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# Epson to Provide Low Power Microcontrollers with 16-bit On-Chip Flash Memory and Smart Card Interfaces


## -Halved operating current while quadrupling operating speed for hand-held card reader tokens-

S1C17M10 microcontroller with 16-bit on-chip Flash memory

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Seiko Epson Corporation (TSE: 6724, "Epson") has developed and recently begun shipping samples of the S1C17M10, a new low-power, 16-bit microcontroller with on-Chip Flash memory. The new product halves operating current while quadrupling operating speed for hand-held card reader tokens. Epson plans to produce 200,000 units per month when volume production beings in June 2016.

Epson's original microcontrollers with 16-bit Flash memory have proved to be a popular choice for embedding in mobile devices owing to their exceptionally low power consumption. A growing number of financial institutions are providing their online banking customers with tokens*1 to strengthen security, leading to a corresponding increase in demand for token microcontrollers. Epson's microcontrollers enable manufacturers to reduce token size and extend token battery life.

The new S1C17M10 is Epson's first microcontroller developed for card reader tokens. Card reader tokens issue passwords while communicating with a user's smart card*2. Although card reader tokens offer better security than other types of tokens, their power consumption is trending upward due to the need to control communications with the card.

To reduce power consumption, Epson provided the new microcontroller with an ISO 7816-3-compliant smart card interface function. The new microcontroller operates at voltages ranging from 1.8 V to 5.5 V, yet at every voltage current consumption is 0.6 uA (typical) in HALT mode with RTC ON, and 145 uA/MHz (typical) in RUN mode. The maximum operating frequency is

16.8 MHz. This enables the new microcontroller to operate at quadruple the speed of a comparable earlier product*3 and on half the current, given the same conditions. It performs more complex software and transmission processing yet has a longer battery life. Epson better tailored the specifications to card reader tokens. Also built into the chip is an LCD driver that can directly drive the liquid crystal in a display with up to 1,280 dots. With support for up to two lines and 10 alphanumeric characters, the display can provide all the information needed. In addition, the microcontroller integrates on a single chip UART, SPI and I2C interfaces, 64 Kbytes of self-programmable Flash memory, and 4 Kbytes of RAM. Epson will ship the product in a 128-pin thin quad flat pack (TQFP15-128 pin). The product will also be available as a bare die to help users reduce the board area within their finished products.

Epson is committed to helping its customers improve the performance of their products with solutions that leverage Epson's efficient, compact and precision technologies.

*1 Devices that generate a one-time password
*1 Cards the size of a credit card and with embedded integrated circuits
*2 An Epson S1C17656 16-bit Flash microcontroller

Notes
1. See the attachment for the features and specifications.
2. Please see the link below for further details about these products.
http://global.epson.com/products/semicon/products/mcu/16bit_index.html#ac02

**Feature and Specifications**

**Key product features**
1. Interfaces for communicating with cards or connecting to a variety of devices
- Smart card interface (ISO 7816-3 compliant) functionality
- UART, SPI, and I2C serial interfaces
2. Low-voltage, low-current requirements that dramatically extend battery life
- Guaranteed operating range: 1.8 V - 5.5 V
- Power consumption in RUN mode: 145 µA
3. Embedded circuits that help customers reduce total product part counts, save board space, and shrink software development times
-LCD driver that can directly drive an LCD with up to 1,280 dots
-Oscillator circuit that can be set to 16 MHz, 12 MHz, 8 MHz, or 4 MHz
-Supply voltage detector (SVD) circuit that does not require an external power supply supervisor
-Circuitry that allows I/O port functions to be assigned with software

## Product Specifications

| | |
|---|---|
| Product model number | S1C17M10 |
| CPU core | 16-bit RISC processor + multiply and accumulation unit, multiplier |
| Flash memory | 64 KB |
| RAM | 4 KB |
| Operating voltage | Guaranteed operating range: 1.8 V - 5.5 V<br>Operating voltage when writing to Flash memory: 2.7 V - 3.6 V (when using internal Vpp*1) |
| Current consumption | SLEEP mode RTC OFF: 0.16 µA (typical)<br>HALT mode RTC ON: 0.6 µA (typical)<br>RUN mode 145 µA/MHz (typical) |
| Supply voltage detector | VDD: 28 levels (1.8 to 5.0 V) / external voltage: 32 levels (1.2 to 5.0 V) |
| Smart card interface | 1 channel<br>Baud rate generator |
| LCD driver | 1,280 dots max. (80 SEG x 9-16 COM)<br>704 dots max. (88 SEG x 1-8 COM) |
| Real-time clock | 128- 1 Hz counter. Second, minute, hour, day, day of the week, month, and year counters.<br>Theoretical regulation function for 1-second correction*2<br>Alarm and stopwatch functions |
| Serial interfaces | 1-channel UART, 1-channel SPI, and 1-channel $I^2C$ interfaces |
| I/O ports | 32 max. |
| Package | TQFP15-128 pin (lead pitch: 0.4 mm)<br>Bare die with 80 µm (min.) pad pitch 80 µm (min.) |

*1: When it turns on the Vpp for writing to Flash memory
*2: A function to correct clock error due to frequency tolerance with no external parts required.

## About Epson Electronics America, Inc.

Epson Electronics America, Inc. (EEA) is a subsidiary of Japan-based Seiko Epson Corporation (SEC) and is responsible for sales, marketing and engineering of the product lines of SEC's Microelectronics Device Division in the America's. EEA provides a wide array of timing and frequency control products, integrated circuits, sensing device and system solutions for customer products and applications that require high levels of accuracy, reliability, stability, energy efficiency and compact design. Based in San Jose, California, the EEA Group has three regional offices, more than 40 sales offices in the U.S. and a growing network of exclusive distributors.
www.eea.epson.com

**About Epson**

Epson is a global technology leader dedicated to connecting people, things and information with its original efficient, compact and precision technologies. With a lineup that ranges from inkjet printers and digital printing systems to 3LCD projectors, smart glasses, sensing systems and industrial robots, the company is focused on driving innovations and exceeding customer expectations in inkjet, visual communications, wearables and robotics.

Led by the Japan-based Seiko Epson Corporation, the Epson Group comprises nearly 72,000 employees in 93 companies around the world, and is proud of its contributions to the communities in which it operates and its ongoing efforts to reduce environmental impacts.

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