S1C17706

EPSON
EXCEED YOUR VISION

Low Power 16-bit Single Chip Microcontroller

- Low power MCU : lower operating voltage 1.8V, TBDuA/SLEEP, TBDuA/HALT
- Large capacity flash memory: 1MByte, font data available
- LCD driver: 160 SEG x 32 COM (max.), pseudo 64 SEG x 64 COM display support by 64com emulation mode, 4 level gray-scale, SEG outputs n-line AC reverse drive, COM outputs partial drive
- Analog I/F: A/D converter, R/F converter(for temperature and humidity instruments), Supply Voltage Detector(intermittent operation mode, supply voltage detection RESET function)
- RISC CPU core S1C17: the compact code optimized for C, and high throughput of an instruction/clock, supports serial ICE

■ DESCRIPTIONS

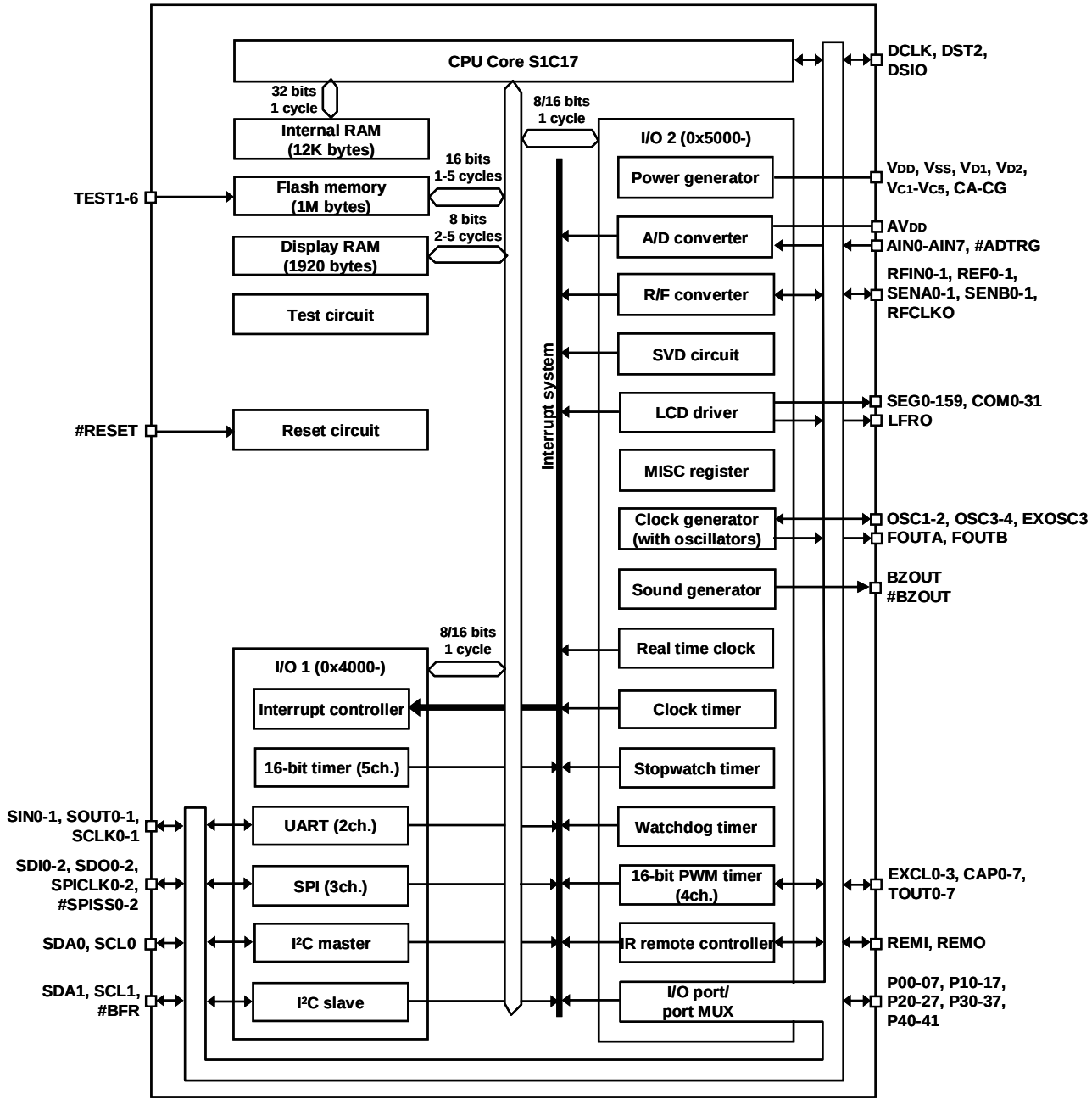
The S1C17706 is a 16-bit MCU featuring high-speed low-power operations, compact dimensions, wide address space, and on-chip ICE. Based on an S1C17 CPU core, this product consists of 1024K bytes of Flash memory, 12K bytes of RAM, serial interface modules supporting sensors such as UART to support high-bit rate and IrDA1.0, SPI, and I2C, various timers, 34 general input/output ports, maximum 160 segment × 32 common LCD driver and a power supply voltage booster circuit, A/D converter, R/F converter, supply voltage detector, and 32 kHz and maximum 8.2 MHz oscillator circuits. The embedded Flash memory can include font data, such as 11 × 12-dot Japanese characters (JIS level-1, JIS level-2 and other kanji fonts), Hangul characters and user defined characters.
It allows 8.2 MHz high-speed operation at a minimum of 1.8 V operating voltage, and executes a basic instruction in one clock cycle with 16-bit RISC processing. The S1C17706 also includes a coprocessor supporting multiplication, division, and MAC (multiply and accumulation) operations.
The on-chip ICE function allows onboard Flash programming/erasing, program debugging, and evaluations using the ICDmini (S5U1C17001H) that can be connected with three signal wires.
The S1C17706 is ideal for applications, such as remote controllers, health care products, and sports watches, that must be driven with battery power and require sensor interfaces and a high-definition LCD display.

■ FEATURES

CPU	• 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	
On-chip Flash memory	• 1M bytes (for both instructions and data)	
	• 1,000 erase/program cycles (min.)	
	• Read/program protection function	
	• Allows on-board programming using a debugging tool such as ICDmini (S5U1C17001H) and self-programming by software control.	
	• Allows storing 11 × 12-dot font data.	
On-chip RAM	• 12K bytes	
On-chip display RAM	• Display data: 960 bytes / Gray-scale data: 960 bytes	
Clock generator	• Three types of built-in oscillators (system clock sources)	
	- IOSC oscillator circuit 2.7 MHz (typ.)	
	- OSC3 oscillator circuit 8.2 MHz (max.) crystal or ceramic oscillator circuit Supports an external clock input	
	- OSC1 oscillator circuit 32.768 kHz (typ.) crystal oscillator circuit	
	• Core clock frequency control	
	• Peripheral module clock supply control	
	• IOSC control for quick-restart processing from SLEEP mode	
I/O ports	• Max. 34 general-purpose I/O ports (Pins are shared with the peripheral I/O.)	
Serial interfaces	• SPI 3 channels	
	• I2C master (I2CM)	1 channel
	• I2C slave (I2CS)	1 channel
	• UART (115200 bps, IrDA 1.0)	2 channels
	• IR remote controller (REMC)	1 channel
Timers	• 16-bit timer (T16)	5 channels
	• 16-bit PWM timer (T16A2)	4 channels
	• Clock timer (CT)	1 channel

	• Stopwatch timer (SWT) 1 channel
	• Watchdog timer (WDT) 1 channel
Real-time clock	• Year(with bissextile correction) / month / week / day / hour / minute / second counter, 30sec time correction, 1ch
Sound generator	• Tones 8 level, Sound volumes 8 level, digital envelop, 1ch
LCD driver	• 160 SEG × 32 COM (1/5 bias)
	• 64 COM emulation display mode
	• Built-in voltage booster
	• 4-level gray-scale
	• SEG outputs n-line AC reverse drive
	• COM outputs partial drive
A/D converter	• Successive approximation type
	• Eight analog input channels (max.)
	• 10-bit resolution
R/F converter	• Two channels, CR oscillation type
	• 24-bit counter
	• Supports DC-bias resistive/capacitive sensors and AC-bias resistive sensors.
	• Supports external input for counting pulses.
Supply voltage detector (SVD)	• 15 programmable detection levels (1.8 V to 3.2 V)
	• Intermittent operation mode
	• Supply voltage detection RESET function
Interrupts	• Reset
	• NMI
	• 27 programmable interrupts (eight levels)
Power supply voltage	• 1.8 V to 3.6 V (for normal operation)
	• 2.5 V to 3.6 V (for Flash erasing/programming)
	• Built-in voltage regulator (two operating voltages switchable)
Operating temperature	• -25°C to 70°C
Current consumption	• SLEEP state: 1.2 µA typ. (OSC1: Off, IOSC: Off, OSC3: Off)
	• HALT state: 2.7 µA typ. (OSC1: 32 kHz, IOSC: Off, OSC3: Off, LCD: Off)
	9.7 µA typ. (OSC1: 32 kHz, IOSC: Off, OSC3: Off, LCD On all on)
	• Run state: 18 µA typ. (OSC1: 32 kHz, IOSC: Off, OSC3: Off, LCD Off)
	557 µA typ. (OSC1: Off, IOSC: Off, OSC3: 1 MHz ceramic, LCD On all on)
Shipping form	• QFP22-256pin package (28 mm × 28 mm, lead pitch: 0.4 mm)
	• Die form (pad pitch: 80 µm)

■ BLOCK DIAGRAM



NOTICE:

No part of this material may be reproduced or duplicated in any form or by any means without the written permission of Seiko Epson. Seiko Epson reserves the right to make changes to this material without notice. Seiko Epson does not assume any liability of any kind arising out of any inaccuracies contained in this material or due to its application or use in any product or circuit and, further, there is no representation that this material is applicable to products requiring high level reliability, such as, medical products. Moreover, no license to any intellectual property rights is granted by implication or otherwise, and there is no representation or warranty that anything made in accordance with this material will be free from any patent or copyright infringement of a third party. This material or portions thereof may contain technology or the subject relating to strategic products under the control of the Foreign Exchange and Foreign Trade Law of Japan and may require an export license from the Ministry of Economy, Trade and Industry or other approval from another government agency.

All brands or product names mentioned herein are trademarks and/or registered trademarks of their respective companies.

©Seiko Epson Corporation 2011, All rights reserved

SEIKO EPSON CORPORATION

MICRODEVICES OPERATIONS DIVISION

EPSON semiconductor website

http://www.epson.jp/device/semicon_e/

Device Sales & Marketing Department
421-8 Hino, Hino-shi, Tokyo 191-8501, JAPAN
Phone: +81-42-587-5814 FAX: +81-42-587-5117

Document code: 411828501
First issue March, 2011 in Japan