S1C17651

EPSON
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16-bit Single Chip Microcontroller

- 16KB MTP ROM(Three times): Read/program protection function, 2KB RAM
  *A programming power supply (V_{PP}) is required.
- Generates the operating clocks with the built-in oscillators.
  - OSC3B oscillator circuit: 2 MHz/1 MHz/500 kHz (typ.) internal oscillator circuit
  - OSC3A oscillator circuit: 4.2 MHz (max.) crystal or ceramic oscillator circuit
  - OSC1B oscillator circuit: 32 kHz (typ.) internal oscillator circuit
  - OSC1A oscillator circuit: 32.768 kHz (typ.) crystal oscillator circuit
- LCD driver Number of driver outputs: 20Seg. x 4Com.
- Shipping form: TQFP13-64PIN(10 × 10 × 1mm), Die
- RISC CPU core S1C17: the compact code optimized for C, and high throughput of an instruction/clock, supports serial ICE

■DESCRIPTIONS

The S1C17651 is suitable for battery driven applications with up to 80-seg LCD, such as OTP (One Time Password) products, Price TAG, and watches.

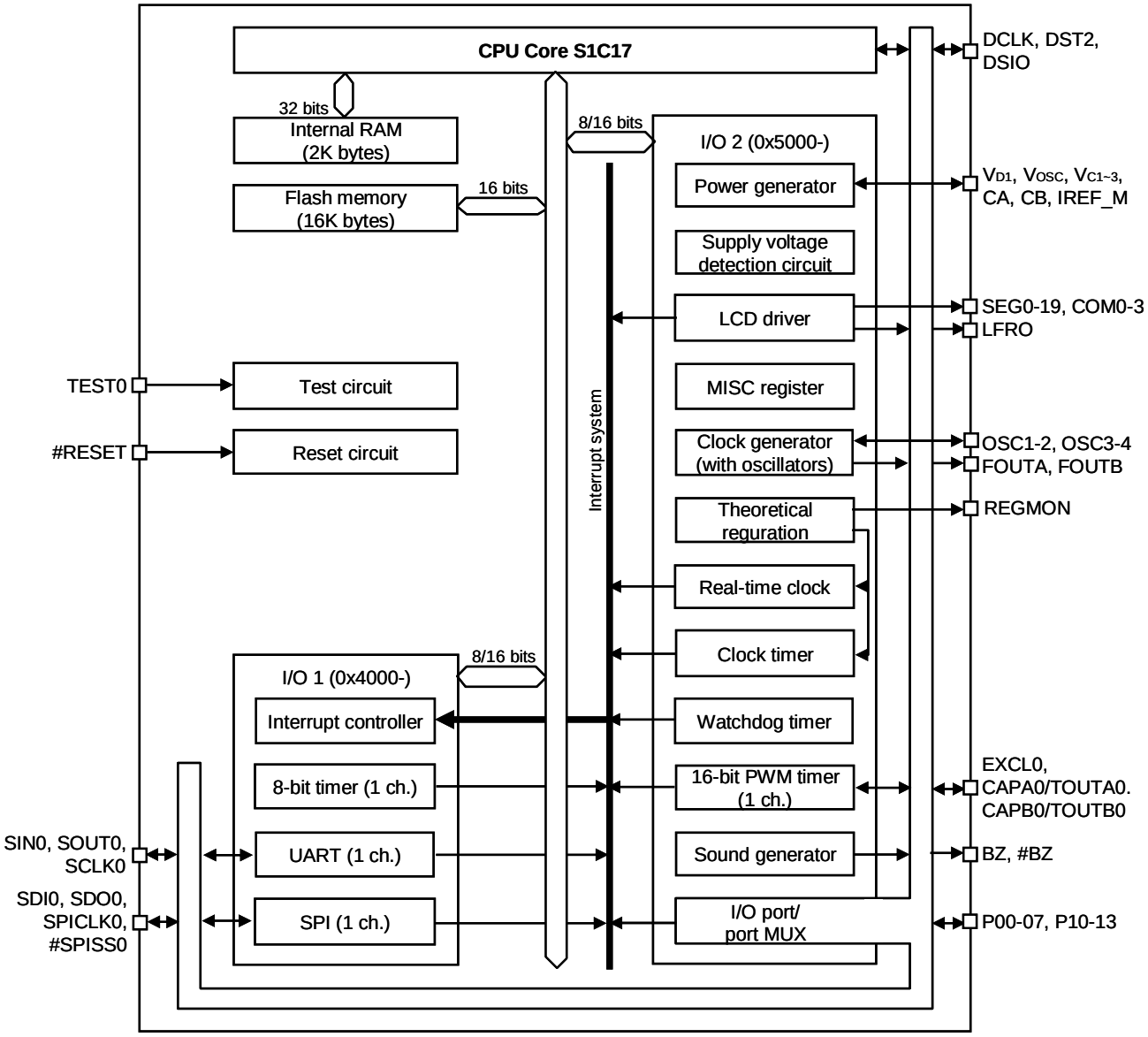
■ FEATURES

The main features of the S1C17651 are listed below.

CPU	
CPU core	Seiko Epson original 16-bit RISC CPU core S1C17
Multiplier/Divider (COPRO)	• 16-bit × 16-bit multiplier • 16-bit × 16-bit + 32-bit multiply and accumulation unit • 16-bit ÷ 16-bit divider
Embedded Flash memory	
Capacity	16K bytes (for both instructions and data)
Erase/program count	Three times
Other	• Read/program protection function • A programming power supply (V_{PP}) is required. • Allows on-board programming using a debugging tool such as ICDmini.
Embedded RAM	
Capacity	2K bytes
Clock generator	
System clock source	System clock source
OSC3B oscillator circuit	2M/1M/500k Hz (typ.) internal oscillator circuit
OSC3A oscillator circuit	4.2 MHz (max.) crystal or ceramic oscillator circuit
OSC1B oscillator circuit	32 kHz (typ.) internal oscillator circuit
OSC1A oscillator circuit	32.768 kHz (typ.) crystal oscillator circuit Oscillation adjustment by theoretical regulation
Other	• Core clock frequency control • Peripheral module clock supply control
LCD driver	
Number of driver outputs	Segment output: 20 pins, Common output: 4 pins
Other	• Includes a power supply voltage booster/reducer. • Includes a display data memory.
I/O ports	
Number of general-purpose I/O ports	Max. 12 bits (Pins are shared with the peripheral I/O.)
Other	• Schmitt input • Pull-up control function • Port input interrupt: 8 bits
Serial interfaces	
SPI	1 channel
UART	1 channel (IrDA1.0 supported)
Timers/Counters	
8-bit timer (T8)	1 channel (Generates the SPI clock.)
16-bit PWM timer (T16A2)	1 channel (PWM output, event counter, and count capture functions)
Watchdog timer (WDT)	1 channel (Generates NMI/reset.)
Clock functions	

Real-time clock (RTC)	1 channel (Hour, minute, and second counters) with theoretical regulation support
Clock timer (CT)	1 channel (128 Hz to 1 Hz counters) with theoretical regulation support
Theoretical regulation function (TR)	Time adjustment function in +16/32768 to -15/32768 second units
Sound generator	
Buzzer frequency	8 frequencies selectable
Volume control	8 steps adjustable
Other	• One-shot buzzer • Auto envelope function
Analog circuits	
Supply voltage detection circuit (SVD)	1 channel (Detection voltage: 13 levels)
Interrupts	
Reset interrupt	#RESET pin/watchdog timer
NMI	Watchdog timer
Programmable interrupts	8 systems (8 levels)
Power supply voltage	
Operating voltage (V_{DD})	2.0 V to 3.6 V
Flash programming/erasing voltage (V_{PP})	7V/7.5V
Operating temperature	
Operating temperature range	-40°C to 85°C
Current consumption (Typ value, V_{DD} = 2.0 V to 3.6 V)	
SLEEP state	90 nA (OSC1 = Off, RTC = Off, OSC3B = Off, OSC3A = Off)
HALT state	0.42 µA (OSC1 = 32 kHz (OSC1A), RTC = Off, OSC3B = Off, OSC3A = Off) 0.42 µA (OSC1 = 32 kHz (OSC1A), RTC = On, OSC3B = Off, OSC3A = Off)
Run state	10 µA (OSC1 = 32 kHz (OSC1A), RTC = Off, OSC3B = Off, OSC3A = Off) 1200 µA (OSC1 = Off, RTC = Off, OSC3B = Off, OSC3A = 4 MHz ceramic) 650 µA (OSC1 = Off, RTC = Off, OSC3B = 2 MHz, OSC3A = Off)
Shipping form	
1	TQFP13-64pin (10 mm × 10 mm × 1 mm, lead pitch: 0.5 mm)
2	Die

■ BLOCK DIAGRAM



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Document code:412274600
First issue Dec, 2012 in Japan