

New Series

## 16-bit Single Chip Microcontroller

- Low voltage operation from 1.2 V with a single alkaline or silver oxide button battery.
- Ultra low standby power consumption (0.3  $\mu$ A during HALT state in super economy mode)
- Embedded A/D converter to support various sensing applications

### ■ DESCRIPTIONS

The S1C17W03/W04 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 A/D converter, 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 A/D conversion function and timers.

### ■ FEATURES

| Model                                                           | S1C17W03                                                                                                                                                                                                                     |                                            | S1C17W04 |
|-----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|----------|
| CPU                                                             |                                                                                                                                                                                                                              |                                            |          |
| CPU core                                                        | Seiko Epson original 16-bit RISC CPU core S1C17                                                                                                                                                                              |                                            |          |
| Other                                                           | On-chip debugger                                                                                                                                                                                                             |                                            |          |
| Embedded Flash memory                                           |                                                                                                                                                                                                                              |                                            |          |
| Capacity                                                        | 16K bytes (for both instructions and data)                                                                                                                                                                                   | 32K bytes (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                                                        | 2K 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<br>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<br>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<br>Oscillation stop detection circuit included                                                                                                                                          |                                            |          |
| OSC3 oscillator circuit                                         | 4.2 MHz (max.) crystal/ceramic oscillator (48-pin package or chip)<br>250, 384, 500 kHz, 1, 2, and 4 MHz-switchable embedded oscillator<br>2.1 MHz (max.) CR oscillator (an external R is required) (48-pin package or chip) |                                            |          |
| EXOSC clock input                                               | 4.2 MHz (max.) square or sine wave input                                                                                                                                                                                     |                                            |          |
| Other                                                           | Configurable system clock division ratio<br>Configurable system clock used at wake up from SLEEP state<br>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: 34 bits (max., 48-pin package or chip)<br>23 bits (max., 32-pin package)                                                                                                                                  |                                            |          |
|                                                                 | Output port: 1 bit (max.)                                                                                                                                                                                                    |                                            |          |
|                                                                 | Pins are shared with the peripheral I/O.                                                                                                                                                                                     |                                            |          |
| Number of input interrupt ports                                 | 30 bits (max., 48-pin package or chip)<br>21 bits (max., 32-pin package)                                                                                                                                                     |                                            |          |
| Number of ports that support universal port multiplexer (UPMUX) | 24 bits (48-pin package or chip)<br>21 bits (32-pin package)<br>A peripheral circuit I/O function selected via software can be assigned to each port.                                                                        |                                            |          |
| Timers                                                          |                                                                                                                                                                                                                              |                                            |          |
| Watchdog timer (WDT)                                            | Generates NMI or watchdog timer reset.                                                                                                                                                                                       |                                            |          |
| Real-time clock (RTCA)                                          | 128–1 Hz counter, second/minute/hour/day/day of the week/month/year counters<br>Theoretical regulation function for 1-second correction<br>Alarm and stopwatch functions                                                     |                                            |          |

# S1C17W03/W04

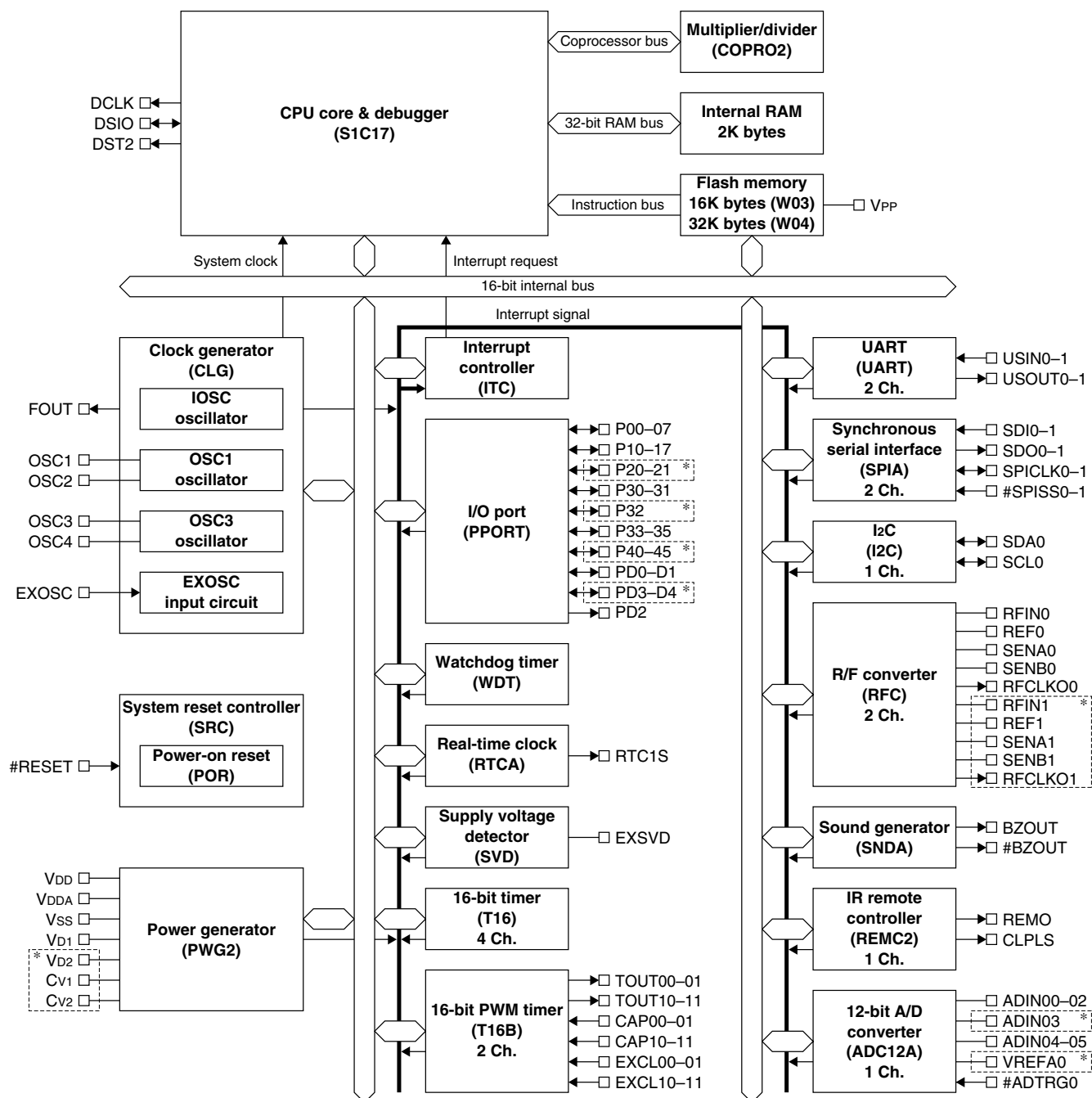
| Model                                | S1C17W03                                                                                                                                                                | S1C17W04 |
|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>Timers</b>                        |                                                                                                                                                                         |          |
| 16-bit timer (T16)                   | 4 channels<br>Generates the SPIA master clocks and the ADC12A operating clock/trigger signal.                                                                           |          |
| 16-bit PWM timer (T16B)              | 2 channels<br>Event counter/capture function<br>PWM waveform generation function<br>Number of PWM output or capture input ports: 2 ports/channel                        |          |
| <b>Supply voltage detector (SVD)</b> |                                                                                                                                                                         |          |
| Detection level                      | 30 levels (1.2 to 3.6 V)                                                                                                                                                |          |
| Detection accuracy                   | ±3 %                                                                                                                                                                    |          |
| Other                                | Intermittent operation mode<br>Generates an interrupt or reset according to the detection level evaluation.                                                             |          |
| <b>Serial interfaces</b>             |                                                                                                                                                                         |          |
| UART (UART)                          | 2 channels<br>Baud-rate generator included, IrDA1.0 supported                                                                                                           |          |
| Synchronous Serial Interface (SPIA)  | 2 channels<br>2 to 16-bit variable data length<br>The 16-bit timer (T16) can be used for the baud-rate generator in master mode.                                        |          |
| I <sup>2</sup> C (I2C)               | 1 channel<br>Baud-rate generator included                                                                                                                               |          |
| <b>Sound generator (SNDA)</b>        |                                                                                                                                                                         |          |
| Buzzer output function               | 512 Hz to 16 kHz output frequencies<br>One-shot output function                                                                                                         |          |
| Melody generation function           | Pitch: 128 Hz to 16 kHz ≈ C3 to C6<br>Duration: 7 notes/rests (Half note/rest to thirty-second note/rest)<br>Tempo: 16 tempos (30 to 480)<br>Tie/slur may be specified. |          |
| <b>IR remote controller (REMC2)</b>  |                                                                                                                                                                         |          |
| Number of transmitter channels       | 1 channel                                                                                                                                                               |          |
| Other                                | EL lamp drive waveform can be generated for an application example.                                                                                                     |          |
| <b>R/F converter (RFC)</b>           |                                                                                                                                                                         |          |
| Conversion method                    | CR oscillation type with 24-bit counters                                                                                                                                |          |
| Number of conversion channels        | 2 channels (48-pin package or chip)<br>1 channel (32-pin package)<br>(Up to two sensors can be connected to each channel.)                                              |          |
| Supported sensors                    | DC-bias resistive sensors, AC-bias resistive sensors (Ch.0 only)                                                                                                        |          |
| <b>12-bit A/D converter (ADC12A)</b> |                                                                                                                                                                         |          |
| Conversion method                    | Successive approximation type                                                                                                                                           |          |
| Resolution                           | 12 bits                                                                                                                                                                 |          |
| Number of conversion channels        | 1 channel                                                                                                                                                               |          |
| Number of analog signal inputs       | 6 ports/channel (48-pin package or chip)<br>5 ports/channel (32-pin package)                                                                                            |          |
| <b>Multiplier/divider (COPRO2)</b>   |                                                                                                                                                                         |          |
| Arithmetic functions                 | 16-bit × 16-bit multiplier<br>16-bit × 16-bit + 32-bit multiply and accumulation unit<br>32-bit ÷ 32-bit divider                                                        |          |
| <b>Reset</b>                         |                                                                                                                                                                         |          |
| #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).                                                        |          |
| <b>Interrupt</b>                     |                                                                                                                                                                         |          |
| Non-maskable interrupt               | 4 systems (Reset, address misaligned interrupt, debug, NMI)                                                                                                             |          |
| Programmable interrupt               | External interrupt: 1 system (8 levels)<br>Internal interrupt: 20 systems (8 levels)                                                                                    |          |

# S1C17W03/W04

| Model                                                        | S1C17W03                                                                                 | S1C17W04 |
|--------------------------------------------------------------|------------------------------------------------------------------------------------------|----------|
| 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 (48-pin package or chip)                                                    |          |
| V <sub>DDA</sub> analog operating voltage                    | 1.2 to 3.6 V (Power supply for P3[5:0] and P4[5:4] ports)                                |          |
| V <sub>DDA</sub> analog operating voltage for A/D conversion | 1.8 to 3.6 V                                                                             |          |
| Operating temperature                                        |                                                                                          |          |
| Operating temperature range                                  | -40 to 85 °C                                                                             |          |
| Current consumption (Typ. value)                             |                                                                                          |          |
| SLEEP mode                                                   | 0.15 μA<br>I <sub>OSC</sub> = OFF, OSC1 = OFF, OSC3 = OFF                                |          |
| HALT mode                                                    | 0.5 μA<br>OSC1 = 32 kHz, RTC = ON                                                        |          |
|                                                              | 0.3 μA (48-pin package or chip)<br>OSC1 = 32 kHz, RTC = ON, super economy mode           |          |
|                                                              |                                                                                          |          |
| RUN mode                                                     | 8 μA<br>OSC1 = 32 kHz, RTC = ON, CPU = OSC1                                              |          |
|                                                              | 4 μA (48-pin package or chip)<br>OSC1 = 32 kHz, RTC = ON, CPU = OSC1, super economy mode |          |
|                                                              | 250 μA                                                                                   |          |
|                                                              | OSC3 = 1 MHz (ceramic oscillator), OSC1 = 32 kHz, RTC = ON, CPU = OSC3                   |          |
| Shipping form                                                |                                                                                          |          |
| 1                                                            | TQFP12-48pin (Lead pitch: 0.5 mm)                                                        |          |
| 2                                                            | SQFN5-32pin (Lead pitch: 0.5 mm)                                                         |          |
| 3                                                            | Die form (Pad pitch: 80 μm (min.))                                                       |          |

# S1C17W03/W04

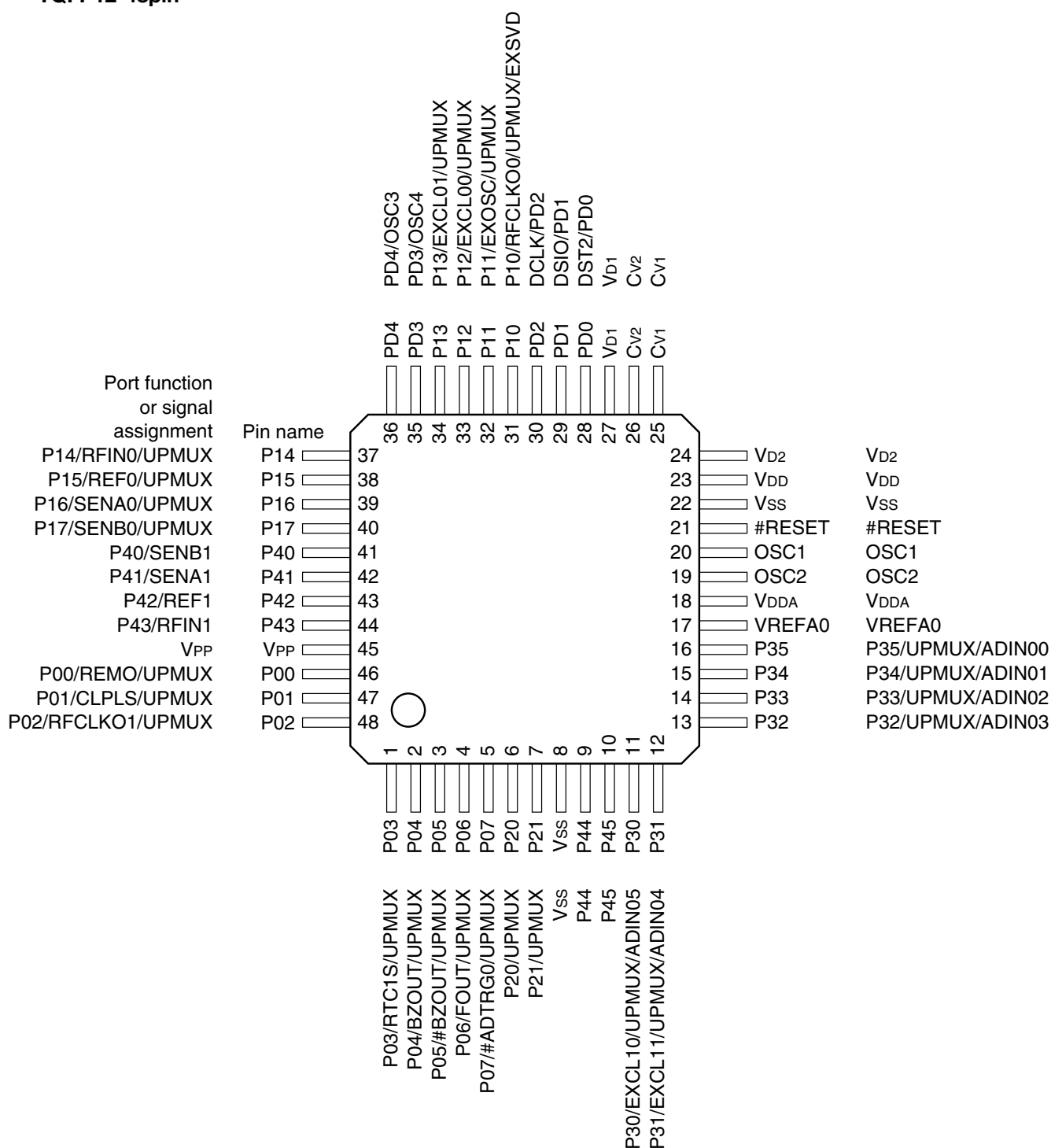
## ■ BLOCK DIAGRAM



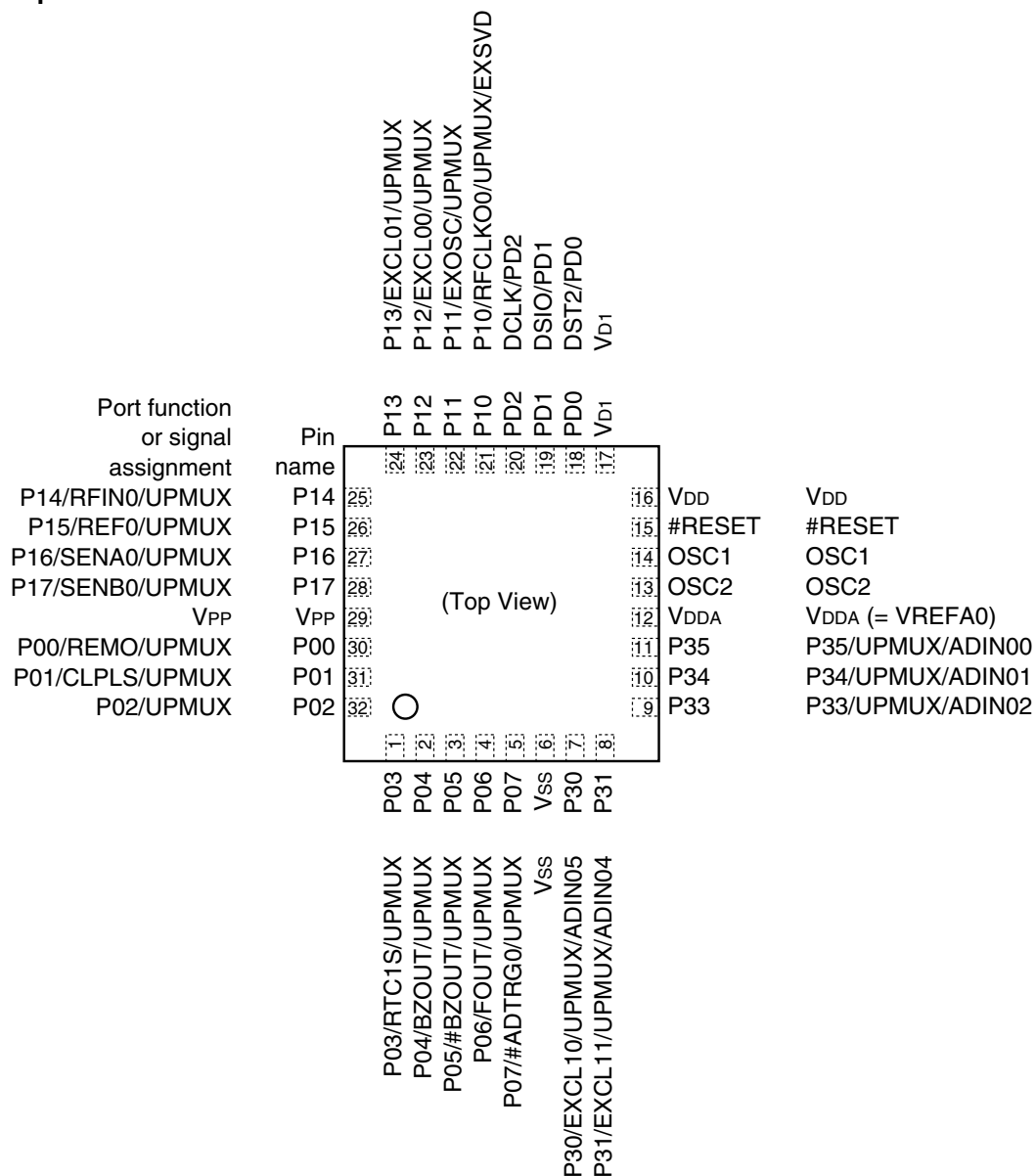
\* These pins do not exist in the 32-pin package.

## PIN CONFIGURATION DIAGRAMS

TQFP12-48pin

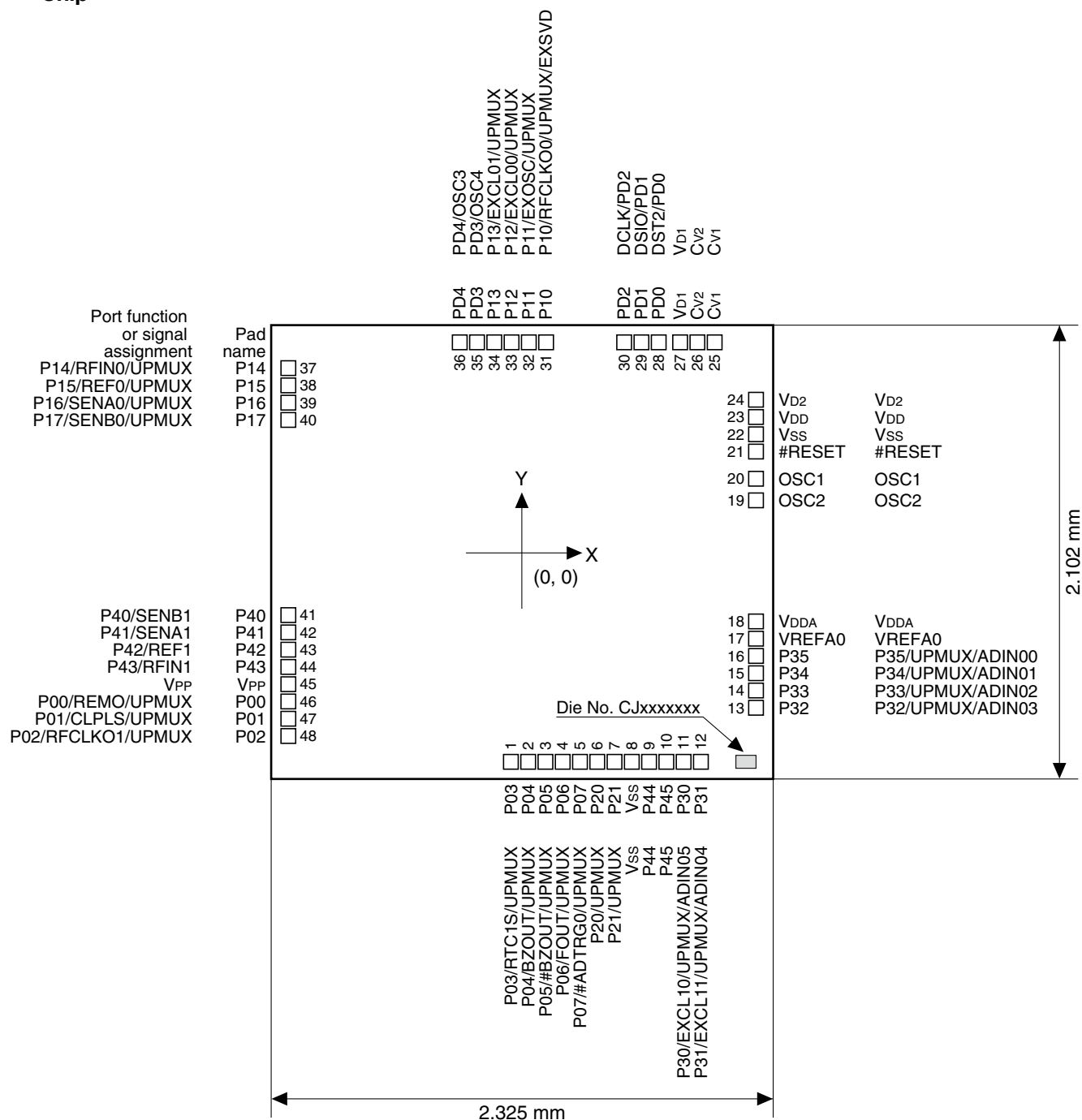


**S1C17W03/W04**

**SQFN5-32pin**

# S1C17W03/W04

## Chip



# S1C17W03/W04

## ■ 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          |
|                | Hi-Z          | = High impedance state   |
| Initial 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)

The over voltage tolerant fail-safe type I/O cell allows interfacing without passing unnecessary current even if a voltage exceeding  $V_{DD}$  is applied to the port. Also unnecessary current is not consumed when the port is externally biased without supplying  $V_{DD}$ .

| Pin/pad name | Assigned signal | I/O | Initial state | Tolerant fail-safe structure | Function                                            | 32-pin | 48-pin/Chip |
|--------------|-----------------|-----|---------------|------------------------------|-----------------------------------------------------|--------|-------------|
| $V_{DD}$     | $V_{DD}$        | P   | –             | –                            | Power supply (+)                                    | ✓      | ✓           |
| $V_{DDA}$    | $V_{DDA}$       | P   | –             | –                            | Analog power supply (+)                             | ✓      | ✓           |
| $V_{SS}$     | $V_{SS}$        | P   | –             | –                            | GND                                                 | ✓      | ✓           |
| $V_{PP}$     | $V_{PP}$        | P   | –             | –                            | Power supply for Flash programming                  | ✓      | ✓           |
| $V_{D1}$     | $V_{D1}$        | A   | –             | –                            | DC-DC converter output                              | ✓      | ✓           |
| $V_{D2}$     | $V_{D2}$        | A   | –             | –                            | DC-DC converter stabilization capacitor connect pin | –      | ✓           |
| $CV_{1-2}$   | $CV_{1-2}$      | A   | –             | –                            | DC-DC converter charge pump capacitor connect pins  | –      | ✓           |
| OSC1         | OSC1            | A   | –             | –                            | OSC1 oscillator circuit input                       | ✓      | ✓           |
| OSC2         | OSC2            | A   | –             | –                            | OSC1 oscillator circuit output                      | ✓      | ✓           |
| VREFA0       | VREFA0          | A   | –             | –                            | 12-bit A/D converter Ch.0 reference voltage input   | –      | ✓           |
| #RESET       | #RESET          | I   | I (Pull-up)   | –                            | Reset input                                         | ✓      | ✓           |
| P00          | P00             | 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)      | ✓      | ✓           |
| P01          | P01             | 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)      | ✓      | ✓           |
| P02          | P02             | 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)      | ✓      | ✓           |
| P03          | P03             | 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)      | ✓      | ✓           |
| P04          | P04             | I/O | Hi-Z          | –                            | I/O port                                            | ✓      | ✓           |
|              | BZOUT           | O   |               |                              | Sound generator output                              | ✓      | ✓           |
|              | UPMUX           | I/O |               |                              | User-selected I/O (universal port multiplexer)      | ✓      | ✓           |
| P05          | P05             | I/O | Hi-Z          | –                            | I/O port                                            | ✓      | ✓           |
|              | #BZOUT          | O   |               |                              | Sound generator inverted output                     | ✓      | ✓           |
|              | UPMUX           | I/O |               |                              | User-selected I/O (universal port multiplexer)      | ✓      | ✓           |
| P06          | P06             | I/O | Hi-Z          | –                            | I/O port                                            | ✓      | ✓           |
|              | FOUT            | O   |               |                              | Clock external output                               | ✓      | ✓           |
|              | UPMUX           | I/O |               |                              | User-selected I/O (universal port multiplexer)      | ✓      | ✓           |
| P07          | P07             | 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)      | ✓      | ✓           |

# S1C17W03/W04

| Pin/pad name | Assigned signal | I/O | Initial state | Tolerant fail-safe structure | Function                                        | 32-pin | 48-pin/Chip |
|--------------|-----------------|-----|---------------|------------------------------|-------------------------------------------------|--------|-------------|
| P10          | P10             | I/O | Hi-Z          | -                            | I/O port                                        | ✓      | ✓           |
|              | RFCLK00         | O   |               |                              | R/F converter Ch.0 clock monitor output         | ✓      | ✓           |
|              | UPMUX           | I/O |               |                              | User-selected I/O (universal port multiplexer)  | ✓      | ✓           |
|              | EXSVD           | A   |               |                              | External power supply voltage detection input   | ✓      | ✓           |
| P11          | P11             | I/O | Hi-Z          | -                            | I/O port                                        | ✓      | ✓           |
|              | EXOSC           | I   |               |                              | Clock generator external clock input            | ✓      | ✓           |
|              | UPMUX           | I/O |               |                              | User-selected I/O (universal port multiplexer)  | ✓      | ✓           |
| P12          | P12             | 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)  | ✓      | ✓           |
| P13          | P13             | 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)  | ✓      | ✓           |
| P14          | P14             | 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)  | ✓      | ✓           |
| P15          | P15             | 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)  | ✓      | ✓           |
| P16          | P16             | 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)  | ✓      | ✓           |
| P17          | P17             | 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)  | ✓      | ✓           |
| P20          | P20             | I/O | Hi-Z          | -                            | I/O port                                        | -      | ✓           |
|              | 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)  | -      | ✓           |
| P30          | P30             | 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)  | ✓      | ✓           |
|              | ADIN05          | A   |               |                              | 12-bit A/D converter Ch.0 analog signal input 5 | ✓      | ✓           |
| P31          | P31             | 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)  | ✓      | ✓           |
|              | ADIN04          | A   |               |                              | 12-bit A/D converter Ch.0 analog signal input 4 | ✓      | ✓           |
| P32          | P32             | 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 | -      | ✓           |
| P33          | P33             | 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 | ✓      | ✓           |
| P34          | P34             | 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 | ✓      | ✓           |
| P35          | P35             | 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 | ✓      | ✓           |
| P40          | P40             | I/O | Hi-Z          | -                            | I/O port                                        | -      | ✓           |
| P41          | P41             | I/O | Hi-Z          | -                            | R/F converter Ch.1 sensor B oscillator pin      | -      | ✓           |
|              | SENA1           | A   |               |                              | R/F converter Ch.1 sensor A oscillator pin      | -      | ✓           |
| P42          | P42             | I/O | Hi-Z          | -                            | I/O port                                        | -      | ✓           |
|              | REF1            | A   |               |                              | R/F converter Ch.1 reference oscillator pin     | -      | ✓           |
| P43          | P43             | I/O | Hi-Z          | -                            | I/O port                                        | -      | ✓           |
|              | RFIN1           | A   |               |                              | R/F converter Ch.1 oscillation input            | -      | ✓           |

# S1C17W03/W04

| Pin/pad name | Assigned signal | I/O | Initial state | Tolerant fail-safe structure | Function                           | 32-pin | 48-pin/Chip |
|--------------|-----------------|-----|---------------|------------------------------|------------------------------------|--------|-------------|
| P44          | P44             | I/O | Hi-Z          | —                            | I/O port                           | —      | ✓           |
| P45          | P45             | I/O | Hi-Z          | —                            | I/O port                           | —      | ✓           |
| 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                           | —      | ✓           |
|              | OSC4            | A   |               |                              | OSC3 oscillator circuit output     | —      | ✓           |
| PD4          | PD4             | I/O | Hi-Z          | —                            | I/O port                           | —      | ✓           |
|              | OSC3            | A   |               |                              | OSC3 oscillator circuit input      | —      | ✓           |

## 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. Note, however, that a function cannot be assigned to two or more pins simultaneously.

| Peripheral circuit                  | Signal to be assigned                               | I/O | Channel number <i>n</i>   | Function                                     |
|-------------------------------------|-----------------------------------------------------|-----|---------------------------|----------------------------------------------|
| Synchronous serial interface (SPIA) | SDIn                                                | I   | S1C17W03: <i>n</i> = 0, 1 | SPIA Ch. <i>n</i> data input                 |
|                                     | SDOn                                                | O   | S1C17W04: <i>n</i> = 0, 1 | SPIA Ch. <i>n</i> data output                |
|                                     | SPICLK <sub><i>n</i></sub>                          | I/O |                           | SPIA Ch. <i>n</i> clock input/output         |
|                                     | #SPISS <sub><i>n</i></sub>                          | I   |                           | SPIA Ch. <i>n</i> slave-select input         |
| I <sup>2</sup> C (I2C)              | SCL <sub><i>n</i></sub>                             | I/O | S1C17W03: <i>n</i> = 0    | I2C Ch. <i>n</i> clock input/output          |
|                                     | SDA <sub><i>n</i></sub>                             | I/O | S1C17W04: <i>n</i> = 0    | I2C Ch. <i>n</i> data input/output           |
| UART (UART)                         | USIN <sub><i>n</i></sub>                            | I   | S1C17W03: <i>n</i> = 0, 1 | UART Ch. <i>n</i> data input                 |
|                                     | USOUT <sub><i>n</i></sub>                           | O   | S1C17W04: <i>n</i> = 0, 1 | UART Ch. <i>n</i> data output                |
| 16-bit PWM timer (T16B)             | TOUT <sub><i>n</i>0</sub> /CAP <sub><i>n</i>0</sub> | I/O | S1C17W03: <i>n</i> = 0, 1 | T16B Ch. <i>n</i> PWM output/capture input 0 |
|                                     | TOUT <sub><i>n</i>1</sub> /CAP <sub><i>n</i>1</sub> | I/O | S1C17W04: <i>n</i> = 0, 1 | T16B Ch. <i>n</i> PWM output/capture input 1 |

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