S1C17705/703



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

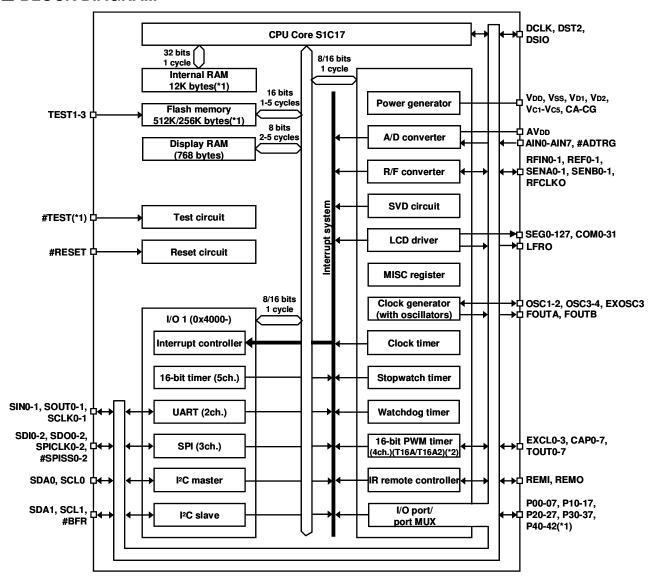
The main features of the S1C17705/703 are listed below.

Model	S1C17705	S1C17703		
CPU				
CPU core	Seiko Epson original 16-bit RISC CF	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	256K bytes		
	(for both instructions and data)	(for both instructions and data)		
Erase/program count		1,000 cycles (min.)		
Other	Read/program protection function			
	 Allows on-board programming usin 	Allows on-board programming using a debugging tool such as ICDmini		
	(S5U1C17001H) and self-programming by software control.			
Internal RAM				
Capacity	12K bytes	12K bytes		
Internal Display RAM				
Capacity	768 bytes	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 proce	IOSC control for quick-restart processing from SLEEP mode		
I/O ports		The same and the s		
Number of general-purpose I/O	Max. 35 bits	Max. 34 bits		
ports	(Pins are shared with the peripheral	(Pins are shared with the peripheral I/O.)		
Serial interfaces				
ŞPI	3 channels			
I ² C master (I2CM)	1 channel	1 11 1		
I ² C slave (I2CS)	1 channel	1 channel		

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	O channels (IrDA1 O curported)		
UART	2 channels (IrDA1.0 supported)		
IR remote controller (REMC)	i channel	1 channel	
LCD driver	100.050	100.050	
LCD outputs	• 128 SEG × 32 COM	• 120 SEG × 32 COM	
	Supports 64 SEG × 64 COM	• Supports 60 SEG × 64 COM	
	emulation RAM mapping.	emulation RAM mapping.	
Other	1/5 bias (built-in power supply voltage bo	poster circuit)	
Timers			
16-bit timer (T16)	5 channels		
16-bit PWM timer (T16A)	4 channels		
16-bit PWM timer (T16A2)	. Gridiniois	4 channels	
Clock timer (CT)	1 channel		
Stopwatch timer (SWT)	1 channel		
Watchdog timer (WDT)			
	1 channel		
A/D converter	10		
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)	Oupports external input for counting pulses.		
Detection levels	15 programmable detection levels (1.8 V	(+o 2 2 \/)	
	15 programmable detection levels (1.6 v	(U 3.2 V)	
Interrupts	L #DEGET :		
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			
	-25°C to 70°C		
Operating temperature range	-25°C to 70°C		
Operating temperature range Current consumption (Typ. value)		1.0uA	
Operating temperature range Current consumption (Typ. value) SLEEP state	-25°C to 70°C 1.2μA	1.0μΑ	
Operating temperature range Current consumption (Typ. value) SLEEP state (OSC1 = Off, IOSC = Off,		1.0μΑ	
Operating temperature range Current consumption (Typ. value) SLEEP state (OSC1 = Off, IOSC = Off, OSC3 = Off)	1.2μΑ	·	
Operating temperature range Current consumption (Typ. value) SLEEP state (OSC1 = Off, IOSC = Off, OSC3 = Off) HALT state		1.0µA 2.5µA	
Operating temperature range Current consumption (Typ. value) SLEEP state (OSC1 = Off, IOSC = Off, OSC3 = Off) HALT state (OSC1 = 32kHz, IOSC = Off,	1.2μΑ	·	
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Operating temperature range Current consumption (Typ. value) SLEEP state (OSC1 = Off, IOSC = Off, OSC3 = Off) HALT state (OSC1 = 32kHz, IOSC = Off, OSC3 = Off, LCD = Off) HALT state (OSC1 = 32kHz, IOSC = Off, OSC3 = Off, LCD = On) Run state (OSC1 = 32kHz, IOSC = Off, OSC3 = Off, LCD = Off)	1.2μA 2.7μA 9.7μA	2.5μA 9.5μA 15μA	
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Operating temperature range Current consumption (Typ. value) SLEEP state (OSC1 = Off, IOSC = Off, OSC3 = Off) HALT state (OSC1 = 32kHz, IOSC = Off, OSC3 = Off, LCD = Off) HALT state (OSC1 = 32kHz, IOSC = Off, OSC3 = Off, LCD = On) Run state (OSC1 = 32kHz, IOSC = Off, OSC3 = Off, LCD = Off) Run state (OSC1 = 32kHz, IOSC = Off, OSC3 = Off, LCD = Off) Run state (OSC1 = Off, IOSC = Off, OSC3 = 1 MHz ceramic,	1.2μA 2.7μA 9.7μA	2.5μA 9.5μA 15μA	
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Operating temperature range Current consumption (Typ. value) SLEEP state (OSC1 = Off, IOSC = Off, OSC3 = Off) HALT state (OSC1 = 32kHz, IOSC = Off, OSC3 = Off, LCD = Off) HALT state (OSC1 = 32kHz, IOSC = Off, OSC3 = Off, LCD = On) Run state (OSC1 = 32kHz, IOSC = Off, OSC3 = Off, LCD = Off) Run state (OSC1 = 32kHz, IOSC = Off, OSC3 = Off, LCD = Off) Run state (OSC1 = Off, IOSC = Off, OSC3 = 1 MHz ceramic, LCD = Off) A/D converting current	1.2μA 2.7μA 9.7μA	2.5μA 9.5μA 15μA 450μA	
Operating temperature range Current consumption (Typ. value) SLEEP state (OSC1 = Off, IOSC = Off, OSC3 = Off) HALT state (OSC1 = 32kHz, IOSC = Off, OSC3 = Off, LCD = Off) HALT state (OSC1 = 32kHz, IOSC = Off, OSC3 = Off, LCD = On) Run state (OSC1 = 32kHz, IOSC = Off, OSC3 = Off, LCD = Off) Run state (OSC1 = 32kHz, IOSC = Off, OSC3 = Off, LCD = Off) Run state (OSC1 = Off, IOSC = Off, OSC3 = 1 MHz ceramic, LCD = Off) A/D converting current Shipping form	1.2μA 2.7μA 9.7μA 18μA 557μA 200 μA (AVDD = 3.6 V, 100 kHz sampling)	2.5μA 9.5μA 15μA 450μA	
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Operating temperature range Current consumption (Typ. value) SLEEP state (OSC1 = Off, IOSC = Off, OSC3 = Off) HALT state (OSC1 = 32kHz, IOSC = Off, OSC3 = Off, LCD = Off) HALT state (OSC1 = 32kHz, IOSC = Off, OSC3 = Off, LCD = On) Run state (OSC1 = 32kHz, IOSC = Off, OSC3 = Off, LCD = Off) Run state (OSC1 = 32kHz, IOSC = Off, OSC3 = Off, LCD = Off) Run state (OSC1 = Off, IOSC = Off, OSC3 = 1 MHz ceramic, LCD = Off) A/D converting current Shipping form 1 2 3	1.2μA 2.7μA 9.7μA 18μA 557μA 200 μA (AVDD = 3.6 V, 100 kHz sampling Chip VFBGA10H-240 (body size: 32 mm × QFP23-240pin (body size: 24 mm × QFP21-216pin (body s	2.5μA 9.5μA 15μA 450μA QFP21-216pin Chip 32 mm, lead pitch: 0.5 mm) 24 mm, lead pitch: 0.4 mm)	
Operating temperature range Current consumption (Typ. value) SLEEP state (OSC1 = Off, IOSC = Off, OSC3 = Off) HALT state (OSC1 = 32kHz, IOSC = Off, OSC3 = Off, LCD = Off) HALT state (OSC1 = 32kHz, IOSC = Off, OSC3 = Off, LCD = On) Run state (OSC1 = 32kHz, IOSC = Off, OSC3 = Off, LCD = Off) Run state (OSC1 = 32kHz, IOSC = Off, OSC3 = Off, LCD = Off) Run state (OSC1 = Off, IOSC = Off, OSC3 = 1 MHz ceramic, LCD = Off) A/D converting current Shipping form 1 2 3	1.2μA 2.7μA 9.7μA 18μA 557μA 200 μA (AVDD = 3.6 V, 100 kHz sampling continuous con	2.5μA 9.5μA 15μA 450μA QFP21-216pin Chip 32 mm, lead pitch: 0.5 mm)	
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■ 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	SEG0-SEG127	SEG0-SEG119
(1/16, 1/24, 1/32 duty)	COM0-COM31	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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