

# S1C60N16

## 4-bit Single Chip Microcomputer

- S1C6200B Core CPU
- Low Voltage and Low Power
- Built-in LCD Driver
- Built-in SVD (Supply Voltage Detector)

### ■ DESCRIPTION

The S1C60N16 Series is a single-chip microcomputer made up of the 4-bit core CPU S1C6200C, ROM (4,096 words × 12 bits), RAM (256 words × 4 bits), LCD driver, analog comparator, event counter, watchdog timer, and two types of time base counter. Because of its low-voltage operation and low power consumption, this series is ideal for a wide range of battery-driven applications. It is especially suitable for various controller applications such as a clock, game and pager.

### ■ CONFIGURATION

The S1C60N16 Series is configured as follows, depending on supply voltage and oscillation circuits.

| Model               | S1C60N16                     | S1C60L16 | S1C60A16                      |
|---------------------|------------------------------|----------|-------------------------------|
| Supply voltage      | 3.0V                         | 1.5V     | 3.0V                          |
| Oscillation circuit | OSC1 only<br>(Single clock)  |          | OSC1 and OSC3<br>(Twin clock) |
| LCD power supply    | Supports<br>3.0 V LCD panels |          |                               |

### ■ FEATURES

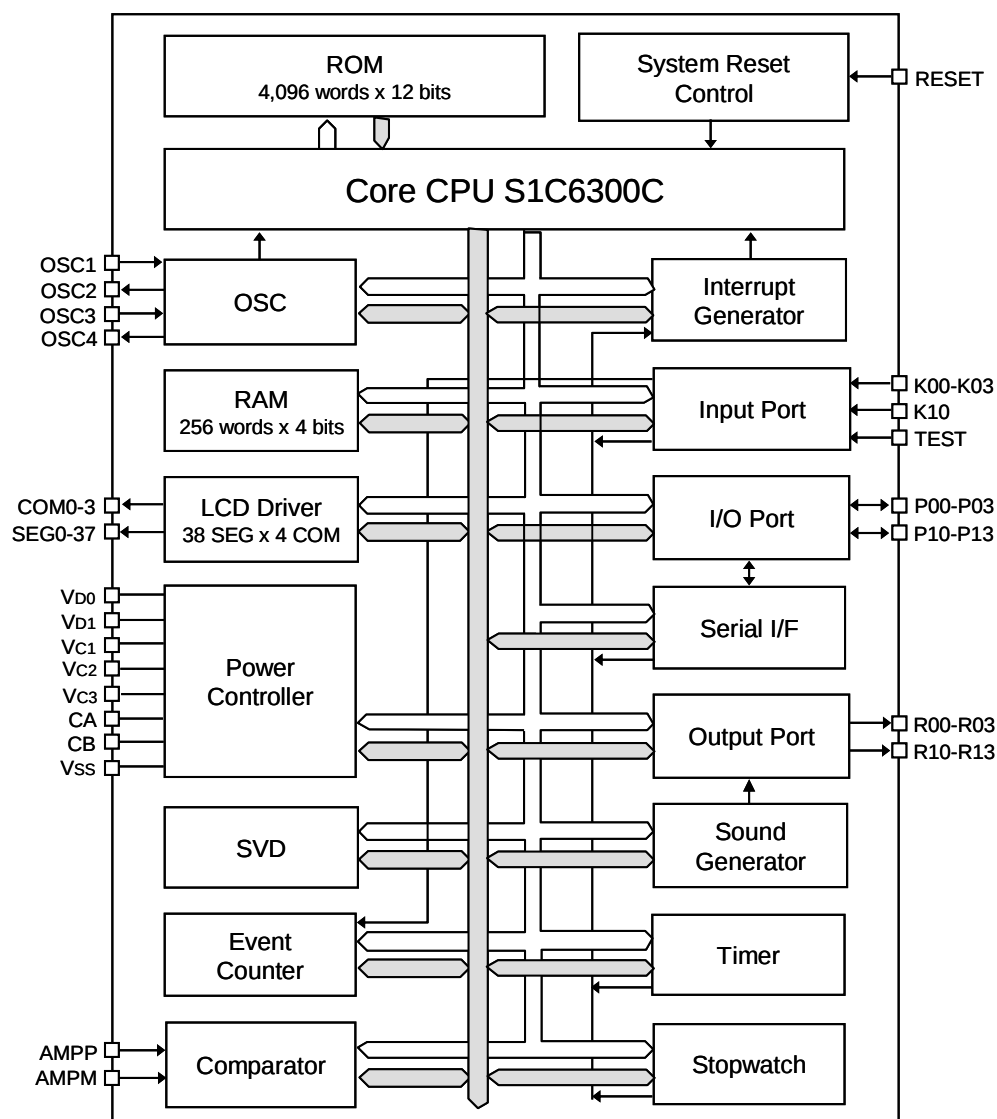
The main features of the S1C60N16/L16/A16 are listed below.

| Model                                                                                              | S1C60N16                                                                                                                                   | S1C60L16       | S1C60A16                                                                 |
|----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|----------------|--------------------------------------------------------------------------|
| OSC1 oscillation circuit                                                                           | Crystal oscillation circuit 32.768 kHz (Typ.)                                                                                              |                |                                                                          |
| OSC3 oscillation circuit                                                                           | —                                                                                                                                          |                | CR or ceramic oscillation circuit (selected by mask option) 1 MHz (Typ.) |
| Instruction set                                                                                    | 108 types                                                                                                                                  |                |                                                                          |
| Instruction execution time<br>(differs depending on instruction)<br>(CLK: CPU operation frequency) | 153μsec, 214μsec, 366μsec (CLK=32.768kHz)                                                                                                  |                |                                                                          |
|                                                                                                    | —                                                                                                                                          |                | 5μsec, 7μsec, 12μsec<br>(CLK=1MHz)                                       |
| ROM capacity                                                                                       | 4,096 words × 12 bits                                                                                                                      |                |                                                                          |
| RAM capacity                                                                                       | 256 words × 4 bits                                                                                                                         |                |                                                                          |
| Input ports                                                                                        | 5 bits (pull-down resistor can be added by mask option)                                                                                    |                |                                                                          |
| Output ports                                                                                       | 8 bits (BZ, BZ, FOUT and SIOF outputs are available by mask option)                                                                        |                |                                                                          |
| I/O ports                                                                                          | 8 bits (pull-down resistor is added during input data read-out)<br>(3 bits can be configured as serial I/O ports by mask option)           |                |                                                                          |
| Serial interface                                                                                   | 1 port (8-bit clock synchronous system)                                                                                                    |                |                                                                          |
| LCD driver                                                                                         | 38 segments × 4, 3, or 2 commons (selected by mask option)<br>V-3 V 1/4, 1/3 or 1/2 duty (voltage regulator and booster circuits built-in) |                |                                                                          |
| Time base counter                                                                                  | Two types (timer and stopwatch)                                                                                                            |                |                                                                          |
| Watchdog timer                                                                                     | Built-in (can be disabled by mask option)                                                                                                  |                |                                                                          |
| Event counter                                                                                      | Two 8-bit inputs (dial input evaluation or independent)                                                                                    |                |                                                                          |
| Sound generator                                                                                    | Programmable in 8 sounds (8 frequencies)<br>Digital envelope built-in (can be disabled by mask option)                                     |                |                                                                          |
| Analog comparator                                                                                  | Inverted input × 1, non-inverted input × 1                                                                                                 |                |                                                                          |
| Supply voltage detection (SVD)                                                                     | 2.2V                                                                                                                                       | 1.2V           | 2.2V                                                                     |
| Heavy load protection function                                                                     | Not implemented                                                                                                                            |                | Implemented                                                              |
| External interrupt                                                                                 | Input interrupt: 2 systems                                                                                                                 |                |                                                                          |
| Internal interrupt                                                                                 | Time base counter interrupt: 2 systems<br>Serial interface interrupt: 1 system                                                             |                |                                                                          |
| Supply voltage                                                                                     | 3.0V(2.2~3.6V)                                                                                                                             | 1.5V(1.2~1.8V) | 3.0V(2.2~3.6V)                                                           |
| Current                                                                                            | CLK=32.768kHz<br>0.7μA                                                                                                                     | 0.7μA          | 1.5μA                                                                    |

# S1C60N16

|                             |                                          |                     |       |                                  |
|-----------------------------|------------------------------------------|---------------------|-------|----------------------------------|
| consumption<br>(Typ. value) | (when halted)                            |                     |       | (Normal operation mode)          |
|                             | CLK=32.768kHz<br>(when executed)         | 1.4μA               | 1.4μA | 2.4μA<br>(Normal operation mode) |
|                             | CLK=1MHz<br>(ceramic)<br>(when executed) | —                   | —     | 50μA<br>(Normal operation mode)  |
|                             | CLK=1MHz(CR)<br>(when executed)          | —                   | —     | 85μA<br>(Normal operation mode)  |
| Form when shipped           |                                          | QFP14-80pin or chip |       |                                  |

## ■ BLOCK DIAGRAM



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