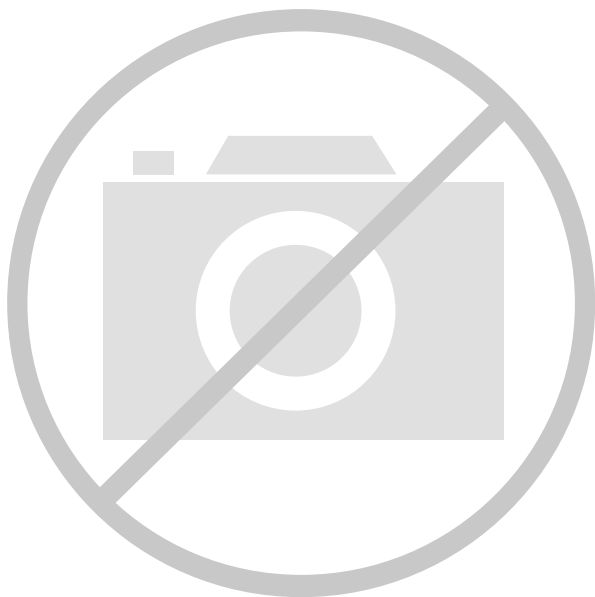




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### What is "[Embedded - Microcontrollers](#)"?

"[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, SPI, UART/USART                                                                                                     |
| Peripherals                | LCD, POR, PWM, RFC, SNDA, WDT                                                                                                               |
| Number of I/O              | 32                                                                                                                                          |
| Program Memory Size        | 64KB (64K 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             | Die                                                                                                                                         |
| Supplier Device Package    | Die                                                                                                                                         |
| Purchase URL               | <a href="https://www.e-xfl.com/product-detail/epson/s1c17w15f005100-160">https://www.e-xfl.com/product-detail/epson/s1c17w15f005100-160</a> |

# S1C17W15 (rev 1.00)

New series

## 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 0.5  $\mu$ A (TBD) .  
\*super economy mode
- Built-in LCD Driver: 30 SEG x 8 COM (max.)
- Internal 4ch R/F converters enable to realize various sensing.

### ■ DESCRIPTIONS

The S1C17W15 is a 16-bit MCU that features low-voltage operation from 1.2 V even though the 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.

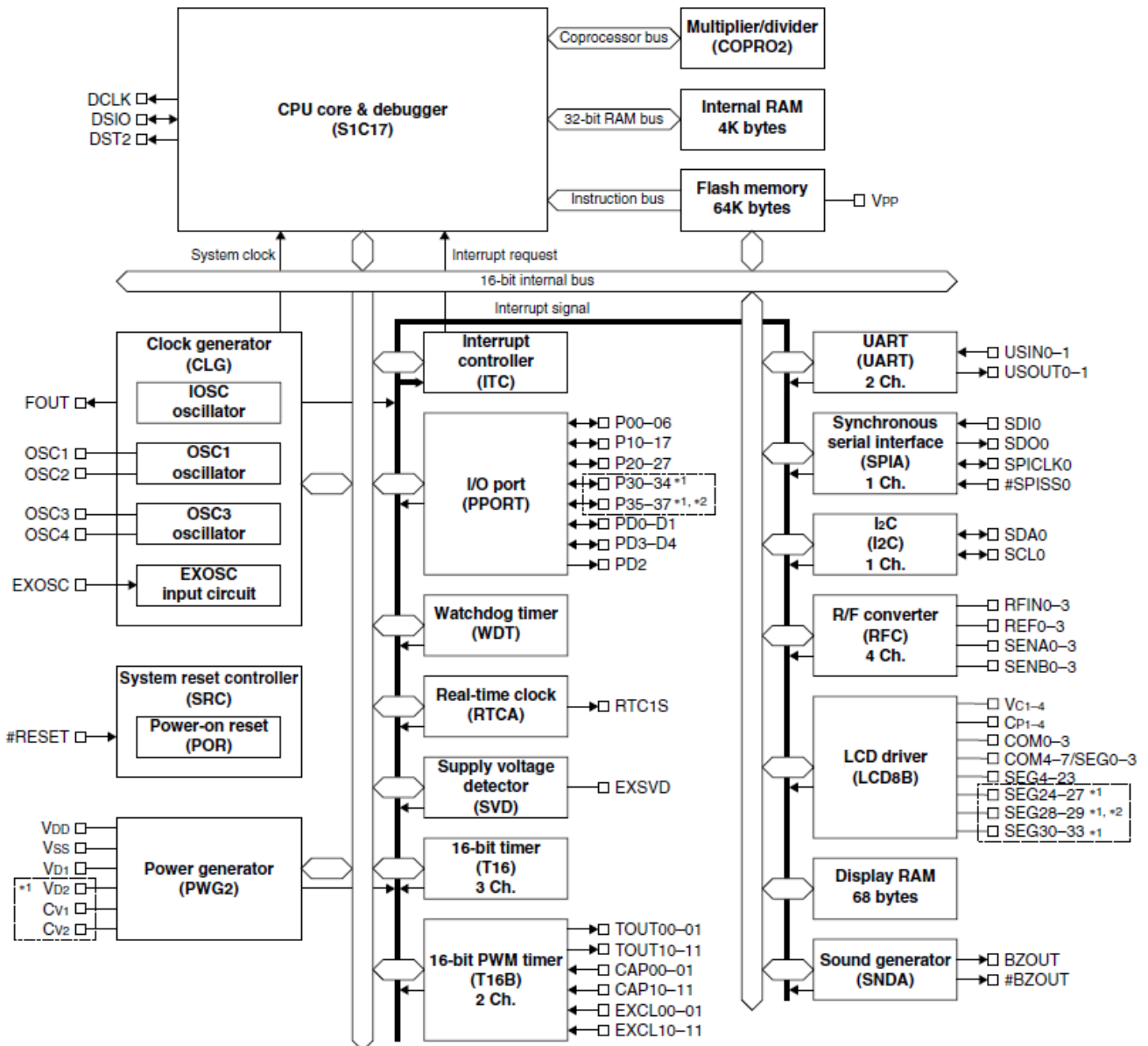
### ■ FEATURES

| Model                                                           | S1C17W15                                                                                                                                                                                   |
|-----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CPU</b>                                                      |                                                                                                                                                                                            |
| CPU Core                                                        | Seiko Epson original 16-bit RISC CPU Core S1C17                                                                                                                                            |
| Other                                                           | On-chip debugger                                                                                                                                                                           |
| <b>Embedded Flash memory</b>                                    |                                                                                                                                                                                            |
| Capacity                                                        | 64K 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                                                                            |
| <b>Embedded RAM</b>                                             |                                                                                                                                                                                            |
| Capacity                                                        | 4K bytes                                                                                                                                                                                   |
| <b>Embedded display RAM</b>                                     |                                                                                                                                                                                            |
| Capacity                                                        | 68 bytes                                                                                                                                                                                   |
| <b>Clock generator (CLG)</b>                                    |                                                                                                                                                                                            |
| System clock source                                             | 4 sources (IOSC/OSC1/OSC3/EXOSC)                                                                                                                                                           |
| System clock frequency (operating frequency)                    | 1.1 MHz (max.) VDD = 1.2 to 1.6 V<br>4.2 MHz (max.) VDD = 1.6 to 3.6 V                                                                                                                     |
| IOSC oscillator circuit (boot clock source)                     | 700 kHz (typ.) embedded oscillator<br>23 $\mu$ s (max.) starting time (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<br>500 kHz, 1, 2, and 4 MHz-switchable embedded oscillator<br>500 Hz to 2 MHz 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<br>Configurable system clock used at wake up from SLEEP state<br>Operating clock frequency for the CPU and all peripheral circuits is selectable. |
| <b>I/O port (PPORT)</b>                                         |                                                                                                                                                                                            |
| Number of general-purpose I/O ports                             | Input/output port: 35 bits (max., 100-pin package or chip)<br>32 bits (max., 80-pin package)<br>27 bits (max., 64-pin package)                                                             |
|                                                                 | Output port: 1 bit (max.)                                                                                                                                                                  |
|                                                                 | Pins are shared with the peripheral I/O.                                                                                                                                                   |
| Number of input interrupt ports                                 | 31 bits (max., 100-pin package or chip)<br>28 bits (max., 80-pin package)<br>23 bits (max., 64-pin package)                                                                                |
| Number of ports that support universal port multiplexer (UPMUX) | 23 bits<br>A peripheral circuit I/O function selected via software can be assigned to each port.                                                                                           |
| <b>Timers</b>                                                   |                                                                                                                                                                                            |
| 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                   |
| 16-bit timer (T16)                                              | 3 channels<br>Generates the SPIA master clock.                                                                                                                                             |
| 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                                              | $\pm 3\%$                                                                                                                                                                                  |
| Other                                                           | Intermittent operation mode                                                                                                                                                                |

# S1C17W15

|                                              |                                                                                                                                                                                                                                                                |
|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                              | Generates an interrupt or reset according to the detection level evaluation.                                                                                                                                                                                   |
| <b>Serial interfaces</b>                     |                                                                                                                                                                                                                                                                |
| UART (UART)                                  | 2 channel<br>Baud-rate generator included, IrDA1.0 supported                                                                                                                                                                                                   |
| Synchronous Serial Interface (SPIA)          | 1 channel<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 $\approx$ 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 may be specified.                                                                                     |
| <b>LCD driver (LCD24A)</b>                   |                                                                                                                                                                                                                                                                |
| LCD output                                   | 30 SEG $\times$ 5–8 COM (max.), 34 SEG $\times$ 1–4 COM (max.) (100-pin package or chip)<br>28 SEG $\times$ 5–8 COM (max.), 32 SEG $\times$ 1–4 COM (max.) (80-pin package)<br>20 SEG $\times$ 5–8 COM (max.), 24 SEG $\times$ 1–4 COM (max.) (64-pin package) |
| LCD contrast                                 | 32 levels                                                                                                                                                                                                                                                      |
| Other                                        | 1/4 or 1/3 bias power supply included, external voltage can be applied.                                                                                                                                                                                        |
| <b>R/F converter (RFC)</b>                   |                                                                                                                                                                                                                                                                |
| Conversion method                            | CR oscillation type with 24-bit counters                                                                                                                                                                                                                       |
| Number of conversion channels                | 4 channels (Up to two sensors can be connected to each channel.)                                                                                                                                                                                               |
| Supported sensors                            | DC-bias resistive sensors, AC-bias resistive sensors (Ch.0 only)                                                                                                                                                                                               |
| <b>Multiplier/divider (COPRO2)</b>           |                                                                                                                                                                                                                                                                |
| Arithmetic functions                         | 16-bit $\times$ 16-bit multiplier<br>16-bit $\times$ 16-bit + 32-bit multiply and accumulation unit<br>32-bit $\div$ 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).                                                                                                                                               |
|                                              |                                                                                                                                                                                                                                                                |
| 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)                                                                                                                                                                           |
| <b>Power supply voltage</b>                  |                                                                                                                                                                                                                                                                |
| VDD operating voltage                        | 1.2 to 3.6 V                                                                                                                                                                                                                                                   |
| VDD operating voltage for Flash programming  | 1.8 to 3.6 V ( $V_{PP} = 7.5$ V external power supply is required.)                                                                                                                                                                                            |
| VDD operating voltage for super economy mode | 2.5 to 3.6 V (100-pin/80-pin package or chip)                                                                                                                                                                                                                  |
| <b>Operating temperature</b>                 |                                                                                                                                                                                                                                                                |
| Operating temperature range                  | -40 to 85 °C                                                                                                                                                                                                                                                   |
| <b>Current consumption</b>                   |                                                                                                                                                                                                                                                                |
| SLEEP mode                                   | 0.15 $\mu$ A<br>I <sub>OSC</sub> =OFF, OSC1=OFF, OSC3=OFF                                                                                                                                                                                                      |
| HALT mode                                    | 0.5 $\mu$ A<br>OSC1=32 kHz, RTC=ON                                                                                                                                                                                                                             |
|                                              | 0.3 $\mu$ A<br>OSC1=32 kHz, RTC=ON, Super economy mode (100-pin/80-pin package or chip)                                                                                                                                                                        |
|                                              | 1.2 $\mu$ A<br>OSC1=32 kHz, RTC=ON, CPU=OSC1, LCD=ON (no panel load, Vc2 reference, 1/3bias), Super economy mode (100-pin/80-pin package or chip)                                                                                                              |
| RUN mode                                     | 8 $\mu$ A<br>OSC1=32 kHz, RTC=ON, CPU=OSC1                                                                                                                                                                                                                     |
|                                              | 4 $\mu$ A<br>OSC1=32 kHz, RTC=ON, CPU=OSC1, Super economy mode (100-pin/80-pin package or chip)                                                                                                                                                                |
|                                              | 250 $\mu$ A<br>OSC3=1MHz (ceramic oscillator), OSC1=32kHz, RTC=ON, CPU=OSC3                                                                                                                                                                                    |
| <b>Shipping form</b>                         |                                                                                                                                                                                                                                                                |
| 1                                            | SQFN9-64pin                                                                                                                                                                                                                                                    |
| 2                                            | TQFP13-64pin                                                                                                                                                                                                                                                   |
| 3                                            | TQFP14-80pin                                                                                                                                                                                                                                                   |
| 4                                            | QFP15-100pin                                                                                                                                                                                                                                                   |
| 5                                            | Die form (Pad pitch: 80 $\mu$ m (min.))                                                                                                                                                                                                                        |

## ■ BLOCK DIAGRAM



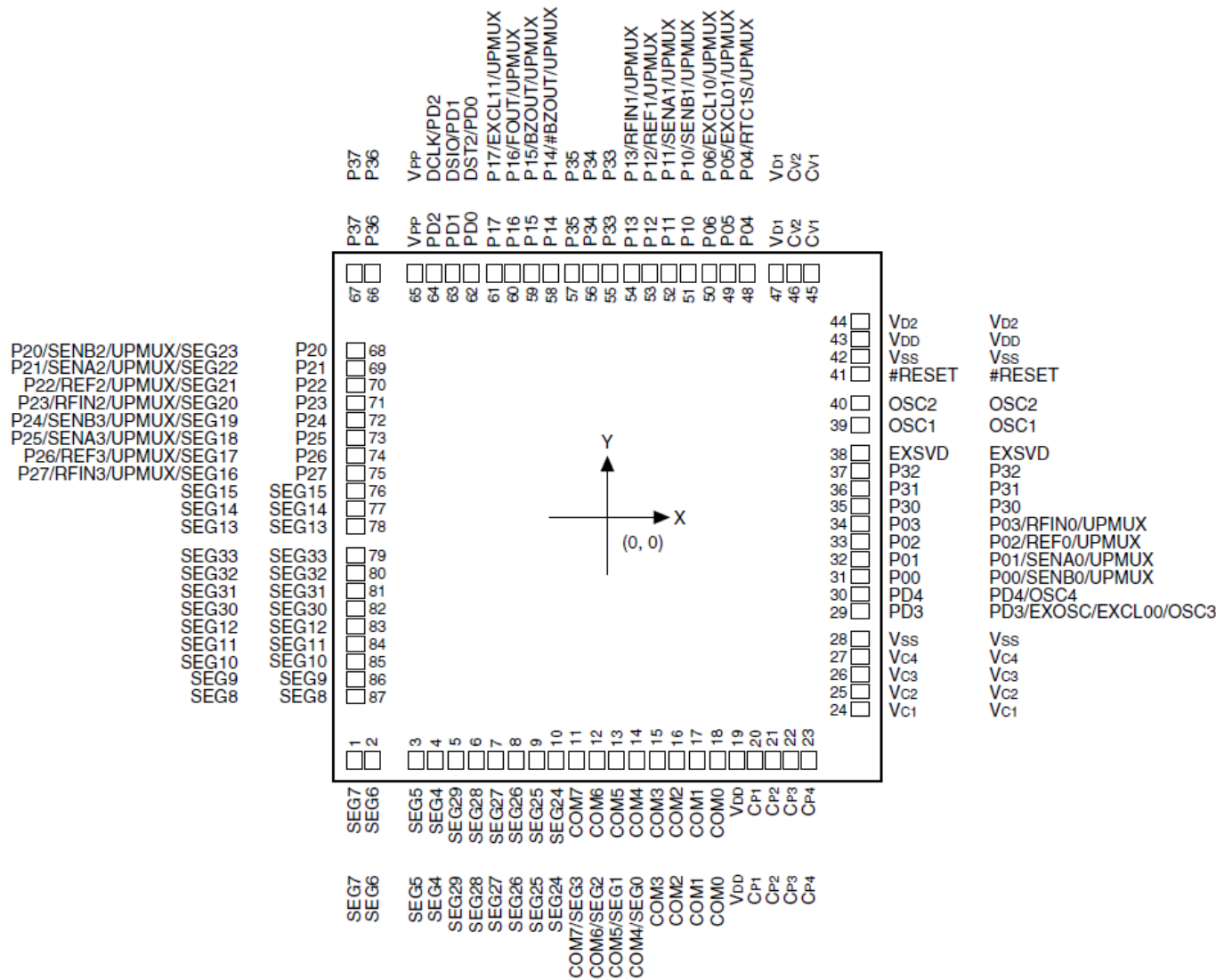
\*1 These pins do not exist in the 64-pin package.

\*2 These pins do not exist in the 80-pin package.

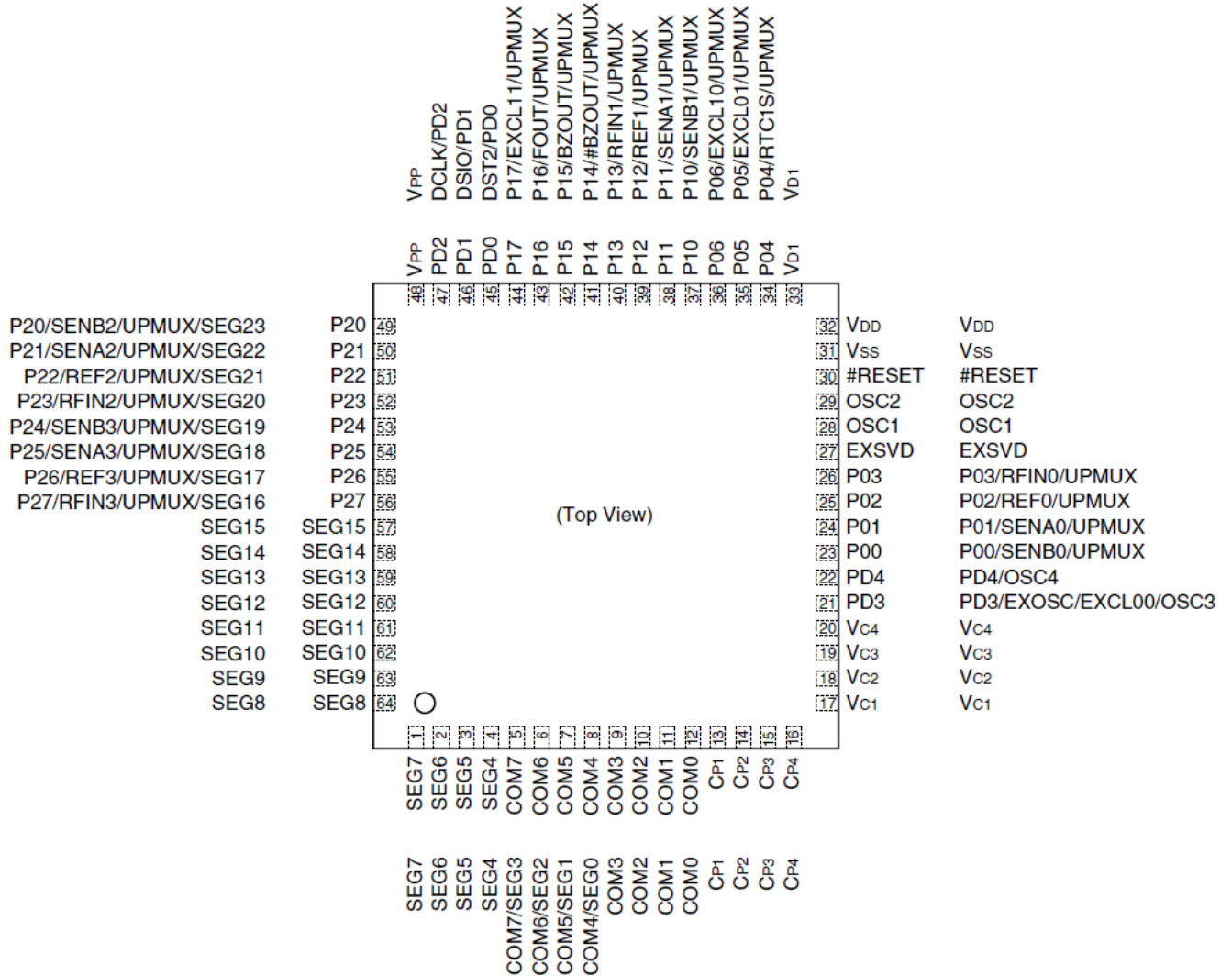
# S1C17W15

## PIN CONFIGURATION DIAGRAM

Die form

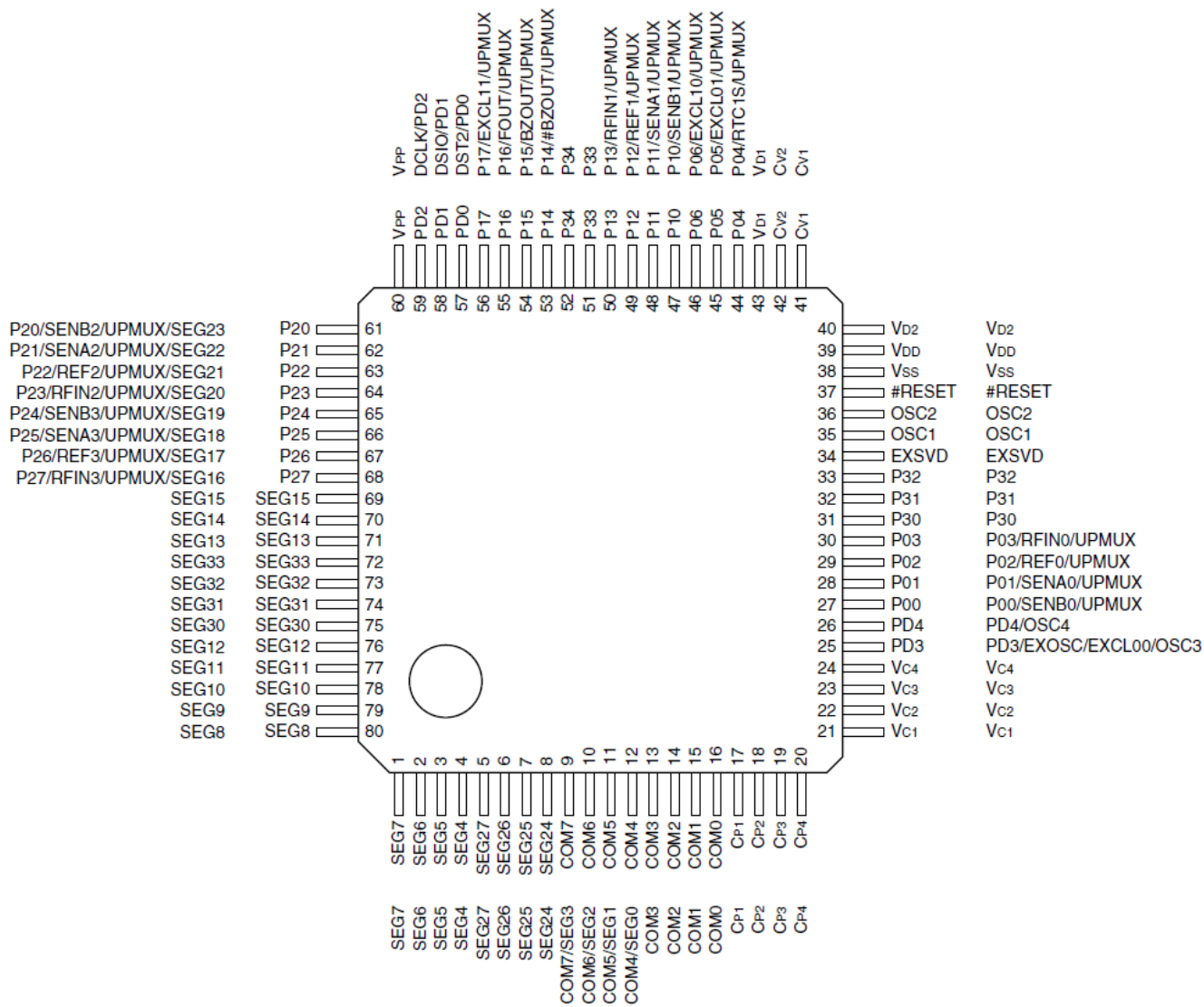


SQFN9-64pin, TQFP13-64pin

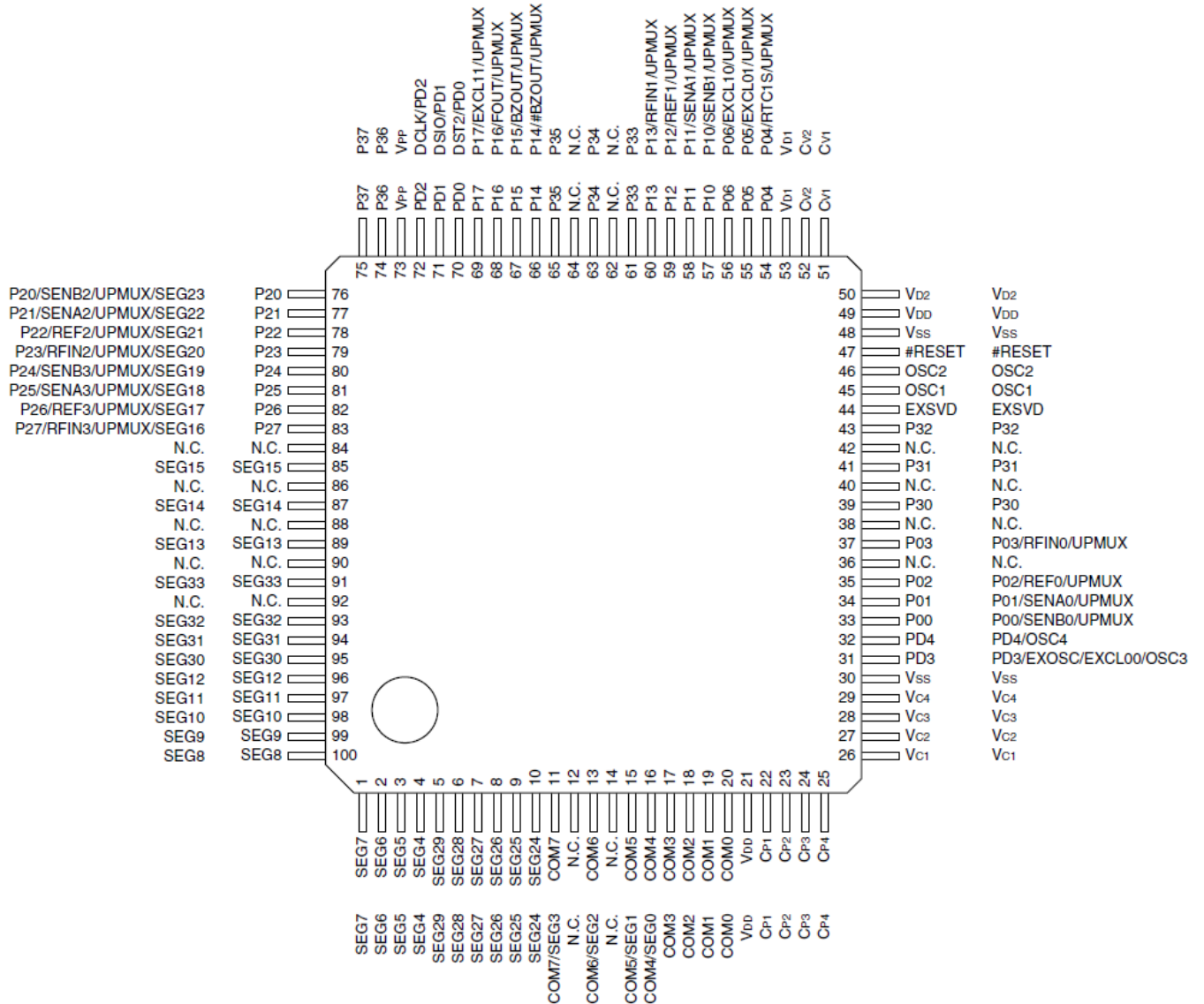


# S1C17W15

## TQFP14-80pin



## QFP15-100pin



# S1C17W15

## PIN DESCRIPTIONS

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)

| Pin/pad name | Assigned signal | I/O   | Initial state | Tolerant fail-safe structure | Function                                            | Package |       |              |
|--------------|-----------------|-------|---------------|------------------------------|-----------------------------------------------------|---------|-------|--------------|
|              |                 |       |               |                              |                                                     | 64pin   | 80pin | 100pin /Chip |
| 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  | -       | ✓     | ✓            |
| VC1-4        | VC1-4           | P     | -             | -                            | LCD panel driver power supply                       | ✓       | ✓     | ✓            |
| CP1-4        | CP1-4           | 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                                            | ✓       | ✓     | ✓            |
|              | UPMUX           | I/O   |               |                              | User-selected I/O (universal port multiplexer)      | ✓       | ✓     | ✓            |
|              | SENB0           | I/O/A |               |                              | R/F converter Ch.0 sensor B oscillator pin          | ✓       | ✓     | ✓            |
| P01          | P01             | I/O   | Hi-Z          | -                            | I/O port                                            | ✓       | ✓     | ✓            |
|              | UPMUX           | I/O   |               |                              | User-selected I/O (universal port multiplexer)      | ✓       | ✓     | ✓            |
|              | SENA0           | I/O/A |               |                              | R/F converter Ch.0 sensor A oscillator pin          | ✓       | ✓     | ✓            |
| P02          | P02             | I/O   | Hi-Z          | -                            | I/O port                                            | ✓       | ✓     | ✓            |
|              | UPMUX           | I/O   |               |                              | User-selected I/O (universal port multiplexer)      | ✓       | ✓     | ✓            |
|              | REF0            | I/O/A |               |                              | R/F converter Ch.0 reference oscillator pin         | ✓       | ✓     | ✓            |
| P03          | P03             | I/O   | Hi-Z          | -                            | I/O port                                            | ✓       | ✓     | ✓            |
|              | UPMUX           | I/O   |               |                              | User-selected I/O (universal port multiplexer)      | ✓       | ✓     | ✓            |
|              | RFIN0           | I/O/A |               |                              | R/F converter Ch.0 oscillation input                | ✓       | ✓     | ✓            |
| P04          | P04             | 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)      | ✓       | ✓     | ✓            |
| P05          | P05             | I/O   | Hi-Z          | -                            | I/O port                                            | ✓       | ✓     | ✓            |
|              | UPMUX           | I/O   |               |                              | User-selected I/O (universal port multiplexer)      | ✓       | ✓     | ✓            |
|              | EXCL01          | I     |               |                              | 16-bit PWM timer Ch.0 event counter input 1         | ✓       | ✓     | ✓            |
| P06          | P06             | I/O   | Hi-Z          | -                            | I/O port                                            | ✓       | ✓     | ✓            |
|              | UPMUX           | I/O   |               |                              | User-selected I/O (universal port multiplexer)      | ✓       | ✓     | ✓            |
|              | EXCL10          | I     |               |                              | 16-bit PWM timer Ch.1 event counter input 0         | ✓       | ✓     | ✓            |
| P10          | P10             | I/O   | Hi-Z          | ✓                            | I/O port                                            | ✓       | ✓     | ✓            |
|              | UPMUX           | I/O   |               |                              | User-selected I/O (universal port multiplexer)      | ✓       | ✓     | ✓            |
|              | SENB1           | I/O   |               |                              | R/F converter Ch.1 sensor B oscillator pin          | ✓       | ✓     | ✓            |
| P11          | P11             | I/O   | Hi-Z          | ✓                            | I/O port                                            | ✓       | ✓     | ✓            |
|              | UPMUX           | I/O   |               |                              | User-selected I/O (universal port multiplexer)      | ✓       | ✓     | ✓            |
|              | SENA1           | I/O   |               |                              | R/F converter Ch.1 sensor A oscillator pin          | ✓       | ✓     | ✓            |

# S1C17W15

| Pin/pad name | Assigned signal | I/O | Initial state | Tolerant fail-safe structure | Function                                       | Package |       |              |
|--------------|-----------------|-----|---------------|------------------------------|------------------------------------------------|---------|-------|--------------|
|              |                 |     |               |                              |                                                | 64pin   | 80pin | 100pin /Chip |
| P12          | P12             | I/O | Hi-Z          | ✓                            | I/O port                                       | ✓       | ✓     | ✓            |
|              | UPMUX           | I/O |               |                              | User-selected I/O (universal port multiplexer) | ✓       | ✓     | ✓            |
|              | REF1            | I/O |               |                              | R/F converter Ch.1 reference oscillator pin    | ✓       | ✓     | ✓            |
| P13          | P13             | I/O | Hi-Z          | ✓                            | I/O port                                       | ✓       | ✓     | ✓            |
|              | UPMUX           | I/O |               |                              | User-selected I/O (universal port multiplexer) | ✓       | ✓     | ✓            |
|              | RFIN1           | O   |               |                              | R/F converter Ch.1 oscillation input           | ✓       | ✓     | ✓            |
| P14          | P14             | I/O | Hi-Z          | ✓                            | I/O port                                       | ✓       | ✓     | ✓            |
|              | #BZOUT          | O   |               |                              | Sound generator inverted output                | ✓       | ✓     | ✓            |
|              | UPMUX           | I/O |               |                              | User-selected I/O (universal port multiplexer) | ✓       | ✓     | ✓            |
| P15          | P15             | I/O | Hi-Z          | ✓                            | I/O port                                       | ✓       | ✓     | ✓            |
|              | BZOUT           | O   |               |                              | Sound generator output                         | ✓       | ✓     | ✓            |
|              | UPMUX           | I/O |               |                              | User-selected I/O (universal port multiplexer) | ✓       | ✓     | ✓            |
| P16          | P16             | I/O | Hi-Z          | ✓                            | I/O port                                       | ✓       | ✓     | ✓            |
|              | UPMUX           | I/O |               |                              | User-selected I/O (universal port multiplexer) | ✓       | ✓     | ✓            |
|              | FOUT            | O   |               |                              | Clock external output                          | ✓       | ✓     | ✓            |
| P17          | P17             | I/O | Hi-Z          | ✓                            | I/O port                                       | ✓       | ✓     | ✓            |
|              | UPMUX           | I/O |               |                              | User-selected I/O (universal port multiplexer) | ✓       | ✓     | ✓            |
|              | EXCL11          | A   |               |                              | 16-bit PWM timer Ch.1 event counter input 1    | ✓       | ✓     | ✓            |
| P20          | P20             | I/O | Hi-Z          | ✓                            | I/O port                                       | ✓       | ✓     | ✓            |
|              | UPMUX           | I/O |               |                              | User-selected I/O (universal port multiplexer) | ✓       | ✓     | ✓            |
|              | SENB2           | I/O |               |                              | R/F converter Ch.2 sensor B oscillator pin     | ✓       | ✓     | ✓            |
|              | SEG23           | A   |               |                              | LCD segment output                             | ✓       | ✓     | ✓            |
| P21          | P21             | I/O | Hi-Z          | ✓                            | I/O port                                       | ✓       | ✓     | ✓            |
|              | UPMUX           | I/O |               |                              | User-selected I/O (universal port multiplexer) | ✓       | ✓     | ✓            |
|              | SENA2           | I/O |               |                              | R/F converter Ch.2 sensor A oscillator pin     | ✓       | ✓     | ✓            |
|              | SEG22           | A   |               |                              | LCD segment output                             | ✓       | ✓     | ✓            |
| P22          | P22             | I/O | Hi-Z          | ✓                            | I/O port                                       | ✓       | ✓     | ✓            |
|              | UPMUX           | I/O |               |                              | User-selected I/O (universal port multiplexer) | ✓       | ✓     | ✓            |
|              | REF2            | I/O |               |                              | R/F converter Ch.2 reference oscillator pin    | ✓       | ✓     | ✓            |
|              | SEG21           | A   |               |                              | LCD segment output                             | ✓       | ✓     | ✓            |
| P23          | P23             | I/O | Hi-Z          | ✓                            | I/O port                                       | ✓       | ✓     | ✓            |
|              | UPMUX           | I/O |               |                              | User-selected I/O (universal port multiplexer) | ✓       | ✓     | ✓            |
|              | RFIN2           | I/O |               |                              | R/F converter Ch.2 oscillation input           | ✓       | ✓     | ✓            |
|              | SEG20           | A   |               |                              | LCD segment output                             | ✓       | ✓     | ✓            |
| P24          | P24             | I/O | Hi-Z          | ✓                            | I/O port                                       | ✓       | ✓     | ✓            |
|              | UPMUX           | I/O |               |                              | User-selected I/O (universal port multiplexer) | ✓       | ✓     | ✓            |
|              | SENB3           | I/O |               |                              | R/F converter Ch.3 sensor B oscillator pin     | ✓       | ✓     | ✓            |
|              | SEG19           | A   |               |                              | LCD segment output                             | ✓       | ✓     | ✓            |
| P25          | P25             | I/O | Hi-Z          | ✓                            | I/O port                                       | ✓       | ✓     | ✓            |
|              | UPMUX           | I/O |               |                              | User-selected I/O (universal port multiplexer) | ✓       | ✓     | ✓            |
|              | SENA3           | I/O |               |                              | R/F converter Ch.3 sensor A oscillator pin     | ✓       | ✓     | ✓            |
|              | SEG18           | A   |               |                              | LCD segment output                             | ✓       | ✓     | ✓            |
| P26          | P26             | I/O | Hi-Z          | ✓                            | I/O port                                       | ✓       | ✓     | ✓            |
|              | UPMUX           | I/O |               |                              | User-selected I/O (universal port multiplexer) | ✓       | ✓     | ✓            |
|              | REF3            | A   |               |                              | R/F converter Ch.3 reference oscillator pin    | ✓       | ✓     | ✓            |
|              | SEG17           | A   |               |                              | LCD segment output                             | ✓       | ✓     | ✓            |
| P27          | P27             | I/O | Hi-Z          | ✓                            | I/O port                                       | ✓       | ✓     | ✓            |
|              | UPMUX           | I/O |               |                              | User-selected I/O (universal port multiplexer) | ✓       | ✓     | ✓            |
|              | RFIN3           | I/O |               |                              | R/F converter Ch.3 oscillation input           | ✓       | ✓     | ✓            |
|              | SEG16           | A   |               |                              | LCD segment output                             | ✓       | ✓     | ✓            |

# S1C17W15

| Pin/pad name | Assigned signal | I/O | Initial state | Tolerant fail-safe structure | Function                                      | Package |       |              |
|--------------|-----------------|-----|---------------|------------------------------|-----------------------------------------------|---------|-------|--------------|
|              |                 |     |               |                              |                                               | 64pin   | 80pin | 100pin /Chip |
| P30          | P30             | I/O | Hi-Z          | ✓                            | I/O port                                      | ✓       | ✓     | ✓            |
| P31          | P31             | I/O | Hi-Z          | ✓                            | I/O port                                      | ✓       | ✓     | ✓            |
| P32          | P32             | I/O | Hi-Z          | ✓                            | I/O port                                      | ✓       | ✓     | ✓            |
| P33          | P33             | I/O | Hi-Z          | ✓                            | I/O port                                      | ✓       | ✓     | ✓            |
| P34          | P34             | I/O | Hi-Z          | ✓                            | I/O port                                      | ✓       | ✓     | ✓            |
| P35          | P35             | I/O | Hi-Z          | ✓                            | I/O port                                      | ✓       | ✓     | ✓            |
| P36          | P36             | I/O | Hi-Z          | ✓                            | I/O port                                      | ✓       | ✓     | ✓            |
| P37          | P37             | 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            | I/O | O(H)          | ✓                            | On-chip debugger clock output                 | ✓       | ✓     | ✓            |
|              | PD2             | O   |               |                              | Output port                                   | ✓       | ✓     | ✓            |
| PD3          | PD3             | I/O | Hi-Z          | -                            | I/O port                                      | ✓       | ✓     | ✓            |
|              | EXOSC           | I   |               |                              | Clock generator external clock input          | ✓       | ✓     | ✓            |
|              | EXCL00          | I   |               |                              | 16-bit PWM timer Ch.0 event counter input 0   | ✓       | ✓     | ✓            |
|              | 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                            | ✓       | ✓     | ✓            |
| SEG4-15      | SEG4-15         | A   | Hi-Z          | -                            | LCD segment output                            | ✓       | ✓     | ✓            |
| SEG24-27     | SEG24-27        | A   | Hi-Z          | -                            | LCD segment output                            | -       | ✓     | ✓            |
| SEG28-29     | SEG28-29        | A   | Hi-Z          | -                            | LCD segment output                            | -       | -     | ✓            |
| SEG30-33     | SEG30-33        | A   | Hi-Z          | -                            | LCD segment output                            | -       | ✓     | ✓            |
| EXSVD        | EXSVD           | A   | A (I)         | -                            | External power supply voltage detection input | ✓       | ✓     | ✓            |

**Note:** In the peripheral circuit descriptions, the assigned signal name is used as the pin name.

## 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   | <i>n</i> =0             | SPIA Ch. <i>n</i> data input                 |
|                                     | SDOn                                  | O   |                         | SPIA Ch. <i>n</i> data output                |
|                                     | SPICLK <sub>n</sub>                   | I/O |                         | SPIA Ch. <i>n</i> clock input/output         |
|                                     | #SPISS <sub>n</sub>                   | I   |                         | SPIA Ch. <i>n</i> slave-select input         |
| I <sup>2</sup> C (I2C)              | SCL <sub>n</sub>                      | I/O | <i>n</i> =0             | I2C Ch. <i>n</i> clock input/output          |
|                                     | SDA <sub>n</sub>                      | I/O |                         | I2C Ch. <i>n</i> data input/output           |
| UART (UART)                         | USIN <sub>n</sub>                     | I   | <i>n</i> =0,1           | UART Ch. <i>n</i> data input                 |
|                                     | USOUT <sub>n</sub>                    | O   |                         | UART Ch. <i>n</i> data output                |
| 16-bit PWM timer (T16B)             | TOUT <sub>n0</sub> /CAP <sub>n0</sub> | I/O | <i>n</i> =0,1           | T16B Ch. <i>n</i> PWM output/capture input 0 |
|                                     | TOUT <sub>n1</sub> /CAP <sub>n1</sub> | I/O |                         | 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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**SEIKO EPSON CORPORATION****MICRODEVICES OPERATIONS DIVISION****IC Sales & Marketing Department**

421-8 Hino, Hino-shi, Tokyo 191-8501, JAPAN

Phone: +81-42-587-5814 FAX: +81-42-587-5117

EPSON semiconductor website

[http://www.epson.jp/device/semicon\\_e/](http://www.epson.jp/device/semicon_e/)

Document code:412533401  
First issue Mar, 2013 in Japan  
Revised Oct, 2013 in Japan