

# 16-bit Single Chip Microcontroller • Built-in FSA (Flexible Signal processing Accelerator) function; It realize high processing with low power

- 12-bit A/D converter
- Several kinds of serial interface
- 48-pin wafer-chip-scale package (WCSP)
- Built-in the flash memory that it can write with a single power supply

#### DESCRIPTIONS

S1C17555/565/955/965 can operate at high speed with low power and it has large address area. These products have good points such as Space-saving package (WCSP), 12-bit A/D converter and Signal processing accelerator(FSA) every model and selectable depending on a use.

In FSA, signal processing ranging from image processing to audio handling is possible. S1C17955/965 is most suitable for the application such as mobile devices. FSA realize high processing with a low clock, and realize a low consumption design by using this function.

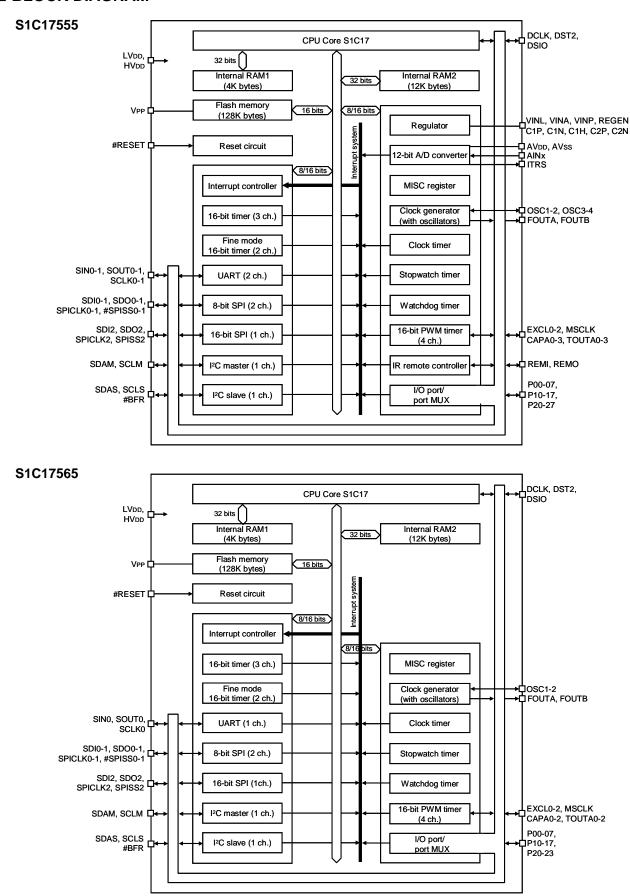
#### **■ FEATURES**

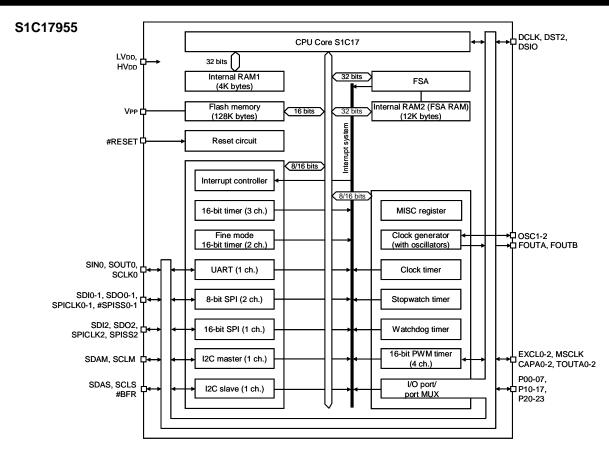
機種	S1C17555	S1C17565	S1C17955	S1C17965			
CPU							
CPU core	Seiko Epson original 16-bit RISC CPU core S1C17						
Multiplier/Divider (COPRO)	· 16-bit × 16-bit multiplier						
. , ,	16-bit × 16-bit + 32-bit multiply and accumulation unit     16-bit ÷ 16-bit divider						
FSA *1	TO BIL + TO BIL GIVIGE						
Multiply and accumulation unit	-		32-bit v 32-bit multiplier +	72-hit adder			
Data access	- 32-bit x 32-bit multiplier + 72-bit adder - 2 inputs and 1 output			- 72-bit addel			
Address space	12K bytes						
Embedded Flash memory			1210 bytes				
Capacity	128K bytes (for both instructions and data)						
Erase/program count	40 times (min.) (Applied only when FLS V1.0 or later is used.)						
Other	Read/program protection function						
Culci							
	An embedded power supply booster for erasing/programming  Allows on board an expression value of the principle to be provided to the principle of the prin						
Fort add d DaM	· Allows on-board programming using a debugging tool such as ICDmini.						
Embedded RaM	4K hydaa						
RAM1 Capacity	4K bytes						
RAM2 (FSA RAM) Capacity  Clock generator (CIG)	12K bytes						
	0	2	1 2	2			
System clock source	2 sources	3 sources	2 sources	3 sources			
IOSC oscillator circuit	(IOSC/OSC1)	(IOSC/OSC1/OSC3)	(IOSC/OSC1)	(IOSC/OSC1/OSC3)			
OSC3 oscillator circuit	2/4/8/12 MHz (typ.) internal oscillator circuit						
OSC3 oscillator circuit	-	24 MHz (max.) crystal or ceramic oscillator	-	24 MHz (max.) crystal or ceramic oscillator			
		circuit		circuit			
		Supports an external		Supports an external			
		clock input.		clock input.			
OSC1 oscillator circuit	32.768 kHz (typ.) crystal oscillator circuit. Supports an external clock input.						
Other	Core clock frequency control     Peripheral module clock supply control						
I/O ports (P)							
Number of general-purpose	Max. 20 bits	Max. 24 bits	Max. 20 bits	Max. 24 bits			
I/O ports	Pins are shared with the peripheral I/O.						
Serial interfaces	The are original with the pe						
8-bit SPI (SPI)	2 channels						
16-bit SPI (SPI16)	1 channel						
I <sup>2</sup> C master (I2CM)	1 channel						
I <sup>2</sup> C slave (I2CS)	1 channel						
UART (UART)	1 channel	2 channels	1 channel	2 channels			
- C (G)	(IrDA1.0 supported)	(IrDA1.0 supported)	(IrDA1.0 supported)	(IrDA1.0 supported)			
IR remote controller (REMC)	_	1 channel	_	1 channel			
Timers			<u> </u>				
16-bit timer (T16)	3 channels						
Fine mode 16-bit timer (T16F)	2 channels						
16-bit PWM timer (T16A2)	4 channels						
Clock timer (CT)	1 channel						
Stopwatch timer (SWT)	1 channel						
Watchdog timer (WDT)	1 channel	1 channel					

12-bit A/D converter (aDC12S	ia)					
Conversion method	-	Successive	-	Successive		
		approximation type		approximation type		
Analog input channel	-	6 channels	-	6 channels		
3 1		(Three channels can		(Three channels can		
		only be used for		only be used for		
		multichannel		multichannel		
		conversion.)		conversion.)		
Resolution	-	12 bits	-	12 bits		
Interrupts						
Reset interrupt	#RESET pin					
NMI	Watchdog timer					
Programmable interrupts	21 systems (8 levels)	22 systems (8 levels)	21 systems (8 levels)	22 systems (8 levels)		
Power supply voltage		., ., ., .,		, , , , , , , , , , , , , , , , , , , ,		
Core voltage (LVDD)	1.65 V to 1.95 V	1.65 V to 1.95 V	1.65 V to 1.95 V	1.65 V to 1.95 V		
		(Not required when the		(Not required when the		
		regulator is used)		regulator is used)		
I/O voltage (HVDD)	1.65 V to 3.6 V	2.0 V to 3.6 V	1.65 V to 3.6 V	2.0 V to 3.6 V		
i, o voltago (11455)	1.00 1 10 0.0 1	(When the regulator is	1.00 1 10 0.0 1	(When the regulator is		
		used)		used)		
		1.65 V to 3.6 V		1.65 V to 3.6 V		
		(When the regulator is		(When the regulator is		
		not used)		not used)		
Analog voltage (AVDD)	_	2.7 V to 3.6 V (Not	_	2.7 V to 3.6 V (Not		
rulaiog voltago (rvvbb)		required when the		required when the		
		regulator is used)		regulator is used)		
Flash programming voltage	7.5 V (Not required when t	he regulator/booster is used	1.)	regulator to accup		
(VPP)						
Regulators						
LVDD regulator	-	Input: 2.0 V to 3.6 V	-	Input: 2.0 V to 3.6 V		
		Output: 1.8 V		Output: 1.8 V		
AVDD regulator	-	Input: 3.1 V to 3.6 V,	-	Input: 3.1 V to 3.6 V,		
		Output: 2.8 V		Output: 2.8 V		
VPP regulator/booster		nput: 2.4 V to 3.6 V				
	Output: 7.5 V					
Operating temperature						
Operating temperature range	-40°C to 85°C (10 to 40°C	when programing/erasing the	ne Flash)			
Current consumption (Typ. va						
SLEEP state	1.0 μA (IOSC = Off, OSC1	= Off, OSC3 = Off)				
HALT state	2.9 µA (IOSC = Off, OSC1 = 32 kHz, OSC3 = Off)					
Run state	3500 μA (IOSC = 12 MHz, OSC1 = Off, OSC3 = Off)					
FSA operating current	- +270 μA/MHz					
Shipping form						
1	WCSP-48	TQFP13-64pin	WCSP-48	TQFP13-64pin		
	3.863 × 3.863 × 0.8 mm,	10 × 10 × 1.0 mm,	$3.863 \times 3.863 \times 0.8 \text{ mm}$	10 × 10 × 1.0 mm,		
	ball pitch: 0.5 mm	lead pitch: 0.5 mm	ball pitch: 0.5 mm	lead pitch: 0.5 mm		
2		Die form		Die form		
<del>_</del>		3.863 × 3.863 mm,		3.863 × 3.863 mm,		
		pad pitch: 140 µm		pad pitch: 140 µm		
	J		tion on the ESA please			

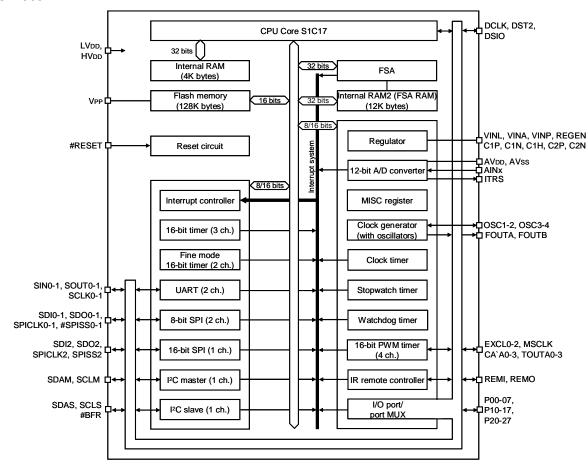
<sup>\*1</sup> For more information on the FSA, please contact Seiko Epson.

#### **■ BLOCK DIAGRAM**





#### S1C17965



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