Low Power 16-bit Single Chip Microcontroller

- Low Power MCU (operating voltage 1.8 V, 0.6 μA/SLEEP, 2.0 μA/HALT)
- Flash memory (32KByte), 8.2MHz high speed operating at 1.8V power voltage
- LCD driver: max 128 segment, 16seg x 8com or 20seg x 4com
- Analog I/F: A/D converter (INL/DNL Max. 1.5LSB), R/F converter
- S1C17 High Performance 16-bit RISC CPU Core with C Optimized Compact Code and Serial ICE Support

## DESCRIPTIONS

The S1C17601 is a 16-bit MCU featuring high-speed low-power operations, compact dimensions, wide address space and on-chip ICE. A/D converter and R/F converter are built in and sensor of various analog I/F can be connected. It is suitable for the application of health care product, sports watch and meter module etc. with sensor that is required a small size and micro display in the battery driven.

## FEATURES

- **CPU**
  - Epson original 16-bit RISC CPU core S1C17
  - 16 bit x 16 bit + 32 bit product-sum operation, 16 bit ÷ 16 bit division arithmetic unit
- **IOSC oscillator circuit**
  - 2.7 MHz (typ.)
  - Oscillating start up 5 μs (max.)
  - Boot Clock (External components not required.)
- **OSC3 oscillator circuit**
  - Crystal oscillator circuit or ceramic oscillator circuit, 8.2 MHz (max.) or external clock input
- **OSC1 oscillator circuit**
  - Crystal oscillator circuit 32.768 kHz (typ.)
- **Internal flash memory**
  - 32 Kbytes (for both instructions and data)
  - Allows 1,000 rewrites (min.)
  - Read/write protection function
  - Allows on-board rewriting with the ICD Mini (SSU1C17702H) debug tool and self-rewriting via software.
- **Internal RAM**
  - 2 Kbytes
- **Internal Display RAM**
  - 20 bytes
- **A/D Converter**
  - 10 bit resolution 4ch
- **R/F Converter**
  - DC oscillation/AC oscillation/External input 1ch.
- **Input/output port**
  - Max. 24-bit general purpose input/output (shared with peripheral circuit input/output pins)
- **Serial interfaces**
  - SPI (master/slave) 1ch
  - I²C (master) 1ch
  - I²C (slave) 1ch
  - UART (460,800 bps, IrDA1.0 compatible) 1ch
- **Timers**
  - 8-bit timer (T8F) 1ch
  - 16-bit timer (T16) 3ch
  - PWM timer (T16E) 1ch
  - 8-bit OSC1 timer (T8OSC1) 1ch
  - Clock timer (CT) 1ch
  - Stopwatch timer (SWT) 1ch
  - Watchdog timer (WDT) 1ch
- **LCD Driver**
  - 16 SEG x 8 COM or 20 SEG x 4 COM (1/3 bias)
  - Internal booster power supply circuit (16-value programmable contrast)
- **Supply voltage detector**
  - 15-value programmable (1.8 V to 3.2 V)
- **Interrupts**
  - NMI, P Port Input interrupt 3ch.
  - Serial Interface interrupt 4ch.
  - Timer interrupt 9ch.
  - LCD, SVD, ADC, RFC interrupt
- **Power supply voltage**
  - 1.8 V to 3.6 V (for normal operations)
  - 2.7 V to 3.6 V (for flash deletion/programing)
  - Including voltage regulator circuit (with binary programmable operating voltage)
- **Operating temperature**
  - -25°C to 70°C
- **Power consumption**
  - SLEEP mode: 0.6 μA typ. (OSC1=OFF, IOSC=OFF, OSC3=OFF)
HALT mode:  
2.0 μA typ. (OSC1=32 kHz, IOSC=OFF, OSC3=OFF, PCKEN=0x0, LCD OFF)  
2.7 μA typ. (OSC1=32 kHz, IOSC=OFF, OSC3=OFF, PCKEN=0x0, LCD ON (All LCD On, maximum contrast, VC2 standard))  
When operating:  
12 μA typ. (OSC1=32kHz, IOSC=OFF, OSC3=OFF, LCD OFF)  
340 μA typ. (OSC1=OFF, IOSC=OFF, OSC3=1 MHz ceramic oscillator)  

Shipping form:  
- TQFP13-64 package (10 mm x 10 mm body, 0.5 mm pitch)  
- VFBGA8H-81 package (8 mm x 8 mm, body, 0.8 mm pitch)  
- Bare chip 100 μm pitch
Block Diagram

CPU Core S1C17

- Internal RAM (2K bytes)
- Flash memory (32K bytes)
- Test circuit
- Reset circuit
- IO 1 (0x4000-)
- Interrupt controller
- Prescaler
- 8-bit timer
- 16-bit timer
- UART (1ch)
- SPI
- PC master (1ch)
- PC slave (1ch)
- IO port/IO MUX
- Oscillator/Clock generator
- 8-bit OSC1 PWM timer
- Clock timer
- Stop watch timer
- Watchdog timer
- 16-bit PWM timer (2ch)

DCLK, DST2, DSIO (P27-25)

- Vdd, Vss, Vo1, Vo2, Vo3, CA-CB, RFIN, REF, SENA, SERXB (P15-12)
- RFCLO (P00)
- AIN0-3, ADTRG (P07-04, P03)
- SEG0-16/19, COM0-7/4
- LFRO (P00)
- OSC1-2, OSC3-4
- FOUT1 (P16), FOUTH (P02), OUT4 (P04)
- OUT5 (P05)
- #SPISS (P22)
- SDA0, SCL0 (P11-10)
- SDA1, SCL1 (P11-10 or P13-14)
- #BFR (P12)

SIN, SOUT (P21-20 or P24-23)
- SCLK (P17)
- SDI, SD0, SERCLK (P21-20, P17)
- #SPBS (P22)

TEST1-3
- #TEST
- #RESET
- EXCL0-2 (P02, P04, P05)

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