

S1C17705/703

EPSON
EXCEED YOUR VISION

Low Power 16-bit Single Chip Microcontroller

- Low power MCU : lower operating voltage 1.8V, 1.2 μ A/SLEEP, 2.7 μ A/HALT *
- Large capacity flash memory: 512K bytes*
- LCD driver: 128 SEG x 32 COM (max.)*, pseudo 64 SEG x 64 COM* display support by 64 COM emulation mode
- Analog I/F: A/D converter, R/F converter(for temperature and humidity instruments), Supply Voltage Detector
- RISC CPU core S1C17: the compact code optimized for C-language, and high throughput of an instruction/clock, supports serial ICE

* For S1C17705

■ DESCRIPTIONS

The S1C17705/703 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 Flash memory, RAM, serial interface modules supporting sensors such as UART to support high-bit rate and IrDA1.0, SPI, and I2C, various timers, maximum 35 general input/output ports, maximum 128 segment \times 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.

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 S1C17705/703 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 S1C17705/703 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

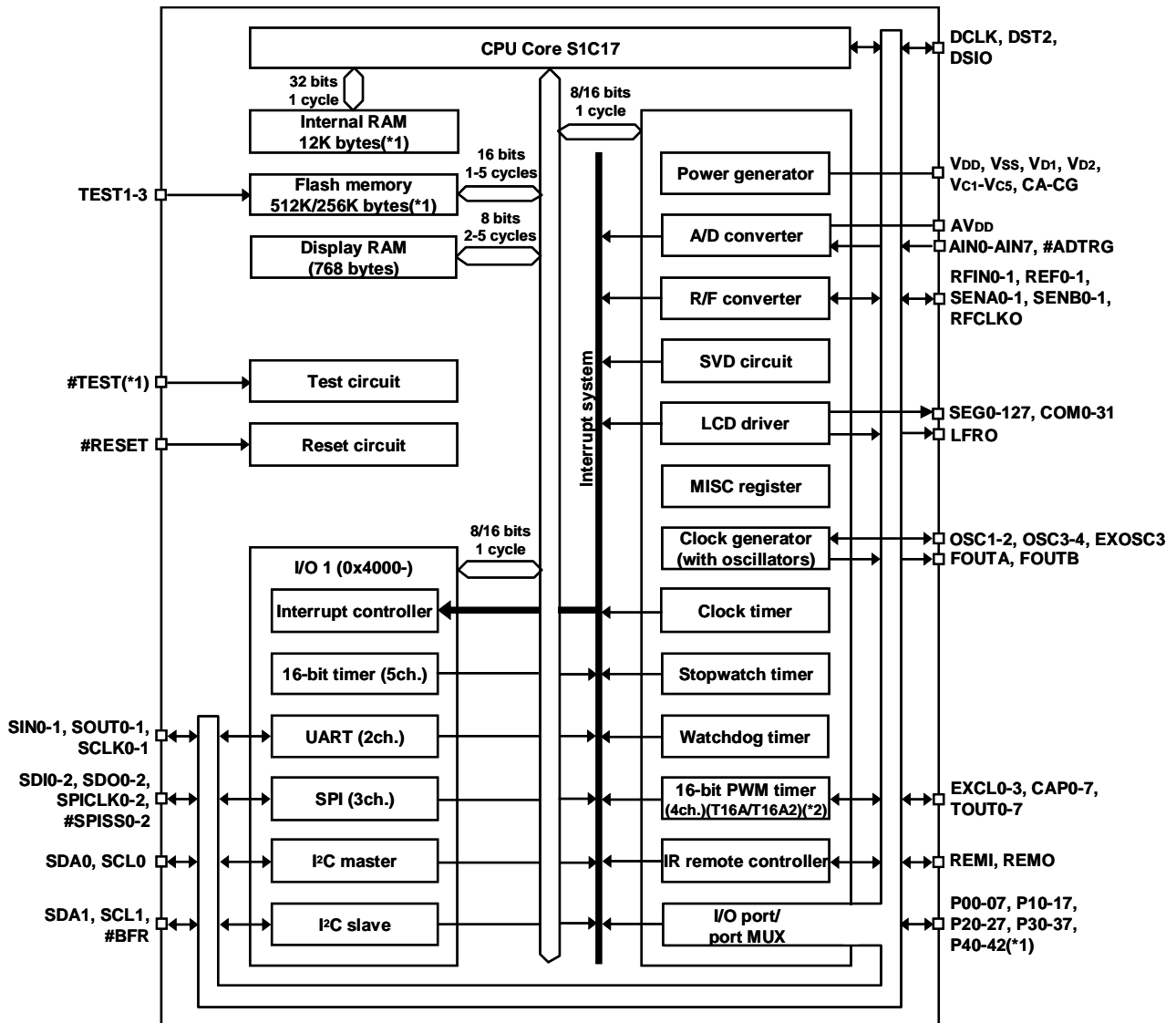
The main features of the S1C17705/703 are listed below.

Model	S1C17705	S1C17703
CPU		
CPU core	Seiko Epson original 16-bit RISC CPU core S1C17	
Multiplier/Divider (COPRO)	• 16-bit \times 16-bit multiplier • 16-bit \times 16-bit + 32-bit multiply and accumulation unit • 16-bit \div 16-bit divider	
Internal Flash memory		
Capacity	512K bytes (for both instructions and data)	256K bytes (for both instructions and data)
Erase/program count	1,000 cycles (min.)	
Other	• Read/program protection function • Allows on-board programming using a debugging tool such as ICDmini (S5U1C17001H) and self-programming by software control.	
Internal RAM		
Capacity	12K bytes	
Internal Display RAM		
Capacity	768 bytes	
Clock generator		
System clock source	3 sources (IOSC/OSC3/OSC1)	
IOSC oscillator circuit	2.7 MHz(typ.) internal oscillator circuit (oscillation start time 5 μ s min.)	
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	
Other	• Core clock frequency control • Peripheral module clock supply control • IOSC control for quick-restart processing from SLEEP mode	
I/O ports		
Number of general-purpose I/O ports	Max. 35 bits	Max. 34 bits
	(Pins are shared with the peripheral I/O.)	
Serial interfaces		
SPI	3 channels	
I ² C master (I2CM)	1 channel	
I ² C slave (I2CS)	1 channel	

S1C17705/703

UART	2 channels (IrDA1.0 supported)	
IR remote controller (REMC)	1 channel	
LCD driver		
LCD outputs	<ul style="list-style-type: none"> • 128 SEG × 32 COM • Supports 64 SEG × 64 COM emulation RAM mapping. 	<ul style="list-style-type: none"> • 120 SEG × 32 COM • Supports 60 SEG × 64 COM emulation RAM mapping.
Other	1/5 bias (built-in power supply voltage booster circuit)	
Timers		
16-bit timer (T16)	5 channels	
16-bit PWM timer (T16A)	4 channels	
16-bit PWM timer (T16A2)		4 channels
Clock timer (CT)	1 channel	
Stopwatch timer (SWT)	1 channel	
Watchdog timer (WDT)	1 channel	
A/D converter		
Conversion method	Successive approximation type	
Number of analog input channels	8 channels (max.)	
Resolution	10 bits	
R/F converter		
Conversion method	CR oscillation type with 24-bit counter	
Number of conversion channels	2 channels (2 sensors can be connected to each channel.)	
Sensor supported	DC-bias resistive/capacitive sensors and AC-bias resistive sensors	
Other	Supports external input for counting pulses.	
Supply voltage detector (SVD)		
Detection levels	15 programmable detection levels (1.8 V to 3.2 V)	
Interrupts		
Reset interrupt	#RESET pin	
NMI	Watchdog timer	
Programmable interrupts	26 systems (8 levels)	
Power supply voltage		
Operating voltage (V_{DD})	<ul style="list-style-type: none"> • 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) 	
Analog voltage (AV_{DD})	$AV_{DD} = V_{DD}$	
Operating temperature		
Operating temperature range	-25°C to 70°C	
Current consumption (Typ. value)		
SLEEP state (OSC1 = Off, IOSC = Off, OSC3 = Off)	1.2μA	1.0μA
HALT state (OSC1 = 32kHz, IOSC = Off, OSC3 = Off, LCD = Off)	2.7μA	2.5μA
HALT state (OSC1 = 32kHz, IOSC = Off, OSC3 = Off, LCD = On)	9.7μA	9.5μA
Run state (OSC1 = 32kHz, IOSC = Off, OSC3 = Off, LCD = Off)	18μA	15μA
Run state (OSC1 = Off, IOSC = Off, OSC3 = 1 MHz ceramic, LCD = Off)	557μA	450μA
A/D converting current	200 μA ($AV_{DD} = 3.6 V$, 100 kHz sampling)	
Shipping form		
1	QFP23-240pin	QFP21-216pin
2	Chip	Chip
3	VFBGA10H-240	
Size/pitch	QFP23-240pin (body size: 32 mm × 32 mm, lead pitch: 0.5 mm) QFP21-216pin (body size: 24 mm × 24 mm, lead pitch: 0.4 mm) VFBGA7H-240 (body size: 10 mm × 10 mm, ball pitch: 0.5 mm) Chip (S1C17705) (pad pitch: 90 μm) Chip (S1C17703) (pad pitch: 80 μm)	

■ BLOCK DIAGRAM



*1: The models have a different memory size, LCD outputs and I/O/test port configurations.

*2: 16-bit PWM timer (T16A) is available in the S1C17705 and 16-bit PWM timer (T16A2) is available in the S1C17703.

Memory/function	S1C17705	S1C17703
Flash memory	512K bytes	256K bytes
SEG/COM output pins (1/16, 1/24, 1/32 duty)	SEG0-SEG127 COM0-COM31	SEG0-SEG119 COM0-COM31
I/O port pins	35 (P00-P42)	34 (P00-P41)
#TEST pin	Available	Unavailable
16-bit PWM timer (T16A)	Available	Unavailable
16-bit PWM timer (T16A2)	Unavailable	Available

S1C17705/703

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 2012, All rights reserved

SEIKO EPSON CORPORATION

MICRODEVICES OPERATIONS DIVISION

EPSON semiconductor website

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

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

Document code: 411677603
First issue April, 2012 in Japan