Microcontrollers

2017

EPSON
Microcontrollers
2017
SEIKO EPSON CORPORATION

EPSON
CMOS LSIs
Product Catalog 2017
SEIKO EPSON CORPORATION

EPSON
ASICs
Gate Arrays / Embedded Arrays / Standard Cells
2017
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EPSON
ASSPs
Application Specific Standard Products
2017
SEIKO EPSON CORPORATION

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Non-promotional product information
For non-promotional products, please visit the Epson website or see the Epson product general catalog.

Trademark & Company Name
I²C BUS: NXP Semiconductors Corp. / SuperFlash: Silicon Storage Technology Inc. in U.S.A. / ARM, Cortex: ARM Limited in U.K.
All brands or product names mentioned herein are trademarks and/or registered trademarks of their respective companies.

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

SEIKO EPSON CORPORATION
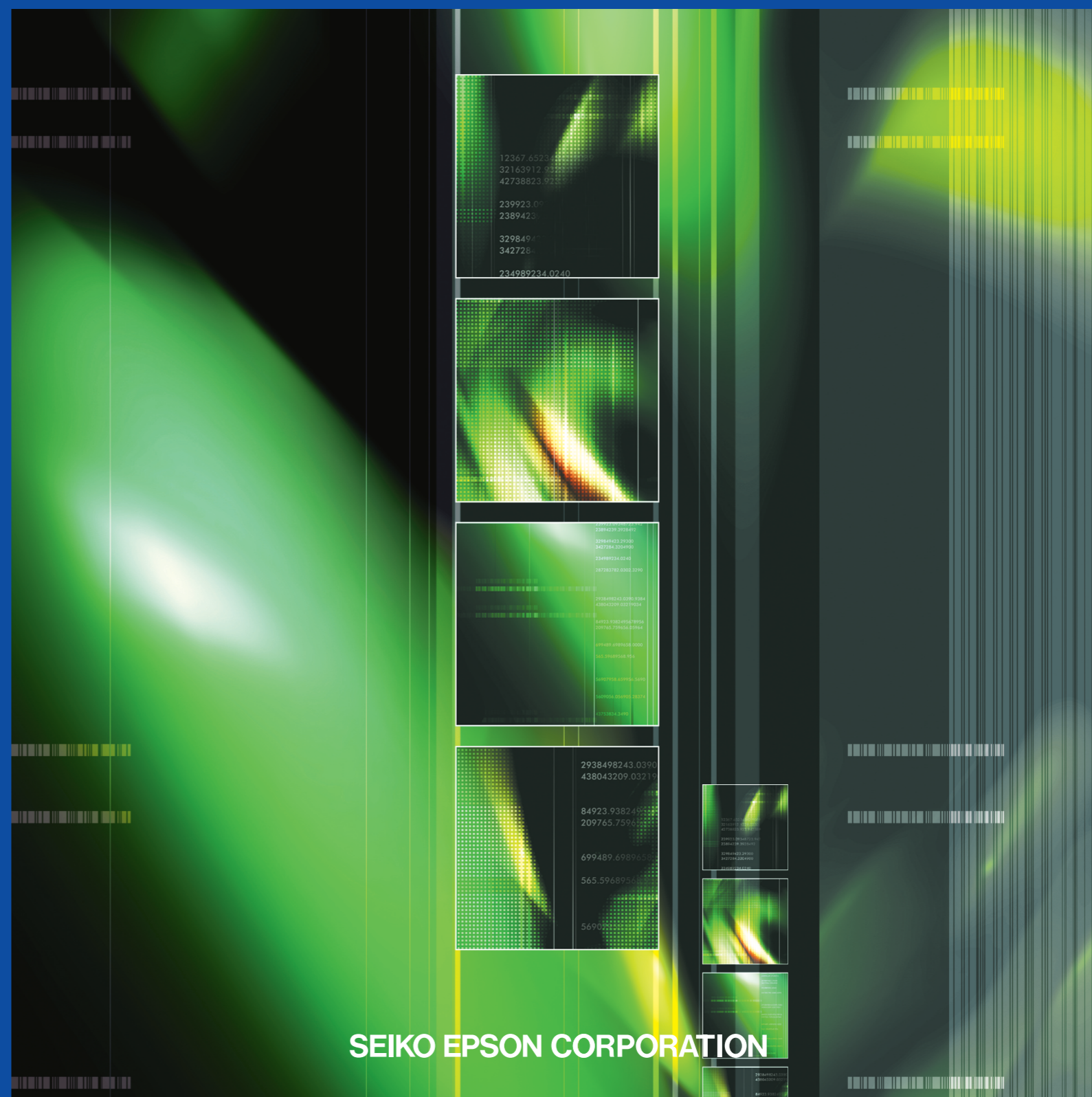
Business Concept

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.
   http://global.epson.com/products/semicon/technology/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 : Fujimi plant/Swa-minami plant/Tohoku Epson Corp.
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

ISO 14001
BUREAU VERITAS
Certification
1828

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 and ISO/TS16949 certification with its IC, module and their application products.

Quality Management system third party certification status
ISO9001
Type of Certification : ISO9001: 2008 , JIS Q 9001: 2008
Awarded to : Semiconductor Operations Fujimi Plant, Hino Office, Suwa Minami Plant,
             Tohoku Epson Corp.
Certified by : Bureau Veritas Japan Co., Ltd.
Certificate No. : A3124795
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

ISO/TS16949
Type of Certification : ISO/TS16949:2009 -Third Edition
Awarded to : TOHOKU EPSON Corp, SEIKO EPSON CORPORATION Fujimi Plant, Hino Office,
             EPSON EUROPE ELECTRONICS GmbH
Certified by : Bureau Veritas Certification Holding.
Certificate No. : 199476
Initial Date of Certification : May 9, 2006
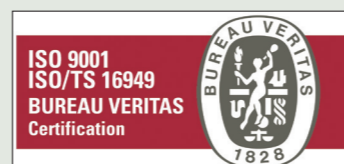
Type of Certification : ISO/TS16949:2009
Awarded to : Singapore Epson Industrial Pte. Ltd.
Certified by : SGS
Certificate No. : SG07/00021
Initial Date of Certification : June 7, 2007

ISO 9001
ISO/TS 16949
BUREAU VERITAS
Certification
1828

CPU Core Lineup

S1C31 Family ARM® Cortex®-M0+
- S1C31D00 series
- S1C31W00 series

S1C17 Family 16-bit CPU
- S1C17100 sereis
- S1C17500 series
- S1C17600 series
- S1C17700 series
- S1C17800 series
- S1C17900 series
- S1C17F00 series
- S1C17M00 series
- S1C17W00 series

S1C63 Family 4-bit CPU
- S1C63000 series
- S1C63100 series
- S1C63400 series
- S1C63500 series
- S1C63600 series
- S1C63700 series

☐ General-purpose microcontrollers without LCD driver/controller
☐ EPD driver built-in series
☐ Segment LCD driver built-in series
☐ Dot matrix LCD driver built-in series
☐ Segment Dot Matrix LCD Driver Built-in Series
☐ LCD controller built-in series

Performance

C O N T E N T S

Business Environment and Mega Trends

Refined efficient, compact and precision technologies, and connected people, things and information

Smart technologies, Environment technologies

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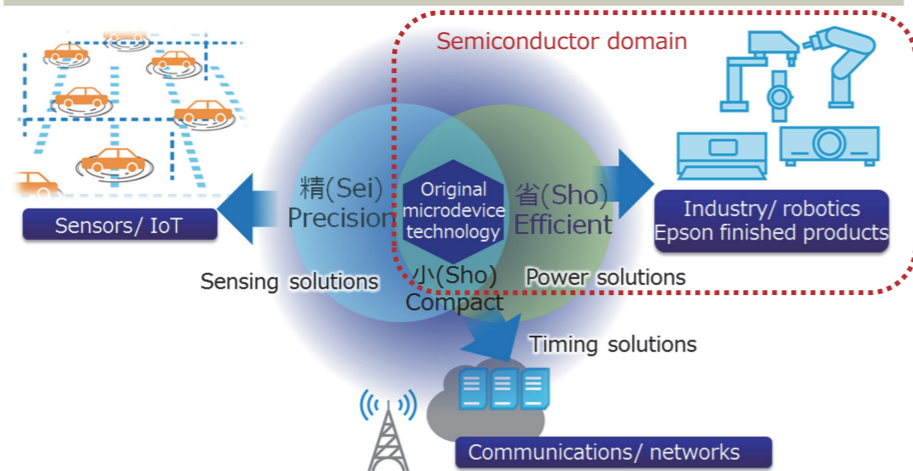
Semiconductor business contribute to the value creation of the Epson finished product, by advanced "Power Saving" solutions.

History of Epson Semiconductor'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)

LCD Driver
LCD Controller
ASSP
Microcontroller
ASIC (G/A, E/A, S/C)
Custom IC (Analog)
Silicon Foundry

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

Epson microcontroller application examples

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

Total Dot number (y-axis): VGA, QVGA, 4,096, 1,024, 512, 128

ROM Capacity (x-axis): 16KB, 32KB, 64KB, 128KB, 256KB, 512KB~1MB

- S1C17800 Series
- S1C31D00 Series
- S1C17700 Series
- S1C31W00 Series
- S1C17W00/M00 Series
- S1C63 Family
- S1C17600 Series
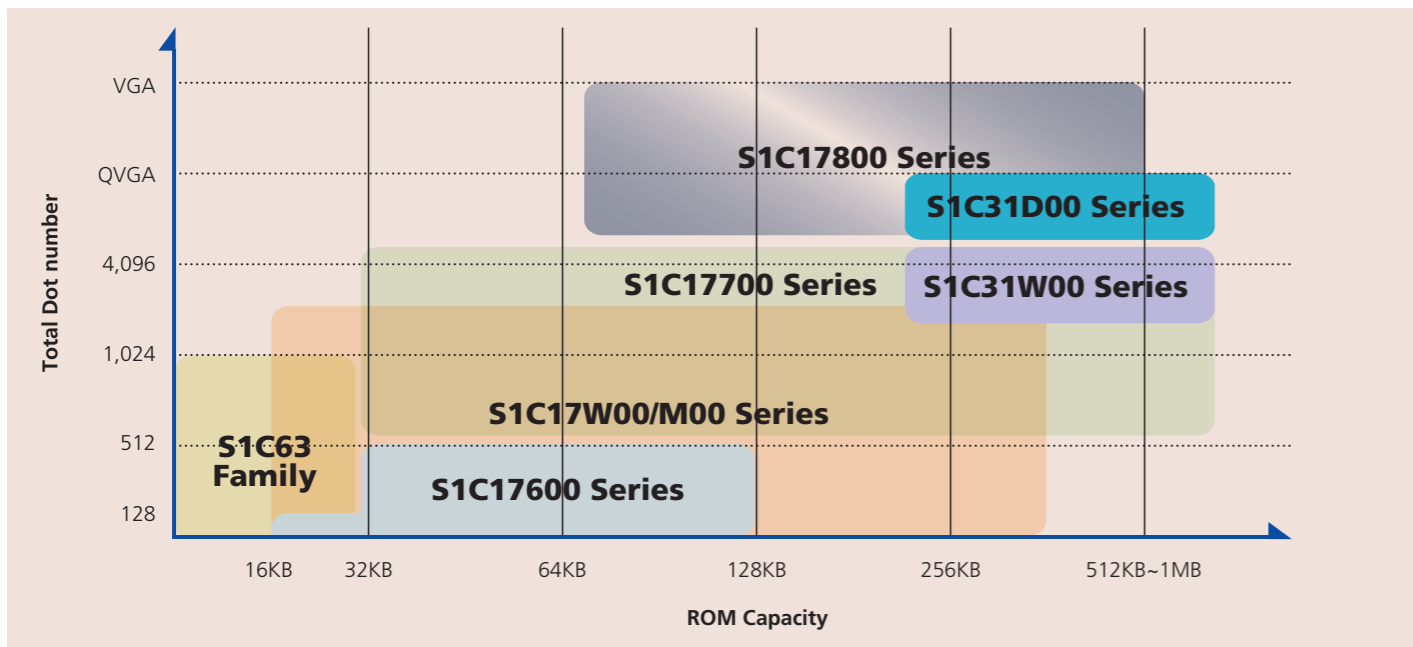
Providing package types suitable for a range of applications

ROM Capacity (y-axis): 1M, 512/560K, 384K, 224/240/256K, 116/128K, 48/64K, 32K, 16K, 6/8K, 2/4K, ROM Less

Pin Number (x-axis): 32, 48, 64, 80, 100, 128, 144, 176/180, 216, 240/256

- ARM 32-bit
- 16-bit
- 4-bit

Legend:
- S1C31: built-in LCD dr
- S1C31: built-in LCDC
- S1C17: built-in LCDC
- S1C17: non-LCD
- S1C17: built-in EPD dr
- S1C17: built-in LCD dr
- S1C63: built-in LCD dr
- S1C63: non-LCD

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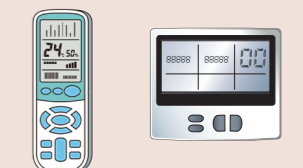
■ Suitable models：S1C17W00/S1C17M00/S1C17100/S1C17500/S1C17600/S1C17700/S1C17800 series

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.
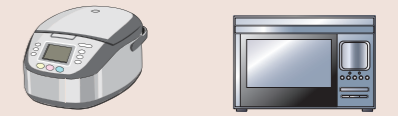
■ Suitable models：S1C17800 series

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, S1C63100/600 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 and S1C63000/S1C63100/S1C63600 series.

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

Built-in power supply circuit

Regulator   Charge pump

1V-3V

LCD Driver

3V type LCD

Stable Contrast

3V
2V
1V

1V

COM 0
COM 1
COM 2
COM 3
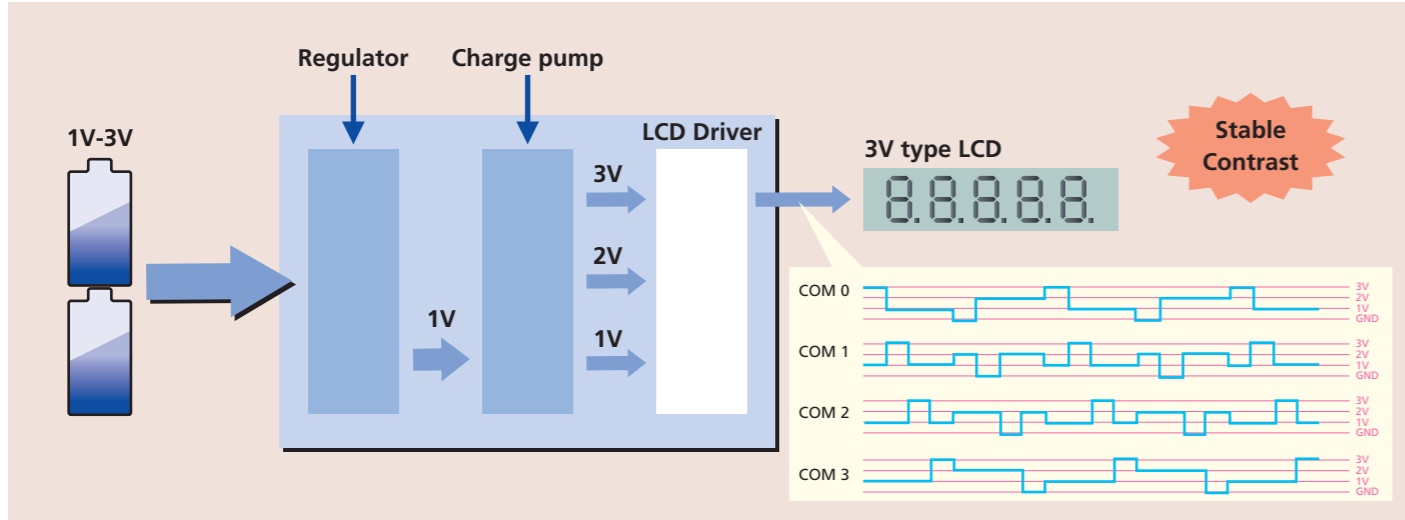
Epson microcontrollers include the voltage regulator circuit. With the built-in regulator, the microcontroller generates sufficient voltage to drive its circuit internally, so that it can maintain a high quality display unaffected by battery power levels. Because the high quality can be maintained without 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.

When battery power drops…

EPSON

Other companies
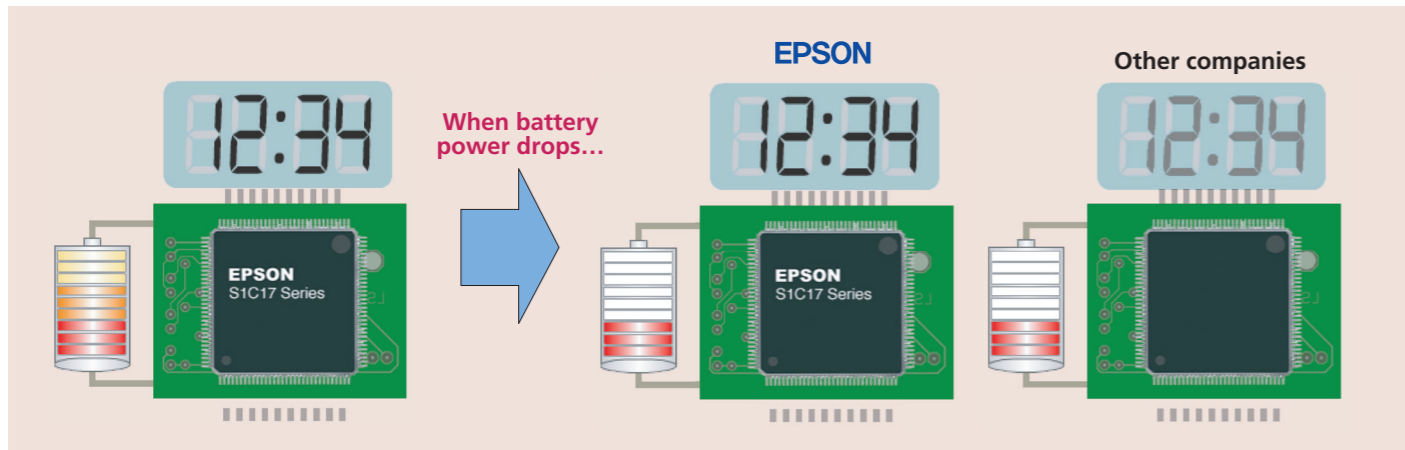
Even when battery power level drops, the contrast level is not affected. The same level of display quality as that of a new machine can be maintained until battery power has been completely consumed.
The battery power level is detected by the Supply Voltage Detector (SVD) circuit, so you do not have 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

EPSON FLASH MCU

No!
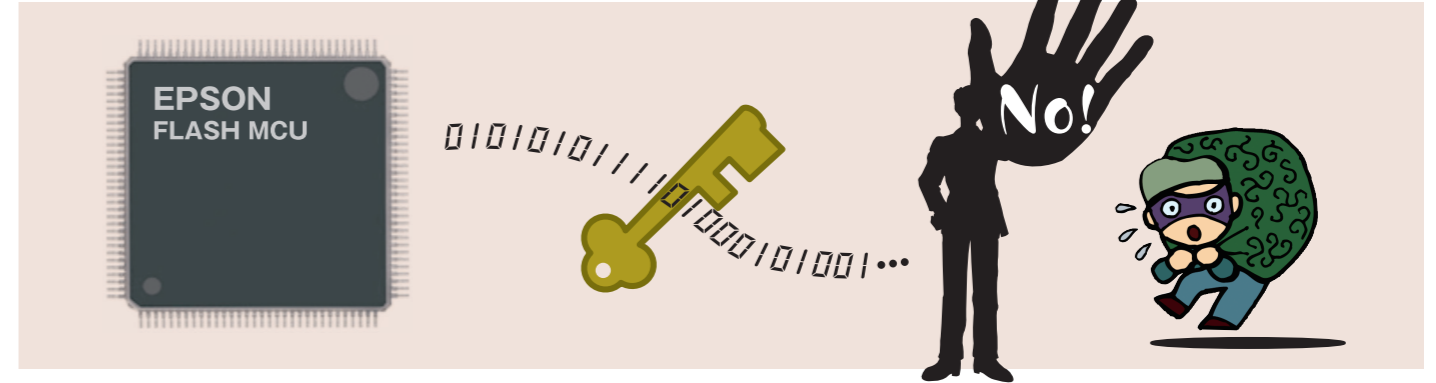
The debug interface disconnection function and the flash memory write/read protections are provided to protect the contents of the built-in flash memory and the RAM.
Prohibiting data reading and writing protects the important software assets for our customers.

A large number of different types of interfaces are included

Ultra-low power / Successive-approximation type / A/D Converter

Acceleration sensor
Pressure sensor
Photo sensor
Gyro sensor

By connecting with different types of sensors, various functions, including pedometer measurement, fall detection, barometric and altitude measurement, weather forecast, motion sensing, and backlight control, can be provided.

Epson MCU

ADC
RFC
UART
SPI
QSPI
I²C
GPIO
USB
REMC *
AMRC
SMCIF

R/F Converter
Highly accurate temperature and humidity measurement has been easily achieved by using only a few components such as a thermistor and a humidity sensor!!

Example of temperature measurement
Example of humidity measurement

CR oscillation circuit

SENB
SENA
REF
RFIN
Thermistor

SENB
SENA
REF
RFIN
Humidity sensor

24-bit counter

Thermistor   Humidity sensor

SPI: Supports master/slave.
Can be connected with different types of peripheral ICs and sensor modules.

I²C: Supports master/slave.
Can be connected with different types of peripheral ICs and sensor modules.

USB device function and remote controller transmission circuit enable easy communication with peripheral devices. Functions such as data management can be added.

SMCIF: This is an interface circuit for a smart card (IC card) which complies with ISO7816-3.

AMRC: MR sensor controller which achieves flow measurements. An MR sensor can be connected directly, which enables continuous measurement of analog rotation phase signals.

MR sensor

*: 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.

■ 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 Series list

S1C31D00 Series: Built-in Memory Liquid Crystal Controller

S1C31W00 Series: Built-in Dot Matrix Display Driver

S1C31 Family Application examples

Example of an application using the S1C31W74: Digital watch

Example of an application using the S1C31D01: Smart watch

S1C31 Family Products overview

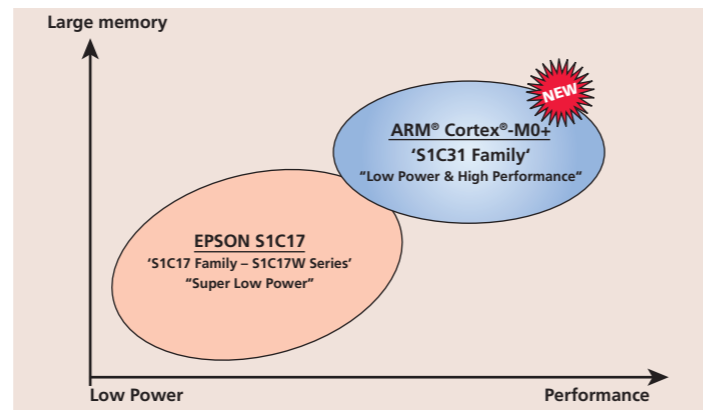| Products | Display | | | Operation clock | | | Supply current | | | | Power supply | Memory | | | I/O | Timer | | | | | SIO | | | | | | Analog | | | Others | | | | Form of delivery | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 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 | 0.4 | 1.7 | TBD | TBD *1, *3 | 1.8 to 5.5 | 256K (*4) | 512 | 96K | 57 | – | 8 | 2 × 6 | 1 | 1 | 3 | 2 | 1 | 2 | 1 | FS Dev | – | 7 | 1 | 1 | 1 | 4 | – | VFBGA5H-81 WCSP96 TQFP14-80 | O |
| S1C31W00 series | Ultra-low consumption microcomputer which has a liquid crystal driver built-in. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S1C31W74 | 88 x 16 80 x 24 72 x 32 | – | | 21.7M | 32.768k | 1M/2M/8M/ 12M/16M/20M | 0.4 | 1.7 | 4 | 4400 *2, *3 | 1.8 to 3.6 | 512K (*4) | 512 | 128K | 71 | – | 4 | 2 × 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | FS Dev | 1 | – | 2 | – | 1 | 4 | – | VFBGA8H-181 | O |

*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
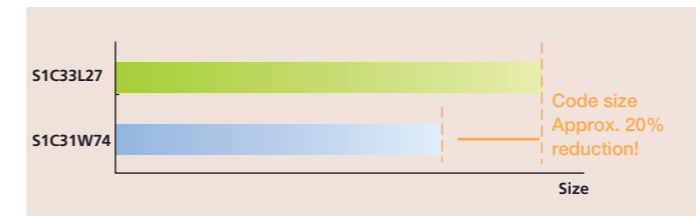*3: During operations LCD (V_DD): 2.5V to 3.6V
*4: During erasing / programming voltage in flash memory (V_PP): The external applying of 7.5V / 7.5V (Typ.) is needed. (*4) can be rewritten even with internal power supply.
*5: SVD is an abbreviation for Supply Voltage Detector.
*6: Including Input port and Output port.

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 Ultra-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 MCU Line up

	16KB	24KB	32KB	48KB	64KB	96KB	128KB	256KB	384KB	512KB
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 S1C17W03			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

Current Consumption in SLEEP Mode
CLK=OFF, RTC=OFF, CPU=OFF — **Standby**

1/5 Compared to Conventional
- 150nA (S1C17W00 series)
- EPSON Conventional

Current Consumption in HALT Mode
CLK=32kHz, RTC=ON, CPU=OFF — **RTC Execution**

1/8 Compared to Conventional
- 500nA (S1C17W00 series)
- 300nA (S1C17W00 series, Super Economy Mode)
- EPSON Conventional

Current Consumption in RUN Mode (32 kHz)
CLK=32kHz, RTC=ON, CPU=32kHz — **Low-speed Execution**

1/4 Compared to Conventional
- 6µA (S1C17W00 series)
- 3µA (S1C17W00 series, Super Economy Mode)
- EPSON Conventional

Current Consumption in RUN Mode (1MHz)
CLK=1MHz, RTC=ON, CPU=1MHz — **High-speed Execution**

1/5 Compared to Conventional
- 140µA (S1C17W00 series)
- EPSON Conventional

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

(Conventional)
- I_{DD}, V_{DD} → Linear Regulator → V_{D1} → Internal Circuit
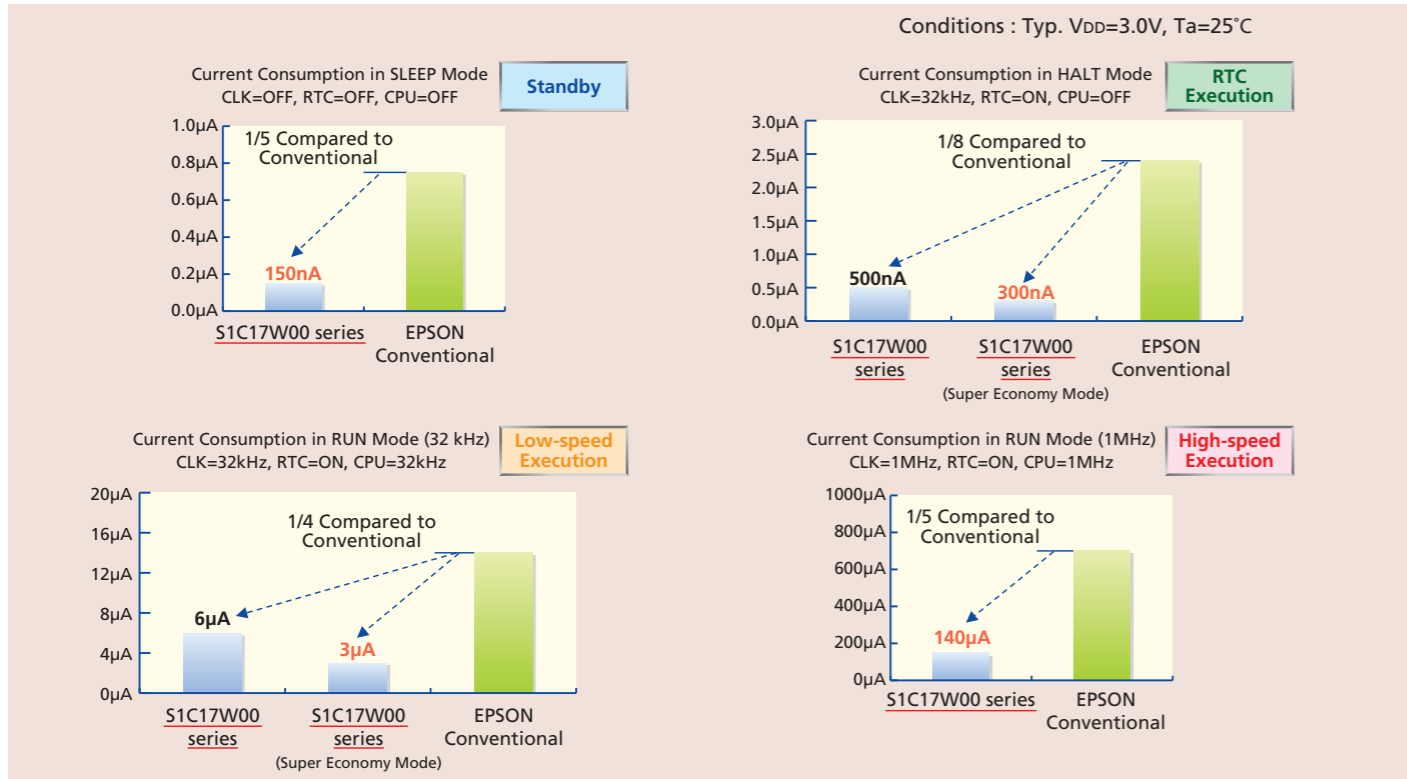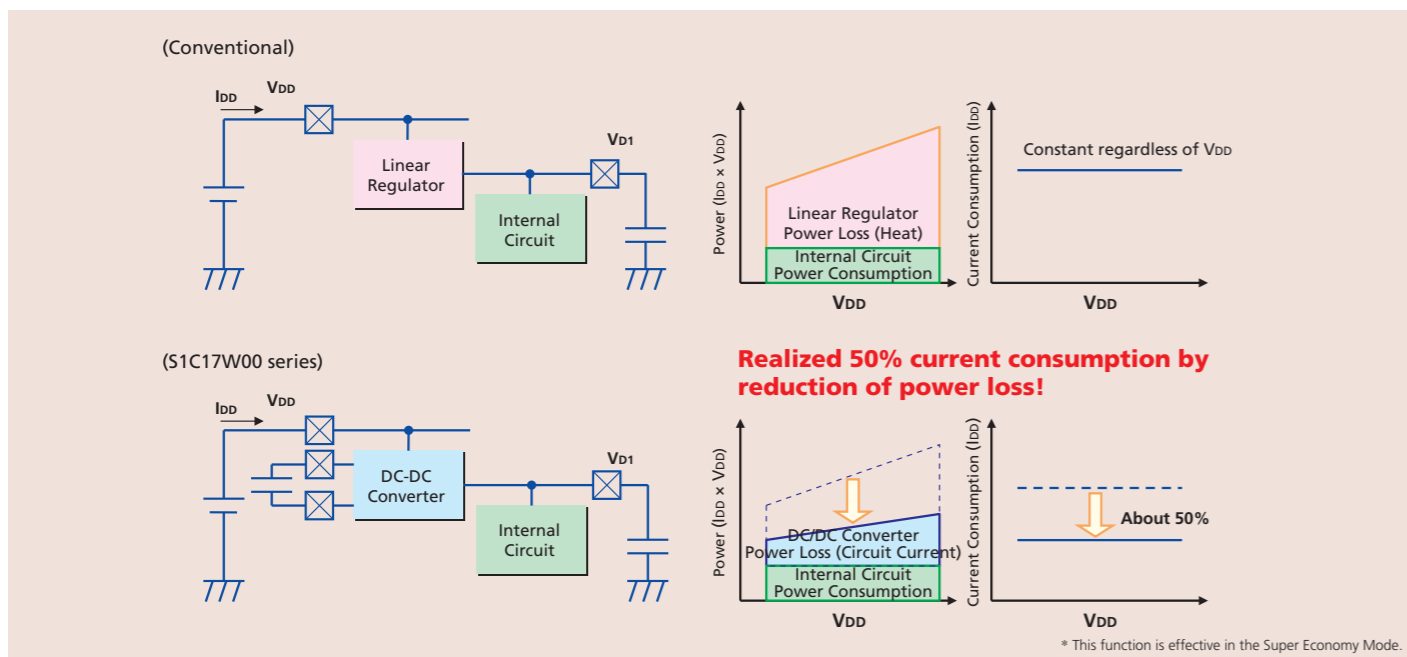- Power ($I_{DD} \times V_{DD}$): Linear Regulator Power Loss (Heat), Internal Circuit Power Consumption vs V_{DD}
- Current Consumption (I_{DD}): Constant regardless of V_{DD} vs V_{DD}

(S1C17W00 series)
- I_{DD}, V_{DD} → DC-DC Converter → V_{D1} → Internal Circuit
- Power ($I_{DD} \times V_{DD}$): DC/DC Converter Power Loss (Circuit Current), Internal Circuit Power Consumption vs V_{DD}
- Current Consumption (I_{DD}): About 50% vs V_{DD}

Realized 50% current consumption by reduction of power loss!

* This function is effective in the Super Economy Mode.

S1C17W00 series low-power consumption technology

RESET

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

IOSC

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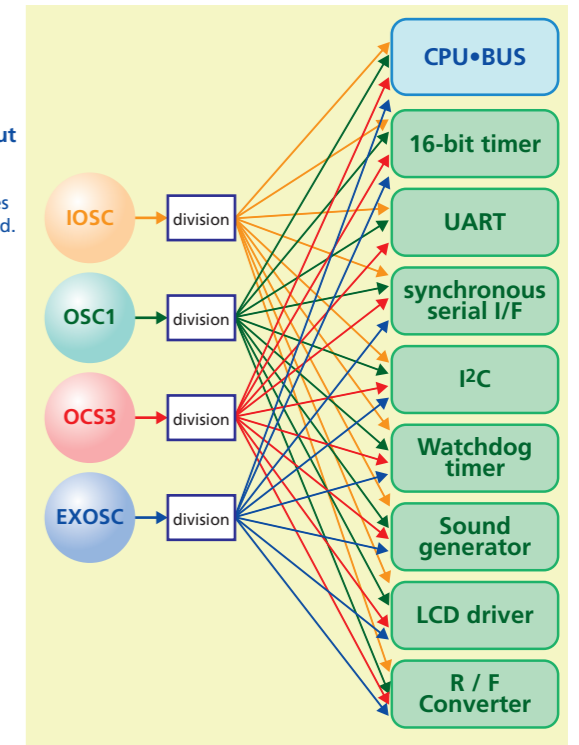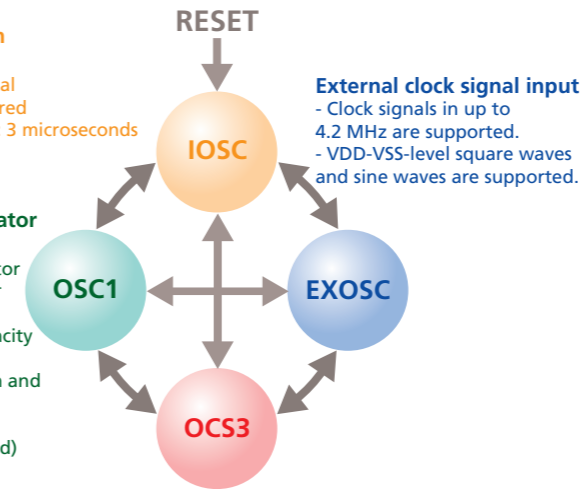- VDD-VSS-level square waves and sine waves are supported.

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

OSC1 — **EXOSC**
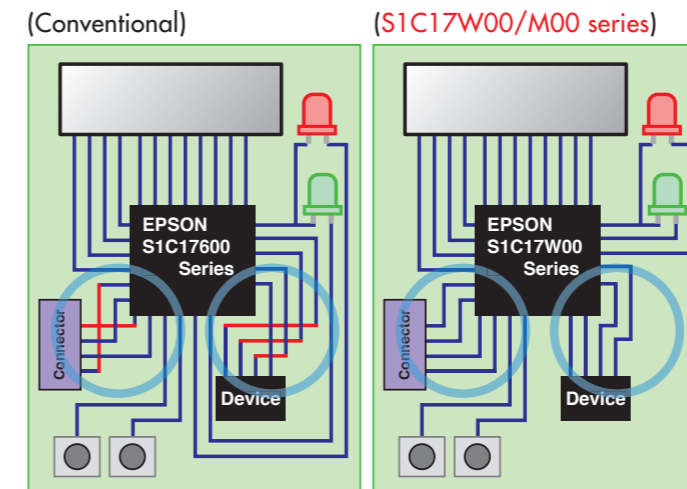
OCS3

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!

IOSC → division
OSC1 → division
OCS3 → division
EXOSC → division

→ CPU•BUS, 16-bit timer, UART, synchronous serial I/F, I2C, Watchdog timer, Sound generator, LCD driver, R / F Converter

Terminals can be allocated freely (UPMUX)

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

(Conventional) — EPSON S1C17600 Series — Connector — Device

(S1C17W00/M00 series) — EPSON S1C17W00 Series — Connector — Device

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 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	Multiplier/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.																	
S1C17W13	26 × 4 / 18 × 8 / 20 × 4 *7	4.2M	32.768k	32k/250k/384k/500k/700k/1M/2M/4M	0.15	0.3	2 / 4	140	1.2 to 3.6 *9	48K *3	2K	32 / 26	3	2 x 2	1	1	2	1	–	1	1	2 *5	–	1	1	1	LED pin x 2	QFP13-64 / SQFN7-48 / TQFP12-48	○ / –
S1C17W14	54 × 4 / 50 × 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 × 4 / 30 × 8 / 32 × 4 / 28 × 8 / 24 × 4 / 20 × 8	4.2M	32.768k	500k/700k/1M/2M/4M	0.15	0.3 / 0.5	4 / 8	250	1.2 to 3.6 *1	64K *3	4K	36 / 33 / 28	3	2 x 2	1	1	2	1	–	1	–	4 *5	–	1	1	1	–	QFP15-100 / TQFP14-80 / SQFN9-64 / TQFP13-64	○ / – / –
S1C17W16	60 × 4 / 56 × 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 × 4 / 44 × 8 / 32 × 4 / 28 × 8 / 24 × 4 / 20 × 8	4.2M	32.768k	250k/384k/500k/700k/1M/2M/4M	0.15	0.3 / 0.5	2 / 4	140	1.2 to 3.6 *9	128K (*3)	8K	68 / 59 / 49	4	3 x 2	1	1	2	2	–	1	1	2 *5	7	1	1	1	Temperature sensor	TQFP15-128 / TQFP14-80 / SQFN9-64	○ / –
S1C17W22	72 × 4/8 / 64 × 16 / 56 × 24	4.2M	32.768k	500k/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 × 4/8 / 64 × 16 / 56 × 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 × 16 / 64 × 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 × 16 / 64 × 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 × 16 / 64 × 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 (VDD): 1.8V to 3.6 V
*2: During operations LCD (VDD): 2.5V to 3.6V
*3: During erasing / programming voltage in flash memory (VPP): 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 (VDD): 2.7V to 3.6V, 1.8V to 3.6V during the external applying VPP=7.5V/7.5V(Typ.)
*7: External voltage application mode only.
*8: Including Input port and Output port.
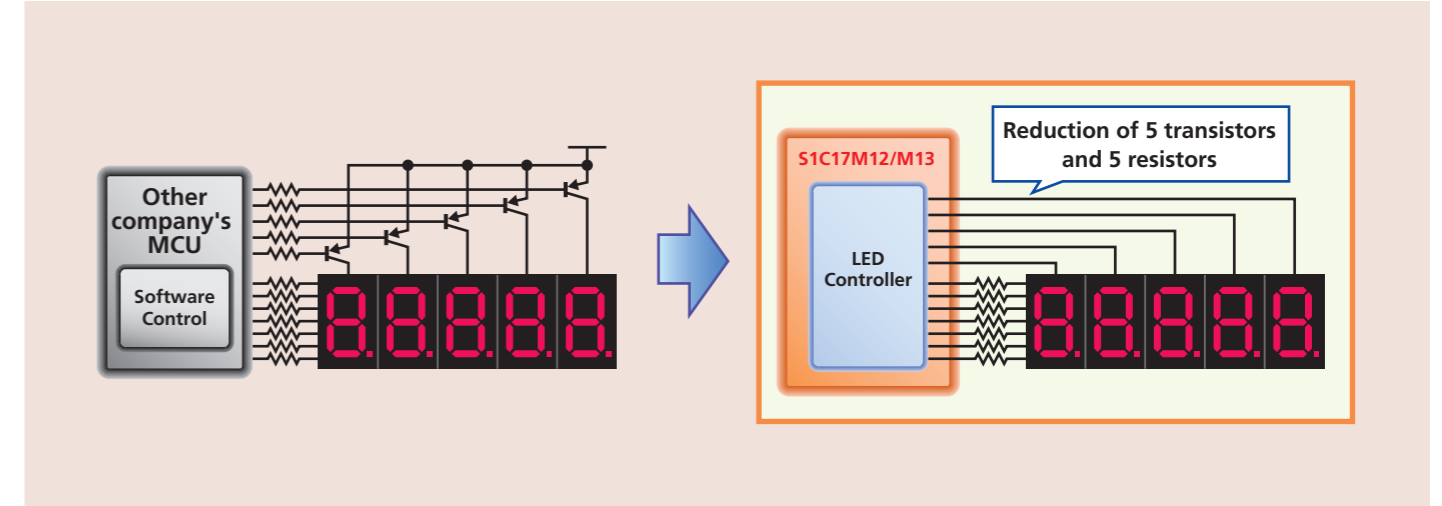*9: During erasing / programming in flash memory (VDD): 2.4V to 3.6 V

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

Products	Display		Operation clock			Supply current				Power supply	Memory			I/O	Timer					SIO					Analog		Reset		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]	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	Multiple r/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	32.768kHz	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	32.768kHz	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	–	700k/12M/ 16M/20M	0.5	2	6	160	1.8 to 5.5 *2	16K (*3)	–	2K	18 25	4	2 x 2	1	1	2	2	–	1	1	–	4 6	1	○	○	1	1	–	SQFN4-24 SQFN5-32	–
S1C17M21	–	–	21M	32.768kHz	700k/12M/ 16M/20M	0.5	2	6	160	1.8 to 5.5 *2	16K (*3)	–	2K	25	4	2 x 2	1	1	2	2	–	1	1	–	6	1	○	○	1	1	–	TQFP12-32	–
S1C17M22	–	–	21M	32.768kHz	700k/12M/ 16M/20M	0.5	2	6	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	–	700k/12M/ 16M/20M	0.5	2	6	160	1.8 to 5.5 *2	32K (*3)	–	2K	18 25	4	2 x 2	1	1	2	2	–	1	1	–	4 6	1	○	○	1	1	–	SQFN4-24 SQFN5-32	–
S1C17M24	–	–	21M	32.768kHz	700k/12M/ 16M/20M	0.5	2	6	160	1.8 to 5.5 *2	32K (*3)	–	2K	25	4	2 x 2	1	1	2	2	–	1	1	–	6	1	○	○	1	1	–	TQFP12-32	–
S1C17M25	–	–	21M	32.768kHz	700k/12M/ 16M/20M	0.5	2	6	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	32.768kHz	32k/700k/ 12M/16M	0.35	0.8	5	160	1.8 to 5.5 *2	48K (*3)	T.B.D	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	0.35	0.8	5	160	1.8 to 5.5 *2	48K (*3)	T.B.D	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	32.768kHz	32k/700k/ 12M/16M	0.35	0.8	5	160	1.8 to 5.5 *2	64K (*3)	T.B.D	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	32.768kHz	32k/700k/ 12M/16M	0.35	0.8	5	160	1.8 to 5.5 *2	96K (*3)	–	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	32.768kHz	32k/700k/ 12M/16M	0.35	0.8	5	160	1.8 to 5.5 *2	64K (*3)	T.B.D	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

S1C17 Family Products overview

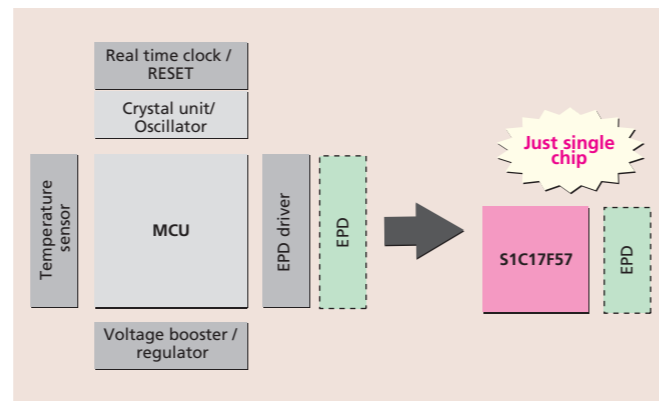| Products	Display LCD Driver seg×com	Operation clock High-speed [Hz] (Max.)	Low-speed [Hz] (Typ.)	Built-in oscillator [Hz] (Typ.)	Supply current Sleep [μA] (Typ.)	Halt [μA] (Typ.)	32kHz Operating [μA] (Typ.)	1MHz Operating [μA] (Typ.)	Power supply Supply voltage [V]	Memory Flash ROM [Byte]	Mask ROM [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 ultra-low power consumption, DSP has made it possible to achieve advanced signal processing, which was difficult for conventional battery-driven devices to perform, with extremely low power consumption. 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.																																
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.
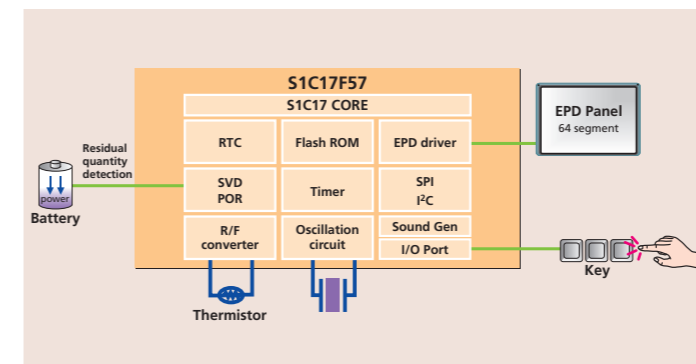*8: SVD is an abbreviation for Supply Voltage Detector.
*9: Resolution: 10-bit
*10: Independent operation for each channel.
*11: Ultra low power DSP
*12: Including Input port and Output port.
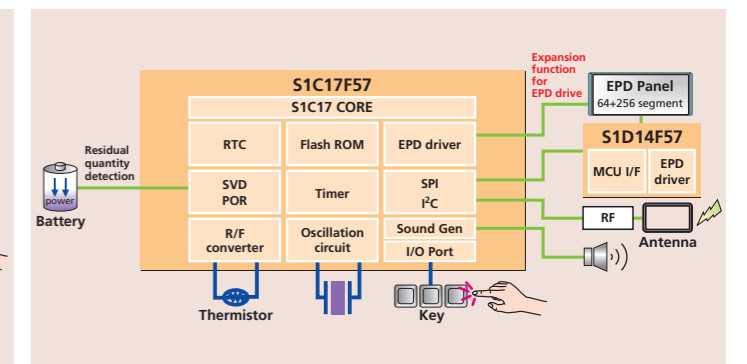
S1C17 Family Application examples

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.

Real time clock / RESET
Crystal unit/ Oscillator
Temperature sensor
MCU
EPD driver — EPD
Voltage booster / regulator

Just single chip → S1C17F57 — EPD

Example of an application using the S1C17F57 : OTP cards

S1C17F57 — S1C17 CORE
RTC | Flash ROM | EPD driver
SVD POR | Timer | SPI I²C
R/F converter | Oscillation circuit | Sound Gen I/O Port

Battery — Residual quantity detection
Thermistor
EPD Panel 64 segment
Key

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

S1C17F57 — S1C17 CORE
RTC | Flash ROM | EPD driver
SVD POR | Timer | SPI I²C
R/F converter | Oscillation circuit | Sound Gen I/O Port

Battery — Residual quantity detection
Thermistor
Key

Expansion function for EPD drive
S1D14F57 — MCU I/F | EPD driver
RF — Antenna
EPD Panel 64+256 segment

S1C17 Family Products overview

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.

Products	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
S1C17153	32 × 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 × 4 / 36 × 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 × 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 × 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 × 4	–	32.768k	500k/1M2M/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 × 4 / 8 × 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 × 4 / 16 × 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 × 4 / 36 × 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 × 4 / 36 × 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 × 4 / 52 × 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 × 4 / 36 × 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 × 4 / 52 × 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.

Products	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
S1C17711	64 × 16 / 56 × 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 × 16 / 56 × 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 × 16 / 56 × 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 × 16 / 72 × 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 × 16/24/32 / 60 × 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 × 16/24/32 / 64 × 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	–	–	QFP23-240 VFBGA10H-240	○

*1: During erasing / programming in flash memory (VDD): 2.7V to 3.6 V
*2: During erasing / programming in flash memory (VDD): 2.5V to 3.6 V
*3: During erasing / programming voltage in flash memory (VPP): The external applying of 7.5V / 7.0V (Typ.) is needed.
*4: During erasing / programming voltage in flash memory (VPP): 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: Al pad, Au bump
*9: Including Input port and Output port.

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.

Products	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	Temperature detection circuit	Package	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	TQFP15-128	○*3

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

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.

Products	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	Temperature detection circuit	Package	Chip
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.

S1C63 Family Overview

The S1C60/S1C63 Family microcontroller has a 4-bit core CPU together with various peripheral circuits including ROM, RAM, I/O ports, and LCD drivers, all of which are condensed into a single chip. This 4-bit microcontroller is fused with unique low voltage/power consumption technology proprietary to Seiko Epson.

◆ **Features of S1C63 CPU**
  ■ Abundant instruction sets and high-speed instruction cycle.
    Each of most typical instructions runs in one single cycle (two clocks).
  ■ Linear address space of program memory: 64 KW *, and data memory: 64KW.

◆ **Low power consumption and a wide range of operating voltages**
  ■ HALT/SLEEP standby functions

◆ **Enhanced development tools**
  ■ A thorough evaluation can be achieved using the Full ICE development tool.
  ■ Software simulator allows for software debugging on your PC

S1C60/63 MCU Line up

	1KB	4KB	6KB	8KB	12KB	16KB	32KB
Built-in Dot Matrix LCD Dr. 64 x 16 / 56 x 24 / 48 x 32						S1C6F632 / S1C63632	
56 x 16 / 48 x 24 / 40 x 32						S1C63616	
Built-in Segment LCD Dr. 60 x 17				S1C63408		S1C63567	
64 x 8					S1C63709	S1C63666	
56 x 8				S1C63658		S1C6F016 / S1C63016	
50 x 8				S1C63008			
36 x 8		S1C63004					
32 x 6		S1C63654					
22 x 5		S1C63003					
38 x 4			S1C63656				Flash
Non LCD Driver			S1C63158				Mask

S1C60/S1C63 Family Application examples

Example of an application using the S1C6F016: Radio controlled clock
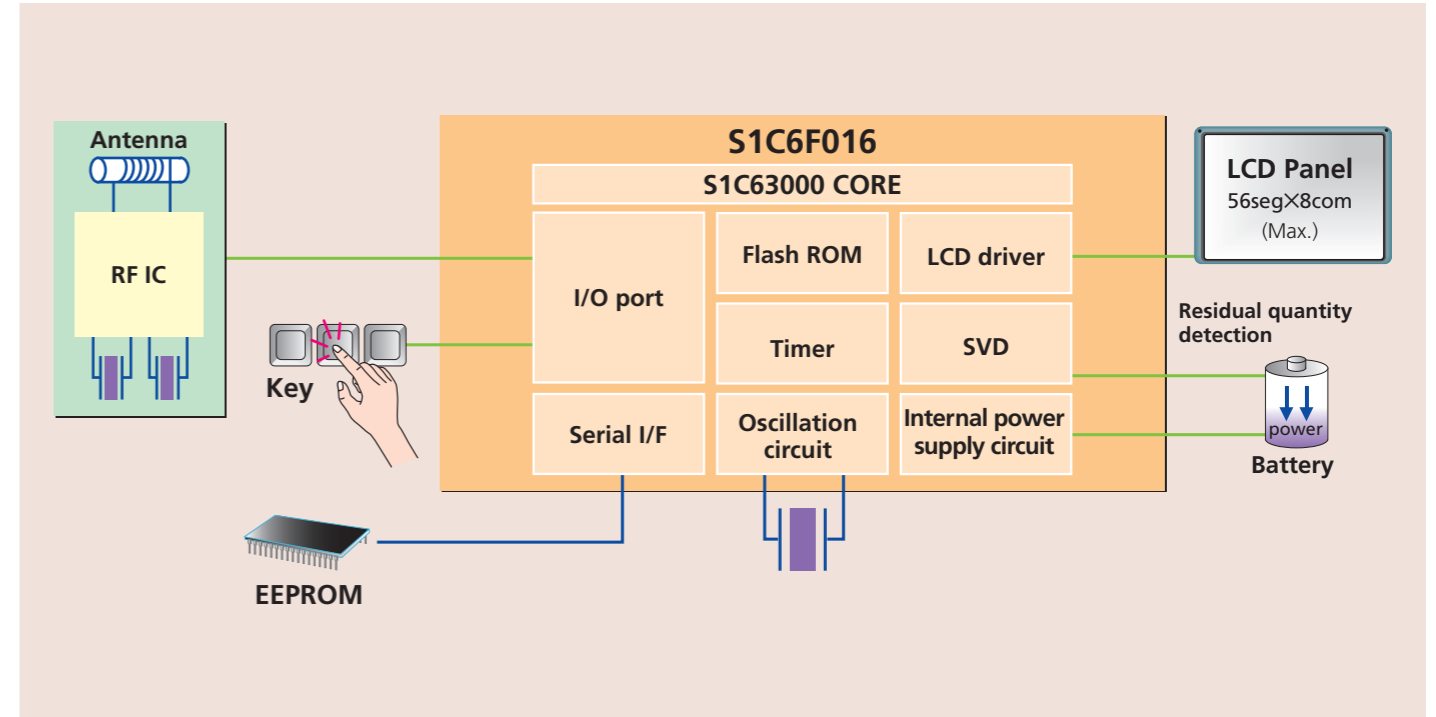
Terminal compatibility of s1c 63000 series

S1C63 Family Products overview

S1C63000 series
The microcontroller of this Family integrates ROM, RAM, LCD driver, and various timer functions. It is characterized by a wide range of operating voltages and low levels of power consumption, and is suitable for watches and clocks for which you want to extend battery life, as well as portable devices with temperature measurement functions.

Products	LCD Driver seg×com	High-speed [Hz] (Max.)	Low-speed [Hz] (Max.)	Sleep [μA] (Typ.)	Halt [μA] (Typ.)	32kHz Operating [μA] (Typ.)	In High-speed osillation [μA] (Typ.)	Supply voltage [V]	ROM [×13-bit]	RAM [×4-bit]	Input port	Output port	I/O port	Programmable 8-bit	Stopwatch	Watchdog timer	Clock	Asynchronous	Clock synchronous	A/D converter	R/F converter	SVD *1	Buzzer	DTMF output	DP output	External	Internal	Package	Chip
S1C63003	22 (Max) × 3/4/5 *2	550k	32.768k	0.1	0.5	2.0 / 2.3	30 / 40	1.1 to 1.7 / 1.8 to 5.5	4,096	256	–	–	16 *3	1	1	1	1	–	–	–	2	–	1	–	–	4	11	QFP12-48	○
S1C63004	36 (Max) × 3/4/5/6/7/8 *4	1M (1.5V) / 4M (3V)	32.768k	0.1	0.5	2.0 / 2.3	60 / 220	1.1 to 1.7 / 1.8 to 5.5	4,096	512	–	–	20 *5	3 *6	1	1	1	–	1 *7	–	2	1	1	–	–	8	23	QFP14-80 TQFP14-100	○
S1C63008	50 (Max) × 3/4/5/6/7/8 *8	1M (1.5V) / 4M (3V)	32.768k	0.1	0.5	2.0 / 2.3	60 / 220	1.1 to 1.7 / 1.8 to 5.5	8,192	1,024	–	–	24 *9	3 *6	1	1	1	–	1 *7	–	2	1	1	–	–	8	23	QFP15-100 TQFP14-100	○
S1C63016	56 (Max) × 3/4/5/6/7/8 *8	1M (1.5V) / 4M (3V)	32.768k	0.1	0.5	2.0 / 2.3	60 / 220	1.1 to 1.7 / 1.8 to 5.5	16,384	2,048	–	–	24 *9	4 *6	1	1	1	–	1 *7	–	2	1	1	–	–	8	25	QFP15-100 TQFP14-100	○
S1C6F016	56 (Max) × 3/4/5/6/7/8 *8	4.2M	32.768k	0.7	2.0	9.0	950	1.8 to 3.6 *10	16,384 (Flash) *11	2,048	–	–	24 *9	4 *6	1	1	1	–	1 *7	–	2	1	1	–	–	8	25	QFP15-100	○

S1C63100 series (Non promotion)
A microcontroller being equipped with ROM, RAM, serial interface, A/D converter, various timer functions, etc. It features built-in A/D converter, wide operating voltage range and low power consumption and is suitable for portable equipment.

Products	LCD Driver seg×com	High-speed [Hz] (Max.)	Low-speed [Hz] (Max.)	Sleep [μA] (Typ.)	Halt [μA] (Typ.)	32kHz Operating [μA] (Typ.)	In High-speed osillation [μA] (Typ.)	Supply voltage [V]	ROM [×13-bit]	RAM [×4-bit]	Input port	Output port	I/O port	Programmable 8-bit	Stopwatch	Watchdog timer	Clock	Asynchronous	Clock synchronous	A/D converter	R/F converter	SVD *1	Buzzer	DTMF output	DP output	External	Internal	Package	Chip
S1C63158	–	4M	32.768k	–	1.0	3.0	900	0.9 to 3.6 / 2.2 to 3.6	8,192	512	9	12	20	2 *6	–	1	1	–	1	4 *12	–	1	1	–	–	3	8	QFP12-48 QFP13-64 PFBGA5U-60	○

S1C63400 series (Non promotion)
A microcontroller being equipped with ROM, RAM, dot-matrix LCD driver, various timer functions, etc. It features wide operating voltage range and low power consumption and is suitable for portable equipment such as data banks which require dot-matrix indications.

Products	LCD Driver seg×com	High-speed [Hz] (Max.)	Low-speed [Hz] (Max.)	Sleep [μA] (Typ.)	Halt [μA] (Typ.)	32kHz Operating [μA] (Typ.)	In High-speed osillation [μA] (Typ.)	Supply voltage [V]	ROM [×13-bit]	RAM [×4-bit]	Input port	Output port	I/O port	Programmable 8-bit	Stopwatch	Watchdog timer	Clock	Asynchronous	Clock synchronous	A/D converter	R/F converter	SVD *1	Buzzer	DTMF output	DP output	External	Internal	Package	Chip
S1C63408	60 × 8/9/16/17	– / 4M	32.768k	–	1.3	3.0	550	1.3 to 3.6 / 1.8 to 3.6	8,192	1,024	4	4	4	2 *6	1	1	1	–	1 *13	–	–	1	–	–	–	4	11	QFP15-128	○

S1C63500 series (Non promotion)
A microcontroller being equipped with ROM, RAM, dot-matrix LCD driver, DTMF/DP generator, FSK demodulator, various timer functions, etc. It features wide operating voltage rane and low power consumption and is suitable for communication-equipment and portable-equipment such as data banks and Caller-ID which require dot-matrix indications.

Products	LCD Driver seg×com	High-speed [Hz] (Max.)	Low-speed [Hz] (Max.)	Sleep [μA] (Typ.)	Halt [μA] (Typ.)	32kHz Operating [μA] (Typ.)	In High-speed osillation [μA] (Typ.)	Supply voltage [V]	ROM [×13-bit]	RAM [×4-bit]	Input port	Output port	I/O port	Programmable 8-bit	Stopwatch	Watchdog timer	Clock	Asynchronous	Clock synchronous	A/D converter	R/F converter	SVD *1	Buzzer	DTMF output	DP output	External	Internal	Package	Chip
S1C63567	60 × 8/16/17	3.58M	32.768k	–	1.5	10	600	2.2 to 5.5	16,384	5,120	8	12	16	2 *6	1	1	1	–	1 *13	–	–	1	1	1	1	2	12	QFP20-144	○

S1C63600 series (Non promotion)
The microcontroller of this series integrates ROM, RAM, multiplication and division circuits, LCD driver, R/F converter, and a variety of timer functions. Since this series features a wide range of operating voltage and low power consumption, it is best fit for portable equipment with temperature measuring facility that requires battery-powered operation.

Products	LCD Driver seg×com	High-speed [Hz] (Max.)	Low-speed [Hz] (Max.)	Sleep [μA] (Typ.)	Halt [μA] (Typ.)	32kHz Operating [μA] (Typ.)	In High-speed osillation [μA] (Typ.)	Supply voltage [V]	ROM [×13-bit]	RAM [×4-bit]	Input port	Output port	I/O port	Programmable 8-bit	Stopwatch	Watchdog timer	Clock	Asynchronous	Clock synchronous	A/D converter	R/F converter	SVD *1	Buzzer	DTMF output	DP output	External	Internal	Package	Chip
S1C63654	32 × 3/4/5/6	– / 4M	32.768k	–	0.65	2.5	800	1.8 to 3.6 / 2.4 to 3.6	4,096	512	8	4	8	2 *6	1	1	1	–	1	–	2	1	1	–	–	2	15	QFP15-100	○
S1C63656	38 × 3/4	– / 4M	32.768k	–	0.6	2.5	800	1.1 to 3.6 *14 / 2.4 to 3.6	6,144	1,024	8	4	8	2 *6	1	1	1	–	1	–	2	1	1	–	–	2	18	QFP20-144	○
S1C63658	56 × 4/5/8	– / 4M	32.768k	–	0.65	2.5	800	1.8 to 3.6 / 2.4 to 3.6	8,192	1,024	8	8	8	3 *6	1	1	1	–	1	–	2	1	1	–	–	2	16	QFP20-144	○
S1C63666	64 × 4/5/8	– / 4M	32.768k	–	0.65	2.5	800	1.5 to 3.6 / 2.4 to 3.6	16,384	5,120	8	8	8	3 *6	1	1	1	–	1	–	2	1	1	–	–	2	14	QFP20-144	○
S1C63616	56 × 16 / 48 × 24 / 40 × 32	4M	32.768k	0.08	0.6	2.5	320	1.6 to 5.5	16,384	2,048	–	–	16	8 *6	1	1	1	–	1 *7	–	2	1	1	–	–	8	32	TQFP15-128	○
S1C63632	64 × 16 / 56 × 24 / 48 × 32	4M	32.768k	0.08	0.6	2.5	320	1.6 to 5.5	31,744	8,192	–	–	24	8 *6	1	1	1	–	1 *7	–	2	1	1	–	–	8	32	QFP20-144 VFBGA10H-144	○
S1C6F632	64 × 16 / 56 × 24 / 48 × 32	4M	32.768k	0.7	2.0	9.0	960	1.8 to 3.6 *10	31,744 (Flash) *11	8,192	–	–	24	8 *6	1	1	1	–	1 *7	–	2	1	1	–	–	8	32	QFP20-144	○

*1: SVD is an abbreviation for Supply Voltage Detector. Supply Voltage Detector.
*2: Total 12 segment terminals share the function with I/O ports and R/F converter terminals (to be selected by mask option).
*3: Total 4 I/O ports share the function with sgment terminals (to be selected by mask option), and 4 share with R/F converter terminals (to be selected by software).
*4: Total 16 segment terminals share the function with I/O ports and R/F converter terminals (to be selected by mask option).
*5: Total 8 I/O ports share the function with sgment terminals (to be selected by mask option), and 4 share with R/F converter terminals (to be selected by software).
*6: Two 8 bits serve as a 16-bit timer.
*7: Connectable to SPI
*8: A total of 20 segment terminals share the function with I/O ports and R/F converter terminals (to be selected by mask option).
*9: Total 12 I/O ports share the function with sgment terminals (to be selected by mask option), and 4 share with R/F converter terminals (to be selected by software).
*10: During programming in flash memory : 2.7V to 3.6V.
*11: This product use SuperFlash® technology licensed from Silicon Storage Technology, Inc.
*12: 8 bits successive-approximation type and serves as general-purpose I/O.
*13: Either the asynchronous system or clock synchronous system can be selected by software.
*14: When the OSC1 single clock is used, and LCD contrast is not adjusted. (1.8V to 3.6V for other specifications)

http://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
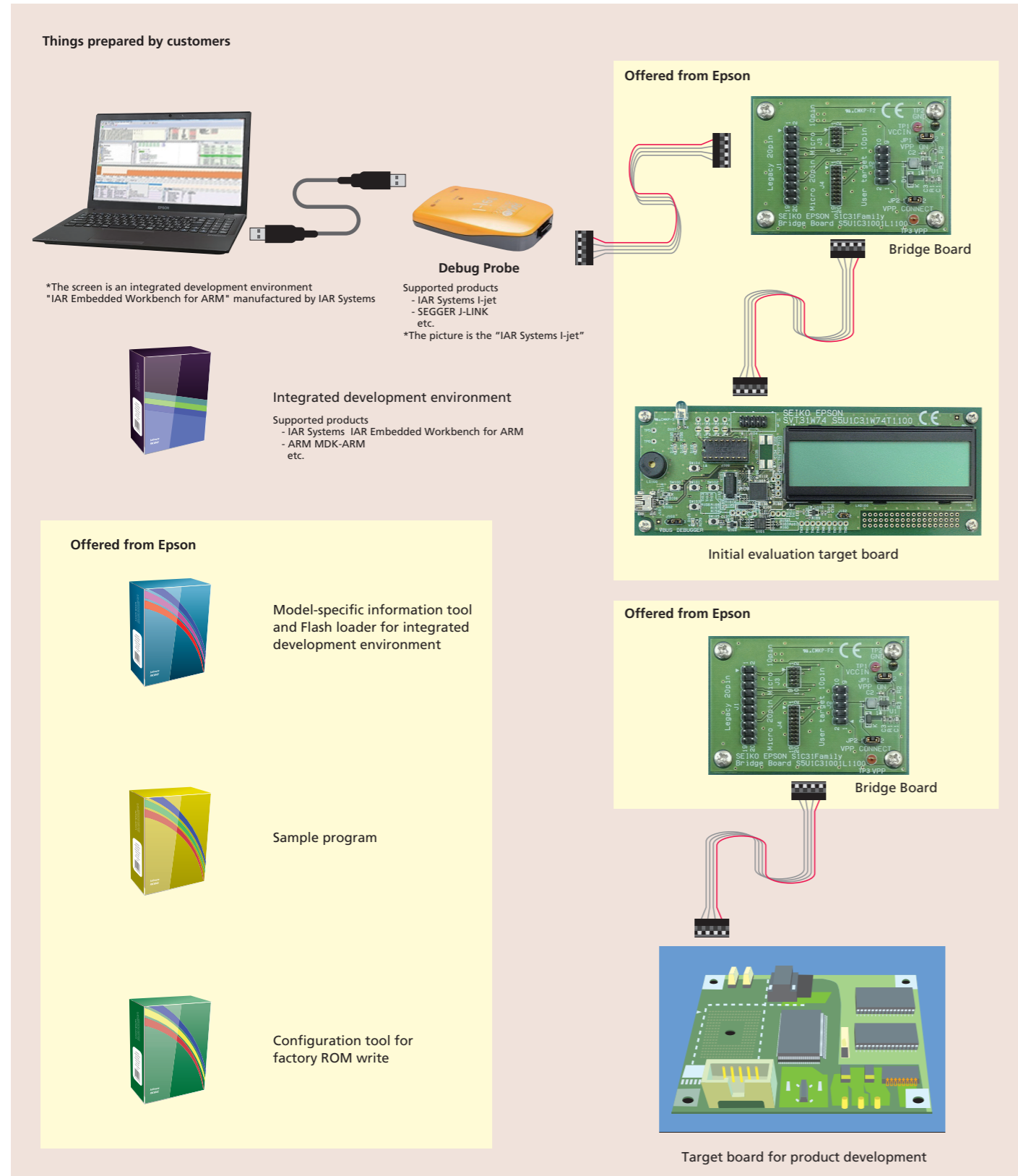· Application Note
· Sample Program
· MP Support Tool

· **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
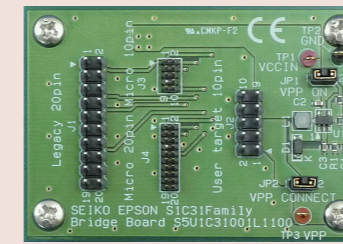
Bridge Board
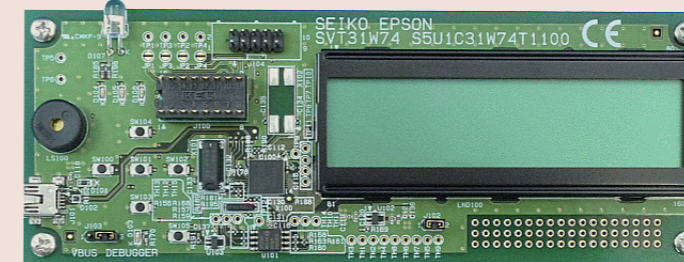
SVT31D01
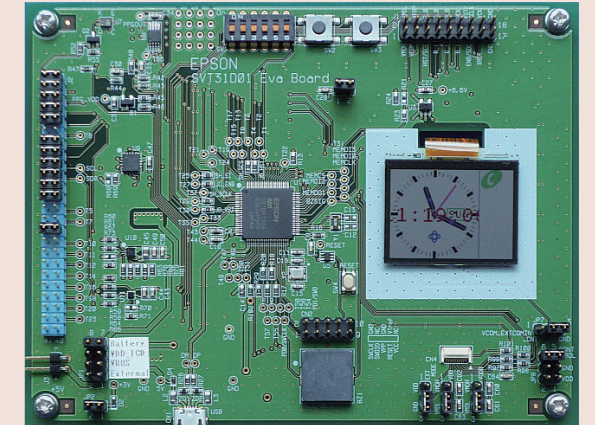
SVT31W74

■ 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   IAR Systems K.K.
http://www.iar.com/buy/contact/

Left Page

GNU17 package

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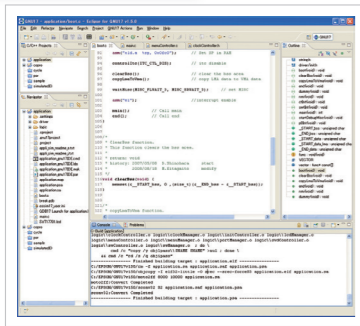
ICD mini

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. *1
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

GNU17

USB cable

Starter / Beginner

S1C17 SVT board

Initial evaluation target board

ICD mini
(S5U1C17001H)

4-line cable
(DCLK, DSIO, DST2, GND)
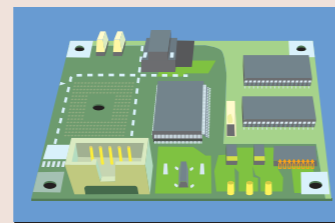
Target board for product development

*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)
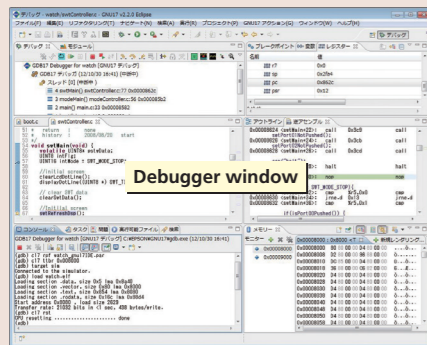
Debugger window

Port setting

LCD capture
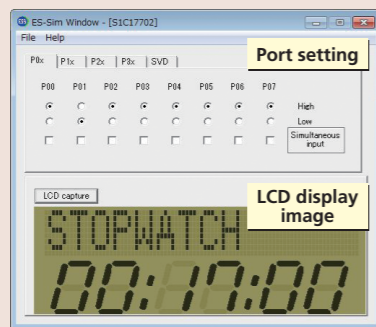
LCD display image

●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

Right Page

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

SVTmini17M10   SVTmini17M11   SVT17M13   SVTmini17M13

SVT17F57   SVTmini17F57   SVT17M01   SVTmini17W04   SVTmini17W13   SVTmini17W14   SVT17W15   SVTmini17W15   SVTmini17W16

SVTmini17W18   SVT17W23   SVTmini17W36   SVTmini17564   SVTmini17589   SVT17602   SVTmini17611   SVTmini17651

SVT17656   SVTmini17656   SVT17702   SVT17704/17701   SVT17801   SVTmini17803   SVTmini17965
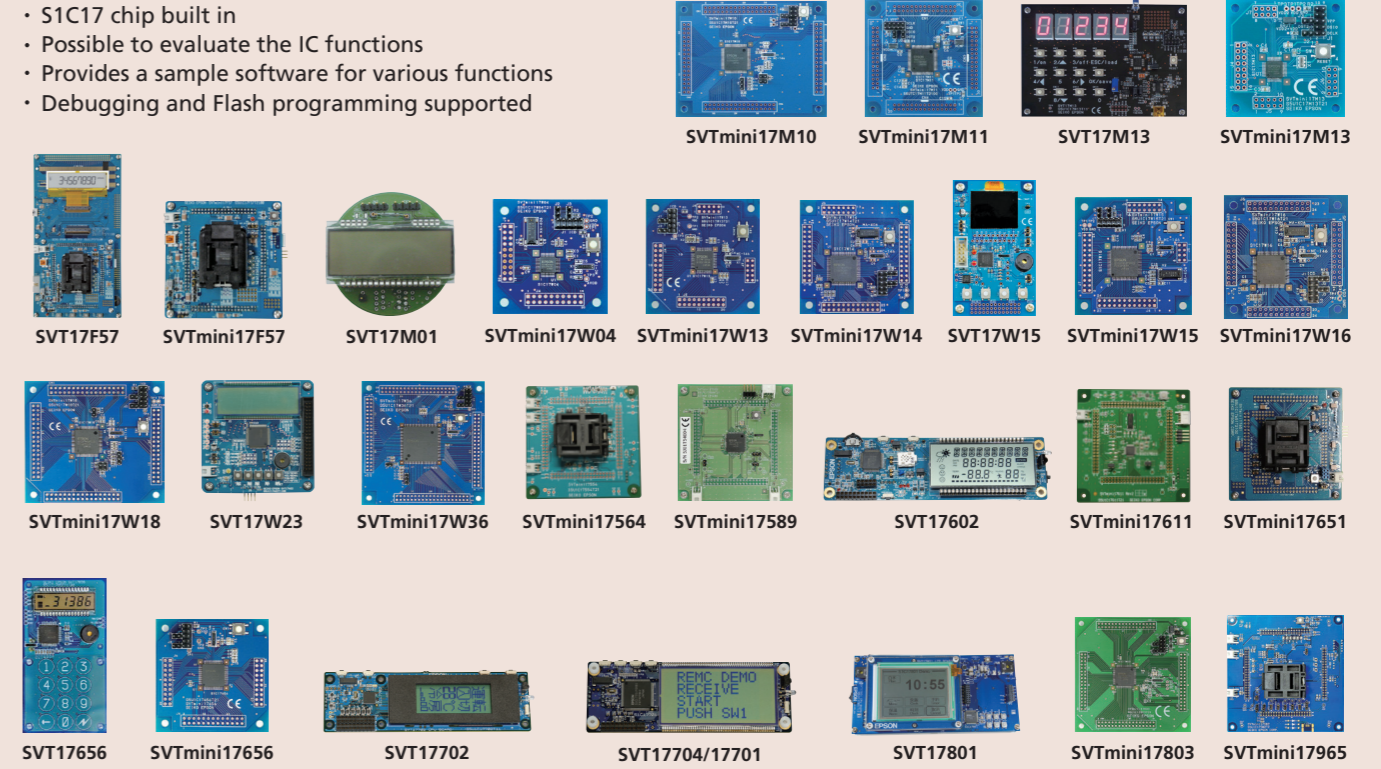
■ Evaluation board

| 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
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	

S1C63 assembler package

Integrated development environment of the S1C63 family Editing of source code using GUI Provides an efficient work environment to implement tasks from assembling to debugging.
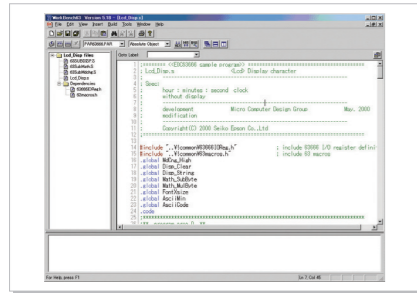
ICE63

S1C63 ICE
(S1C63 Family In-Circuit Emulator)
Hardware tool to facilitate the development of software for the S1C63 family.
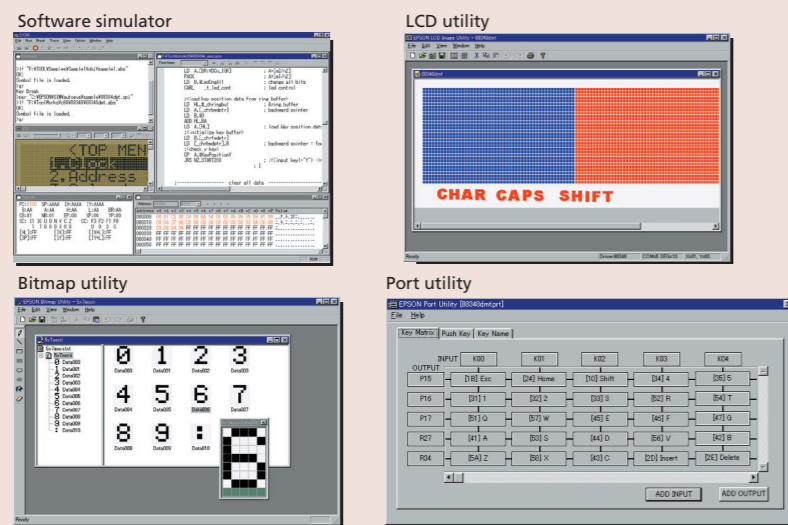Provides a software development environment by combining a peripheral circuit board and a PC.
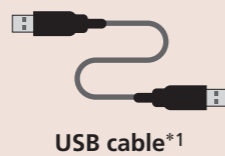
USB cable*1

ICE63
(S5U1C63000H)

*Use the RS232C cable for ICE earlier than version 6.

Software development support tool (S1C63 software simulator, various utility tools)

Software simulator

LCD utility

CHAR CAPS SHIFT

Bitmap utility

Port utility

●Simulation can be performed on a PC, including an LCD display, without the need to use dedicated hardware tools such as ICE.
●Multi-window display allows users to view various kinds of data at the same time.
●Source code display and symbolic debug function that corresponds to assembly source code.
●Function to create panel layout and COM/SEG port assignment data.
●Function to create bitmap image data for use in a dot-matrix LCD display.
●Function to assign push keys and key matrix to ports and set PC keys.

■ Development Tool   H/W version

As of February, 2016. For the latest information, please visit Epson microcontroller user's site.

Model Name	ICE	PRC *2	FPGA Data *3	Add-on board
S1C63003		S5U1C63000P6100	S5U1C63008F61 (Ver. 1)	S5U1C6F016P2100
S1C63004				
S1C63008				
S1C63016			S5U1C6F016F62 (Ver. 2)	
S1C63158		S5U1C63000P1100 or S5U1C63000P6100	S5U1C63358F12 (Ver. 2) S5U1C63358F61 (Ver. 1)	—
S1C63256		S5U1C63005P1100	—	—
S1C63358			S5U1C63358F12 (Ver. 2) S5U1C63358F61 (Ver. 1)	—
S1C63406		S5U1C63000P1100 or S5U1C63000P6100	S5U1C63406F11 (Ver. 1) S5U1C63406F61 (Ver. 1)	—
S1C63408			S5U1C63408F11 (Ver. 1) S5U1C63408F61 (Ver. 1)	—
S1C63458			S5U1C63466F11 (Ver. 1)	—
S1C63466			S5U1C63466F61 (Ver. 1)	—
S1C63557		S5U1C63007P1100	—	—
S1C63558			—	—
S1C63567			—	—
S1C63653	S5U1C63000H2300 or S5U1C63000H6100 or S5U1C63000H6600 *1		S5U1C63654F11 (Ver. 1)	S5U1C63658P2100
S1C63654		S5U1C63000P1100 or S5U1C63000P6100	S5U1C63654F62 (Ver. 2)	
S1C63656			S5U1C63656F11(Ver. 1) S5U1C63656F61 (Ver. 1)	
S1C63657			S5U1C63658F12 (Ver. 2)	
S1C63658			S5U1C63658F61 (Ver. 1)	
S1C63666			S5U1C63666F14(Ver. 4) S5U1C63666F61 (Ver. 1)	—
S1C63616		S5U1C63000P6100	S5U1C6F632F62 (Ver. 2)	S5U1C6F632P2100
S1C63632				
S1C63709			S5U1C63709F14 (Ver. 4) S5U1C63709F63 (Ver. 3)	S5U1C63709P2100
S1C63808			S5U1C63808F11 (Ver. 1) S5U1C63808F61 (Ver. 1)	—
S1C6P366			S5U1C63358F12 (Ver. 2) S5U1C63358F61 (Ver. 1)	—
S1C6P466			S5U1C63466F11 (Ver. 1) S5U1C63466F61 (Ver. 1)	—
S1C6F416			*4	—
S1C6F567		S5U1C63007P1100	—	—
S1C6F666		S5U1C63000P1100 or S5U1C63000P6100	*5	S5U1C63658P2100
S1C6F016		S5U1C63000P6100	S5U1C6F016F62 (Ver. 2)	S5U1C6F016P2100
S1C6F632		S5U1C63000P6100	S5U1C6F632F62 (Ver. 2)	S5U1C6F632P2100

*1 : S5U1C63000H23: RS-232C connection   S5U1C63000H61/66: USB connection RoHS
*2 : S5U1C63000P61: RoHS
*3 : Downloadable from S/W Development tool
     Upper number : for S5U1C63000P11 / Lower number: for S5U1C63000P61
     (If it is included in other tools, the table does not have the link.)
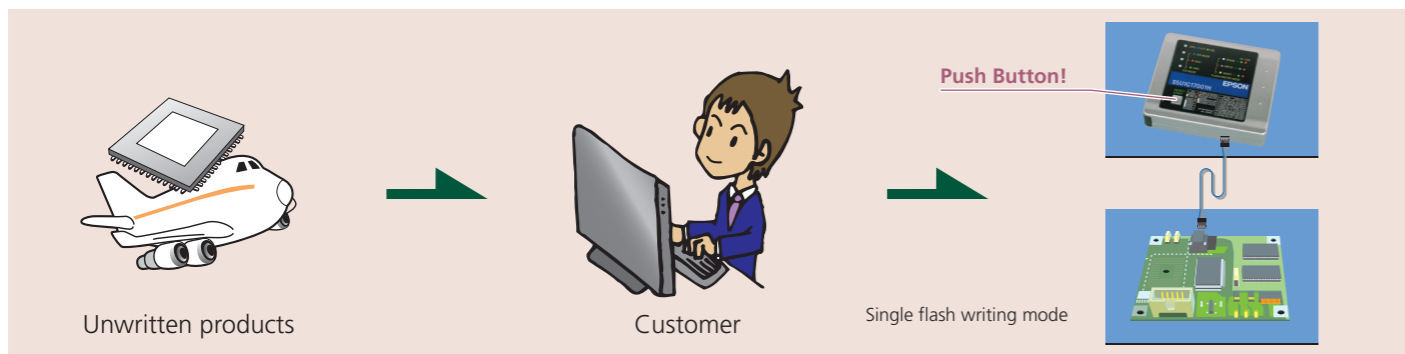*4 : Same as for target model (S1C63406/63408)
*5 : Same as for target model (S1C63653/654/656/657/658/666)

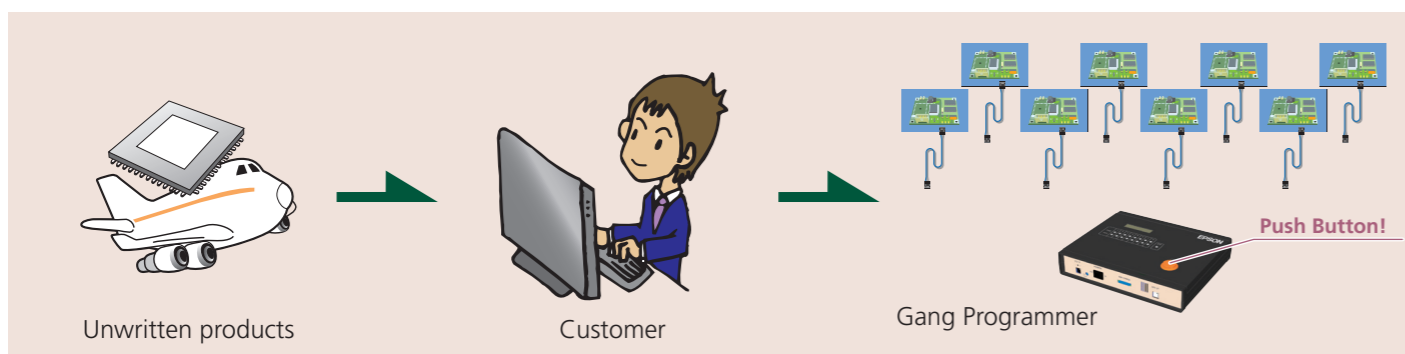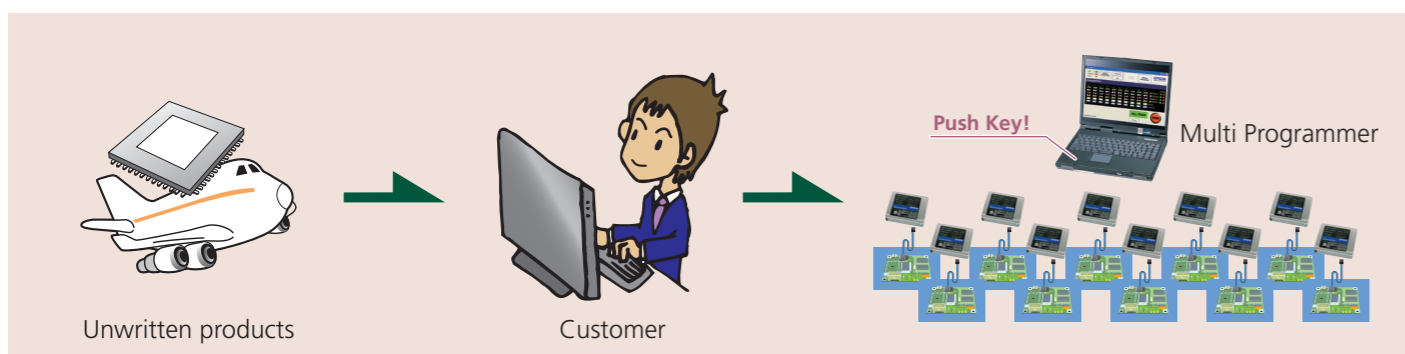## If you procure written products from a Seiko Epson dealer

Seiko Epson semiconductor plant → Written products → Customer
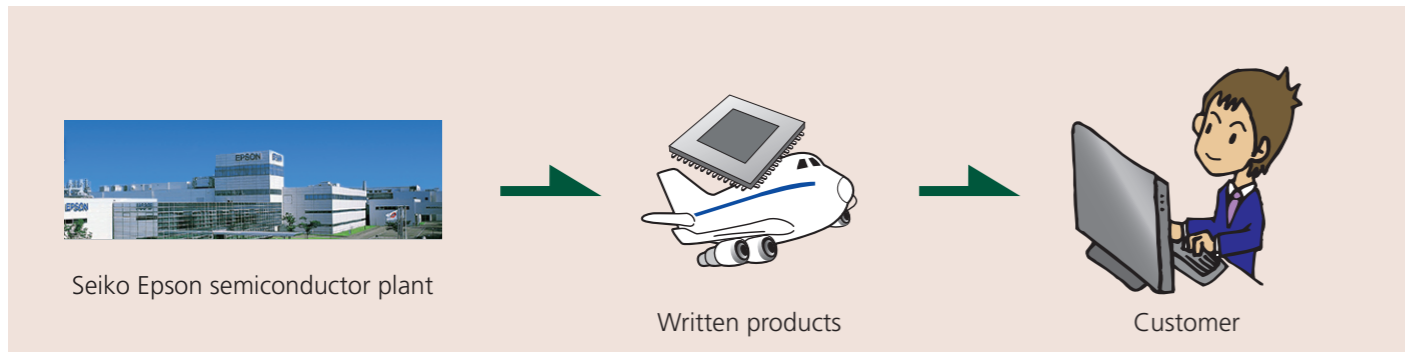
If you write to flash memory on your side (Single writing)

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 → Gang Programmer — Push Button!

On-board writing tools and environments

■Compatible models:S1C6F016, S1C6F632

PC — FLASH writer — Target board

S5U1C63000Y2 (Gang Writer)
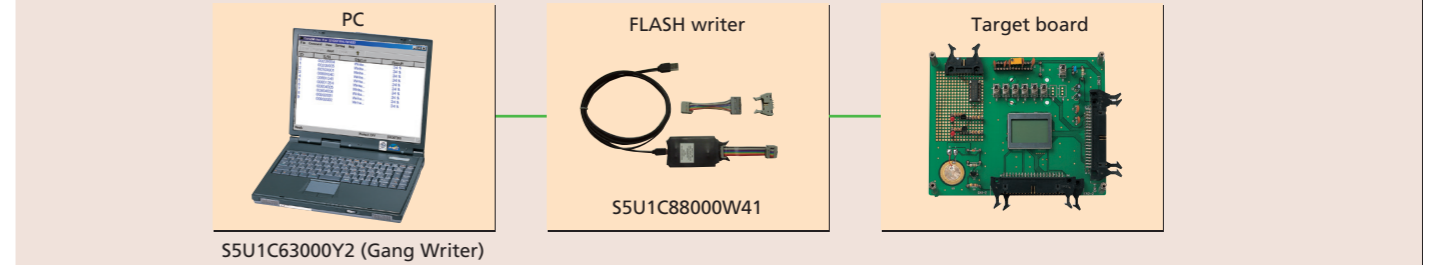
S5U1C88000W41

- User data can be written to a model with internal flash ROM using the S5U1C88000W4 (USB serial on-board writer).
- PROM on-board programming environment can be constructed easily using the S5U1C88000W4, a compact and lightweight writer operating on USB bus power.
- * Power supply to the target board is required separately.
- * The product does not include the target board and PC.

■Compatible models:S1C17 Family

AC/DC adapter (or Battery box) — FLASH writer — Target board

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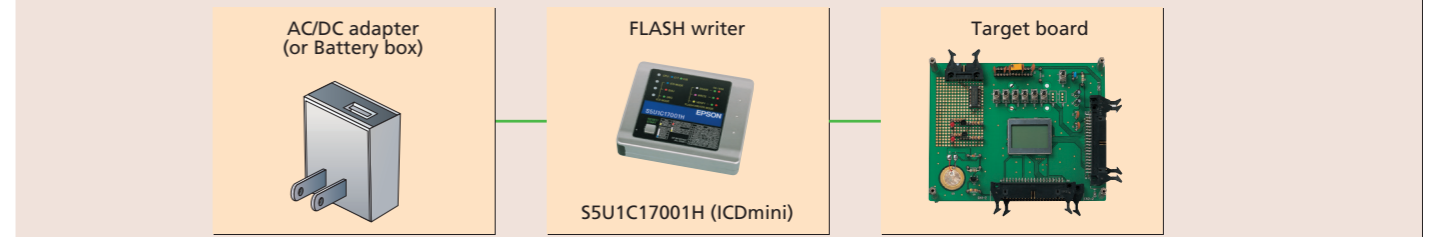
- A single S5U1C17001H (ICDmini) unit operates as an on-chip flash writer. Simply by pressing a button, user data previously saved in the ICDmini can be written to the internal flash ROM on the target board, or the flash ROM connected to the external bus.
- You can enjoy on-board programming easily at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

PC — USB HUB — FLASH writer — Target board

S5U1C17000Y (Multi Programmer)

S5U1C17001H (ICDmini) x10(max.)
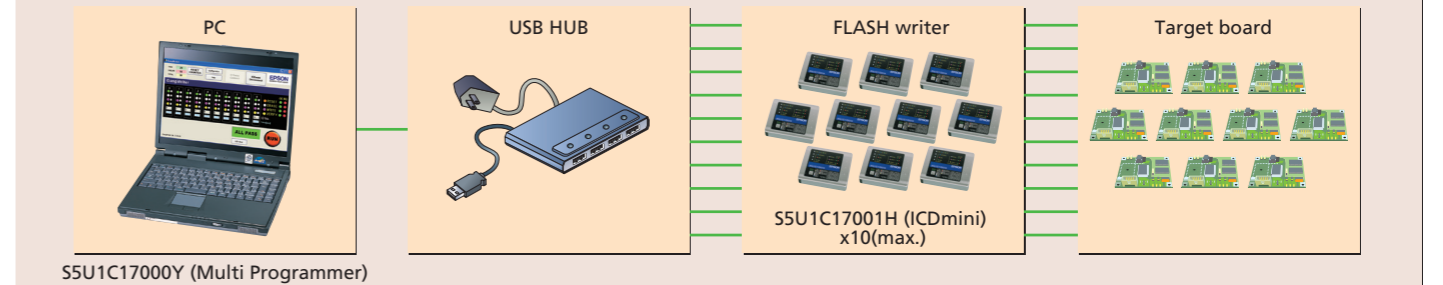
- Up to 10 units of the S5U1C17001H (ICDmini) can be used to construct an environment enabling user data to be downloaded simultaneously to multiple targets.
- The S5U1C17000Y, GangWriter software that controls the ICDmini, provides user- friendly screen and simple operation.
- * Power supply to the 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

SD Card — Gang Programmer — Target board

S5U1C17001W

- 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.

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

QFP & TQFP & QFN

PKG type/Pin count	Body size (mm)	Lead pitch (mm)
QFP21-216	24 X 24 X 1.7	0.4
QFP23-240	32 X 32 X 4.1	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

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

QFP

(Top surface) (Bottom surface) Lead IC Chip
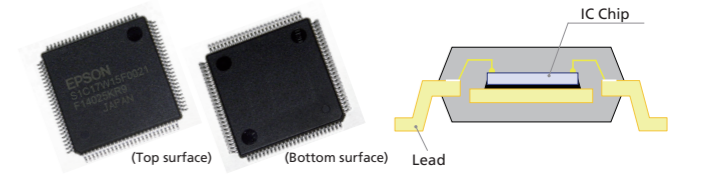
H4QFP (QFP with exposed die pad)

(Top surface) (Bottom surface) Lead Exposed Die Pad Stacked components IC Chip

SQFN

(Top surface) (Bottom surface) Lead Exposed Die Pad IC Chip

WCSP

(Top surface) (Bottom surface) Solder Ball Over Coat Resin Redistribution Circuit(Cu) Polyimide IC Pad IC Chip

Thin type BGA (VFBGA)

(Top surface) (Bottom surface) Solder ball Interposer IC Chip