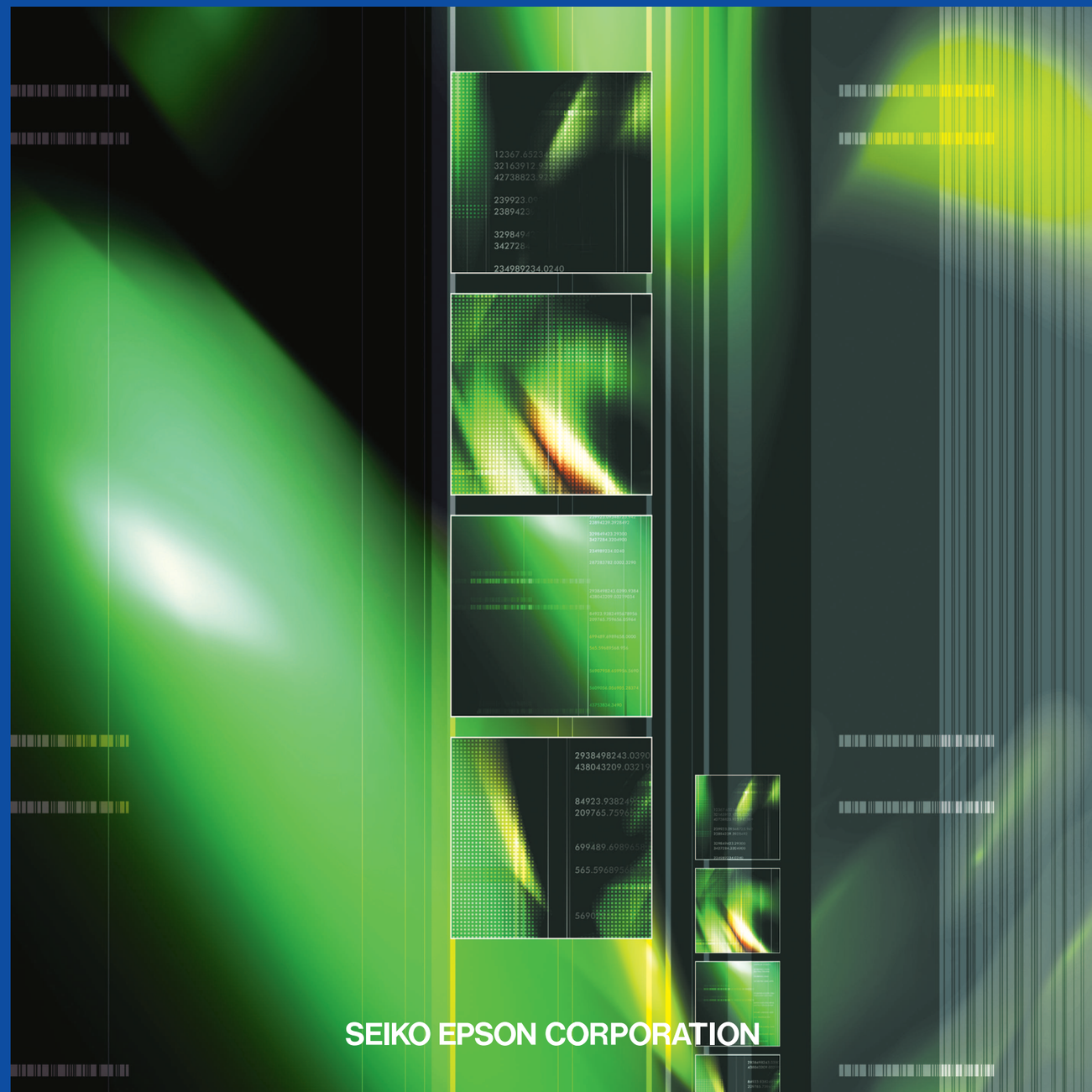
Device Sales & Marketing Department
421-8, Hino, Hino-shi, Tokyo 191-8501, Japan
Phone: +81-42-587-5816 FAX: +81-42-587-5116

EPSON semiconductor website global.epson.com/products_and_drivers/semicon/

Document code : 701078825
First Issue April 2002
Revised March 2018 in JAPAN (F)

Microcontrollers

2018



SEIKO EPSON CORPORATION

MCUs

Business Concept

Expanding use of smartphones and tablets is giving broadband internet and wireless communications even greater roles in our daily lives, and making the arrival of the ubiquitous network society an inevitable reality. In particular, semiconductors for use in portable devices, information terminals, in-vehicle devices and FA devices are expected to provide higher performance in terms of thinner structure, lighter weight, and longer operation with limited power supply. We have been focusing on the creation of compact, low-power semiconductors since we started the development of CMOS LSI for watches in 1969. Since then, we have steadily built up our expertise in energy-saving, space-saving, and time-saving designs. This has enabled us to quickly obtain the semiconductor development technology needed to meet the demands of the new era of ubiquitous networks. Our concept is to develop "saving technologies" to reduce power consumption, development times, and implementation space. Our goal is to be a true partner for you, providing you with strategic advantages, enhancing your customer value based on our "saving technologies" and mixed analog/digital technologies that we have cultivated, as well as our design capabilities, manufacturing capabilities and stable supply that can satisfy your detailed requirements.

Environmental Responsibility

Epson semiconductor technology provides environmental value to customers by creating and manufacturing eco-friendly products.
1) We Epson's products are surely complying with the Eu-RoHS (2011/65/EU) Directive.
2) We are releasing information about the containing chemical substances of products at web-site.
Product of QFP & BGA are described in the following URL.
global.epson.com/products_and_drivers/semicon/information/package_lineup.html *Some products are excluded.

Environmental management system third party certification status
ISO14001
Type of certification : ISO 14001: 2004, JIS Q 14001: 2004
Awarded to : TOHOKU EPSON CORPORATION, SEIKO EPSON CORPORATION (Fujimi Plant, Suwa Minami Plant)
Certified by : Bureau Veritas Japan Co., Ltd.
Date of certification : April 3, 1999

Type of certification : ISO 14001: 2004
Awarded to : Singapore Epson Industrial Pte. Ltd.
Certified by : SGS
Date of certification : Jan 12, 1999

Epson's Quality Policy

Keeping the customer in mind at all times, we make the quality of our products and services our highest priority. From the quality-assurance efforts of each employee to the quality of our company as a whole, we devote ourselves to creating products and services that please our customers and earn their trust.
Epson has acquired ISO9001, IATF16949 and ISO/TS16949 certification with its IC, module and their application products.

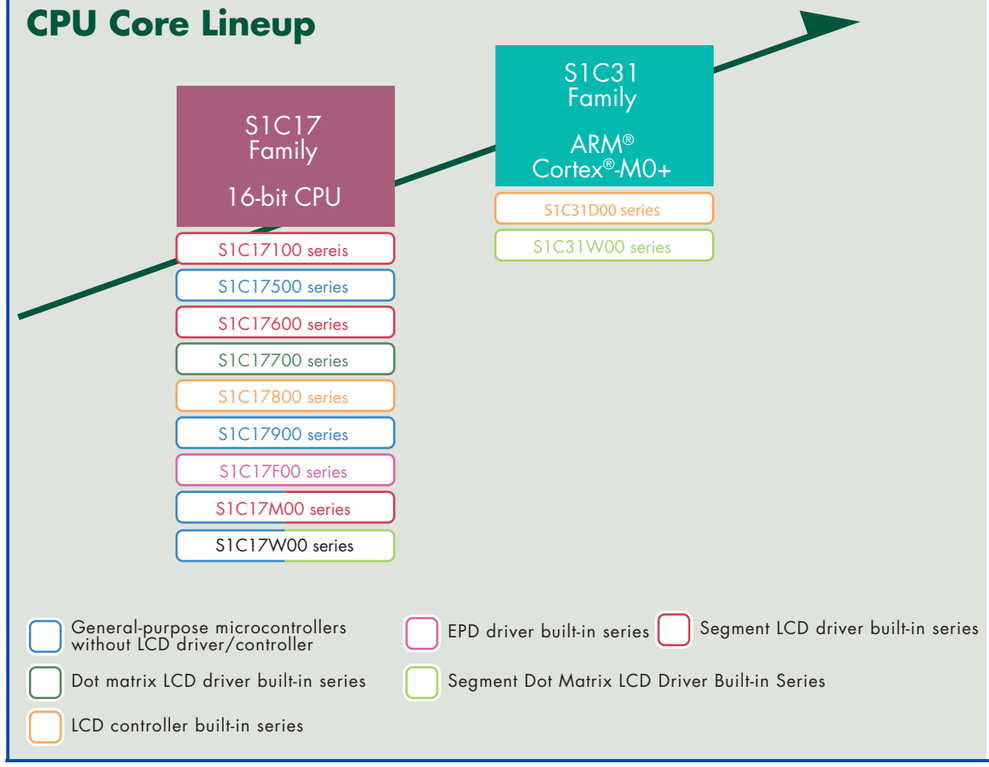
Quality Management system third party certification status
ISO9001
Type of Certification : ISO9001: 2015 , JIS Q 9001: 2015
Awarded to : TOHOKU EPSON CORPORATION, SEIKO EPSON CORPORATION (Fujimi Plant, Suwa Minami Plant, Hino Office)
Certified by : Bureau Veritas Japan Co., Ltd.
Certificate No. : 3762381
Initial Date of Certification : October 10, 1993

Type of Certification : ISO9001: 2008
Awarded to : Singapore Epson Industrial Pte. Ltd.
Certified by : SGS
Certificate No. : SG03/00011
Initial Date of Certification : February 4, 2003

IATF16949, ISO/TS16949
Type of Certification : IATF16949:2016
Awarded to : TOHOKU EPSON CORPORATION, SEIKO EPSON CORPORATION (Fujimi Plant, Suwa Minami Plant, Hino Office), EPSON EUROPE ELECTRONICS GmbH
Certified by : Bureau Veritas Japan Co., Ltd.
Certificate No. : 281371
Initial Date of Certification : Dec 9, 2017

Type of Certification : ISO/TS16949:2009
Awarded to : Singapore Epson Industrial Pte. Ltd.
Certified by : SGS
Certificate No. : SG07/00021
Initial Date of Certification : June 7, 2007
*Scheduled to acquire IATF certification in 2018

CPU Core Lineup

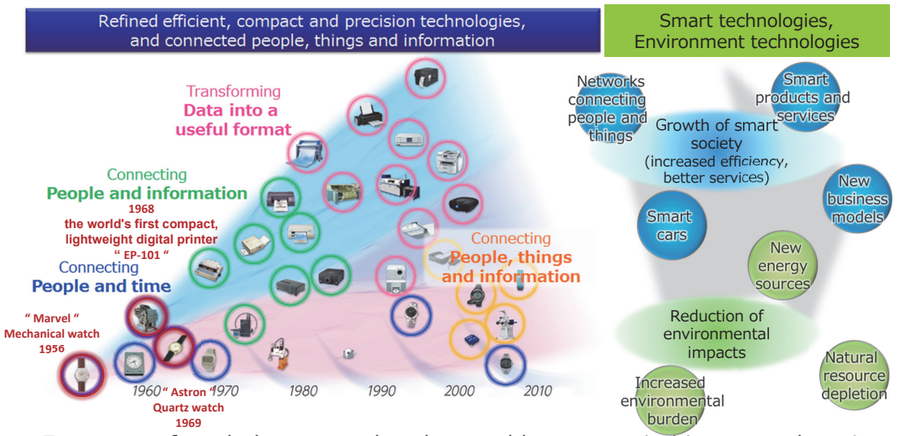


C O N T E N T S

History of Epson semiconductor 4-5
Deployment of Epson microcontroller products
Epson microcontroller application examples 6-7
Features of Epson microcontrollers 8-9
S1C31 Family ARM® microcontrollers 10-11
S1C17 Family 16-bit microcontrollers 12-23
Epson MCU website 24-25
Development environments 26-29
Flash memory writing 30-31
Package lineup 32-33

History of Epson semiconductor

Business Environment and Mega Trends

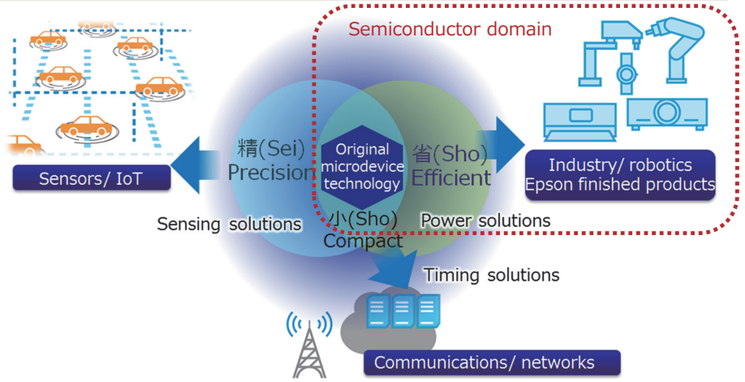


- Epson was founded as a watchmaker, and has expanded business domain from home products to office, commerce and industry
  - Epson has provided value of connecting people to things and information
- Epson will provide "smart technology" and the "environment technologies"
  - such as autonomous robots, wearable equipment, and office papermaking system named PaperLab

The role of Microdevices Div. and Semiconductor domain

Microdevices Vision and Strategy: Supporting the Four Innovations

Contribute to Epson's finished products and to the development of smart communications, power, transportation and manufacturing systems with advanced Epson quartz timing and sensing solutions and low-power semiconductor solutions.

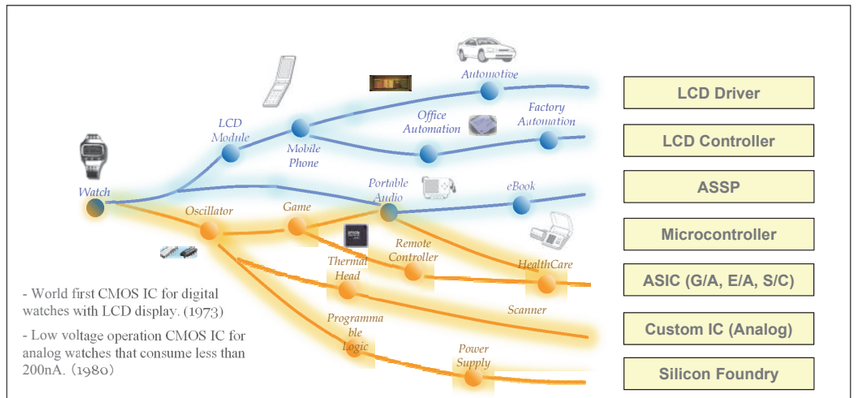


Semiconductor business contribute to the value creation of the Epson finished product, by advanced "Power Saving" solutions.

History of Epson Semiconductor

History of Epson Semiconductor's Technology

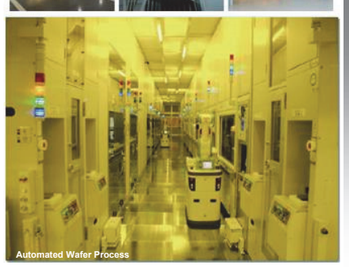
As the semiconductor division of "worldwide watch maker SEIKO", EPSON semiconductor business has expanded into LCD Drivers, ASICs and MCUs from IC for Watches.
These businesses are all based on Epson's energy-saving technology.



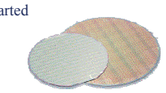
- World first CMOS IC for digital watches with LCD display. (1973)
- Low voltage operation CMOS IC for analog watches that consume less than 200nA. (1980)

Energy-Saving Technology ; Technology that reduces power consumption from both sides of process and circuit have been nurtured by Epson over 40 years since division was founded.

Epson Semiconductor's History



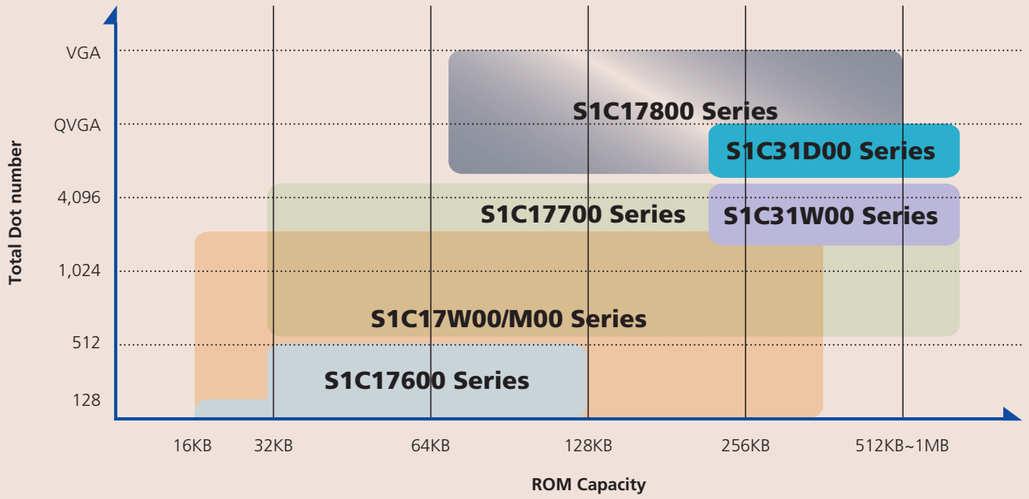
1969	Development of CMOS IC for watches started
1973	CMOS IC production started in Headquarter
1980	Fujimi plant (B-wing, 4 inch) operation started
1984	A-wing (5 inch) operation started
1985	D-wing (6 inch) operation started



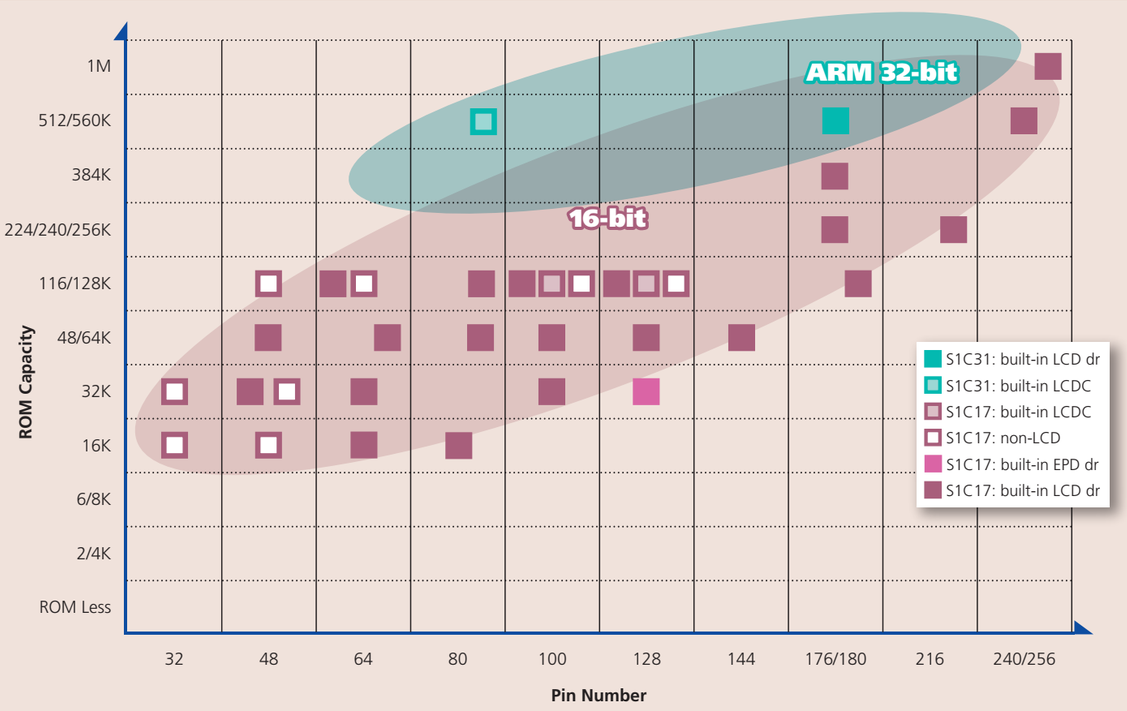
1991	Sakata plant (S-wing,6 inch) operation started
1993	ISO9000 series certified
1994	Singapore assembly plant (SEP) operation started
1997	T-wing (8 inch, Sakata) operation started
	ISO14001 certified
2001	T-wing manufacturing line expanded
2006	ISO/TS16949 certified
2010	Microdevices Operations Division started

Deployment of Epson microcontroller products

Allowing for display control of a wide range of small- to large-sized panels



Providing package types suitable for a range of applications



Epson microcontroller application examples

MCUs

For electronic paper devices

OTP cards, logistics / price tags, etc.

The built-in drivers suitable for electronic paper display drive and thermal sensors can not only drive displays but also correct the effect on display quality under thermal chracteristics. The characteristics of electronic paper display can be obtained for the best with one chip.

■ Suitable models : S1C17F00 / S1D14F00 series

For remote control devices

Air conditioners, TV sets, audio devices, lavatories with spray functions, multifunctional remote controllers, wall type remote controllers, etc.

The LCD driver that supports segments or dot-matrix displays, and the internal voltage regulator circuit provide various resolutions of “user-friendly displays” that are not affected by reduced battery voltage levels. The remote control circuit can easily generate carrier signals and provides remote control functions with a small number of part items. Low power consumption feature contributes to extended battery life.

■ Suitable models : S1C17W00/S1C17M00/S1C17100/S1C17500/S1C17600/S1C17700/S1C17800 series

For home appliances

Rice cookers, washing machines, microwave ovens, coffee machines, etc.

The built-in LCD controller provides different types of displays from monochrome to up to the STN VGA class. Features such as touch panel, dial input, and audio guidance can be realized, greatly improving the user interface of your products.

■ Suitable models : S1C17800 series

For portable devices

Mobile phones, handheld gaming devices, electronic dictionaries, portable information devices, etc.

Different types of displays are provided by the LCD driver that supports monochrome dot matrix displays, or the built-in LCD controller that supports monochrome to displays up to the STN VGA class. Optimum for portable devices that draw low levels of power allowing for extended battery life.

■ Suitable models : S1C17100/S1C17600/S1C17700/S1C17800 series

For healthcare devices

Clinical thermometers, blood pressure meters, pedometers, body composition meters, blood glucose meters, etc

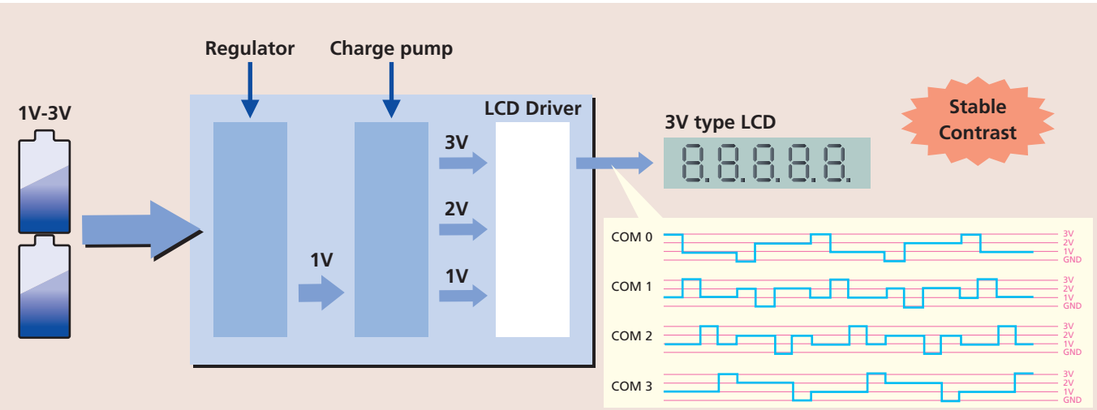
The LCD driver that supports segments or dot-matrix displays, and the internal voltage regulator circuit provide various resolutions of “user-friendly displays” that are not affected by the reduced battery voltage levels. Various sensor interfaces enable the device to connect with different types of sensors. Low power consumption feature provides extended battery life.

■ Suitable models : S1C17W00/S1C17100/S1C17600/S1C17700 series

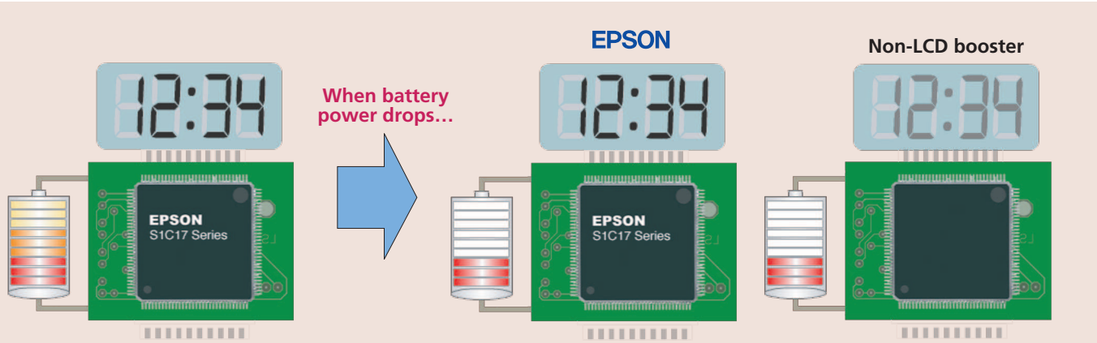
Features of Epson microcontrollers

Internal voltage regulator circuit provides a display quality unaffected by battery power level *1

Built-in power supply circuit



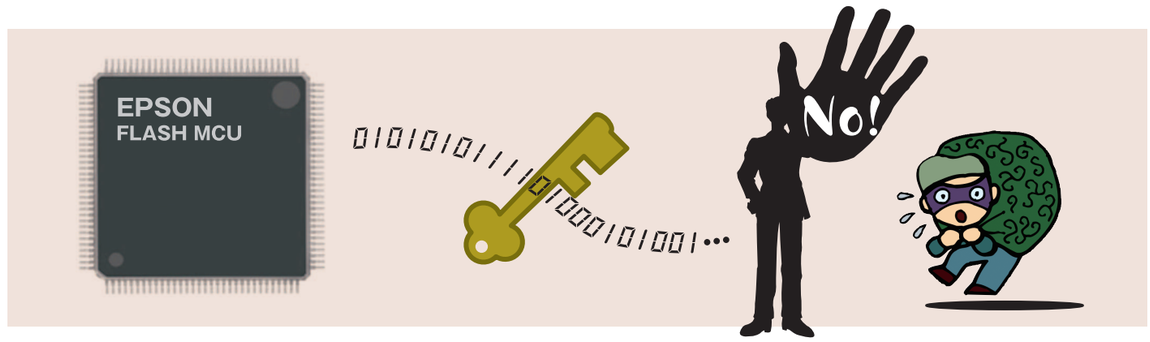
Epson microcontrollers include the voltage regulator circuit. With the built-in regulator, the microcontroller generates sufficient voltage to drive its circuit internally, so that it can maintain a high quality display unaffected by battery power levels. Because the high quality can be maintained without an external regulator, the built-in regulator helps reduce the number of parts, and thereby total cost. Another feature of the Epson microcontroller is that low power consumption can be maintained even with the internal regulator.



Even when battery power level drops, the contrast level is not affected. The same level of display quality as that of a new machine can be maintained until battery power has been completely consumed.
The battery power level is detected by the Supply Voltage Detector (SVD) circuit, so you do not have to be concerned about the level during operation.*2
In addition, a software-based function is included that allows the user to finely adjust contrast. You can use this function to match voltage with liquid crystal panel. Also, a contrast adjustment function can be added to your products.

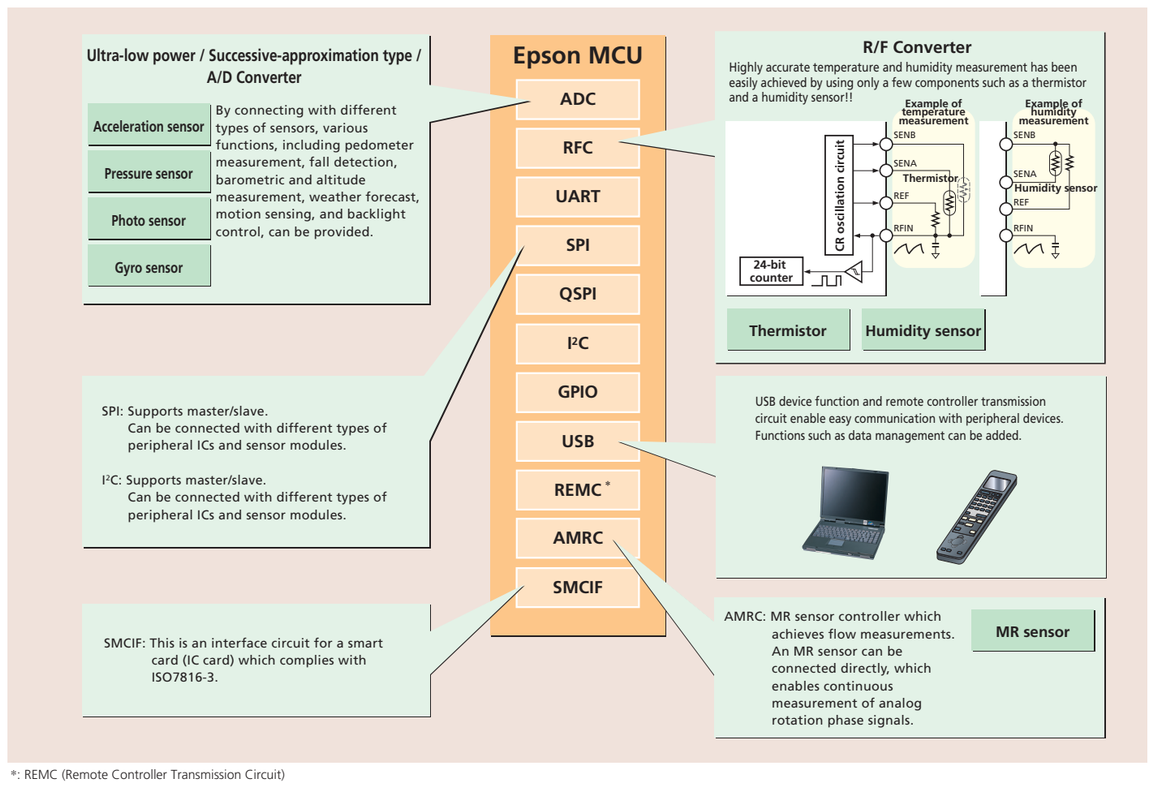
*1: This feature is provided for models containing an LCD driver.
*2: For models that support this feature, see the outline of each product.

Protect functions guard software assets



The debug interface disconnection function and the flash memory write/read protections are provided to protect the contents of the built-in flash memory and the RAM.
Prohibiting data reading and writing protects the important software assets for our customers.

A large number of different types of interfaces are included



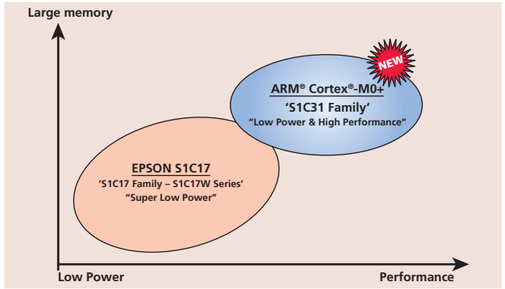
*: REMC (Remote Controller Transmission Circuit)

S1C31 Family Overview

The S1C31 Family is a 32-bit microcontroller which adopts the ARM® Cortex®-M0+ processor for the CPU core with several built-in features, such as various timers, serial interface functions, LCD driver, USB controller and Flash memory in one chip. The S1C31 Family constructed and manufactured with the exceedingly energy efficient Cortex®-M0+ processor, Epson's original super-low leak process and circuit technology, contributes to exceptional performance of various mobile devices and sensor node terminals which perform environmental measurements over a long period while extending battery life.

■ Image of product lineup

This series is manufactured using the same process as that of Epson's original SIC17 family of low-power 16-bit microprocessors, and has enhanced processing performance and built-in functions.



S1C31 Family Series list

- S1C31D00 Series: Built-in Memory Liquid Crystal Controller
- S1C31W00 Series: Built-in Dot Matrix Display Driver

S1C31 Family Products overview

Products	Display		Operation clock			Supply current				Power supply	Memory			I/O	Timer					SIO						Analog			Others				Form of delivery	
	LCD Driver seg×com	Display controller	High-speed [Hz] (Max.)	Low-speed [Hz] (Max.)	Built-in oscillator [Hz] (Typ.)	Sleep [µA] (Typ.)	Halt [µA] (Typ.)	32kHz Operating [µA] (Typ.)	1MHz Operating [µA] (Typ.)	Supply voltage [V]	Flash ROM [Byte]	Mask ROM [Byte]	RAM [Byte]	I/O port	8-bit timer	16-bit timer	16-bit PWM timer	Watchdog timer	Real-time clock	UART	SPI	Quad SPI	I²C	Remote controller transmission and reception	USB	R/F converter (24-bit)	A/D converter (12-bit)	SVD *5	Temperature sensor	Sound generator	DMA	Special function	Package	Chip
S1C31D00 series	Ultra-low consumption microcomputer which has a liquid crystal controller built-in.																																	
S1C31D01	–	Memory display controller Power supply generation for 3V system LCD Power supply generation for 5V system LCD	21M	32.768k	32k/1M/2M/8M/12M/16M/20M	0.46	1.7	10	4400 *1, *3	1.8 to 5.5	256K (*4)	512	96K	57	–	8	2 x 6	1	1	3	2	1	2	1	FS Dev	–	7	1	1	1	4	–	VFBGA5H-81 WCSP96 TQFP14-80	○
S1C31W00 series	Ultra-low consumption microcomputer which has a liquid crystal driver built-in.																																	
S1C31W74	88 x 16 80 x 24 72 x 32	–	21M	32.768k	1M/2M/8M/12M/16M/20M	0.4	1.7	10	4400 *2, *3	1.8 to 3.6	512K (*4)	512	128K	71	–	4	2 x 2	1	1	2	1	1	2	1	FS Dev	1	–	2	–	1	4	–	VFBGA8H-181	○

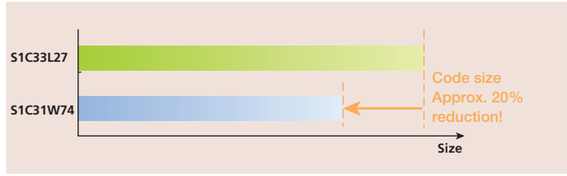
*1: During erasing / programming in flash memory (V_{DD}): 2.7V to 5.5 V, V_{PP}=7.5V/7.5(Typ.) During the external applying : 1.8V to 5.5V
*2: During erasing / programming in flash memory (V_{DD}): 2.7V to 3.6 V, V_{PP}=7.5V/7.5(Typ.) During the external applying : 1.8V to 3.6V
*3: During operations LCD (V_{DD}): 2.5V to 3.6V

*4: During erasing / programming voltage in flash memory (V_{PP}): The external applying of 7.5V / 7.5V (Typ.) is needed. (*4) can be rewritten even with internal power supply.
*5: SVD is an abbreviation for Supply Voltage Detector.
*6: Including Input port and Output port.

Products	Display		Operation clock			Supply current			Power supply	Panel Interface			Host Interface			Memory	I/O	Timer		SIO				Others				Form of delivery	
	Display controller		High-speed [Hz] (Max.)	Low-speed [Hz] (Typ.)	Built-in oscillator [Hz] (Typ.)	Sleep [µA] (Typ.)	32kHz Operating [µA] (Typ.)	1MHz Operating [µA] (Typ.)	Supply voltage [V]	6-bit color MIP I/F	8-bit color Memory LCD SPI I/F	1/3-bit B/W Memory LCD SPI I/F	SPI	QSPI	Indirect 8-bit	RAM [Byte]	I/O port	16-bit timer	Real-time clock	SPI	QSPI	I2C	REMC	Drawing and Copying functions	Event processor	DMA	Sound generator	Package	Chip
S1D13C00 series	LCD controller																												
S1D13C00	–	Memory Display Controller Power supply generation for 3V system LCD(2.3 to 3.6V) Power supply generation for 5V system LCD(4.3 to 5.0V)	–	32.768k	32k/20M				1.8 to 5.5	1	1	1	1	1	1	96K	10	1	1	1	1	1	1	1	1	1	1	TQFP13-64 WCSP64	–

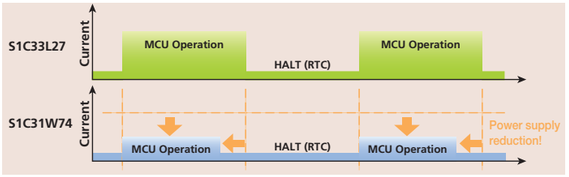
■ Code size comparison

Compared to Epson's original S1C33 family of 32-bit microprocessors, there are some cases in which the code size can be reduced by about 20% when the same software is used.



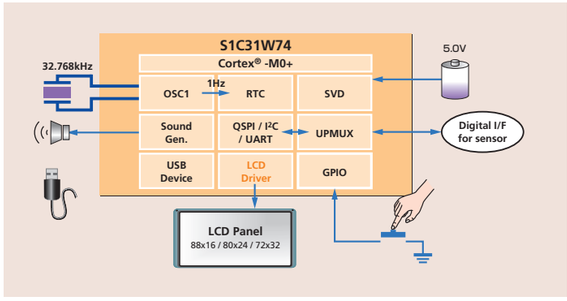
■ Comparison of current consumed for the same processing

Compared to Epson's original S1C33 family of 32-bit microprocessors, it is expected that the average current drawn by this series will be reduced to no more than one half for the same processing.

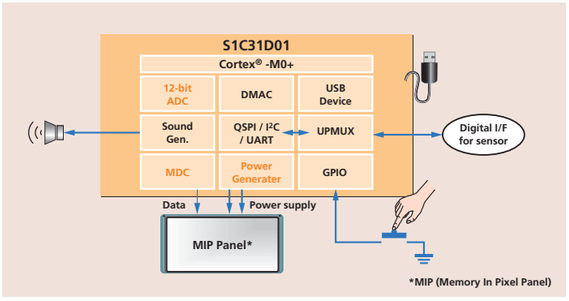


S1C31 Family Application examples

Example of an application using the S1C31W74: Digital wathc



Example of an application using the S1C31D01: Smart wathc



*MIP (Memory In Pixel Panel)

S1C17 Family 16-bit microcontrollers

S1C17 Family Overview

The S1C17 Family, 16-bit microcontrollers integrate a wide variety of peripheral circuits such as various interfaces that meet various types of sensors and the LCD driver/controller that covers the wide display area into a single chip design. They can realize both high-speed operation and low power consumption, and provide the products suitable to portable gears. Also, various flash ROM built-in products are lined up. The flexible development environment and on-chip ICE functions can shorten the product development period.

◆ Features of S1C17 RISC CPU

- Includes the instruction set optimized for C language.
- Supports memory space of up to 16M bytes.
- Includes lower-power instructions (Halt and Sleep).
- Incorporates coprocessor interface that allows for expansion of product-sum/division operator.

◆ Includes Flash ROM

- Protect functions that guard software assets.
- Self-rewriting function

◆ User-friendly and comfortable development tools

- On-chip debugger and highly-functional software simulator
- Software evaluation board (SVT board)

◆ Low power consumption

- Adopted a highly efficient power generating DC/DC converter for internal circuit operation.
- CPU clock gear function allows for low power consumption.
- Provides low power consumption equivalent to that of 8-bit microcontroller.

S1C17 Family Series List

- S1C17M00 Series: Application Optimization
- S1C17F00 Series: Built-in EPD Driver and Controller
- S1C17900 Series: Built-in Low Power Consumption DSP (without Display Functionality)
- S1C17800 Series: Built-in High-Resolution LCD Controller
- S1C17700 / W00 (W20) Series: Built-in Dot Matrix Display Driver
- S1C17600 / M00 / W00 (W10) Series: Built-in Segment Type Display Driver
- S1C17500 / M00 / W00 (W00) Series: Standard (without Display Functionality)
- S1C17100 Series: Built-in Segment Type Display Driver, and Mask ROM

S1C17 Family 16-bit microcontrollers

MCUs

S1C17 MCU Line up

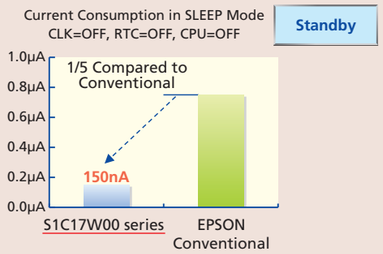
Built-in EPD Dr.	S1D14F57		S1C17F57							
Built-in LCD Controller							S1C17803 S1C17801			
Built-in Dot Matrix LCD Dr. 128 x 32 / 64 x 64										S1C17705
120 x 32 / 60 x 64								S1C17703		
88 x 16 / 72 x 32							S1C17702			
80 x 16 / 64 x 32							S1C17W34	S1C17W35	S1C17W36	
80 x 16					S1C17M10					
72 x 16 / 56 x 32					S1C17704 S1C17701					
64 x 16 / 56 x 24					S1C17711 S1C17W22	S1C17W23				
Built-in Segment LCD Dr. 88 x 8					S1C17M10					
72 x 4 / 72 x 8					S1C17W22	S1C17W23				
60 x 4 / 56 x 8					S1C17W16					
56 x 4 / 52 x 8					S1C17622		S1C17624			
54 x 4 / 50 x 8				S1C17W14						
50 x 4 / 46 x 8						S1C17M33				
48 x 4 / 44 x 8							S1C17W18			
42 x 4 / 38 x 8					S1C17M32					
40 x 4 / 36 x 8			S1C17621 S1C17121		S1C17602		S1C17604			
37 x 4 / 33 x 8					S1C17M34					
34 x 4 / 30 x 8					S1C17W15		S1C17M11			
32 x 4 / 28 x 8	S1C17653 S1C17153	S1C17656	S1C17M01							
26 x 4				S1C17W13 S1C17M30 S1C17M31						
20 x 4 / 16 x 8	S1C17651		S1C17601							
12 x 4 / 8 x 8			S1C17611							
Non LCD Driver	S1C17M13 S1C17M12 S1C17M20 S1C17M21 S1C17M22 S1C17W03		S1C17M23 S1C17M24 S1C17M25 S1C17W04				S1C17W18 S1C17965 S1C17955 S1C17589 S1C17564			Flash Mask
ROM Size	**16KB**	**24KB**	**32KB**	**48KB**	**64KB**	**96KB**	**128KB**	**256KB**	**384KB**	**512KB**

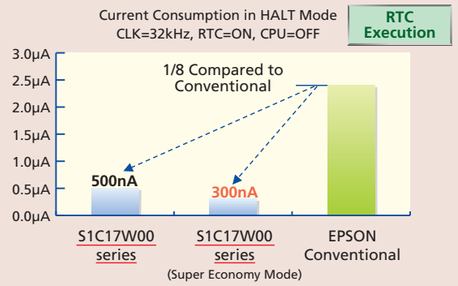
S1C17 Family Features

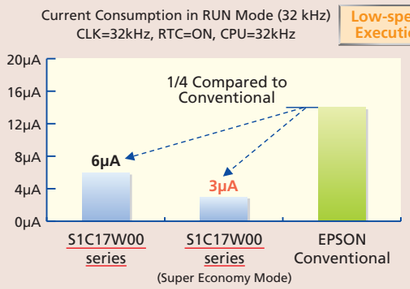
In most cases, the S1C17 Family of products will allow customers currently using 8-bit microcontrollers to enjoy higher performance with the same power consumption. In addition, it will enable customers already using 16-bit/32-bit microcontrollers to benefit from longer battery life as a result of low operating voltage.

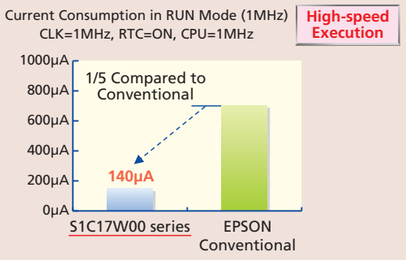
Lowest Current Consumption in Industry

Conditions : Typ. V_{DD}=3.0V, Ta=25°C

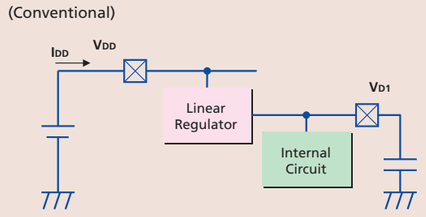


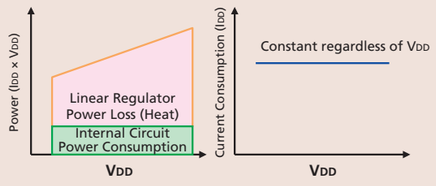


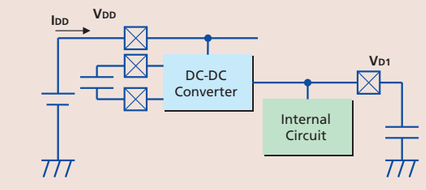




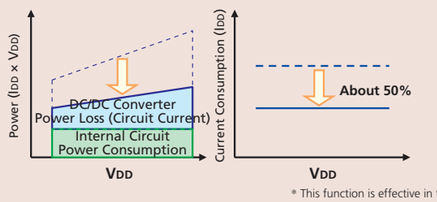
Adopted a highly efficient power generating DC/DC converter for internal circuit operation







Realized 50% current consumption by reduction of power loss!

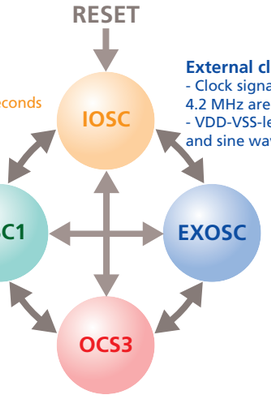


* This function is effective in the Super Economy Mode.

S1C17W00 series low-power consumption technology

Built-in high-precision oscillator circuit
- 700 kHz start clock signal
- No external parts required
- Oscillator starting time: 3 microseconds Max.

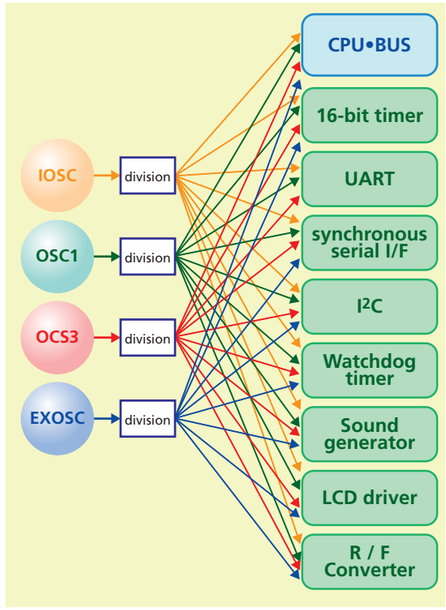
Low-power clock oscillator circuit
- 32.768 kHz crystal oscillator
- 4-stage oscillator inverter gain adjustment function
- Built-in 8-stage gate capacity adjustment function
- Oscillation stop detection and restart function
- Built-in oscillator mode (No external parts required)
- Built-in oscillator : 32kHz



External clock signal input
- Clock signals in up to 4.2 MHz are supported.
- VDD-VSS-level square waves and sine waves are supported.

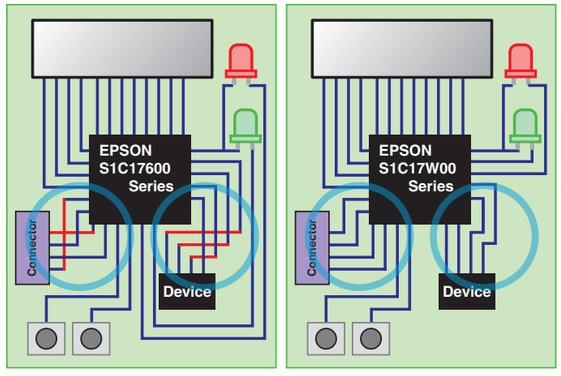
High-speed oscillator circuit
- Crystal/ceramic oscillation mode
- External resistor CR oscillation mode
- Built-in oscillator mode (no external parts required)
- Built-in oscillators can be selected from 250k, 384k, 500k, 1M, 2M, and 4M

Four types of characteristic clock sources can be freely selected for each circuit!



Terminals can be allocated freely (UPMUX)

SPI, I²C, UART, 16-bit PWM, and other terminals can be freely allocated as individual UPMUX terminals.



Terminals can be allocated freely using software.

The font library for the S1C17 Family is now available.

Example of 16x16 dot character displays (English, numeric, and Japanese)

Fonts	Required ROM capacity
12x12 dot size (JIS level-1 Japanese characters, JIS level-2 Japanese characters)	137KB
12x6 dot size (Half-width characters)	4KB
16x16 dot size (JIS level-1 Japanese characters, JIS level-2 Japanese characters)	239KB
16x8 dot size (Half-width characters)	7KB

*For other languages, please consult with us.

World realized by low power consumption of the S1C17W Series

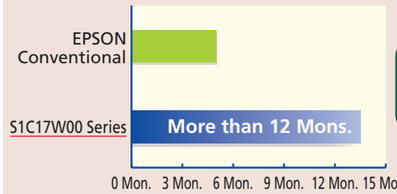
Case of Digital Watch

■ Conditions: Continuous LCD watch display using LR44 battery (1.5 V)

* Calculated in 32kHz RUN mode for 10m per second

Case of Pedometer

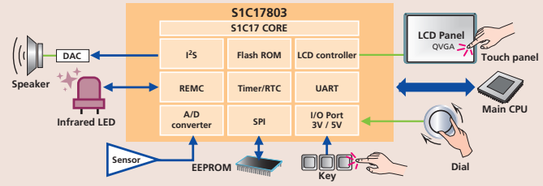
■ Conditions: LCD display and acceleration sensing for several hours per day using the CR2032 battery (3V)



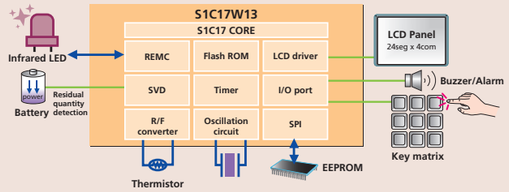
* Calculated in 2MHz RUN mode for 1 hour per day

S1C17 Family Application examples

Example of an application using the S1C17803: Home appliances (Adding functions)



Example of an application using the S1C17W13: Remote controller



S1C17 Family Products overview

Products	Display	Operation clock			Supply current				Power supply	Memory			I/O	Timer				SIO					Analog			Others			Form of delivery	
	LCD Driver seg×com	High-speed [Hz] (Max.)	Low-speed [Hz] (Typ.)	Built-in oscillator [Hz] (Typ.)	Sleep [µA] (Typ.)	Halt [µA] (Typ.)	32kHz Operating [µA] (Typ.)	1MHz Operating [µA] (Typ.)	Supply voltage [V]	Flash ROM [Byte]	RAM [Byte]		I/O port *8	16-bit timer	16-bit PWM timer	Watchdog timer	Real-time clock	UART	SPI	QSPI	I²C	Remote controller transmission and reception	R/F converter (24-bit)	A/D converter (12-bit)	SVD *4	Sound generator	Multiple r/Divider	Special function	Package	Chip
S1C17W00 series/W10/W20/W30 group	[Ultra Low Power] This is an ultra-low power consumption 16-bit MCU compatible to low voltage operations from 1.2V, even with built-in flash memory. LCD driver, high-performance PWM and improved analog functions, combined with the powerful processing capacity of the 16-bit CPU, suitable for battery																The embedded highly efficient DC-DC converter generates an internal constant voltage, to drive an IC with a low power consumption operation beyond 4-bit MCUs. This product is equipped with a built-in RTC, driven applications that require a LCD and clock function.													
S1C17W12	26 x 4	4.2M	32.768k	32k/250k/ 384k/500k/ 700k/1M/ 2M/4M	0.15	0.3	2	140	1.2 to 3.6 *9	48K *3	2K		32	3	2 x 2	1	1	2	1	–	1	1	2 *5	–	1	1	1	LED pin x 2	–	○
	18 x 4					1.5	5						26															SQFN7-48	–
S1C17W13	26 x 4	4.2M	32.768k	32k/250k/ 384k/500k/ 700k/1M/ 2M/4M	0.15	0.3	2	140	1.2 to 3.6 *9	48K *3	2K		32	3	2 x 2	1	1	2	1	–	1	1	2 *5	–	1	1	1	LED pin x 2	QFP13-64	○
	18 x 8						4						26															SQFN7-48	
	20 x 4 *7																						–					TQFP12-48	
S1C17W14	54 x 4 50 x 8	4.2M	32.768k	250k/384k/ 500k/700k/ 1M/2M/4M	0.15	0.3	3	200	1.2 to 3.6 *1	48K *3	4K		33	3	2 x 2	1	1	2	2	–	1	1	1	–	1	1	1	–	QFP15-100	○
S1C17W15	34 x 4 30 x 8	4.2M	32.768k	500k/700k/ 1M/2M/4M	0.15	0.3	4	250	1.2 to 3.6 *1	64K *3	4K		36	3	2 x 2	1	1	2	1	–	1	–	4 *5	–	1	1	1	–	QFP15-100	○
	32 x 4 28 x 8												33															TQFP14-80	
	24 x 4 20 x 8					0.5	8						28															SQFN9-64 TQFP13-64	
S1C17W16	60 x 4 56 x 8	4.2M	32.768k	250k/384k/ 500k/700k/ 1M/2M/4M	0.15	0.3	3	200	1.2 to 3.6 *1	64K *3	8K		40	5	2 x 2	1	1	2	3	–	1	1	2 *5	4	1	1	1	–	TQFP15-128	○
S1C17W18	48 x 4 44 x 8	4.2M	32.768k	250k/384k/ 500k/700k/ 1M/2M/4M	0.15	0.3	2	140	1.2 to 3.6 *9	128K (*3)	8K		68	4	3 x 2	1	1	2	2	–	1	1	2 *5	7	1	1	1	Temperature sensor	TQFP15-128	○
	32 x 4 28 x 8					0.5	4						59															TQFP14-80	
	24 x 4 20 x 8												49															SQFN9-64	
S1C17W22	72 x 4/8 64 x 16 56 x 24	4.2M	32.768k	500k/700k/ 1M/2M/4M	0.15	0.3	4	250	1.2 to 3.6 *1	64K *3	4K		42	2	2 x 2	1	1	1	1	–	1	1	2 *5	–	1	1	1	–	TQFP15-128	○
S1C17W23	72 x 4/8 64 x 16 56 x 24	4.2M	32.768k	500k/700k/ 1M/2M/4M	0.15	0.3	4	250	1.2 to 3.6 *1	96K *3	8K		42	4	3 x 2	1	1	2	2	–	1	1	2 *5	6	1	1	1	–	TQFP15-128	○
S1C17W34	80 x 16 64 x 32	4.2M	32.768k	250k/384k/ 500k/700k/ 1M/2M/4M	0.15	0.4	3	150	1.2 to 3.6 *2, *6	128K (*3)	12K		53	4	3 x 2	1	3	2	2	–	1	1	2 *5	7	1	1	1	Temperature sensor	QFP21-176	○
S1C17W35	80 x 16 64 x 32	4.2M	32.768k	250k/384k/ 500k/700k/ 1M/2M/4M	0.15	0.4	3	150	1.2 to 3.6 *2, *6	256K (*3)	12K		53	4	3 x 2	1	3	2	2	–	1	1	2 *5	7	1	1	1	Temperature sensor	QFP21-176	○
S1C17W36	80 x 16 64 x 32	4.2M	32.768k	250k/384k/ 500k/700k/ 1M/2M/4M	0.15	0.4	3	150	1.2 to 3.6 *2, *6	384K (*3)	16K		53	4	3 x 2	1	3	2	2	–	1	1	2 *5	7	1	1	1	Temperature sensor	QFP21-176	○

*1: During erasing / programming in flash memory (V_{DD}): 1.8V to 3.6 V

*2: During operations LCD (V_{DD}): 2.5V to 3.6V

*3: During erasing / programming voltage in flash memory (V_{PP}): The external applying of 7.5V / 7.5V (Typ.) is needed. (*5) can be rewritten even with internal power supply.

*4: SVD is an abbreviation for Supply Voltage Detector.

*5: Independent operation for each channel.

*6: During erasing / programming in flash memory (V_{DD}): 2.7V to 3.6V, 1.8V to 3.6V during the external applying V_{PP}=7.5V/7.5V(Typ.)

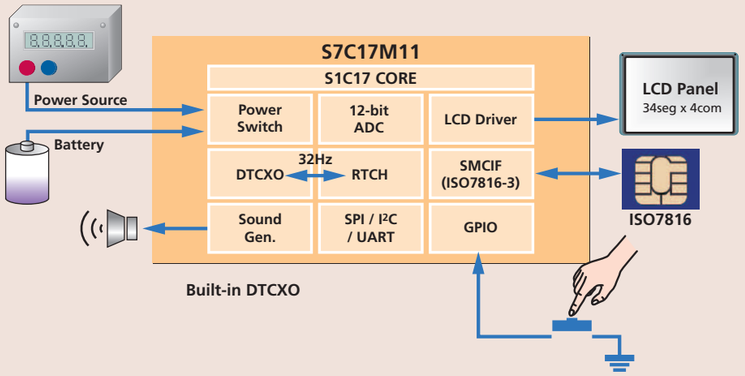
*7: External voltage application mode only.

*8: Including Input port and Output port.

*9: During erasing / programming in flash memory (V_{DD}): 2.4V to 3.6 V

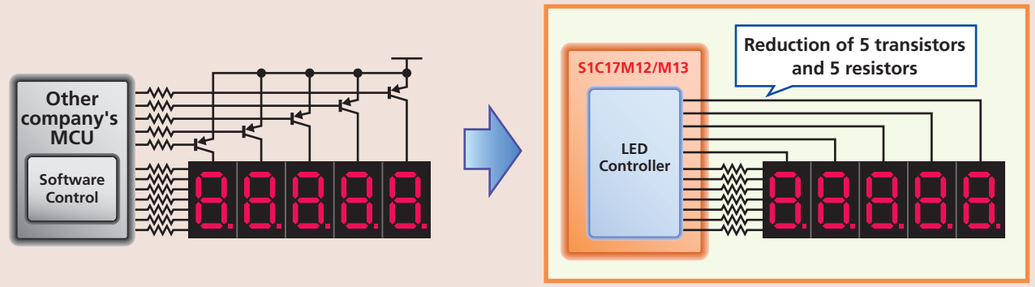
S1C17 Family Application examples

Example of an application using the S7C17M11: Electricity meter



S1C17 Family Function introduction

Example of an 7 seg LED lighting up using the S1C17M12/M13



S1C17 Family Products overview

	Display	Operation clock	Supply current	Power supply	Memory		I/O	Timer				SIO				Analog				Reset	Others			Form of delivery	
Products	LCD Driver seg×com	Display controller	High-speed [Hz] (Max.)	Low-speed [Hz] (Max.)	Built-in oscillator [Hz] (Typ.)	Sleep [µA] (Typ.)	Halt [µA] (Typ.)	32kHz Operating [µA] (Typ.)	1MHz Operating [µA] (Typ.)	Supply voltage [V]	Flash ROM [Byte]	EEPROM [Byte]	RAM [Byte]		I/O port *5	16-bit timer	16-bit PWM timer	Watchdog timer	Real-time clock	UART	SPI	Quad SPI	I²C	Remote controller transmission and reception	R/F converter (24-bit)	A/D converter (12-bit)	SVD *4	POR	BOR	Sound generator	Multiplier/Divider	Special function	Package	Chip
S1C17M00 series	It is an application specialized series. It is a 16-bit MCU with Flash memory compatible with high processing while achieving low power consumption, supporting power supply voltages from 1.8 V to 5.5 V.																															
S1C17M01	32 x 4 28 x 8	–	16.3M	32.768k	7.37M	0.35	0.8	12.5	210	1.8 to 5.5 *1, *7	32K *3	–	4K		19	5	–	1	1	1	2	–	1	–	1	–	1	○	–	–	–	AMRC	TQFP13-64	○
S1C17M10	88 x 8 80 x 16	–	16M	32.768k	32k/ 4M/8M/ 12M/16M	0.16	0.6	4	145	1.8 to 5.5 *2	64K (*3)	–	4K		33	5	1 x 2	1	1	1	1	–	1	–	–	–	1	○	–	–	1	SMCIF	TQFP15-128	○
S7C17M11	34 x 4 32 x 6 30 x 8	–	16.8M	–	32.768k/ 4M/8M/ 12M/16M	2.25	2.35	8	187	1.8 to 5.5 *2	126K *3	–	8K		43	4	1 x 2	1	1	4	1	–	2	–	–	8	1	○	○	1	1	SMCIF x 2 DTCXO	H4QFP15-100	–
S1C17M12	–	LED controller 8x5	16.8M	–	4M/8M/ 12M/16M	0.35	40	–	150	1.8 to 5.5 *2	16K *3	–	2K		39	4	1 x 2	1	–	1	2	–	1	1	–	–	1	○	○	–	1	High current port x 5	TQFP12-48	○
S1C17M13	–	LED controller 8x5	16.8M	–	4M/8M/ 12M/16M	0.35	40	–	150	1.8 to 5.5 *2	16K *3	–	2K		39	4	1 x 2	1	–	1	2	–	1	1	–	8	1	○	○	–	1	High current port x 5	TQFP12-48	○
S1C17M20	–	–	21M	– 32.768k	32k/700k/ 12M/16M/20M	0.36	0.7	5	160	1.8 to 5.5 *2	16K (*3)	–	2K		18 24	4	2 x 2	1	1	2	2	–	1	1	–	4 6	1	○	○	1	1	–	SQFN4-24 SQFN5-32	– –
S1C17M21	–	–	21M	32.768k	32k/700k/ 12M/16M/20M	0.36	0.7	5	160	1.8 to 5.5 *2	16K (*3)	–	2K		24	4	2 x 2	1	1	2	2	–	1	1	–	6	1	○	○	1	1	–	TQFP12-32	–
S1C17M22	–	–	21M	32.768k	32k/700k/ 12M/16M/20M	0.36	0.7	5	160	1.8 to 5.5 *2	16K (*3)	–	2K		40	4	2 x 2	1	1	2	2	–	1	1	2	8	1	○	○	1	1	–	TQFP12-48	–
S1C17M23	–	–	21M	– 32.768k	32k/700k/ 12M/16M/20M	0.36	0.7	5	160	1.8 to 5.5 *2	32K (*3)	–	2K		18 24	4	2 x 2	1	1	2	2	–	1	1	–	4 6	1	○	○	1	1	–	SQFN4-24 SQFN5-32	– –
S1C17M24	–	–	21M	32.768k	32k/700k/ 12M/16M/20M	0.36	0.7	5	160	1.8 to 5.5 *2	32K (*3)	–	2K		24	4	2 x 2	1	1	2	2	–	1	1	–	6	1	○	○	1	1	–	TQFP12-32	–
S1C17M25	–	–	21M	32.768k	32k/700k/ 12M/16M/20M	0.36	0.7	5	160	1.8 to 5.5 *2	32K (*3)	–	2K		40	4	2 x 2	1	1	2	2	–	1	1	2	8	1	○	○	1	1	–	TQFP12-48	–
S1C17M30	26 x 4 22 x 8 *6	–	16.8M	32.768k	32k/700k/ 12M/16M	0.2	0.7	5	160	1.8 to 5.5 *2	48K (*3)	256	4K		38	4	3 x 2	1	1	2	2	–	1	1	2	2	1	○	○	1	1	–	TQFP12-48	–
S1C17M31	26 x 4 22 x 8	–	16.8M	–	32k/700k/ 12M/16M	0.2	0.7	5	160	1.8 to 5.5 *2	48K (*3)	256	4K		38	4	3 x 2	1	1	2	2	–	1	1	2	2	1	○	○	1	1	–	TQFP12-48	–
S1C17M32	42 x 4 38 x 8 *6	–	16.8M	32.768k	32k/700k/ 12M/16M	0.2	0.7	5	160	1.8 to 5.5 *2	64K (*3)	265	4K		54	4	3 x 2	1	1	2	2	–	1	1	2	2	1	○	○	1	1	–	TQFP13-64	–
S1C17M33	50 x 4 46 x 8	–	16.8M	32.768k	32k/700k/ 12M/16M	0.2	0.7	5	160	1.8 to 5.5 *2	96K (*3)	32 to 512 *8	4K		66	4	3 x 2	1	1	2	2	–	1	1	2	5	1	○	○	1	1	–	TQFP14-80	○
S1C17M34	37 x 4 33 x 8	–	16.8M	32.768k	32k/700k/ 12M/16M	0.2	0.7	5	160	1.8 to 5.5 *2	64K (*3)	256	4K		52	4	3 x 2	1	1	2	2	–	1	1	2	5	1	○	○	1	1	–	TQFP13-64	–

*1: During erasing / programming in flash memory (V_{DD}): V_{PP}=2.7V to 5.5V without the external applying, V_{PP}=1.8V to 5.5V during the external applying

*2: During erasing / programming in flash memory (V_{DD}): 2.7V to 5.5 V

*3: During erasing / programming voltage in flash memory (V_{PP}): The external applying of 7.5V / 7.5V (Typ.) is needed. (*3) can be rewritten even with internal power supply.

*4: SVD is an abbreviation for Supply Voltage Detector.

*5: Output dedicated port 1 included.

*6: External voltage application mode only.

*7: (MR sensor controller) Operation (V_{DD}) : 2.0V to 5.5V

*8: Flash erea is used.

S1C17 Family 16-bit microcontrollers MCUs

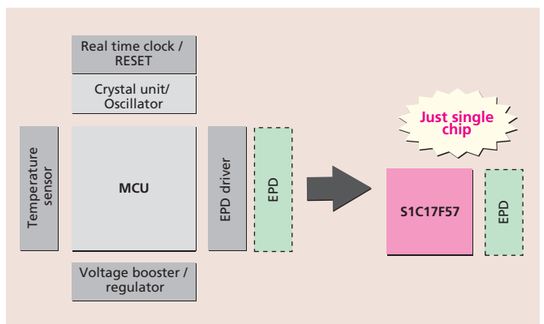
S1C17 Family Products overview

Products	Display	Operation clock			Supply current				Power supply	Memory			I/O	Timer							SIO					Analog			Others			Form of delivery	
	LCD Driver seg×com	High-speed [Hz] (Max.)	Low-speed [Hz] (Typ.)	Built-in oscillator [Hz] (Typ.)	Sleep [µA] (Typ.)	Halt [µA] (Typ.)	32kHz Operating [µA] (Typ.)	1MHz Operating [µA] (Typ.)	Supply voltage [V]	Flash ROM [Byte]	Mask ROM [Byte]	RAM [Byte]	I/O port	8-bit timer	16-bit timer	16-bit PWM timer	Stopwatch	Watchdog timer	Clock	Real-time clock	UART	SPI	I²C master	I²C slave	Remote controller transmission and reception	R/F converter (24-bit)	A/D converter (12-bit)	SVD *8	Sound generator	Multiplier /Divider	Special function	Package	Chip
S1C17W00 series/W00 group		[Ultra Low Power] This is an ultra-low power consumption 16-bit MCU compatible to low voltage operations from 1.2V, even with built-in flash memory. This product is equipped with a built-in RTC, stopwatch, high-performance PWM, external bus I/F and improved analog functions, combined with the powerful												The embedded highly efficient DC-DC converter generates an internal constant voltage, to drive an IC with a low power consumption operation beyond 4-bit MCUs. processing capacity of the 16-bit CPU, suitable for battery driven applications.																		
S1C17W03	–	4.2M	32.768k	250k/384k/ 500k/700k/ 1M/2M/4M	0.15	0.3	4	250	1.2 to 3.6 *1	16K *3	–	2K	35	–	4	2 x 2	–	1	–	1	2	2	1	1	1	2 *10	6	1	1	1	–	TQFP12-48	○
													24													1	5					SQFN5-32	–
S1C17W04	–	4.2M	32.768k	250k/384k/ 500k/700k/ 1M/2M/4M	0.15	0.3	4	250	1.2 to 3.6 *1	32K *3	–	2K	35	–	4	2 x 2	–	1	–	1	2	2	1	1	1	2 *10	6	1	1	1	–	TQFP12-48	○
													24													1	5					SQFN5-32	–
S1C17560/580 series		[Low Power] This is a 16-bit MCU with built-in flash memory, which realizes high-speed processing at low power consumption. This product is equipped with various												features, such as a general-purpose I/O port, A/D converter input and serial I/F, and is suitable for controlling various sensor built-in devices, including household appliances.																		
S1C17564	–	24M	32.768k	2M to 12M	0.8	2.7	16	450	2.0 to 5.5	128K *2	–	16K	40	–	5	4	1	1	1	–	2	3	1	1	1	–	4 *9	–	–	1	–	TQFP13-64 VFBGA5H-81	○
S1C17589	–	16.8M	32.768k	4M/8M/ 12M/16M	0.2	0.6	9	280	1.8 to 5.5	128K *3	–	16K	88	–	6	4 x 6	–	1	–	1	3	2	1	1	1	–	16	1	–	1	–	QFP15-100	○
													68														11					QFP14-80	–
													52														7 *9					QFP13-64	–
S1C17800 series		[High Performance] This 16-bit MCU realized advanced processing equivalent to 32-bit. The built-in LCD controller provides maximum VGA monochrome displays. This product is equipped with abundant built-in I/F, such as USB, various serial interfaces												and A/D converters, suitable for operation panel control of white home appliances and various products, with improved user interface utilizing displays, music, sound, touch panels and etc.																		
S1C17801	LCD Controllers	48M	32.768k	–	1.4 *5	12	–	6000	3.0 to 3.6	128K *7	–	4K	99	6	2	1	–	1	–	1 *4	1	2	1	–	1	–	8 *9	–	–	Multiplier :○ Divider :×	BUS supported USB FS	TQFP15-128	–
S1C17803	LCD Controllers	33M	32.768k	–	1.3 *5	5	–	6500	2.7 to 5.5	128K *7	–	16K	97	4	1	2	–	1	–	1 *4	1	2 *6	1	1	1	–	4 *9	–	–	1	BUS supported	TQFP15-128	–
													69																			TQFP14-100	–
S1C17900 series		[Application-specific type] Incorporating low power consumption, DSP has made it possible to achieve advanced signal processing, which was difficult for This series can be used for a variety of sensor-mounted applications, together with a rich array of serial interfaces and analog-to-digital converters.												conventional battery-driven devices to perform, with extremely low power consumption.																		
S1C17955	–	–	32.768k	2M/4M/ 8M/12M	1.0	2.9	15	400	1.65 to 1.95 (Core) 1.65 to 3.6 (I/O)	128K *3	–	16K	20	–	5	4	1	1	1	–	1	3	1	1	–	–	–	–	–	1	FSA *11	WCSP-48	○
S1C17965	–	24M	32.768k	2M/4M/ 8M/12M	1.0	2.9	15	400	2.0 to 3.6	128K *3	–	16K	24	–	5	4	1	1	1	–	2	3	1	1	1	–	6	–	–	1	FSA *11	TQFP13-64	○

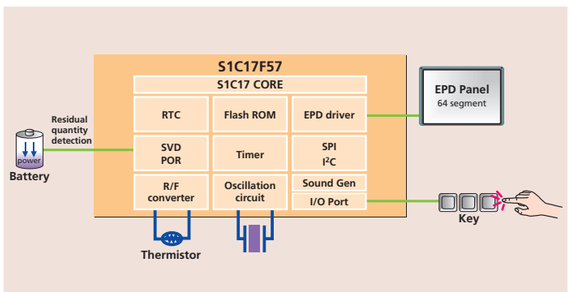
*1: During erasing / programming voltage in flash memory (V_{DD}): 1.8V to 3.6V
*2: During erasing / programming voltage in flash memory (V_{PP}): The external applying of 7.5V / 7.0V (Typ.) is needed.
*3: During erasing / programming voltage in flash memory (V_{PP}): The external applying of 7.5V / 7.5V (Typ.) is needed.
*4: The battery backed up operation is supported.
*5: Unmounted OSC1
*6: Universal serial interface (Any of UART, SPI and I²C functions can be selected.)
*7: This product uses SuperFlash® technology licensed from Silicon Storage Technology, Inc.
*8: SVD is an abbreviation for Supply Voltage Detector.
*9: Resolution: 10-bit
*10: Independent operation for each channel.
*11: Low power DSP
*12: Including Input port and Output port.

S1C17 Family Application examples

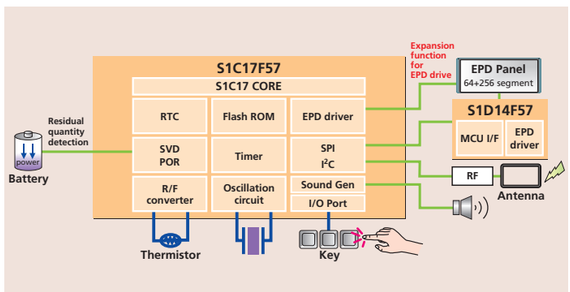
The S1C17F57 is a microcontroller with a built-in driver for small- and medium-sized segmented electronic paper displays (e-paper displays or EPDs). The product includes embedded features such as a real-time clock, theoretical regulation, voltage booster and regulator, a segmented EPD driver, and temperature sensor. As a result, the device dose not simply drive the display, but also corrects temperature effects that could potentially distort the image on the display thus maximizing the characteristics of an e-paper display with a single chip.
It is suitable for electronic tags, smart displays and various applications with high contrast, flexibility, image stability and low power consumption.
And low-power EPD driver ICs, called the S1D14F50 series, can expand the segment display domain when coupled with the S1C17F57.



Example of an application using the S1C17F57 : OTP cards



Example of an application using the S1C17F57+ S1D14F57 : Logistic tags



S1C17 Family 16-bit microcontrollers MCUs

S1C17 Family Products overview

Products	Display	Operation clock			Supply current				Power supply	Memory			I/O	Timer							SIO					Analog					Form of delivery	
	LCD Driver seg×com	High-speed [Hz] (Max.)	Low-speed [Hz] (Typ.)	Built-in oscillator [Hz] (Typ.)	Sleep [µA] (Typ.)	Halt [µA] (Typ.)	32kHz Operating [µA] (Typ.)	1MHz Operating [µA] (Typ.)	Supply voltage [V]	Flash ROM [Byte]	Mask ROM [Byte]	RAM [Byte]	I/O port *9	8-bit timer	16-bit timer	16-bit PWM timer	Stopwatch	Watchdog timer	Clock	Real-time clock	UART	SPI	I²C master	I²C slave	Remote controller transmission and reception	R/F converter (24-bit)	A/D converter (10-bit)	SVD *5	Multiplier /Divider	Sound generator	Special function	Package	Chip
S1C17100/600 series		[Low Power] This is a 16-bit MCU with improved processing capacity and development environment, while maintaining low power consumption equivalent to Epson's 4/8-bit MCUs. This product is equipped with a built-in segment LCD driver, power circuit, clock function and various I/F, suitable for watches, clocks, remote controllers and healthcare devices.																														
S1C17153	32 x 4	–	32.768k	500k/1M/2M	0.13	0.42	4	160	2.0 to 3.6	–	16K	2K	12	1	–	1	–	1	1	1	1	1	–	–	–	–	–	1	1	1	–	○
S1C17121	40 x 4 36 x 8	4.2M	32.768k	2.7M	0.15	0.9	7	250	1.8 to 3.6	–	32K	2K	36	3	3	1	1	1	1	–	2	1	1	1	1	2	8	1	1	–	–	TQFP14-100	○
S1C17651	20 x 4	4.2M	32.768k	32k/500k/1M/2M	0.09	0.42	10	350	2.0 to 3.6	16K *3	–	2K	12	1	–	1	–	1	1	1	1	1	–	–	–	–	–	1	1	1	–	TQFP13-64	○
S1C17653	32 x 4	4.2M	32.768k	32k/500k/1M/2M	0.09	0.42	10	350	2.0 to 3.6	16K *3	–	2K	12	1	–	1	–	1	1	1	1	1	–	–	–	–	–	1	1	1	–	TQFP14-80	○ *8
S1C17656	32 x 4	–	32.768k	500k/1M/2M/4M	0.13	0.5	7.3	280	1.8 to 3.6	24K *4	–	2K	20	1	–	1	–	1	1	1	1	1	–	–	–	1	–	1	1	1	–	TQFP14-80	○
S1C17611	12 x 4 8 x 8	8.2M	32.768k	2.7M	0.6	2.0	12	400	1.8 to 3.6 *1	32K *6	–	2K	19	2	3	2	1	1	1	–	1	1	1	1	–	1	4	1	1	–	–	QFP12-48	○
S1C17601	20 x 4 16 x 8	8.2M	32.768k	2.7M	0.6	2.0	12	340	1.8 to 3.6 *1	32K *6	–	2K	24	2	3	2	1	1	1	–	1	1	1	1	–	1	4	1	1	–	–	TQFP13-64	○
S1C17621	40 x 4 36 x 8	8.2M	32.768k	2.7M	0.75	2.5	15	410	1.8 to 3.6 *1	32K *6	–	2K	36	3	3	1	1	1	1	–	2	1	1	1	1	2	8	1	1	–	–	TQFP14-100	○
S1C17602	40 x 4 36 x 8	8.2M	32.768k	2.7M	0.75	2.5	15	410	1.8 to 3.6 *1	64K *6	–	4K	36	3	3	1	1	1	1	–	2	1	1	1	1	2	8	1	1	–	–	TQFP14-100	○
S1C17622	56 x 4 52 x 8	8.2M	32.768k	2.7M	0.75	2.3	14	400	1.8 to 3.6 *1	64K *6	–	4K	47	3	3	1	1	1	1	–	2	1	1	1	1	2	8	1	1	–	–	TQFP15-128	○
S1C17604	40 x 4 36 x 8	8.2M	32.768k	2.7M	0.75	2.3	14	400	1.8 to 3.6 *1	128K *6	–	8K	36	3	3	3	1	1	1	1	2	1	1	1	1	2	8	1	1	–	–	TQFP14-100	○
S1C17624	56 x 4 52 x 8	8.2M	32.768k	2.7M	0.75	2.3	14	400	1.8 to 3.6 *1	128K *6	–	8K	47	3	3	3	1	1	1	1	2	1	1	1	1	2	8	1	1	–	–	TQFP15-128	○
S1C17700 series		It is an application specialized series. It is a 16-bit MCU with Flash memory compatible with high processing while achieving low power consumption, supporting power supply voltages from 1.8 V to 5.5 V.																														
S1C17711	64 x 16 56 x 24	8.2M	32.768k	2.7M	1.0	2.0	12	400	1.8 to 3.6 *1	64K *6	–	4K	29	–	4	4	1	1	1	–	1	1	1	1	1	2	8	1	1	–	–	TQFP15-128	○
S1C17701	72 x 16 56 x 32	8.2M (Crystal / ceramic) 2.2M (CR)	32.768k	–	1.0	2.6	14	420 *7 500 *7	1.8 to 3.6 *1	64K *6	–	4K	28	2	3	1	1	1	1	–	1	1	1	–	1	–	–	1	–	–	–	TQFP24-144 TQFP24-144	○ ○
S1C17704	72 x 16 56 x 32	8.2M (Crystal / ceramic) 2.2M (CR)	32.768k	–	1.0	2.6	17	550 660	1.8 to 3.6 *1	64K *6	–	4K	28	2	3	1	1	1	1	–	1	1	1	–	1	–	–	1	–	–	–	TQFP24-144 VFBGA10H-144 VFBGA7H-161 TQFP24-144 VFBGA10H-144 VFBGA7H-161	○ ○
S1C17702	88 x 16 72 x 32	8.2M	32.768k	2.7M	1.0	2.5	16	450	1.8 to 3.6 *1	128K *6	–	12K	28	3	3	2	1	1	1	–	1	1	1	–	1	–	–	1	1	–	–	QFP21-176 VFBGA10H-180 VFBGA8H-181	○
S1C17703	120 x 16/24/32 60 x 64	8.2M	32.768k	2.7M	1.0	2.5	15	450	1.8 to 3.6 *2	256K *6	–	12K	34	–	5	4	1	1	1	–	2	3	1	1	1	2	8	1	1	–	–	QFP21-216 VFBGA10H-240	○
S1C17705	128 x 16/24/32 64 x 64	8.2M	32.768k	2.7M	1.2	2.7	18	550	1.8 to 3.6 *2	512K *6	–	12K	35	–	5	4	1	1	1	–	2	3	1	1	1	2	8	1	1	–	–	VFBGA10H-240	○

*1: During erasing / programming in flash memory (V_{DD}): 2.7V to 3.6 V
*2: During erasing / programming in flash memory (V_{DD}): 2.5V to 3.6 V
*3: During erasing / programming voltage in flash memory (V_{PP}): The external applying of 7.5V / 7.0V (Typ.) is needed.
*4: During erasing / programming voltage in flash memory (V_{PP}): The external applying of 7.5V / 7.5V (Typ.) is needed.
*5: SVD is an abbreviation for Supply Voltage Detector.
*6: This product uses SuperFlash® technology licensed from Silicon Storage Technology, Inc.
*7: Single instruction is executed in 1.5 clocks.
*8: AI pad, Au bump
*9: Including Input port and Output port.

Products	Display	Operation clock			Supply current				Power supply	Memory			I/O	Timer							SIO					Analog			Others		Form of delivery	
	EPD Driver seg (TP/BP)	High-speed [Hz] (Max.)	Low-speed [Hz] (Typ.)	Built-in oscillator [Hz] (Typ.)	Sleep [µA] (Typ.)	Halt [µA] (Typ.)	32kHz Operating [µA] (Typ.)	4MHz operating [µA] (Typ.)	Supply voltage [V]	Flash ROM [Byte]	Mask ROM [Byte]	RAM [Byte]	I/O port *4	8-bit timer	16-bit timer	16bit-PWM timer	Stopwatch	Watchdog timer	Clock	Real-time clock	UART	SPI	I²C master	I²C slave	Remote controller transmission and reception	R/F converter (24-bit)	A/D converter	SVD *1	Multiplier/Divider	Temparature detection circuit	Package	Chip
S1C17F50 series		[Medium and small segment EPD] The product also includes embedded features such as a real-time clock, theoretical regulation, a driver capable of wringing the maximum performance from segmented EPDs, and a temperature sensor. As a result, the device does not simply drive the display, but also corrects temperature effects that could harm display quality making it possible to maximize the characteristics of an e-paper display with a single chip.																														
S1C17F57	64 (2TP/2BP)	4.2M	32.768k	32k/500k/1M/2M	0.10	0.55	12	1,400	2.0 to 3.6	32K *2	–	2K	29	2	–	2	1	1	1	1	1	1	1	1	–	1	–	1	1	1	–	○ *3

*1: SVD is an abbreviation for Supply Voltage Detector.
*2: During erasing / programming in flash memory (Vpp) : The external applying of 7.0V / 7.5V (Typ.) is needed.
*3: AI pad, Au bump
*4: Including Input port and Output port.

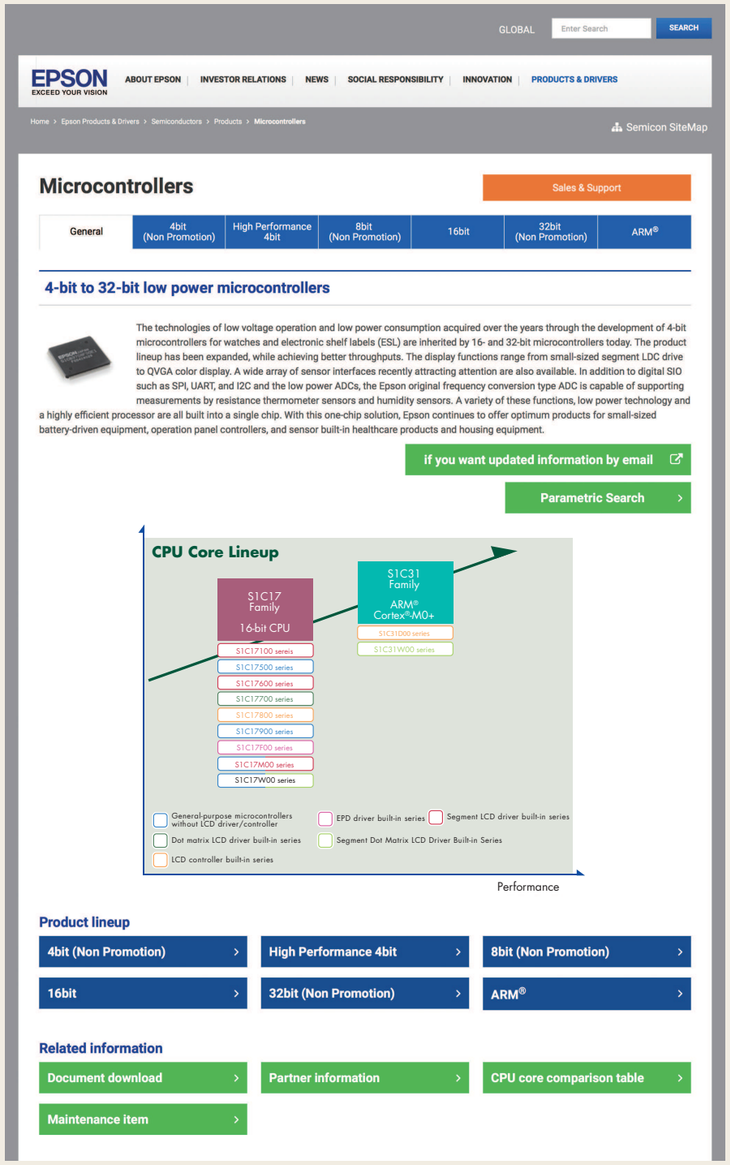
Products	Display		Operation clock	Power supply	Memory	Interafces		Reset	Others	Form of delivery	
	EPD Driver seg (TP/BP)	EPD Operating voltage [V]	Built-in oscillator [Hz] (Typ.)	Supply voltage [V]	Flash ROM [Byte]	I²C slave	SPI slave	POR	Temparature detection circuit	Package	Chip
S1D14F50 series		[Expansion EPD Dr] These driver ICs can expand the segment display domain when coupled with the S1C17F50 series. Since display circuitry optimized for driving EPDs is built-in, outstanding performance is also demonstrated even when used as a standalone driver IC.									
S1D14F57	256 (2TP/2BP)	9.15/12.30/15.45	1M	1.75 to 5.5	16K *1	1	1	1	1	–	○

*1: During erasing / programming voltage in flash memory (Vpp) : The external applying of 7.0V / 7.0V (Typ.) is needed.

Epson MCU website

global.epson.com/products_and_drivers/semicon/products/micro_controller/

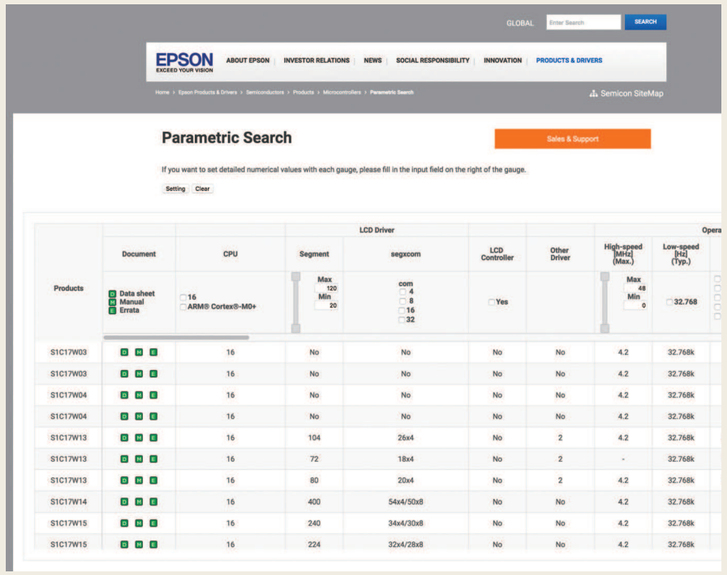
On the Epson MCU website, you can access a variety of information required for device selection and design development.



Downloadable information

- Hardware Development Tool
- Software Development Tool
- Application Note
- Sample Program
- MP Support Tool

- **Microcontrollers Parametric Search**
  It's useful for model selection of a Microcontrollers.
  You can download Data sheets, Technical manuals, and Manual errata sheets.



Downloadable information

- Data sheets
- Technical manuals
- Manual errata sheets

Overall development environment

Things prepared by customers

*The screen is an integrated development environment
"IAR Embedded Workbench for ARM" manufactured by IAR Systems

Debug Probe

Supported products
- IAR Systems I-jet
- SEGGER J-LINK
etc.
*The picture is the "IAR Systems I-jet"

Integrated development environment

Supported products
- IAR Systems IAR Embedded Workbench for ARM
- ARM MDK-ARM
etc.

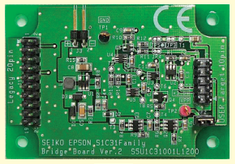
Offered from Epson

Model-specific information tool and Flash loader for integrated development environment

Sample program

Configuration tool for factory ROM write

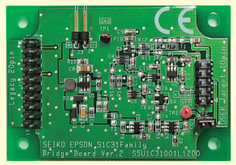
Offered from Epson



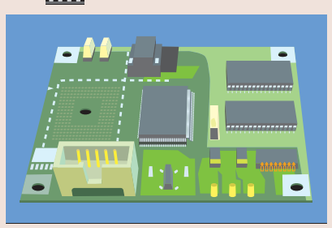
Bridge Board

Initial evaluation target board

Offered from Epson



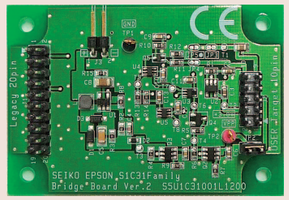
Bridge Board



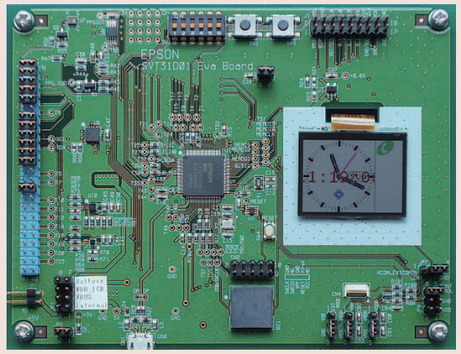
Target board for product development

Development support tool (Evaluation board)

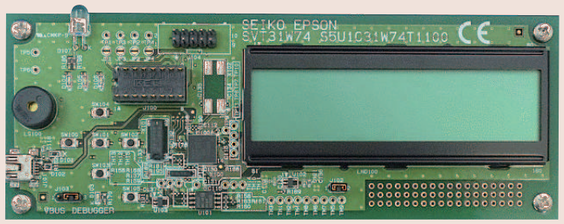
Software Evaluation Tool
- S1C31 chip built in
- Possible to evaluate the IC functions
- Provides a sample sources for various functions
- Debugging and Flash programming supported



Bridge Board



SVT31D01



SVT31W74

■ Evaluation board

Model Name	Product Name	Mounted Microcontroller Name	Remarks
Bridge Board	S5U1C31001L1	–	Connector conversion, Power supply generation for FLASH
SVT31D01	S5U1C31D01T1	S1C31D01	Color memory liquid crystal, Acceleration gyro sensor, Pulse sensor, Bridge Board
SVT31W74	S5U1C31W74T1	S1C31W74	Dot matrix liquid crystal panel, Infrared LED, USB connector, Bridge Board

■ Outside tool inquiries

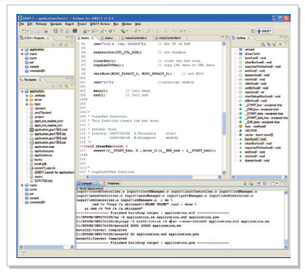
Integrated Development Environment, Debug Probe

IAR Systems K.K.
www.iar.com/buy/contact/

Development environments - S1C17 Family -

GNU17 package

Optimized C compiler supporting 16MB space
Assembler, linker, and ANSI library
GUI-based debugger
Eclipse integrated environment

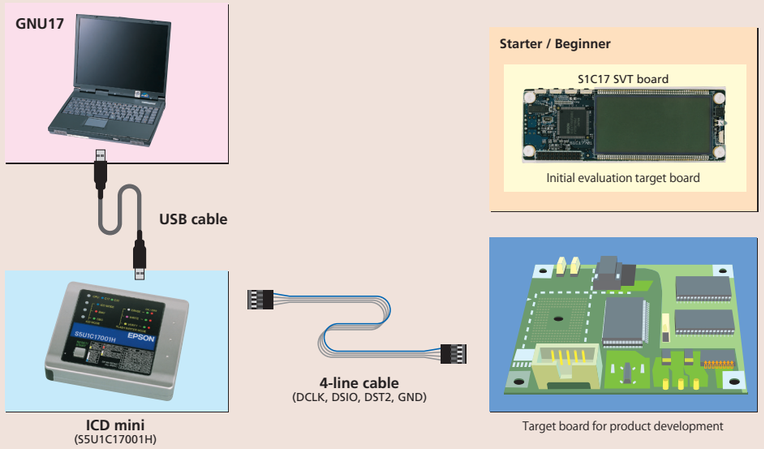


ICD mini

On-chip ICE, S1C17 Family products are supported.
Connect with the target board with 4 pins at minimum (3 signal pins and 1 GND pin).
Includes execution time measurement function.
Uses USB bus power.
Can function as a single on-chip flash writer. *1
Can be used as a GangWriter in multiple units.
Includes firmware update function.
Power supply function for target devices of 3.3V or 1.8V *2

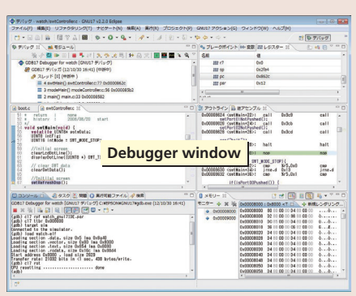
Ver 1.0 to 2.0

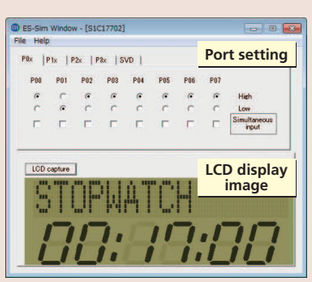
Ver 3.0



*1: Installs it in hardware Ver2.0 or less. *2: Installs it in hardware Ver2.0. Up to each power supply and 100mA or less. Hardware Ver 3.0 is powered by 3.3 V alone.

Development support tool (Software simulator)





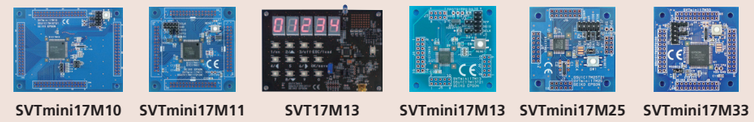
- Simulatable on PC including the LCD display, without the need to use external debugging hardware (Custom-made LCD Panels can be Created)
- Ability to view various data at the same time in multiple windows
- Ability to execute frequently used commands from the tool bar or menus
- Function of displaying C source, program code and symbols using disassembler
- Consecutive program execution and 3 types of step executions
- 3 types of break functions
- Trace and coverage functions
- Automatic command execution using command files

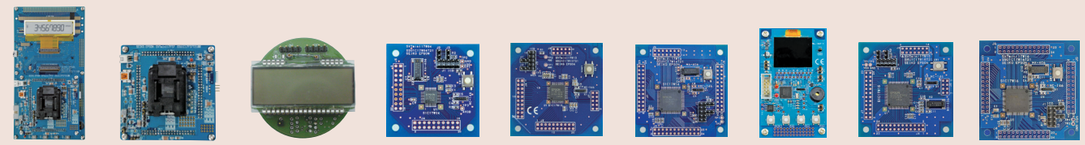
Development environments - S1C17 Family -

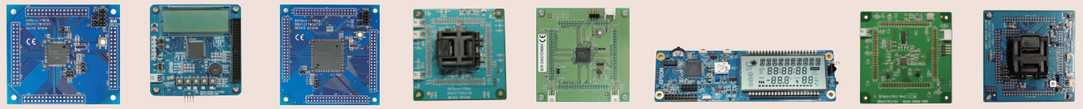
MCUs

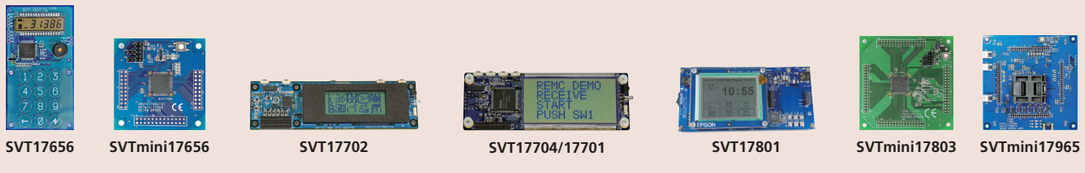
Development support tool (Evaluation board)

Software Evaluation Tool
- S1C17 chip built in
- Possible to evaluate the IC functions
- Provides a sample software for various functions
- Debugging and Flash programming supported









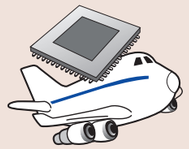
Evaluation board

Model Name	Product Name	Mounted Microcontroller Name	Remarks
SVT17F57	S5U1C17F57T11	S1C17F57	Segment EPD panel
SVTmini17F57	S5U1C17F57T21	S1C17F57	
SVT17M01	S5U1C17M01T11	S1C17M01	LCD panel, MR Sensor with EEPROM
SVTmini17M10	S5U1C17M10T21	S1C17M10	
SVTmini17M11	S5U7C17M11T21	S7C17M11	
SVT17M13	S5U1C17M13T11	S1C17M13	7 seg LED 5 digits, EEPROM, Infrared LED, Key matrix 3x4
SVTmini17M25	S5U1C17M25T21	S1C17M25	
SVTmini17M33	S5U1C17M33T21	S1C17M33	
SVTmini17M13	S5U1C17M13T21	S1C17M13	
SVTmini17W04	S5U1C17W04T21	S1C17W04	
SVTmini17W13	S5U1C17W13T21	S1C17W13	
SVTmini17W14	S5U1C17W14T21	S1C17W14	
SVT17W15	S5U1C17W15T11	S1C17W15	JDI MIP panel, Piezoelectric buzzer
SVTmini17W15	S5U1C17W15T21	S1C17W15	
SVTmini17W16	S5U1C17W16T21	S1C17W16	
SVTmini17W18	S5U1C17W18T21	S1C17W18	
SVT17W23	S5U1C17W23T11	S1C17W23	LCD panel, Piezoelectric buzzer
SVTmini17W36	S5U1C17W36T21	S1C17W36	
SVTmini17564	S5U1C17564T21	S1C17564	
SVTmini17589	S5U1C17589T21	S1C17589	
SVT17602	S5U1C17602T11	S1C17602	LCD panel, Remote control transmitter and receiver, Thermal/Humidity/Illuminance sensor
SVTmini17611	S5U1C17611T21	S1C17611	
SVTmini17651	S5U1C17651T21	S1C17651	
SVT17656	S5U1C17656T11	S1C17656	LCD panel, Capacitive touch button, Piezoelectric buzzer
SVTmini17656	S5U1C17656T21	S1C17656	
SVT17704	S5U1C17704T11	S1C17704	LCD panel, Remote control transmitter and receiver
SVT17702	S5U1C17702T11	S1C17702	LCD panel, Remote control transmitter and receiver
SVT17801	S5U1C17801T11	S1C17801	LCD module(QVGA), Touch Panel, Voice Input/Output, USB, Remote control transmitter and receiver, Various
SVTmini17803	S5U1C17803T21	S1C17803	
SVTmini17965	S5U1C17965T21	S1C17965	

Flash memory writing

If you procure written products from a Seiko Epson dealer

Seiko Epson semiconductor plant



Written products

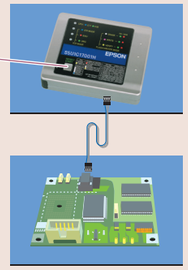
Customer

If you write to flash memory on your side (Single writing)

Unwritten products

Customer

Push Button!



Single flash writing mode

If you write to flash memory on your side (Simultaneous multiple writing)

Unwritten products

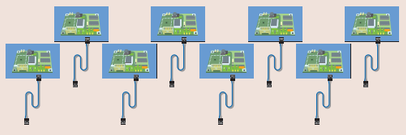
Customer

Push Key!

Multi Programmer

Unwritten products

Customer



Push Button!

Gang Programmer

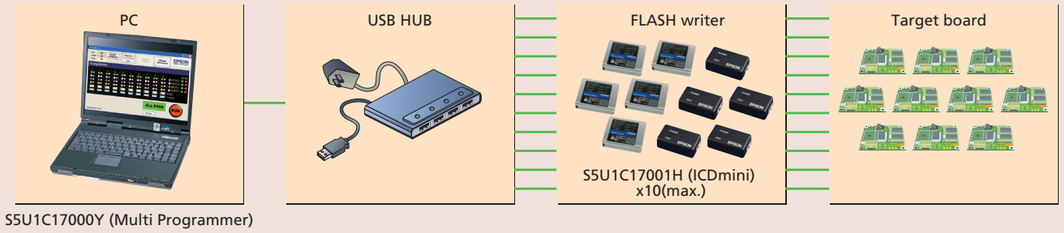
On-board writing tools and environments

■Compatible models:S1C17 Family

- A single S5U1C17001H (ICDmini) unit operates as an on-chip flash writer. Simply by pressing a button, user data previously saved in the ICDmini can be written to the internal flash ROM on the target board, or the flash ROM connected to the external bus.
- You can enjoy on-board programming easily at any location where a 5V power supply is available.

* Power supply to the target board is required separately.
* The product does not include the target board, and AC adapter or battery box to supply power to USB terminals.

■Compatible models:S1C17 Family



- Up to 10 units of the S5U1C17001H (ICDmini) can be used to construct an environment enabling user data to be downloaded simultaneously to multiple targets.
- The S5U1C17000Y, GangWriter software that controls the ICDmini, provides user- friendly screen and simple operation.

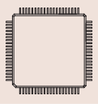
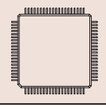
* Power supply to the target board is required separately.
* The product does not include the target board, PC, and the USB hub operating on self-power.

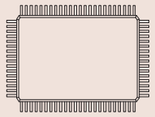
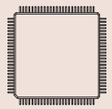
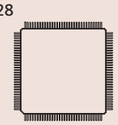
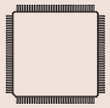
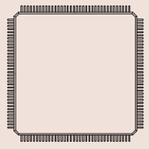
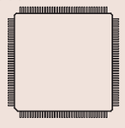
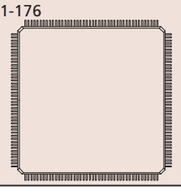
■Compatible models:S1C17 Family

- A single S5U1C1700W unit downloads user data simultaneously to a maximum of 8 targets.
- An SD card is used to input user data, and the operating status can be checked by LCD, LED and buzzer.
- A serial number writing function is also built-in.

Package lineup

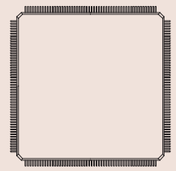
QFP & TQFP & SQFN

PKG type/Pin count	Body size (mm)	Lead pitch (mm)
SQFN4-24 	4 X 4 X 0.9	0.5
SQFN5-32 	5 X 5 X 1.0	0.5
TQFP12-32 	7 X 7 X 1.2	0.8
QFP12-48 	7 X 7 X 1.7	0.5
SQFN7-48 	7 X 7 X 0.9	0.5
TQFP12-48 	7 X 7 X 1.2	0.5
SQFN9-64 	9 X 9 X 1.0	0.5
TQFP12-64 	7 X 7 X 1.2	0.4
QFP13-64 	10 X 10 X 1.7	0.5
TQFP13-64 	10 X 10 X 1.2	0.5
TQFP14-80 	12 X 12 X 1.2	0.5
QFP14-80 	12 X 12 X 1.7	0.5

PKG type/Pin count	Body size (mm)	Lead pitch (mm)
QFP5-80 	20 X 14 X 3.5	0.8
QFP15-100 / H4QFP15-100 	14 X 14 X 1.7	0.5
TQFP14-100 	12 X 12 X 1.2	0.4
QFP15-128 	14 X 14 X 1.7	0.4
TQFP15-128 	14 X 14 X 1.2	0.4
QFP20-144 	20 X 20 X 1.7	0.5
TQFP24-144 	16 X 16 X 1.2	0.4
QFP21-176 	24 X 24 X 1.7	0.5

Package lineup

QFP & TQFP & QFN

PKG type/Pin count	Body size (mm)	Lead pitch (mm)
QFP21-216 	24 X 24 X 1.7	0.4

WCSP

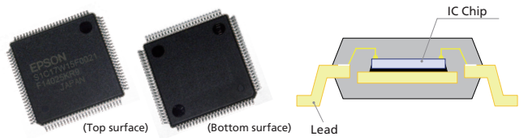
PKG type/Pin count	Body size (mm)	Ball pitch (mm)
WCSP-48 (S1C17955) 	3.9 X 3.9 X 0.9	0.5
WCSP-96 (S1C31D01) 	4.5 X 4.5 X 0.7	0.4

Compact BGA (PFBGA) & Thin type BGA (VFBGA)

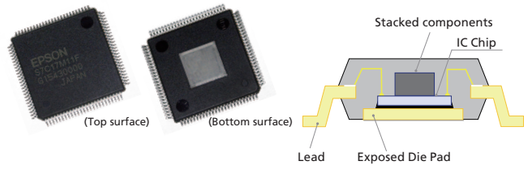
PKG type/Pin count	Body size (mm)	Ball pitch (mm)
PFBGA5U-60 	5 X 5 X 1.2	0.5
VFBGA5H-81 	5 X 5 X 1.0	0.5
PFBGA10U-144 VFBGA10H-144 	10 X 10 X 1.2 10 X 10 X 1.0	0.8
VFBGA7H-161 	7 X 7 X 1.0	0.5

PKG type/Pin count	Body size (mm)	Ball pitch (mm)
VFBGA10H-180 	10 X 10 X 1.0	0.65
VFBGA8H-181 	8 X 8 X 1.0	0.5
VFBGA10H-240 	10 X 10 X 1.0	0.5

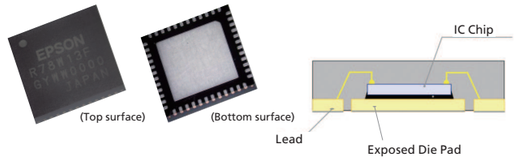
QFP



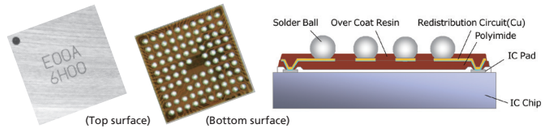
H4QFP (QFP with exposed die pad)



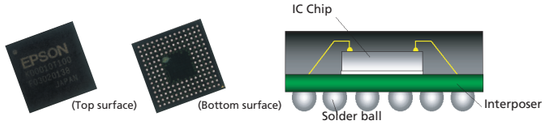
SQFN



WCSP



Thin type BGA (VFBGA)



Memo

NOTICE

The content of this document is subject to change without notice.

1. This document may not be copied, reproduced, or used for any other purpose, in whole or in part, without the consent of Seiko Epson Corporation(“Epson”).
2. Before purchasing or using Epson products, check with our sales representative for the latest information. Always consult Epson’s web site or other sources for the latest information.
3. Information provided in this document concerning application circuits, programs, usage, etc., are for reference only. Epson makes no guarantees against any infringements of or damages to a third party intellectual property rights or any other rights resulting from the information. Epson does not give any licenses to use the intellectual property rights or any other rights of a third party or Epson under this document.
4. Epson is committed to constantly improving quality and reliability, but semiconductor products in general are subject to malfunction and failure. Customers using Epson products assume responsibility for ensuring that their hardware, software, and systems are designed with essential safety to ensure that any malfunction or failure of Epson products would not cause harm to life or health or cause damage to property. During design of the customers’ products using Epson products, check the latest information of Epson products (in this document, specifications, data sheets, manuals, Epson’s web site, etc.) and comply with the latest information. If using information from technical content, programs, algorithms, examples of application circuits, or other information indicated in product data, schematics, tables, etc., from the above materials, etc., the customers should evaluate their own individual products and overall systems thoroughly and decide whether to use Epson products with the products and systems at their own responsibility.
5. Epson has prepared this document carefully and accurately as much as possible, but Epson does not guarantee that the information presented herein is error-free. Epson assumes no responsibility for any damages caused by the customers resulting from information errors in this document.
6. No dismantling, analysis, reverse engineering, modification, alteration, adaptation, reproduction, etc., of Epson products is allowed.
7. Epson products are intended for use in general applications (office equipment, communications equipment, measuring instruments, home electronics, etc.) and applications individually listed in this document. Our products are not intended for use in the applications specified below where particular quality or reliability is required or where a malfunction or failure could cause harm to life or health or serious damage to property or have a serious impact on society. Customers wishing to use our products in any of the following specified applications (other than applications individually listed in this document) should contact our sales representative in advance.
   - Space equipment (artificial satellites, rockets, etc.)
   - Transportation vehicles and their control equipment (automobiles, aircraft, trains, ships, etc.)
   - Medical equipment intended for maintaining life
   - Relay equipment to be placed on sea floor
   - Power station control equipment
   - Disaster or crime prevention equipment
   - Traffic control equipment
   - Financial equipment
   - Other applications requiring similar levels of reliability as the above
8. Epson products listed in this document and their associated technologies may not be used in equipment or systems that are prohibited to manufacture, use or sell under the laws, regulations, or rules in Japan or any other countries. Furthermore, Epson products and their associated technologies may not be used for the development, etc., of weapons of mass destruction, for military uses, or other military applications. If exporting Epson products or their associated technologies, be sure to comply with the Foreign Exchange and Foreign Trade Control Act in Japan and other export-related laws and ordinances in Japan and any other countries and follow the required procedures as provided by the relevant laws and ordinances.
9. Epson assumes no responsibility if our products are used in violation of conditions listed in this document and such use results in damage.
10. Epson assumes no responsibility if customers transfer, loan, etc., our products to a third party and these results in damage.
11. For more details or other concerns about this document, contact our sales representative.
12. Company names and product names listed in this document are trademarks or registered trademarks of their respective companies.

©Seiko Epson Corporation 2018

[Registered trademarks, trademarks, and company names]

Design Compiler® : Synopsys Inc. in U.S.A.
NC-Verilog® : Cadence Design Systems Inc. in U.S.A.
Compact Flash® : Western Digital Technologies Inc. in U.S.A.
ARM® and Cortex® are the registered trademarks of ARM Limited in the EU and other countries.
SuperFlash I Technology : SST UK Ltd. in U.K.

Other brand names and product names are trademarks or registered trademarks of their respective owners.