S1C17705/703

EPSON
EXCEED YOUR VISION

Low Power 16-bit Single Chip Microcontroller

- Low power MCU : lower operating voltage 1.8V, 1.2µA/SLEEP, 2.7µA/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 × 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.

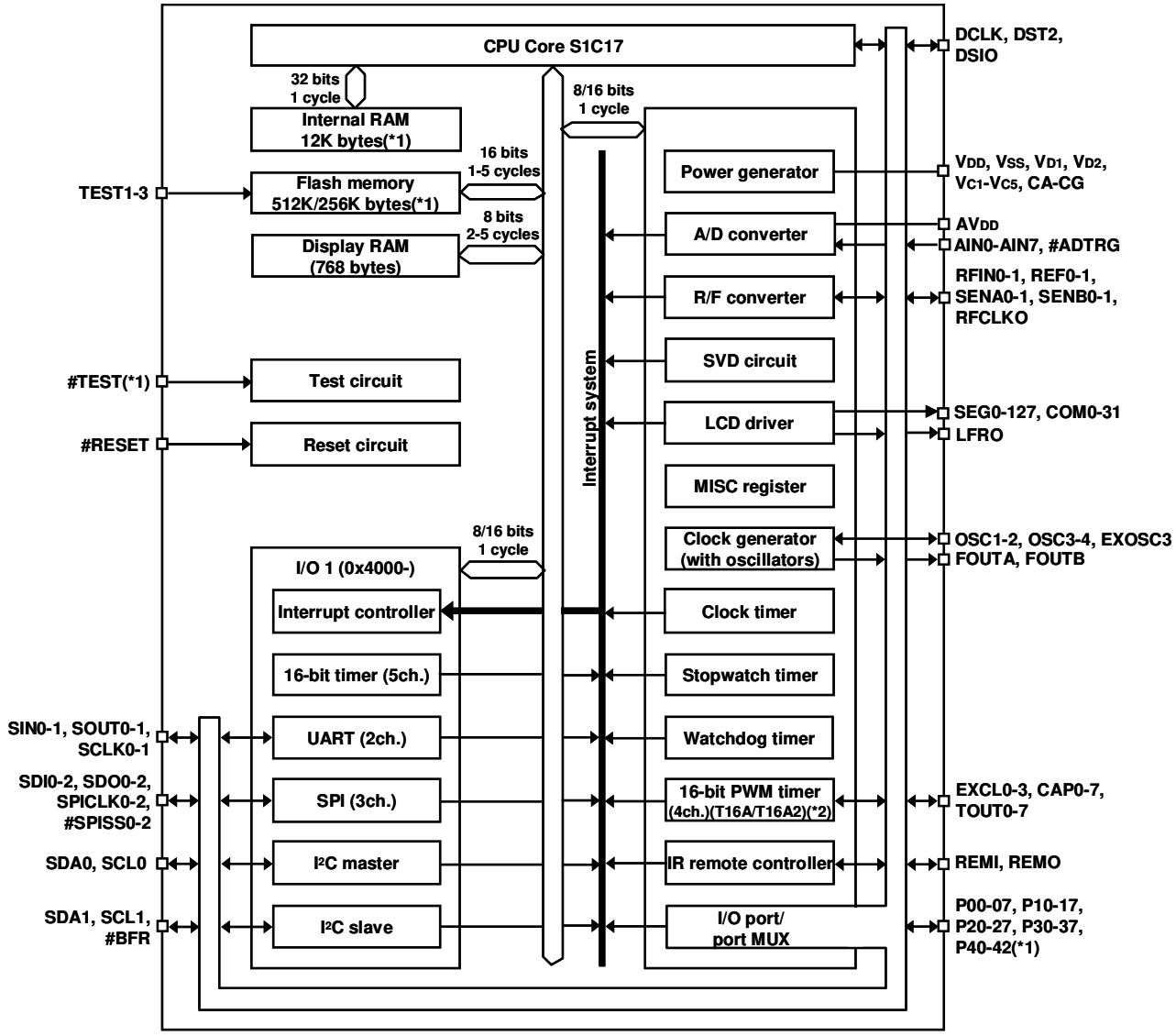
■ FEATURES

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 × 16-bit multiplier • 16-bit × 16-bit + 32-bit multiply and accumulation unit • 16-bit ÷ 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 µs 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 (Pins are shared with the peripheral I/O.)	Max. 34 bits
Serial interfaces		
SPI	3 channels	
I^2C master (I2CM)	1 channel	
I^2C slave (I2CS)	1 channel	

UART	2 channels (IrDA1.0 supported)	
IR remote controller (REMC)	1 channel	
LCD driver		
LCD outputs	• 128 SEG × 32 COM • Supports 64 SEG × 64 COM emulation RAM mapping.	• 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})	• 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 (AVDD = 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

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