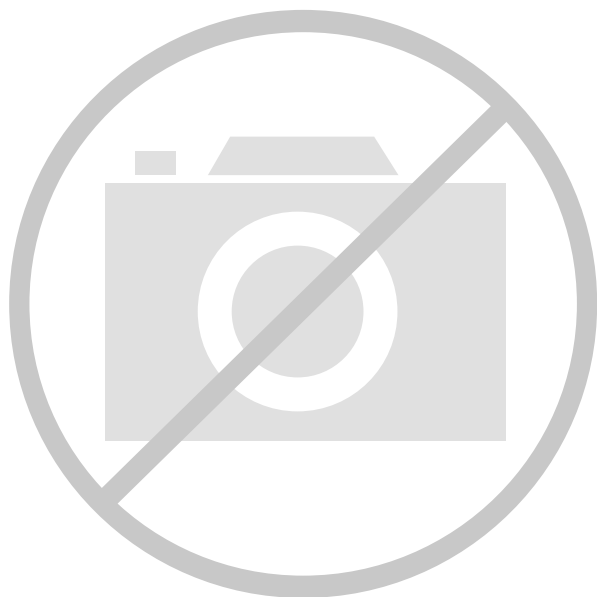




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## What is "[Embedded - Microcontrollers](#)"?

"[Embedded - Microcontrollers](#)" refer to small, integrated circuits designed to perform specific tasks within larger systems. These microcontrollers are essentially compact computers on a single chip, containing a processor core, memory, and programmable input/output peripherals. They are called "embedded" because they are embedded within electronic devices to control various functions, rather than serving as standalone computers. Microcontrollers are crucial in modern electronics, providing the intelligence and control needed for a wide range of applications.

## Applications of "[Embedded - Microcontrollers](#)"

### Details

|                            |                                                                                                                                           |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Product Status             | Active                                                                                                                                    |
| Core Processor             | S1C17                                                                                                                                     |
| Core Size                  | 16-Bit                                                                                                                                    |
| Speed                      | 4.2MHz                                                                                                                                    |
| Connectivity               | I <sup>2</sup> C, IrDA, SSI, UART/USART                                                                                                   |
| Peripherals                | LCD, POR, PWM, Voltage Detect, WDT                                                                                                        |
| Number of I/O              | 32                                                                                                                                        |
| Program Memory Size        | 48KB (48K x 8)                                                                                                                            |
| Program Memory Type        | FLASH                                                                                                                                     |
| EEPROM Size                | -                                                                                                                                         |
| RAM Size                   | 4K x 8                                                                                                                                    |
| Voltage - Supply (Vcc/Vdd) | 1.2V ~ 3.6V                                                                                                                               |
| Data Converters            | -                                                                                                                                         |
| Oscillator Type            | Internal                                                                                                                                  |
| Operating Temperature      | -40°C ~ 85°C (TA)                                                                                                                         |
| Mounting Type              | Surface Mount                                                                                                                             |
| Package / Case             | 100-LQFP                                                                                                                                  |
| Supplier Device Package    | 100-QFP15 (14x14)                                                                                                                         |
| Purchase URL               | <a href="https://www.e-xfl.com/product-detail/epson/s1c17w14f102100-90">https://www.e-xfl.com/product-detail/epson/s1c17w14f102100-90</a> |

# S1C17W14/W16 (rev1.0)

## 16-bit Single Chip Microcontroller

- Low power operation from 1.2V with a single alkaline or silver oxide button battery.
- Low power consumption standby driving at HALT 0.3  $\mu$ A .  
\*super economy mode
- Built-in LCD Driver: 50 SEG x 8 COM (max.) S1C17W14  
Built-in LCD Driver: 56 SEG x 8 COM (max.) S1C17W16

### ■ DESCRIPTIONS

The S1C17W14/W16 is a 16-bit MCU that features low-voltage operation from 1.2 V even though Flash memory is included. The embedded high-efficiency DC-DC converter generates the constant-voltage to drive the IC with lower power consumption than 4-bit MCUs. This IC includes a real-time clock, a stopwatch, an LCD driver, and a PWM timer capable of being used to generate drive waveforms for a motor driver as well as a high-performance 16-bit CPU. It is suitable for battery-driven applications that require an LCD display and timers.

### ■ FEATURES

| Model                                                           | S1C17W14                                                                                                        |                                               | S1C17W16                          |  |
|-----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|-----------------------------------------------|-----------------------------------|--|
| CPU                                                             |                                                                                                                 |                                               |                                   |  |
| CPU core                                                        | Seiko Epson original 16-bit RISC CPU core S1C17                                                                 |                                               |                                   |  |
| Other                                                           | On-chip debugger                                                                                                |                                               |                                   |  |
| Embedded Flash memory                                           |                                                                                                                 |                                               |                                   |  |
| Capacity                                                        | 48K bytes<br>(for both instructions and data)                                                                   | 64K bytes<br>(for both instructions and data) |                                   |  |
| Erase/program count                                             | 50 times (min.) * Programming by the debugging tool ICDmini                                                     |                                               |                                   |  |
| Other                                                           | Security function to protect from reading/programming by ICDmini<br>On-board programming function using ICDmini |                                               |                                   |  |
| Embedded RAM                                                    |                                                                                                                 |                                               |                                   |  |
| Capacity                                                        | 4K bytes                                                                                                        | 8K bytes                                      |                                   |  |
| Embedded display RAM                                            |                                                                                                                 |                                               |                                   |  |
| Capacity                                                        | 108 bytes                                                                                                       | 120 bytes                                     |                                   |  |
| Clock generator (CLG)                                           |                                                                                                                 |                                               |                                   |  |
| System clock source                                             | 4 sources (IOSC/OSC1/OSC3/EXOSC)                                                                                |                                               |                                   |  |
| System clock frequency (operating frequency)                    | 1.1 MHz (max.) V <sub>DD</sub> = 1.2 to 1.6 V                                                                   |                                               |                                   |  |
|                                                                 | 4.2 MHz (max.) V <sub>DD</sub> = 1.6 to 3.6 V                                                                   |                                               |                                   |  |
| IOSC oscillator circuit (boot clock source)                     | 700 kHz (typ.) embedded oscillator                                                                              |                                               |                                   |  |
|                                                                 | 23 μs (max.) starting time<br>(time from cancelation of SLEEP state to vector table read by the CPU)            |                                               |                                   |  |
| OSC1 oscillator circuit                                         | 32.768 kHz (typ.) crystal oscillator                                                                            |                                               |                                   |  |
|                                                                 | Oscillation stop detection circuit included                                                                     |                                               |                                   |  |
| OSC3 oscillator circuit                                         | 4.2 MHz (max.) crystal/ceramic oscillator                                                                       |                                               |                                   |  |
|                                                                 | 256, 384, 500 kHz, 1, 2, and 4 MHz-switchable embedded oscillator                                               |                                               |                                   |  |
|                                                                 | 2.1 MHz (max.) CR oscillator (an external R is required)                                                        |                                               |                                   |  |
| EXOSC clock input                                               | 4.2 MHz (max.) square or sine wave input                                                                        |                                               |                                   |  |
| Other                                                           | Configurable system clock division ratio                                                                        |                                               |                                   |  |
|                                                                 | Configurable system clock used at wake up from SLEEP state                                                      |                                               |                                   |  |
|                                                                 | Operating clock frequency for the CPU and all peripheral circuits is selectable.                                |                                               |                                   |  |
| I/O port (PPORT)                                                |                                                                                                                 |                                               |                                   |  |
| Number of general-purpose I/O ports                             | Input/output port: 32 bits (max.)                                                                               |                                               | Input/output port: 39 bits (max.) |  |
|                                                                 | Output port: 1 bit (max.)                                                                                       |                                               |                                   |  |
|                                                                 | Pins are shared with the peripheral I/O.                                                                        |                                               |                                   |  |
| Number of input interrupt ports                                 | 28 bits                                                                                                         | 35 bits                                       |                                   |  |
| Number of ports that support universal port multiplexer (UPMUX) | 24 bits                                                                                                         | 30 bits                                       |                                   |  |
|                                                                 | A peripheral circuit I/O function selected via software can be assigned to each port.                           |                                               |                                   |  |
| Timers                                                          |                                                                                                                 |                                               |                                   |  |
| Watchdog timer (WDT)                                            | Generates watchdog timer reset.                                                                                 |                                               |                                   |  |
| Real-time clock (RTCA)                                          | 128–1 Hz counter, second/minute/hour/day/day of the week/month/year counters                                    |                                               |                                   |  |
|                                                                 | Theoretical regulation function for 1-second correction                                                         |                                               |                                   |  |
|                                                                 | Alarm and stopwatch functions                                                                                   |                                               |                                   |  |

# S1C17W14/W16

|                                     |                                                                                                                  |                                                                     |
|-------------------------------------|------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| 16-bit timer (T16)                  | 3 channels                                                                                                       | 5 channels                                                          |
|                                     | Generates the SPIA master clocks                                                                                 | Generates the SPIA master clocks and trigger signal of ADC12A       |
| 16-bit PWM timer (T16B)             | 2 channels                                                                                                       |                                                                     |
|                                     | Event counter/capture function                                                                                   |                                                                     |
|                                     | PWM waveform generation function                                                                                 |                                                                     |
|                                     | Number of PWM output or capture input ports: 2 ports/channel                                                     |                                                                     |
| Supply voltage detector (SVD)       |                                                                                                                  |                                                                     |
| Detection level                     | 30 levels (1.2 to 3.6 V)                                                                                         |                                                                     |
| Detection accuracy                  | ± 3 %                                                                                                            |                                                                     |
| Other                               | Intermittent operation mode                                                                                      |                                                                     |
|                                     | Generates an interrupt and reset according to the detection level evaluation.                                    |                                                                     |
| Serial interfaces                   |                                                                                                                  |                                                                     |
| UART (UART)                         | 2 channels                                                                                                       |                                                                     |
|                                     | Baud-rate generator included, IrDA1.0 supported                                                                  |                                                                     |
| Synchronous Serial Interface (SPIA) | 2 channels                                                                                                       | 3 channels                                                          |
|                                     | 2 to 16-bit variable data length                                                                                 |                                                                     |
|                                     | The 16-bit timer (T16) can be used for the baud-rate generator in master mode.                                   |                                                                     |
| I2C (I2C)                           | 1 channel                                                                                                        |                                                                     |
|                                     | Baud-rate generator included                                                                                     |                                                                     |
| Sound generator (SNDA)              |                                                                                                                  |                                                                     |
| Buzzer output function              | 512 Hz to 16 kHz output frequencies                                                                              |                                                                     |
|                                     | One-shot output function                                                                                         |                                                                     |
| Melody generation function          | Pitch: 128 Hz to 16 kHz $\approx$ C3 to C6                                                                       |                                                                     |
|                                     | Duration: 7 notes/rests (Half note/rest to thirty-second note/rest)                                              |                                                                     |
|                                     | Tempo: 16 tempos (30 to 480)                                                                                     |                                                                     |
|                                     | Tie/Slur may be specified.                                                                                       |                                                                     |
| IR remote controller (REMC2)        |                                                                                                                  |                                                                     |
| Number of transmitter channels      | 1 channel                                                                                                        |                                                                     |
| Other                               | EL lamp drive waveform can be generated for an application example.                                              |                                                                     |
| LCD driver (LCD8B)                  |                                                                                                                  |                                                                     |
| LCD output                          | 50 SEG × 5–8 COM (max.),<br>54 SEG × 1–4 COM (max.)                                                              | 56 SEG × 5–8 COM (max.),<br>60 SEG × 1–4 COM (max.)                 |
| LCD contrast                        | 16 levels                                                                                                        |                                                                     |
| Other                               | 1/3 bias power supply included, external voltage can be applied.                                                 |                                                                     |
| R/F converter (RFC)                 |                                                                                                                  |                                                                     |
| Conversion method                   | CR oscillation type with 24-bit counters                                                                         |                                                                     |
| Number of conversion channels       | 1 channel<br>(Up to two sensors can be connected.)                                                               | 2 channels (Up to two sensors can be connected to each channel.)    |
| Supported sensors                   | DC-bias resistive sensors,<br>AC-bias resistive sensors                                                          | DC-bias resistive sensors,<br>AC-bias resistive sensors (Ch.0 only) |
| 12-bit A/D converter (ADC12A)       |                                                                                                                  |                                                                     |
| Conversion method                   | -                                                                                                                | Successive approximation type                                       |
| Resolution                          | -                                                                                                                | 12 bits                                                             |
| Number of conversion channels       | -                                                                                                                | 1 channel                                                           |
| Number of analog signal inputs      | -                                                                                                                | 4 ports/channel                                                     |
| Multiplier/divider (COPRO2)         |                                                                                                                  |                                                                     |
| Arithmetic functions                | 16-bit × 16-bit multiplier                                                                                       |                                                                     |
|                                     | 16-bit × 16-bit + 32-bit multiply and accumulation unit                                                          |                                                                     |
|                                     | 32-bit ÷ 32-bit divider                                                                                          |                                                                     |
| Reset                               |                                                                                                                  |                                                                     |
| #RESET pin                          | Reset when the reset pin is set to low.                                                                          |                                                                     |
| Power-on reset                      | Reset at power on.                                                                                               |                                                                     |
| Key entry reset                     | Reset when the P00 to P01/P02/P03 keys are pressed simultaneously (can be enabled/disabled using a register).    |                                                                     |
| Watchdog timer reset                | Reset when the watchdog timer overflows (can be enabled/disabled using a register).                              |                                                                     |
| Supply voltage detector reset       | Reset when the supply voltage detector detects the set voltage level (can be enabled/disabled using a register). |                                                                     |
| Interrupt                           |                                                                                                                  |                                                                     |
| Non-maskable interrupt              | 4 systems (Reset, address misaligned interrupt, debug, NMI)                                                      |                                                                     |
| Programmable interrupt              | External interrupt: 1 system (8 levels)                                                                          |                                                                     |
|                                     | Internal interrupt: 18 systems (8 levels)                                                                        | Internal interrupt: 23 systems (8 levels)                           |

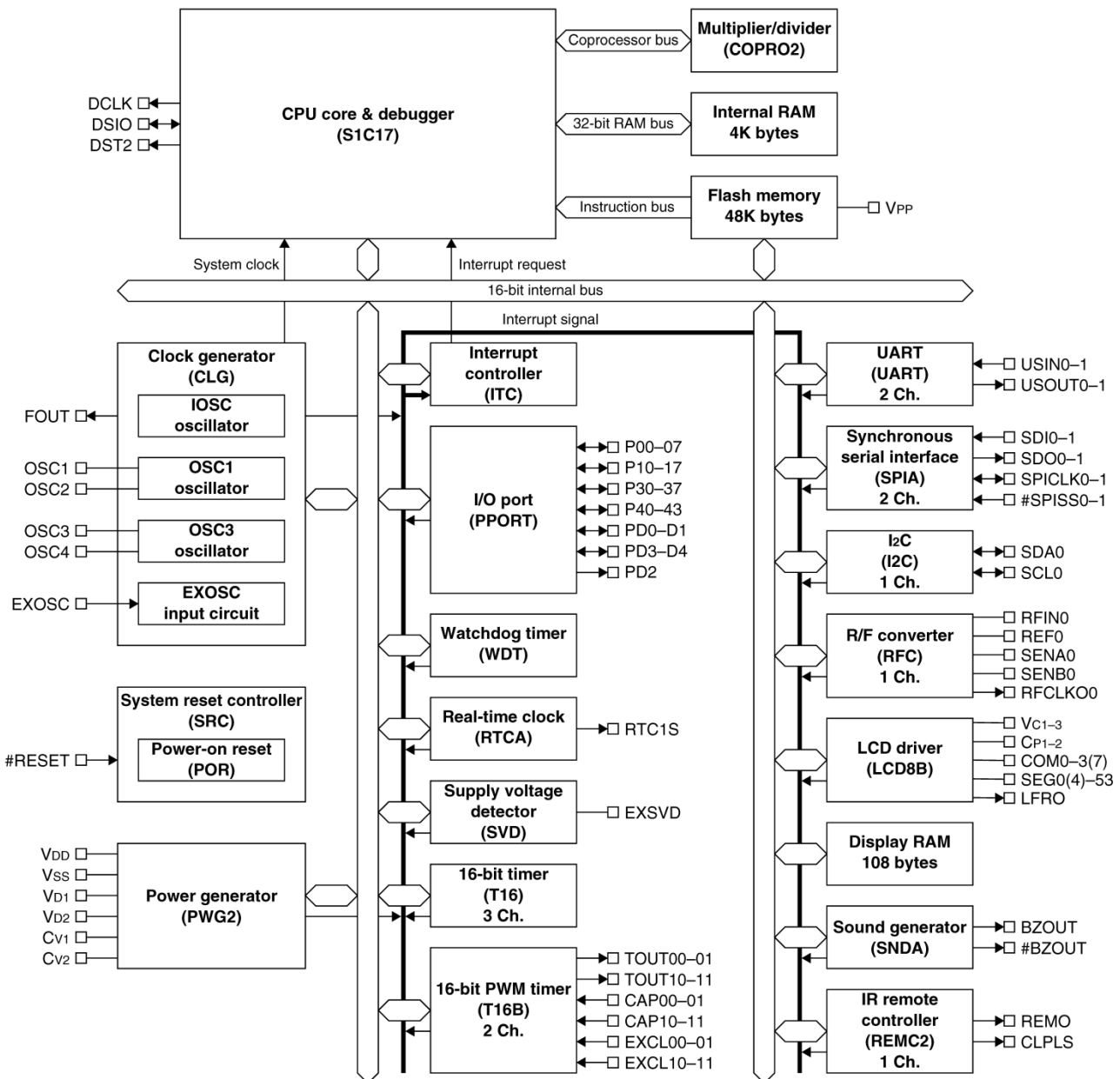
# S1C17W14/W16

| Power supply voltage                                     |                                                                                   |                                    |
|----------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------|
| V <sub>DD</sub> operating voltage                        | 1.2 to 3.6 V                                                                      |                                    |
| V <sub>DD</sub> operating voltage for Flash programming  | 1.8 to 3.6 V (V <sub>PP</sub> = 7.5 V external power supply is required.)         |                                    |
| V <sub>DD</sub> operating voltage for super economy mode | 2.5 to 3.6 V                                                                      |                                    |
| Operating temperature                                    |                                                                                   |                                    |
| Operating temperature range                              | -40 to 85 °C                                                                      |                                    |
| Current consumption                                      |                                                                                   |                                    |
| SLEEP mode                                               | 0.15 µA<br>IOSC = OFF, OSC1 = OFF, OSC3 = OFF                                     |                                    |
| HALT mode                                                | 0.5 µA<br>OSC1 = 32 kHz, RTC = ON                                                 |                                    |
|                                                          | 0.3 µA<br>OSC1 = 32 kHz, RTC = ON, super economy mode                             |                                    |
| RUN mode                                                 | 6 µA<br>OSC1 = 32 kHz, RTC = ON, CPU = OSC1                                       |                                    |
|                                                          | 3 µA<br>OSC1 = 32 kHz, RTC = ON, CPU = OSC1, super economy mode                   |                                    |
|                                                          | 200 µA<br>OSC3 = 1 MHz (internal oscillator), OSC1 = 32 kHz, RTC = ON, CPU = OSC3 |                                    |
| Shipping form                                            |                                                                                   |                                    |
| 1                                                        | QFP15-100pin (Lead pitch: 0.5 mm)                                                 | TQFP15-128pin (Lead pitch: 0.4 mm) |
| 2                                                        | Die form (Pad pitch: 80 µm (min.))                                                |                                    |

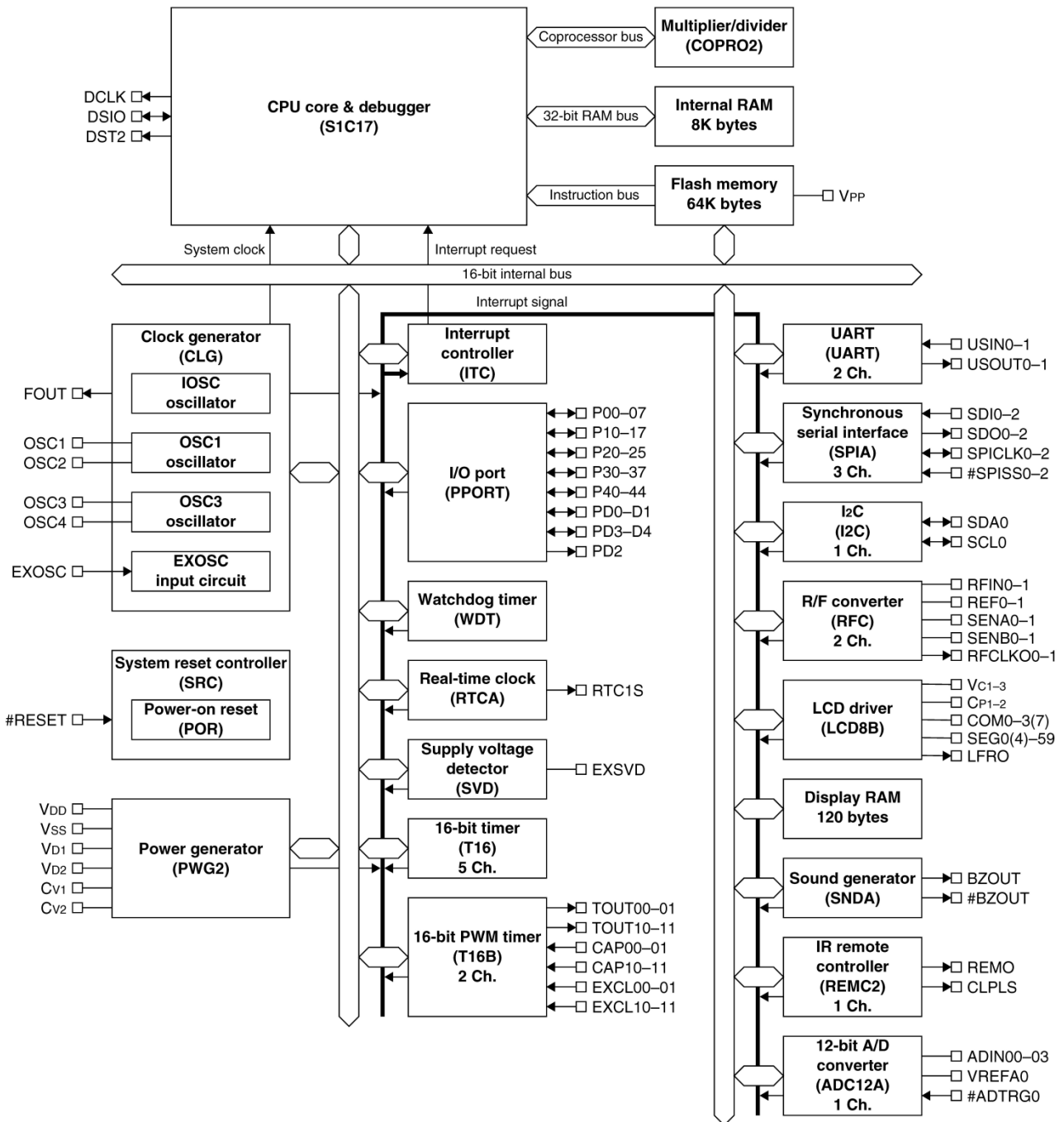
# S1C17W14/W16

## ■ BLOCK DIAGRAM

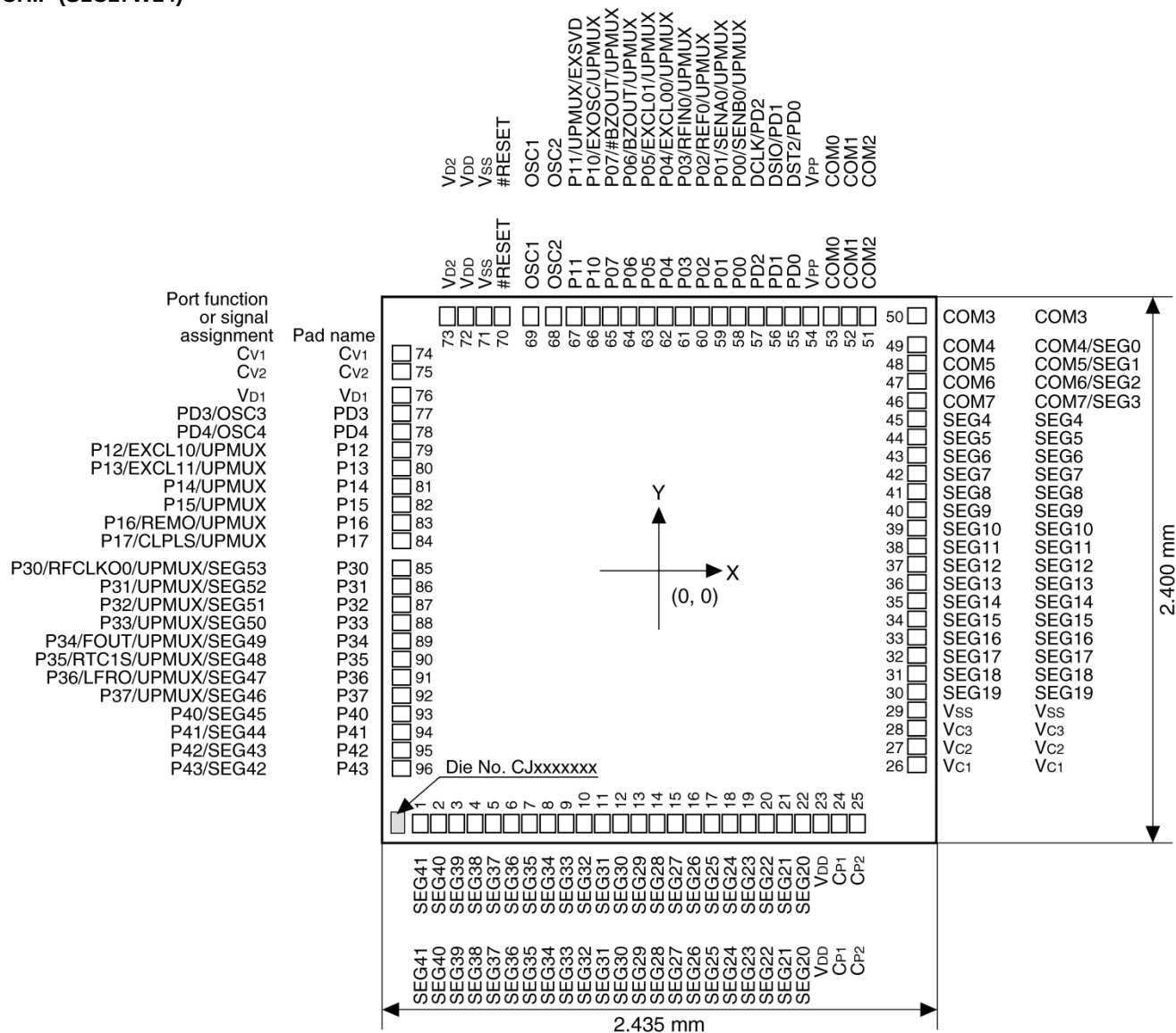
### S1C17W14



## S1C17W16

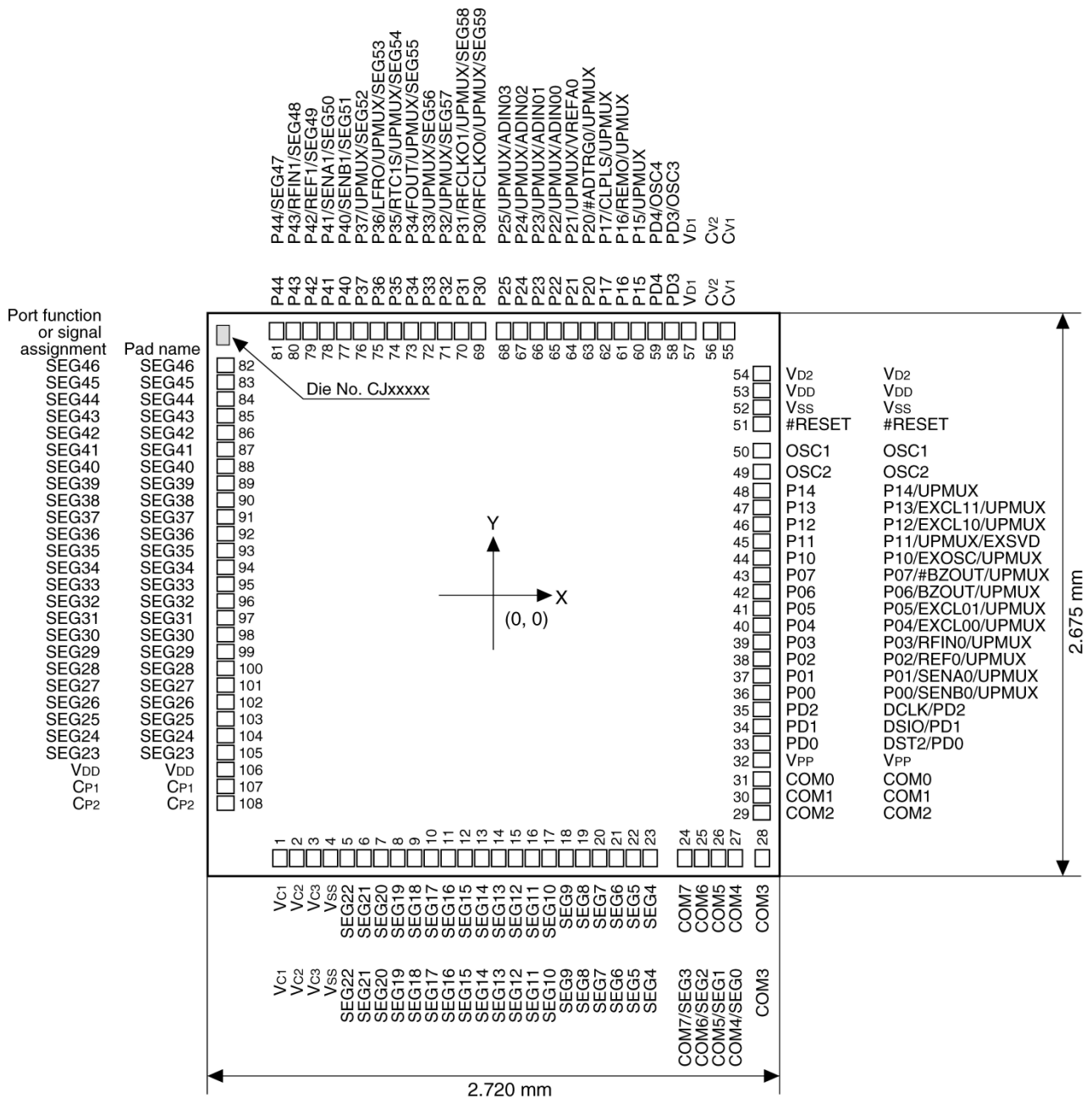


## ■ Pin Configuration Diagram

**CHIP (S1C17W14)**

|                |                                                                                                     |
|----------------|-----------------------------------------------------------------------------------------------------|
| Pad opening    | No. 1–25, 51–73: X = 68 $\mu$ m, Y = 80 $\mu$ m<br>No. 26–50, 74–96: X = 80 $\mu$ m, Y = 68 $\mu$ m |
| Chip thickness | 400 $\mu$ m                                                                                         |

## CHIP (S1C17W16)

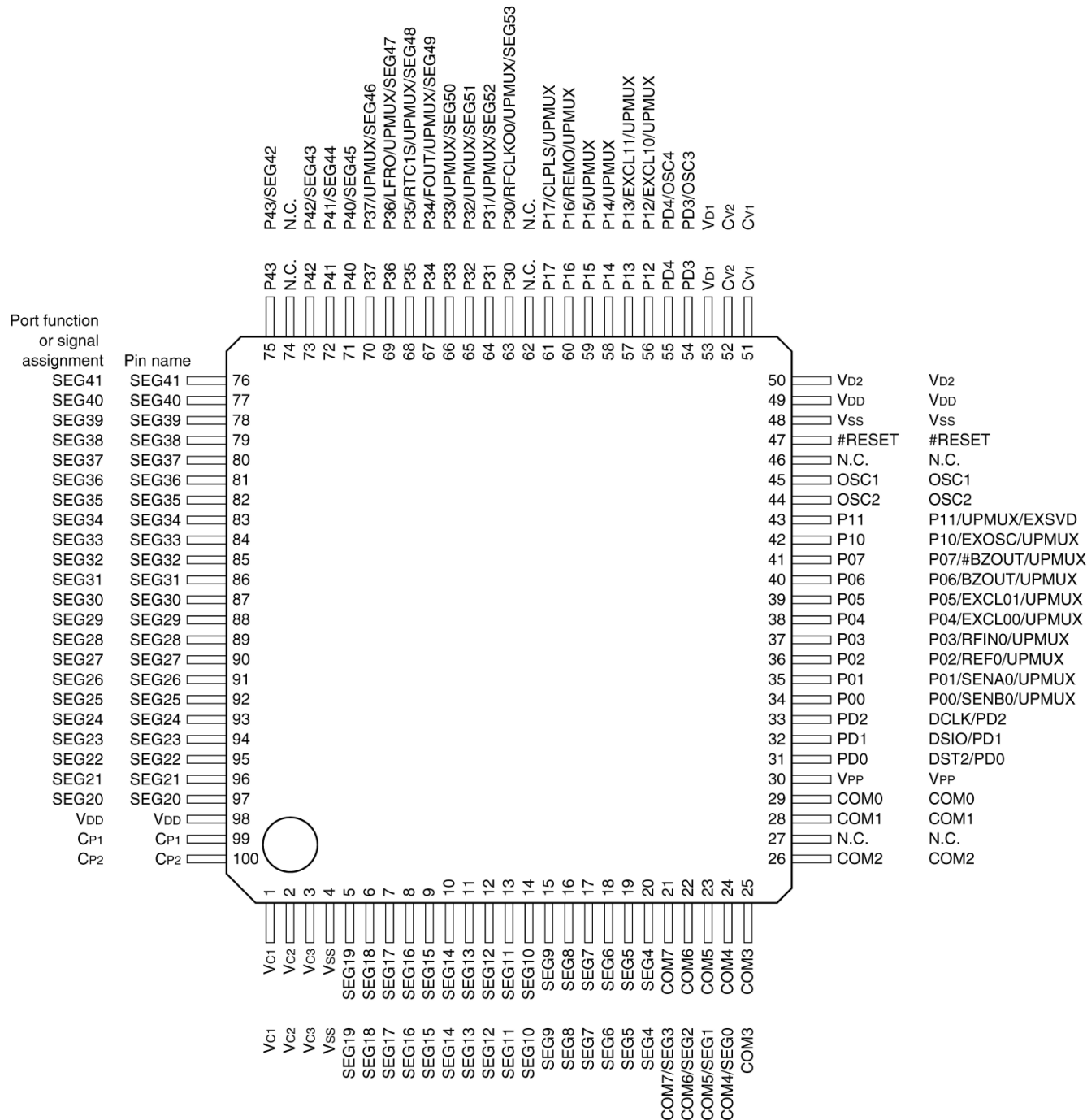


|                |                                                   |
|----------------|---------------------------------------------------|
| Pad opening    | No. 1–28, 55–81: X = 68 $\mu$ m, Y = 80 $\mu$ m   |
|                | No. 29–54, 82–108: X = 80 $\mu$ m, Y = 68 $\mu$ m |
| Chip thickness | 400 $\mu$ m                                       |



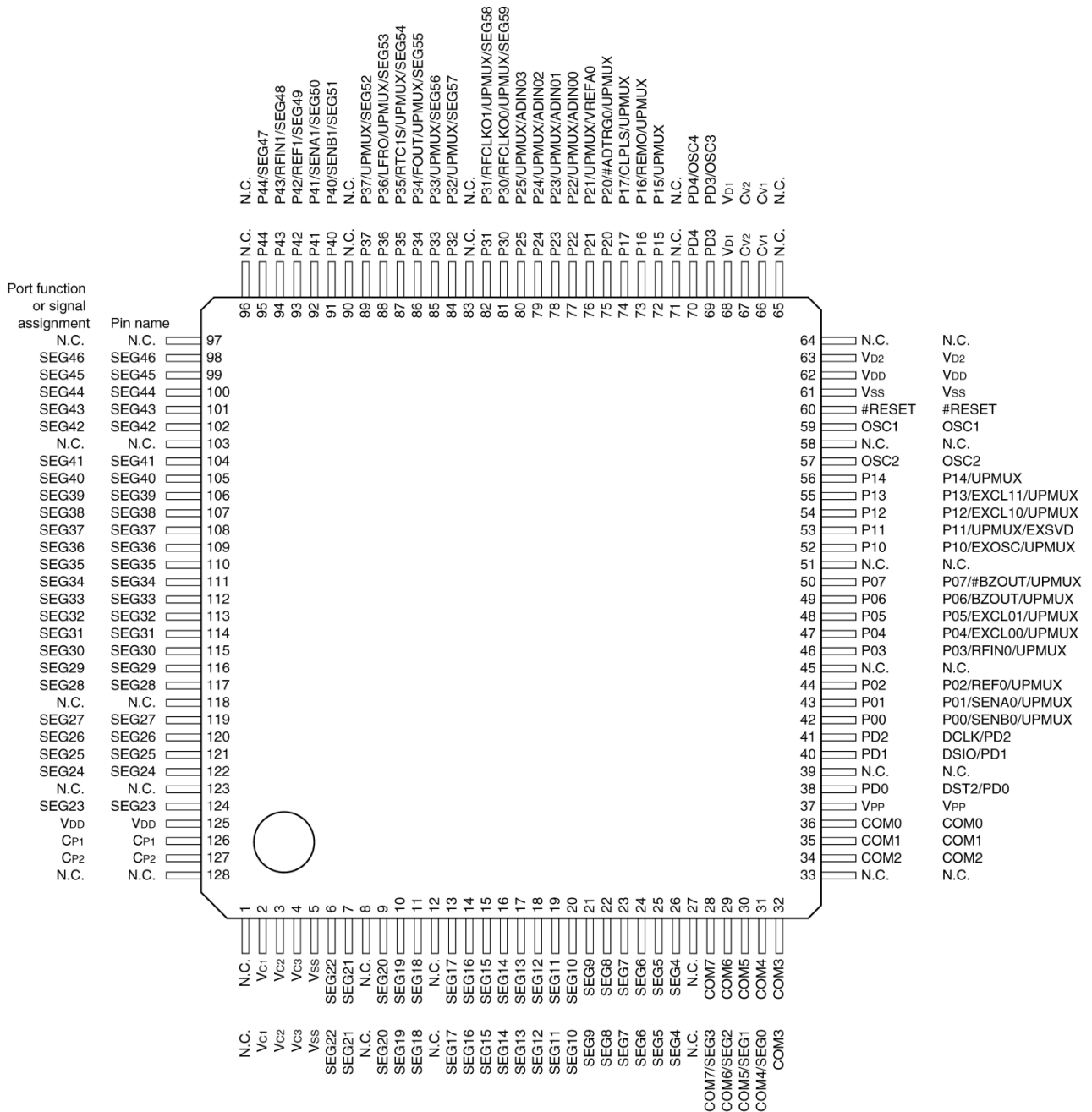
# S1C17W14/W16

S1C17W14 (QFP15-100pin)



# S1C17W14/W16

## S1C17W16 (TQFP15-128pin)



# S1C17W14/W16

## ■ Pin Descriptions

### Symbol meanings

|                               |                                                                                                                                                                                   |                                                                                        |  |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|--|
| Assigned signal:              | The signal listed at the top of each pin is assigned in the initial state. The pin function must be switched via software to assign another signal (see the “I/O Ports” chapter). |                                                                                        |  |
| I/O:                          | I                                                                                                                                                                                 | = Input                                                                                |  |
|                               | O                                                                                                                                                                                 | = Output                                                                               |  |
|                               | I/O                                                                                                                                                                               | = Input/output                                                                         |  |
|                               | P                                                                                                                                                                                 | = Power supply                                                                         |  |
|                               | A                                                                                                                                                                                 | = Analog signal                                                                        |  |
| Initial state:                | Hi-Z                                                                                                                                                                              | = High impedance state                                                                 |  |
|                               | I (Pull-up)                                                                                                                                                                       | = Input with pulled up                                                                 |  |
|                               | I (Pull-down)                                                                                                                                                                     | = Input with pulled down                                                               |  |
|                               | Hi-Z                                                                                                                                                                              | = High impedance state                                                                 |  |
|                               | O (H)                                                                                                                                                                             | = High level output                                                                    |  |
|                               | O (L)                                                                                                                                                                             | = Low level output                                                                     |  |
| Tolerant fail-safe structure: | ✓                                                                                                                                                                                 | = Over voltage tolerant fail-safe type I/O cell included (see the “I/O Ports” chapter) |  |

| Pin/pad name | Assigned signal | I/O | Initial state | Tolerant fail-safe structure | Function                                            | S1C17W14 | S1C17W16 |
|--------------|-----------------|-----|---------------|------------------------------|-----------------------------------------------------|----------|----------|
| VDD          | VDD             | P   | –             | –                            | Power supply (+)                                    | ✓        | ✓        |
| VSS          | VSS             | P   | –             | –                            | GND                                                 | ✓        | ✓        |
| VPP          | VPP             | P   | –             | –                            | Power supply for Flash programming                  | ✓        | ✓        |
| VD1          | VD1             | A   | –             | –                            | DC-DC converter output                              | ✓        | ✓        |
| VD2          | VD2             | A   | –             | –                            | DC-DC converter stabilization capacitor connect pin | ✓        | ✓        |
| CV1-2        | CV1-2           | A   | –             | –                            | DC-DC converter charge pump capacitor connect pins  | ✓        | ✓        |
| VC1-3        | VC1-3           | P   | –             | –                            | LCD panel driver power supply                       | ✓        | ✓        |
| CP1-2        | CP1-2           | A   | –             | –                            | LCD power supply booster capacitor connect pins     | ✓        | ✓        |
| OSC1         | OSC1            | A   | –             | –                            | OSC1 oscillator circuit input                       | ✓        | ✓        |
| OSC2         | OSC2            | A   | –             | –                            | OSC1 oscillator circuit output                      | ✓        | ✓        |
| #RESET       | #RESET          | I   | I (Pull-up)   | –                            | Reset input                                         | ✓        | ✓        |
| P00          | P00             | I/O | Hi-Z          | –                            | I/O port                                            | ✓        | ✓        |
|              | SENB0           | A   |               |                              | R/F converter Ch.0 sensor B oscillator pin          | ✓        | ✓        |
|              | UPMUX           | I/O |               |                              | User-selected I/O (universal port multiplexer)      | ✓        | ✓        |
| P01          | P01             | I/O | Hi-Z          | –                            | I/O port                                            | ✓        | ✓        |
|              | SENA0           | A   |               |                              | R/F converter Ch.0 sensor A oscillator pin          | ✓        | ✓        |
|              | UPMUX           | I/O |               |                              | User-selected I/O (universal port multiplexer)      | ✓        | ✓        |
| P02          | P02             | I/O | Hi-Z          | –                            | I/O port                                            | ✓        | ✓        |
|              | REF0            | A   |               |                              | R/F converter Ch.0 reference oscillator pin         | ✓        | ✓        |
|              | UPMUX           | I/O |               |                              | User-selected I/O (universal port multiplexer)      | ✓        | ✓        |
| P03          | P03             | I/O | Hi-Z          | –                            | I/O port                                            | ✓        | ✓        |
|              | RFIN0           | A   |               |                              | R/F converter Ch.0 oscillation input                | ✓        | ✓        |
|              | UPMUX           | I/O |               |                              | User-selected I/O (universal port multiplexer)      | ✓        | ✓        |
| P04          | P04             | I/O | Hi-Z          | –                            | I/O port                                            | ✓        | ✓        |
|              | EXCL00          | I   |               |                              | 16-bit PWM timer Ch.0 event counter input 0         | ✓        | ✓        |
|              | UPMUX           | I/O |               |                              | User-selected I/O (universal port multiplexer)      | ✓        | ✓        |
| P05          | P05             | I/O | Hi-Z          | –                            | I/O port                                            | ✓        | ✓        |
|              | EXCL01          | I   |               |                              | 16-bit PWM timer Ch.0 event counter input 1         | ✓        | ✓        |
|              | UPMUX           | I/O |               |                              | User-selected I/O (universal port multiplexer)      | ✓        | ✓        |
| P06          | P06             | I/O | Hi-Z          | –                            | I/O port                                            | ✓        | ✓        |
|              | BZOUT           | O   |               |                              | Sound generator output                              | ✓        | ✓        |
|              | UPMUX           | I/O |               |                              | User-selected I/O (universal port multiplexer)      | ✓        | ✓        |
| P07          | P07             | I/O | Hi-Z          | –                            | I/O port                                            | ✓        | ✓        |
|              | #BZOUT          | O   |               |                              | Sound generator inverted output                     | ✓        | ✓        |
|              | UPMUX           | I/O |               |                              | User-selected I/O (universal port multiplexer)      | ✓        | ✓        |
| P10          | P10             | I/O | Hi-Z          | –                            | I/O port                                            | ✓        | ✓        |
|              | EXOSC           | I   |               |                              | Clock generator external clock input                | ✓        | ✓        |
|              | UPMUX           | I/O |               |                              | User-selected I/O (universal port multiplexer)      | ✓        | ✓        |

# S1C17W14/W16

|     |         |     |      |   |                                                   |   |   |
|-----|---------|-----|------|---|---------------------------------------------------|---|---|
| P11 | P11     | I/O | Hi-Z | - | I/O port                                          | ✓ | ✓ |
|     | UPMUX   | I/O |      |   | User-selected I/O (universal port multiplexer)    | ✓ | ✓ |
|     | EXSVD   | A   |      |   | External power supply voltage detection input     | ✓ | ✓ |
| P12 | P12     | I/O | Hi-Z | - | I/O port                                          | ✓ | ✓ |
|     | EXCL10  | I   |      |   | 16-bit PWM timer Ch.1 event counter input 0       | ✓ | ✓ |
|     | UPMUX   | I/O |      |   | User-selected I/O (universal port multiplexer)    | ✓ | ✓ |
| P13 | P13     | I/O | Hi-Z | - | I/O port                                          | ✓ | ✓ |
|     | EXCL11  | I   |      |   | 16-bit PWM timer Ch.1 event counter input 1       | ✓ | ✓ |
|     | UPMUX   | I/O |      |   | User-selected I/O (universal port multiplexer)    | ✓ | ✓ |
| P14 | P14     | I/O | Hi-Z | - | I/O port                                          | ✓ | ✓ |
|     | UPMUX   | I/O |      |   | User-selected I/O (universal port multiplexer)    | ✓ | ✓ |
| P15 | P15     | I/O | Hi-Z | - | I/O port                                          | ✓ | ✓ |
|     | UPMUX   | I/O |      |   | User-selected I/O (universal port multiplexer)    | ✓ | ✓ |
| P16 | P16     | I/O | Hi-Z | - | I/O port                                          | ✓ | ✓ |
|     | REMO    | O   |      |   | IR remote controller transmit data output         | ✓ | ✓ |
|     | UPMUX   | I/O |      |   | User-selected I/O (universal port multiplexer)    | ✓ | ✓ |
| P17 | P17     | I/O | Hi-Z | - | I/O port                                          | ✓ | ✓ |
|     | CLPLS   | O   |      |   | IR remote controller clear pulse output           | ✓ | ✓ |
|     | UPMUX   | I/O |      |   | User-selected I/O (universal port multiplexer)    | ✓ | ✓ |
| P20 | P20     | I/O | Hi-Z | - | I/O port                                          | - | ✓ |
|     | #ADTRG0 | I   |      |   | 12-bit A/D converter Ch.0 trigger input           | - | ✓ |
|     | UPMUX   | I/O |      |   | User-selected I/O (universal port multiplexer)    | - | ✓ |
| P21 | P21     | I/O | Hi-Z | - | I/O port                                          | - | ✓ |
|     | UPMUX   | I/O |      |   | User-selected I/O (universal port multiplexer)    | - | ✓ |
|     | VREFA0  | A   |      |   | 12-bit A/D converter Ch.0 reference voltage input | - | ✓ |
| P22 | P22     | I/O | Hi-Z | - | I/O port                                          | - | ✓ |
|     | UPMUX   | I/O |      |   | User-selected I/O (universal port multiplexer)    | - | ✓ |
|     | ADIN00  | A   |      |   | 12-bit A/D converter Ch.0 analog signal input 0   | - | ✓ |
| P23 | P23     | I/O | Hi-Z | - | I/O port                                          | - | ✓ |
|     | UPMUX   | I/O |      |   | User-selected I/O (universal port multiplexer)    | - | ✓ |
|     | ADIN01  | A   |      |   | 12-bit A/D converter Ch.0 analog signal input 1   | - | ✓ |
| P24 | P24     | I/O | Hi-Z | - | I/O port                                          | - | ✓ |
|     | UPMUX   | I/O |      |   | User-selected I/O (universal port multiplexer)    | - | ✓ |
|     | ADIN02  | A   |      |   | 12-bit A/D converter Ch.0 analog signal input 2   | - | ✓ |
| P25 | P25     | I/O | Hi-Z | - | I/O port                                          | - | ✓ |
|     | UPMUX   | I/O |      |   | User-selected I/O (universal port multiplexer)    | - | ✓ |
|     | ADIN03  | A   |      |   | 12-bit A/D converter Ch.0 analog signal input 3   | - | ✓ |
| P30 | P30     | I/O | Hi-Z | ✓ | I/O port                                          | ✓ | ✓ |
|     | RFCLKO0 | O   |      |   | R/F converter Ch.0 clock monitor output           | ✓ | ✓ |
|     | UPMUX   | I/O |      |   | User-selected I/O (universal port multiplexer)    | ✓ | ✓ |
|     | SEG53   | A   |      |   | LCD segment output                                | ✓ | - |
|     | SEG59   | A   |      |   | LCD segment output                                | - | ✓ |
| P31 | P31     | I/O | Hi-Z | ✓ | I/O port                                          | ✓ | ✓ |
|     | RFCLKO1 | O   |      |   | R/F converter Ch.1 clock monitor output           | - | ✓ |
|     | UPMUX   | I/O |      |   | User-selected I/O (universal port multiplexer)    | ✓ | ✓ |
|     | SEG52   | A   |      |   | LCD segment output                                | ✓ | - |
|     | SEG58   | A   |      |   | LCD segment output                                | - | ✓ |
| P32 | P32     | I/O | Hi-Z | ✓ | I/O port                                          | ✓ | ✓ |
|     | UPMUX   | I/O |      |   | User-selected I/O (universal port multiplexer)    | ✓ | ✓ |
|     | SEG51   | A   |      |   | LCD segment output                                | ✓ | - |
|     | SEG57   | A   |      |   | LCD segment output                                | - | ✓ |
| P33 | P33     | I/O | Hi-Z | ✓ | I/O port                                          | ✓ | ✓ |
|     | UPMUX   | I/O |      |   | User-selected I/O (universal port multiplexer)    | ✓ | ✓ |
|     | SEG50   | A   |      |   | LCD segment output                                | ✓ | - |
|     | SEG56   | A   |      |   | LCD segment output                                | - | ✓ |
| P34 | P34     | I/O | Hi-Z | ✓ | I/O port                                          | ✓ | ✓ |
|     | FOUT    | O   |      |   | Clock external output                             | ✓ | ✓ |
|     | UPMUX   | I/O |      |   | User-selected I/O (universal port multiplexer)    | ✓ | ✓ |
|     | SEG49   | A   |      |   | LCD segment output                                | ✓ | - |
|     | SEG55   | A   |      |   | LCD segment output                                | - | ✓ |

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|          |          |     |             |   |                                                |   |   |
|----------|----------|-----|-------------|---|------------------------------------------------|---|---|
| P35      | P35      | I/O | Hi-Z        | ✓ | I/O port                                       | ✓ | ✓ |
|          | RTC1S    | O   |             |   | Real-time clock 1-second cycle pulse output    | ✓ | ✓ |
|          | UPMUX    | I/O |             |   | User-selected I/O (universal port multiplexer) | ✓ | ✓ |
|          | SEG48    | A   |             |   | LCD segment output                             | ✓ | - |
|          | SEG54    | A   |             |   | LCD segment output                             | - | ✓ |
| P36      | P36      | I/O | Hi-Z        | ✓ | I/O port                                       | ✓ | ✓ |
|          | LFRO     | O   |             |   | LCD frame signal monitor output                | ✓ | ✓ |
|          | UPMUX    | I/O |             |   | User-selected I/O (universal port multiplexer) | ✓ | ✓ |
|          | SEG47    | A   |             |   | LCD segment output                             | ✓ | - |
|          | SEG53    | A   |             |   | LCD segment output                             | - | ✓ |
| P37      | P37      | I/O | Hi-Z        | ✓ | I/O port                                       | ✓ | ✓ |
|          | UPMUX    | I/O |             |   | User-selected I/O (universal port multiplexer) | ✓ | ✓ |
|          | SEG46    | A   |             |   | LCD segment output                             | ✓ | - |
|          | SEG52    | A   |             |   | LCD segment output                             | - | ✓ |
| P40      | P40      | I/O | Hi-Z        | ✓ | I/O port                                       | ✓ | ✓ |
|          | SEN1     | A   |             |   | R/F converter Ch.1 sensor B oscillator pin     | - | ✓ |
|          | SEG45    | A   |             |   | LCD segment output                             | ✓ | - |
|          | SEG51    | A   |             |   | LCD segment output                             | - | ✓ |
| P41      | P41      | I/O | Hi-Z        | ✓ | I/O port                                       | ✓ | ✓ |
|          | SENA1    | A   |             |   | R/F converter Ch.1 sensor A oscillator pin     | - | ✓ |
|          | SEG44    | A   |             |   | LCD segment output                             | ✓ | - |
|          | SEG50    | A   |             |   | LCD segment output                             | - | ✓ |
| P42      | P42      | I/O | Hi-Z        | ✓ | I/O port                                       | ✓ | ✓ |
|          | REF1     | A   |             |   | R/F converter Ch.1 oscillation input           | - | ✓ |
|          | SEG43    | A   |             |   | LCD segment output                             | ✓ | - |
|          | SEG49    | A   |             |   | LCD segment output                             | - | ✓ |
| P43      | P43      | I/O | Hi-Z        | ✓ | I/O port                                       | ✓ | ✓ |
|          | RFIN1    | A   |             |   | R/F converter Ch.1 oscillation input           | - | ✓ |
|          | SEG42    | A   |             |   | LCD segment output                             | ✓ | - |
|          | SEG48    | A   |             |   | LCD segment output                             | - | ✓ |
| P44      | P44      | I/O | Hi-Z        | ✓ | I/O port                                       | - | ✓ |
|          | SEG47    | A   |             |   | LCD segment output                             | - | ✓ |
| PD0      | DST2     | O   | O (L)       | - | On-chip debugger status output                 | ✓ | ✓ |
|          | PD0      | I/O |             |   | I/O port                                       | ✓ | ✓ |
| PD1      | DSIO     | I/O | I (Pull-up) | - | On-chip debugger data input/output             | ✓ | ✓ |
|          | PD1      | I/O |             |   | I/O port                                       | ✓ | ✓ |
| PD2      | DCLK     | O   | O (H)       | - | On-chip debugger clock output                  | ✓ | ✓ |
|          | PD2      | O   |             |   | Output port                                    | ✓ | ✓ |
| PD3      | PD3      | I/O | Hi-Z        | - | I/O port                                       | ✓ | ✓ |
|          | OSC3     | A   |             |   | OSC3 oscillator circuit input                  | ✓ | ✓ |
| PD4      | PD4      | I/O | Hi-Z        | - | I/O port                                       | ✓ | ✓ |
|          | OSC4     | A   |             |   | OSC3 oscillator circuit output                 | ✓ | ✓ |
| COM0-3   | COM0-3   | A   | Hi-Z        | - | LCD common output                              | ✓ | ✓ |
| COM4     | COM4     | A   | Hi-Z        | - | LCD common output                              | ✓ | ✓ |
|          | SEG0     | A   |             |   | LCD segment output                             | ✓ | ✓ |
| COM5     | COM5     | A   | Hi-Z        | - | LCD common output                              | ✓ | ✓ |
|          | SEG1     | A   |             |   | LCD segment output                             | ✓ | ✓ |
| COM6     | COM6     | A   | Hi-Z        | - | LCD common output                              | ✓ | ✓ |
|          | SEG2     | A   |             |   | LCD segment output                             | ✓ | ✓ |
| COM7     | COM7     | A   | Hi-Z        | - | LCD common output                              | ✓ | ✓ |
|          | SEG3     | A   |             |   | LCD segment output                             | ✓ | ✓ |
| SEG4-41  | SEG4-41  | A   | Hi-Z        | - | LCD segment output                             | ✓ | ✓ |
| SEG42-46 | SEG42-46 | A   | Hi-Z        | - | LCD segment output                             | - | ✓ |

Notes: · In the peripheral circuit descriptions, the assigned signal name is used as the pin name.

# S1C17W14/W16

## Universal port multiplexer (UPMUX)

The universal port multiplexer (UPMUX) allows software to select the peripheral circuit input/output function to be assigned to each pin from those listed below.

| Peripheral circuit                  | Signal to be assigned          | I/O | Channel number <i>n</i>      | Function                                     |
|-------------------------------------|--------------------------------|-----|------------------------------|----------------------------------------------|
| Synchronous serial interface (SPIA) | SDIn                           | I   | S1C17W14: <i>n</i> = 0, 1    | SPIA Ch. <i>n</i> data input                 |
|                                     | SDOn                           | O   | S1C17W16: <i>n</i> = 0, 1, 2 | SPIA Ch. <i>n</i> data output                |
|                                     | SPICLK <i>n</i>                | I/O |                              | SPIA Ch. <i>n</i> clock input/output         |
|                                     | #SPISS <i>n</i>                | I   |                              | SPIA Ch. <i>n</i> slave-select input         |
| I2C (I2C)                           | SCL <i>n</i>                   | I/O | S1C17W14: <i>n</i> = 0       | I2C Ch. <i>n</i> clock input/output          |
|                                     | SDA <i>n</i>                   | I/O | S1C17W16: <i>n</i> = 0       | I2C Ch. <i>n</i> data input/output           |
| UART (UART)                         | USIN <i>n</i>                  | I   | S1C17W14: <i>n</i> = 0, 1    | UART Ch. <i>n</i> data input                 |
|                                     | USOUT <i>n</i>                 | O   | S1C17W16: <i>n</i> = 0, 1    | UART Ch. <i>n</i> data output                |
| 16-bit PWM timer (T16B)             | TOUT <i>n</i> 0/CAP <i>n</i> 0 | I/O | S1C17W14: <i>n</i> = 0, 1    | T16B Ch. <i>n</i> PWM output/capture input 0 |
|                                     | TOUT <i>n</i> 1/CAP <i>n</i> 1 | I/O | S1C17W16: <i>n</i> = 0, 1    | T16B Ch. <i>n</i> PWM output/capture input 1 |

Note: Do not assign a function to two or more pins simultaneously.

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Document code: 412911200

First issue Jun., 2013 in Japan

Revised Dec., 2014