Epson Electronics America Inc-Semiconductor Div - S1C17W13F001100 Datasheet

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What is "Embedded - Microcontrollers"?

"Embedded - Microcontrollers" refer to small, integrated circuits designed to perform specific tasks within larger systems. These microcontrollers are essentially compact computers on a single chip, containing a processor core, memory, and programmable input/output peripherals. They are called "embedded" because they are embedded within electronic devices to control various functions, rather than serving as standalone computers. Microcontrollers are crucial in modern electronics, providing the intelligence and control needed for a wide range of applications.

Applications of "Embedded - Microcontrollers"

Details	
Product Status	Active
Core Processor	S1C17
Core Size	16-Bit
Speed	4.2MHz
Connectivity	I²C, IrDA, SSI, UART/USART
Peripherals	LCD, POR, PWM, Voltage Detect, WDT
Number of I/O	-
Program Memory Size	48KB (48K x 8)
Program Memory Type	FLASH
EEPROM Size	-
RAM Size	2K x 8
Voltage - Supply (Vcc/Vdd)	1.2V ~ 3.6V
Data Converters	-
Oscillator Type	Internal
Operating Temperature	-40°C ~ 85°C (TA)
Mounting Type	-
Package / Case	-
Supplier Device Package	-
Purchase URL	https://www.e-xfl.com/product-detail/epson/s1c17w13f001100

S1C17W12/W13 (rev1.1)

EPSON
EXCEED YOUR VISION

16-bit Single Chip Microcontroller

- Low voltage operation from 1.2 V with a single alkaline or silver oxide button battery.
- Ultra low standby power consumption (0.3 µA during HALT state in super economy mode)
- Equipped with an LCD driver capable of driving an 18–26 SEG × 4 COM LCD panel.
- Various kinds of serial interfaces (UART, SPI, I^2C)

■ DESCRIPTIONS

The S1C17W12/W13 is a 16-bit MCU that features low-voltage operation from 1.2 V even though Flash memory is included. This IC has realized an excellent low power operation that is better than Seiko Epson's 4-bit MCUs by adopting a high-efficiency DC-DC converter that generates a constant voltage to drive internal circuits. It includes a real-time clock, a stopwatch, an LCD driver, and a PWM timer capable of being used to generate drive waveforms for a motor driver as well as a high-performance 16-bit CPU. It is suitable for battery-driven applications that require an LCD display.

■ FEATURES

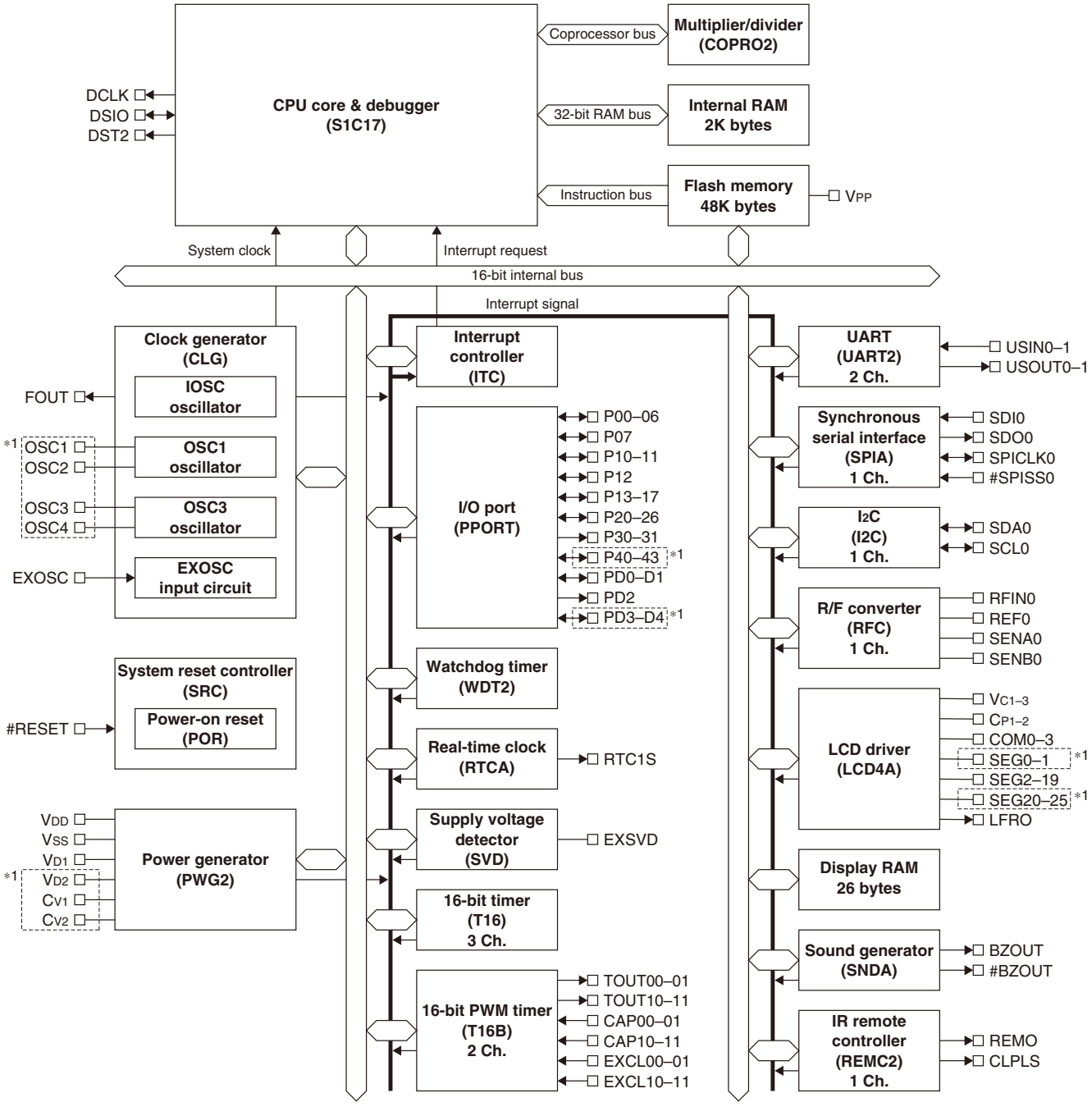
Model	S1C17W12		S1C17W13		
	SQFN7-48pin	Chip	TQFP12-48pin	SQFN7-48pin	QFP13-64pin or chip
CPU					
CPU core	Seiko Epson original 16-bit RISC CPU core S1C17				
Other	On-chip debugger				
Embedded Flash memory					
Capacity	48K bytes (for both instructions and data)				
Erase/program count	1,000 times (min.) ∗ Programming by the debugging tool ICDmini				
Other	Security function to protect from reading/programming by ICDmini				
	On-board programming function using ICDmini ∗ An external smoothing capacitor is required.				
Embedded RAM					
Capacity	2K bytes				
Embedded display RAM					
Capacity	26 bytes				
Clock generator (CLG)					
System clock source	4 sources (IOSC/OSC1/OSC3/EXOSC)				
System clock frequency (operating frequency)	1.1 MHz (max.) V_{DD} = 1.2 to 1.6 V 4.2 MHz (max.) V_{DD} = 1.6 to 3.6 V				
IOSC oscillator circuit (boot clock source)	700 kHz (typ.) embedded oscillator				
	23 µs (max.) starting time (time from cancelation of SLEEP state to vector table read by the CPU)				
OSC1 oscillator circuit	–	32.768 kHz (typ.) crystal oscillator			
	32 kHz (typ.) embedded oscillator				
	–	Oscillation stop detection circuit included			
OSC3 oscillator circuit	–	4.2 MHz (max.) crystal/ceramic oscillator	–		4.2 MHz (max.) crystal/ceramic oscillator
	250, 384, 500 kHz, 1, 2, and 4 MHz-switchable embedded oscillator				
	–	2.1 MHz (max.) CR oscillator (an external R is required)	–		2.1 MHz (max.) CR oscillator (an external R is required)
EXOSC clock input	4.2 MHz (max.) square or sine wave input				
Other	Configurable system clock division ratio				
	Configurable system clock used at wake up from SLEEP state				
	Operating clock frequency for the CPU and all peripheral circuits is selectable.				

Model		S1C17W12		S1C17W13		
		SQFN7-48pin	Chip	TQFP12-48pin	SQFN7-48pin	QFP13-64pin or chip
I/O port (PPORT)						
Number of general-purpose ports	I/O ports	25 bits (max.)	31 bits (max.)	25 bits (max.)		31 bits (max.)
	Output ports	1 bit (max.)				
	Other	Pins are shared with the peripheral I/O.				
Number of input interrupt ports		23 bits (max.)	27 bits (max.)	21 bits (max.)	23 bits (max.)	27 bits (max.)
Number of ports that support universal port multiplexer (UPMUX)		23 bits		21 bits	23 bits	
		A peripheral circuit I/O function selected via software can be assigned to each port.				
LED drive pin		2 bits, Nch open drain, output current 5 mA (max.)		–		2 bits, Nch open drain, output current 5 mA (max.)
Timers						
Watchdog timer (WDT2)		Generates NMI or watchdog timer reset.				
		Programmable NMI/reset generation cycle				
Real-time clock (RTCA)		128–1 Hz counter, second/minute/hour/day/day of the week/month/year counters				
		Theoretical regulation function for 1-second correction				
		Alarm and stopwatch functions				
16-bit timer (T16)		3 channels				
		Generates the SPIA master clock.				
16-bit PWM timer (T16B)		2 channels				
		Event counter/capture function				
		PWM waveform generation function				
		Number of PWM output or capture input ports: 2 ports/channel				
Supply voltage detector (SVD)						
Detection level		30 levels (1.2 to 3.6 V)				
Detection accuracy		±3 %				
Other		Intermittent operation mode				
		Generates an interrupt or reset according to the detection level evaluation.				
Serial interfaces						
UART (UART2)		2 channels				
		Baud-rate generator included, IrDA1.0 supported				
		Open drain output, signal polarity, and baud rate division ratio are configurable.				
Synchronous serial interface (SPIA)		1 channel				
		2 to 16-bit variable data length				
		The 16-bit timer (T16) can be used for the baud-rate generator in master mode.				
I^2C (I2C)		1 channel				
		Baud-rate generator included				
Sound generator (SNDA)						
Buzzer output function		512 Hz to 16 kHz output frequencies				
		One-shot output function				
Melody generation function		Pitch: 128 Hz to 16 kHz ≈ C3 to C6				
		Duration: 7 notes/rests (Half note/rest to thirty-second note/rest)				
		Tempo: 16 tempos (30 to 480)				
		Tie/slur may be specified.				
IR remote controller (REMC2)						
Number of transmitter channels		1 channel				
Other		EL lamp drive waveform can be generated for an application example.				
LCD driver (LCD4A)						
LCD output		18 SEG × 1–4 COM (max.)	26 SEG × 1–4 COM (max.)	20 SEG × 1–4 COM (max.)	18 SEG × 1–4 COM (max.)	26 SEG × 1–4 COM (max.)
LCD contrast		16 levels		–	16 levels	
LCD drive power supply		1/3 bias power supply included (External voltage can be applied.)		External power supply	1/3 bias power supply included (External voltage can be applied.)	
R/F converter (RFC)						
Conversion method		CR oscillation type with 24-bit counters		–	CR oscillation type with 24-bit counters	
Number of conversion channels		1 channel (Up to two sensors can be connected.)			1 channel (Up to two sensors can be connected.)	
Supported sensors		DC-bias resistive sensors, AC-bias resistive sensors			DC-bias resistive sensors, AC-bias resistive sensors	
Other		Low power consumption type		–		

Model	S1C17W12		S1C17W13		
	SQFN7-48pin	Chip	TQFP12-48pin	SQFN7-48pin	QFP13-64pin or chip
Multiplier/divider (COPRO2)					
Arithmetic functions	16-bit × 16-bit multiplier				
	16-bit × 16-bit + 32-bit multiply and accumulation unit				
	32-bit ÷ 32-bit divider				
Reset					
#RESET pin	Reset when the reset pin is set to low.				
Power-on reset	Reset at power on.				
Key entry reset	Reset when the P00 to P01/P02/P03 keys are pressed simultaneously (can be enabled/disabled using a register).				
Watchdog timer reset	Reset when the watchdog timer overflows (can be enabled/disabled using a register).				
Supply voltage detector reset	Reset when the supply voltage detector detects the set voltage level (can be enabled/disabled using a register).				
Interrupt					
Non-maskable interrupt	4 systems (Reset, address misaligned interrupt, debug, NMI)				
Programmable external interrupt	1 system (8 levels)				
Programmable internal interrupt	18 systems (8 levels)		17 systems (8 levels)	18 systems (8 levels)	
Power supply voltage					
V_{DD} operating voltage	1.2 to 3.6 V				
V_{DD} operating voltage for Flash programming	2.4 to 3.6 V (V_{PP} = 7.5 V external power supply is required.)				
V_{DD} operating voltage for super economy mode	–	2.5 to 3.6 V	–		2.5 to 3.6 V
Operating temperature					
Operating temperature range	-40 to 85 °C				
Current consumption (Typ. value)					
SLEEP mode	0.15 µA IOSC = OFF, OSC1 = OFF, OSC3 = OFF				
HALT mode	1.5 µA OSC1 = 32 kHz (internal oscillator), RTC = ON	0.5 µA OSC1 = 32.768 kHz (crystal oscillator), RTC = ON			
	–	0.3 µA OSC1 = 32.768 kHz (crystal oscillator), RTC = ON, super economy mode	–		0.3 µA OSC1 = 32.768 kHz (crystal oscillator), RTC = ON, super economy mode
RUN mode	5 µA OSC1 = 32 kHz (internal oscillator), RTC = ON, CPU = OSC1	4 µA OSC1 = 32.768 kHz (crystal oscillator), RTC = ON, CPU = OSC1			
	–	2 µA OSC1 = 32.768 kHz (crystal oscillator), RTC = ON, CPU = OSC1, super economy mode	–		2 µA OSC1 = 32.768 kHz (crystal oscillator), RTC = ON, CPU = OSC1, super economy mode
	140 µA OSC3 = 1 MHz (ceramic oscillator), OSC1 = 32.768 kHz (crystal oscillator), RTC = ON, CPU = OSC3				
Shipping form					
1	SQFN7-48pin (Lead pitch: 0.5 mm)				
2	Die form (Pad pitch: 80 µm (min.))				
3	–		QFP13-64pin (Lead pitch: 0.5 mm)		
4	–		TQFP12-48pin (Lead pitch: 0.5 mm)		

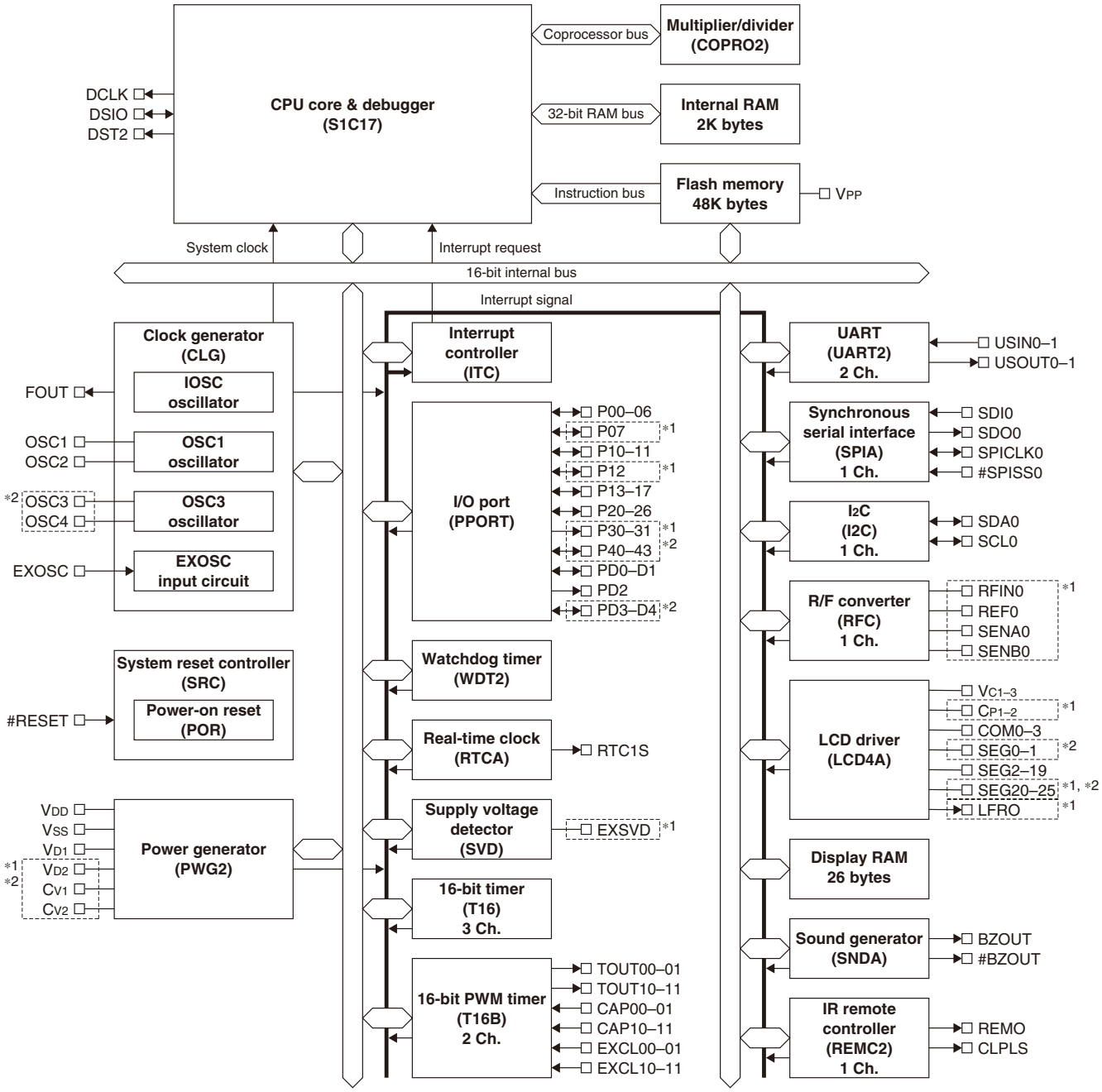
■ BLOCK DIAGRAMS

S1C17W12



*1 These pins do not exist in the SQFN7-48pin package.

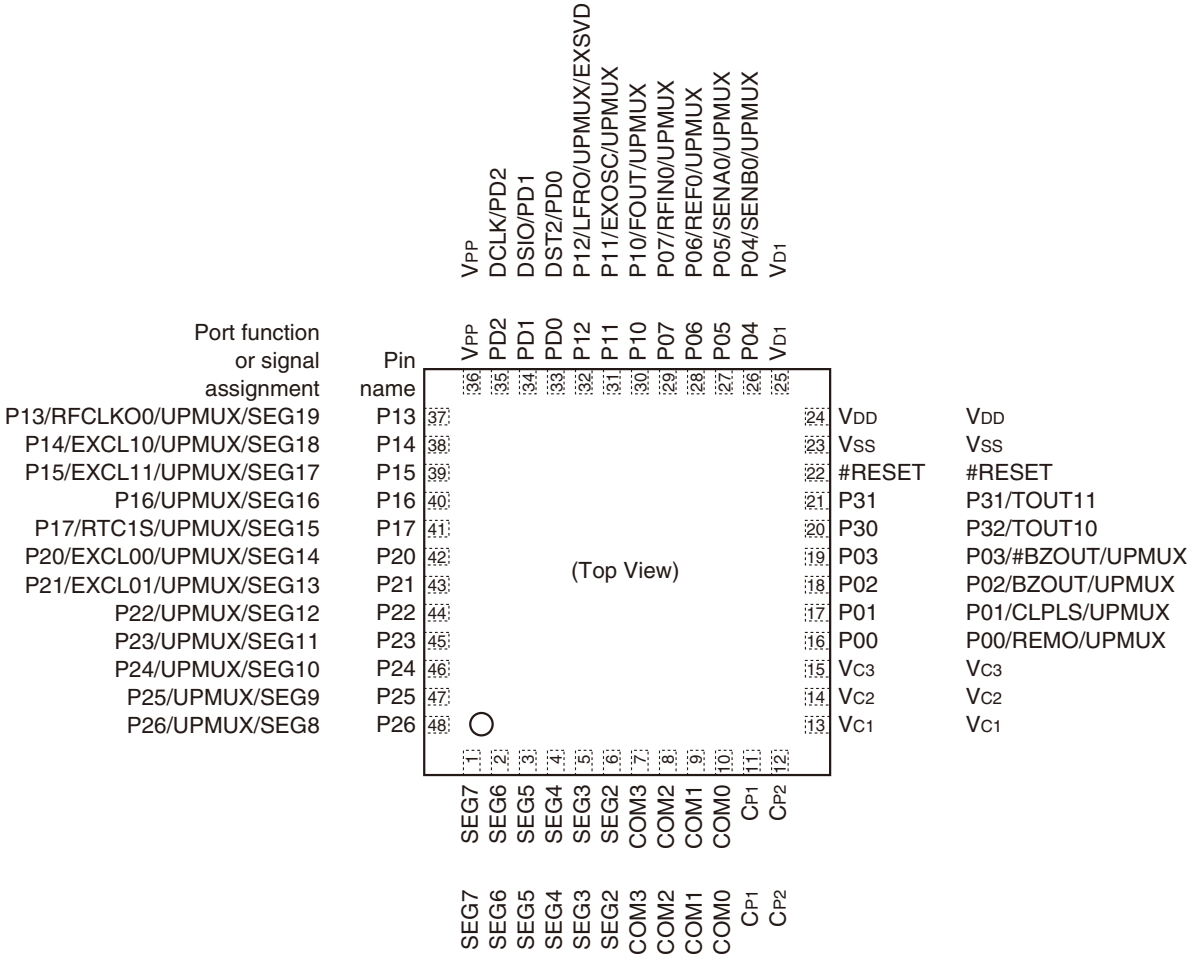
S1C17W13



*1 These pins do not exist in the TQFP12-48pin package.
*2 These pins do not exist in the SQFN7-48pin package.

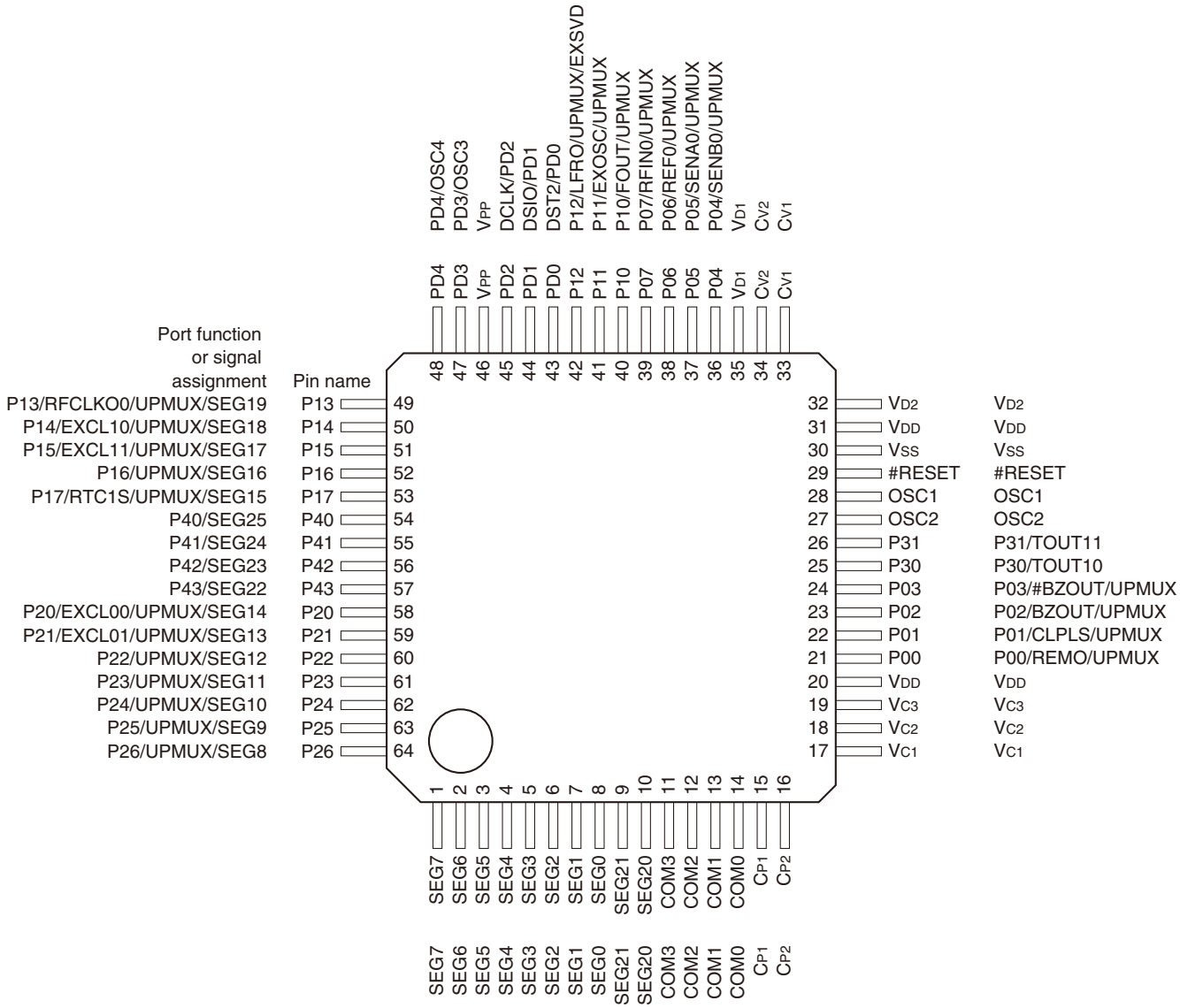
■ PIN CONFIGURATION DIAGRAMS

S1C17W12 (SQFN7-48pin)

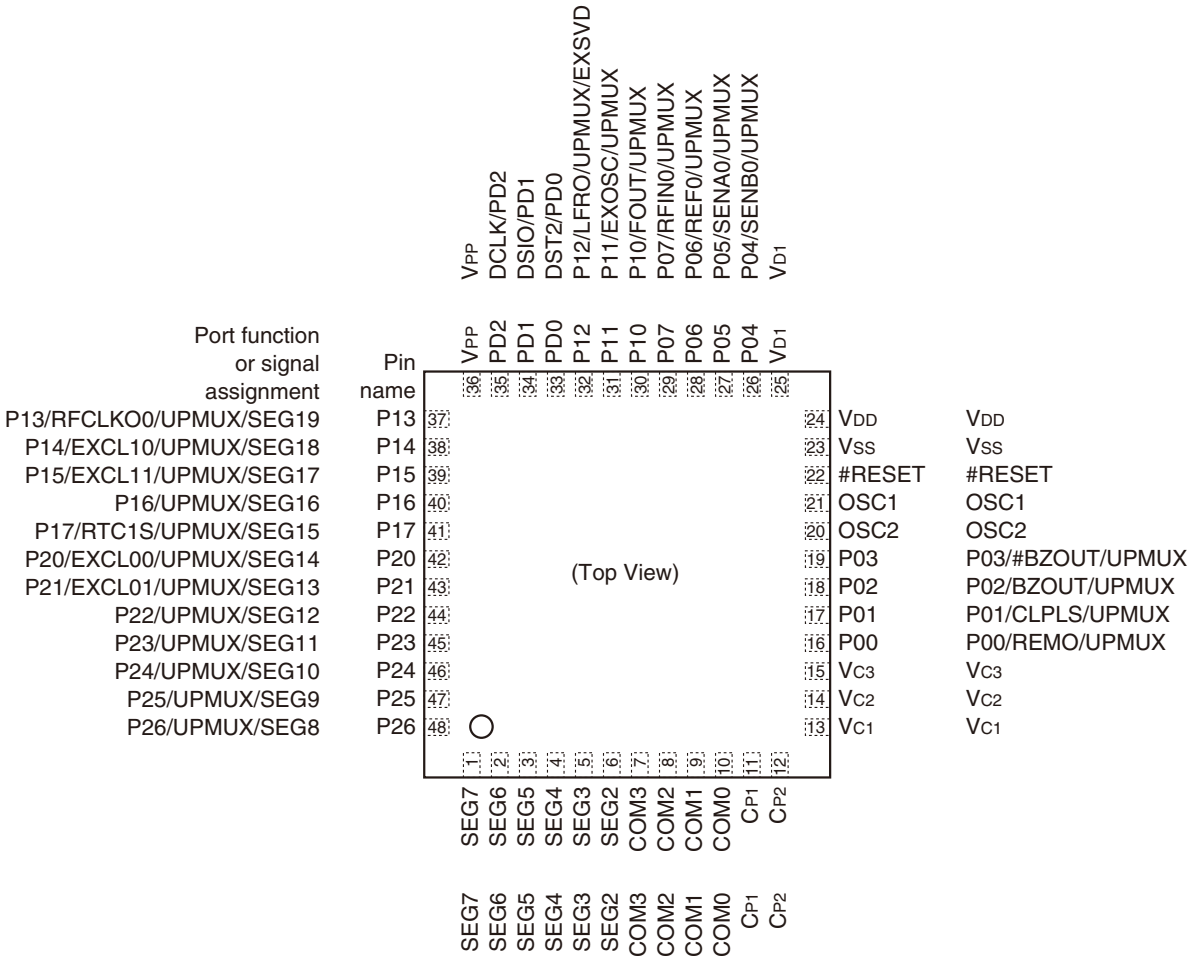


Note: The model in this package cannot be placed into super economy mode, as it does not have the V_{D2}, C_{V1}, and C_{V2} pins.

S1C17W13 (QFP13-64pin)

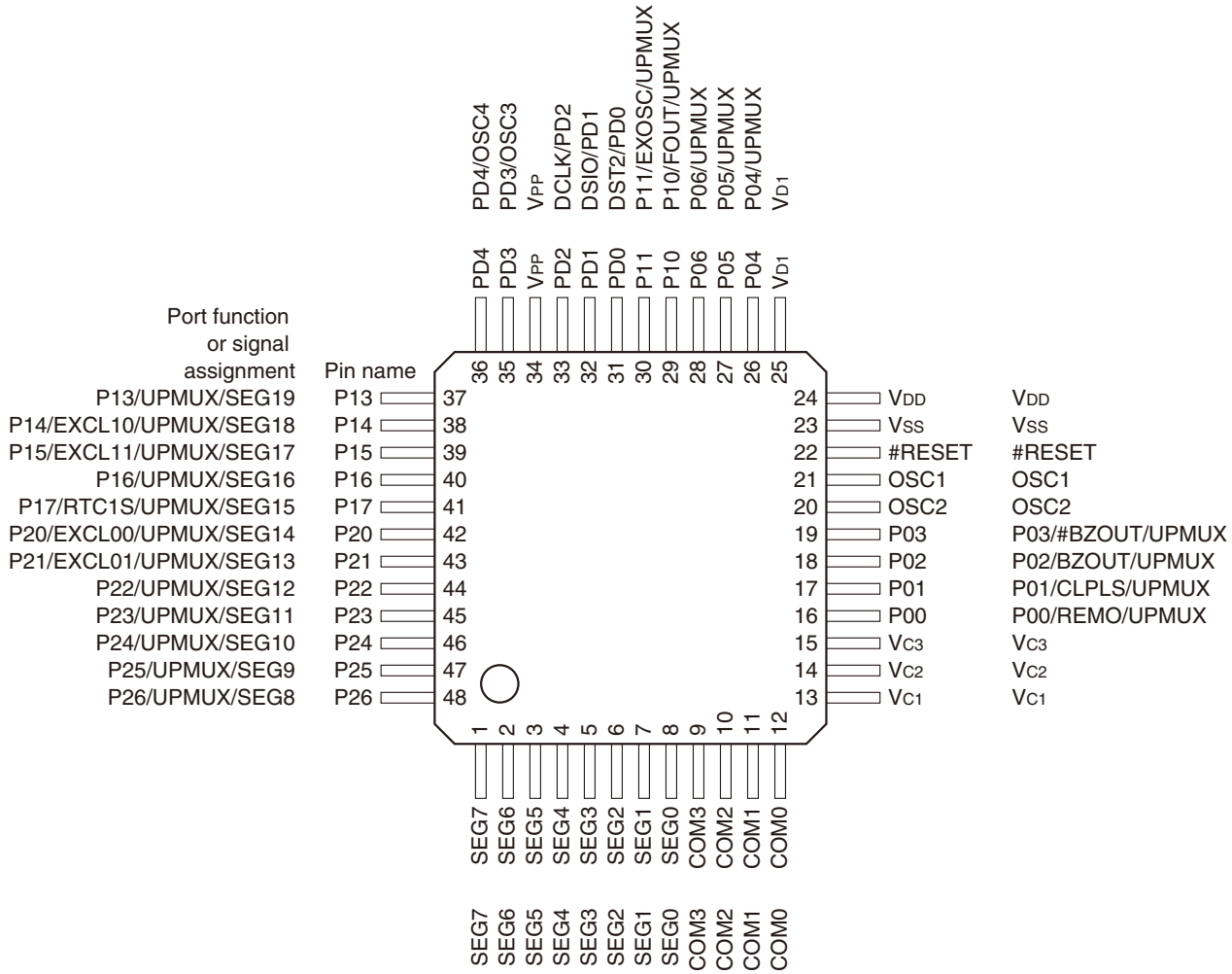


S1C17W13 (SQFN7-48pin)



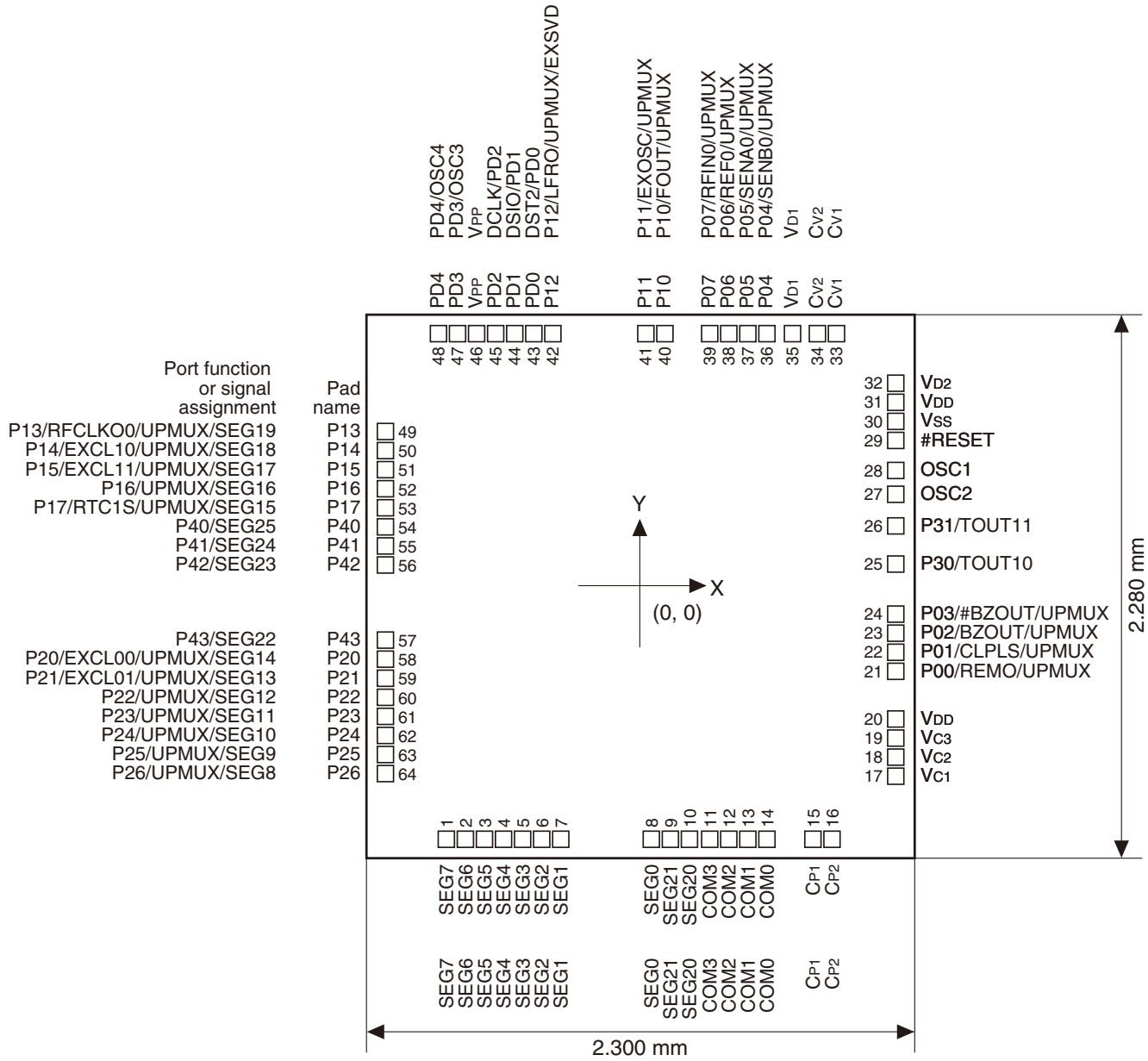
Note: The model in this package cannot be placed into super economy mode, as it does not have the V_{D2}, C_{V1}, and C_{V2} pins.

S1C17W13 (TQFP12-48pin)



Note: The model in this package cannot be placed into super economy mode, as it does not have the V_{D2}, C_{V1}, and C_{V2} pins.

S1C17W12/W13 (Chip)



■ PIN DESCRIPTIONS

Symbol meanings

Assigned signal: The signal listed at the top of each pin is assigned in the initial state. The pin function must be switched via software to assign another signal (see the "I/O Ports" chapter).

I/O:
- I = Input
- O = Output
- I/O = Input/output
- P = Power supply
- A = Analog signal
- Hi-Z = High impedance state

Initial state:
- I (Pull-up) = Input with pulled up
- I (Pull-down) = Input with pulled down
- Hi-Z = High impedance state
- O (H) = High level output
- O (L) = Low level output

Tolerant fail-safe structure:
- ✓ = Over voltage tolerant fail-safe type I/O cell included (see the "I/O Ports" chapter)
  The over voltage tolerant fail-safe type I/O cell allows interfacing without passing unnecessary current even if a voltage exceeding V_{DD} is applied to the port. Also unnecessary current is not consumed when the port is externally biased without supplying V_{DD}.

Pin/pad name	Assigned signal	I/O	Initial state	Tolerant fail-safe structure	Function	W12		W13		
						Chip	SQFN7-48pin	64pin/Chip	SQFN7-48pin	TQFP12-48pin
V_{DD}	V_{DD}	P	–	–	Power supply (+)	✓	✓	✓	✓	✓
V_{SS}	V_{SS}	P	–	–	GND	✓	✓	✓	✓	✓
V_{PP}	V_{PP}	P	–	–	Power supply for Flash programming	✓	✓	✓	✓	✓
V_{D1}	V_{D1}	A	–	–	DC-DC converter output	✓	✓	✓	✓	✓
V_{D2}	V_{D2}	A	–	–	DC-DC converter stabilization capacitor connect pin	✓	–	✓	–	–
C_{V1-2}	C_{V1-2}	A	–	–	DC-DC converter charge pump capacitor connect pins	✓	–	✓	–	–
V_{C1-3}	V_{C1-3}	P	–	–	LCD panel driver power supply	✓	✓	✓	✓	✓
C_{P1-2}	C_{P1-2}	A	–	–	LCD power supply booster capacitor connect pins	✓	✓	✓	✓	–
OSC1	OSC1	A	–	–	OSC1 oscillator circuit input	✓	–	✓	✓	✓
OSC2	OSC2	A	–	–	OSC1 oscillator circuit output	✓	–	✓	✓	✓
#RESET	#RESET	I	I (Pull-up)	–	Reset input	✓	✓	✓	✓	✓
P00	P00	I/O	Hi-Z	✓	I/O port	✓	✓	✓	✓	✓
	REMO	O			IR remote controller transmit data output	✓	✓	✓	✓	✓
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	✓	✓	✓	✓	✓
P01	P01	I/O	Hi-Z	✓	I/O port	✓	✓	✓	✓	✓
	CLPLS	O			IR remote controller clear pulse output	✓	✓	✓	✓	✓
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	✓	✓	✓	✓	✓
P02	P02	I/O	Hi-Z	✓	I/O port	✓	✓	✓	✓	✓
	BZOUT	O			Sound generator output	✓	✓	✓	✓	✓
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	✓	✓	✓	✓	✓
P03	P03	I/O	Hi-Z	✓	I/O port	✓	✓	✓	✓	✓
	#BZOUT	O			Sound generator inverted output	✓	✓	✓	✓	✓
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	✓	✓	✓	✓	✓
P04	P04	I/O	Hi-Z	–	I/O port	✓	✓	✓	✓	✓
	SENB0	A			R/F converter Ch.0 sensor B oscillator pin	✓	✓	✓	✓	–
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	✓	✓	✓	✓	✓
P05	P05	I/O	Hi-Z	–	I/O port	✓	✓	✓	✓	✓
	SENA0	A			R/F converter Ch.0 sensor A oscillator pin	✓	✓	✓	✓	–
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	✓	✓	✓	✓	✓
P06	P06	I/O	Hi-Z	–	I/O port	✓	✓	✓	✓	✓
	REF0	A			R/F converter Ch.0 reference oscillator pin	✓	✓	✓	✓	–
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	✓	✓	✓	✓	✓

Pin/pad name	Assigned signal	I/O	Initial state	Tolerant fail-safe structure	Function	W12		W13		
						Chip	SQFN7-48pin	64pin/Chip	SQFN7-48pin	TQFP12-48pin
P07	P07	I/O	Hi-Z	–	I/O port	✓	✓	✓	✓	–
	RFIN0	A			R/F converter Ch.0 oscillation input	✓	✓	✓	✓	–
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	✓	✓	✓	✓	–
P10	P10	I/O	Hi-Z	✓	I/O port	✓	✓	✓	✓	✓
	FOUT	O			Clock external output	✓	✓	✓	✓	✓
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	✓	✓	✓	✓	✓
P11	P11	I/O	Hi-Z	✓	I/O port	✓	✓	✓	✓	✓
	EXOSC	I			Clock generator external clock input	✓	✓	✓	✓	✓
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	✓	✓	✓	✓	✓
P12	P12	I/O	Hi-Z	✓	I/O port	✓	✓	✓	✓	–
	LFRO	O			LCD frame signal monitor output	✓	✓	✓	✓	–
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	✓	✓	✓	✓	–
	EXSVD	A			External power supply voltage detection input	✓	✓	✓	✓	–
P13	P13	I/O	Hi-Z	✓	I/O port	✓	✓	✓	✓	✓
	RFCLKO0	O			R/F converter Ch.0 clock monitor output	✓	✓	✓	✓	–
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	✓	✓	✓	✓	✓
	SEG19	A			LCD segment output	✓	✓	✓	✓	✓
P14	P14	I/O	Hi-Z	✓	I/O port	✓	✓	✓	✓	✓
	EXCL10	I			16-bit PWM timer Ch.1 event counter input 0	✓	✓	✓	✓	✓
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	✓	✓	✓	✓	✓
	SEG18	A			LCD segment output	✓	✓	✓	✓	✓
P15	P15	I/O	Hi-Z	✓	I/O port	✓	✓	✓	✓	✓
	EXCL11	I			16-bit PWM timer Ch.1 event counter input 1	✓	✓	✓	✓	✓
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	✓	✓	✓	✓	✓
	SEG17	A			LCD segment output	✓	✓	✓	✓	✓
P16	P16	I/O	Hi-Z	✓	I/O port	✓	✓	✓	✓	✓
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	✓	✓	✓	✓	✓
	SEG16	A			LCD segment output	✓	✓	✓	✓	✓
P17	P17	I/O	Hi-Z	✓	I/O port	✓	✓	✓	✓	✓
	RTC1S	O			Real-time clock 1-second cycle pulse output	✓	✓	✓	✓	✓
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	✓	✓	✓	✓	✓
	SEG15	A			LCD segment output	✓	✓	✓	✓	✓
P20	P20	I/O	Hi-Z	✓	I/O port	✓	✓	✓	✓	✓
	EXCL00	I			16-bit PWM timer Ch.0 event counter input 0	✓	✓	✓	✓	✓
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	✓	✓	✓	✓	✓
	SEG14	A			LCD segment output	✓	✓	✓	✓	✓
P21	P21	I/O	Hi-Z	✓	I/O port	✓	✓	✓	✓	✓
	EXCL01	I			16-bit PWM timer Ch.0 event counter input 1	✓	✓	✓	✓	✓
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	✓	✓	✓	✓	✓
	SEG13	A			LCD segment output	✓	✓	✓	✓	✓
P22	P22	I/O	Hi-Z	✓	I/O port	✓	✓	✓	✓	✓
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	✓	✓	✓	✓	✓
	SEG12	A			LCD segment output	✓	✓	✓	✓	✓
P23	P23	I/O	Hi-Z	✓	I/O port	✓	✓	✓	✓	✓
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	✓	✓	✓	✓	✓
	SEG11	A			LCD segment output	✓	✓	✓	✓	✓
P24	P24	I/O	Hi-Z	✓	I/O port	✓	✓	✓	✓	✓
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	✓	✓	✓	✓	✓
	SEG10	A			LCD segment output	✓	✓	✓	✓	✓
P25	P25	I/O	Hi-Z	✓	I/O port	✓	✓	✓	✓	✓
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	✓	✓	✓	✓	✓
	SEG9	A			LCD segment output	✓	✓	✓	✓	✓
P26	P26	I/O	Hi-Z	✓	I/O port	✓	✓	✓	✓	✓
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	✓	✓	✓	✓	✓
	SEG8	A			LCD segment output	✓	✓	✓	✓	✓
P30	P30	O	Hi-Z	–	LED drive port	✓	✓	✓	–	–
	TOUT10	O			16-bit PWM timer Ch.1 PWM output 0	✓	✓	✓	–	–

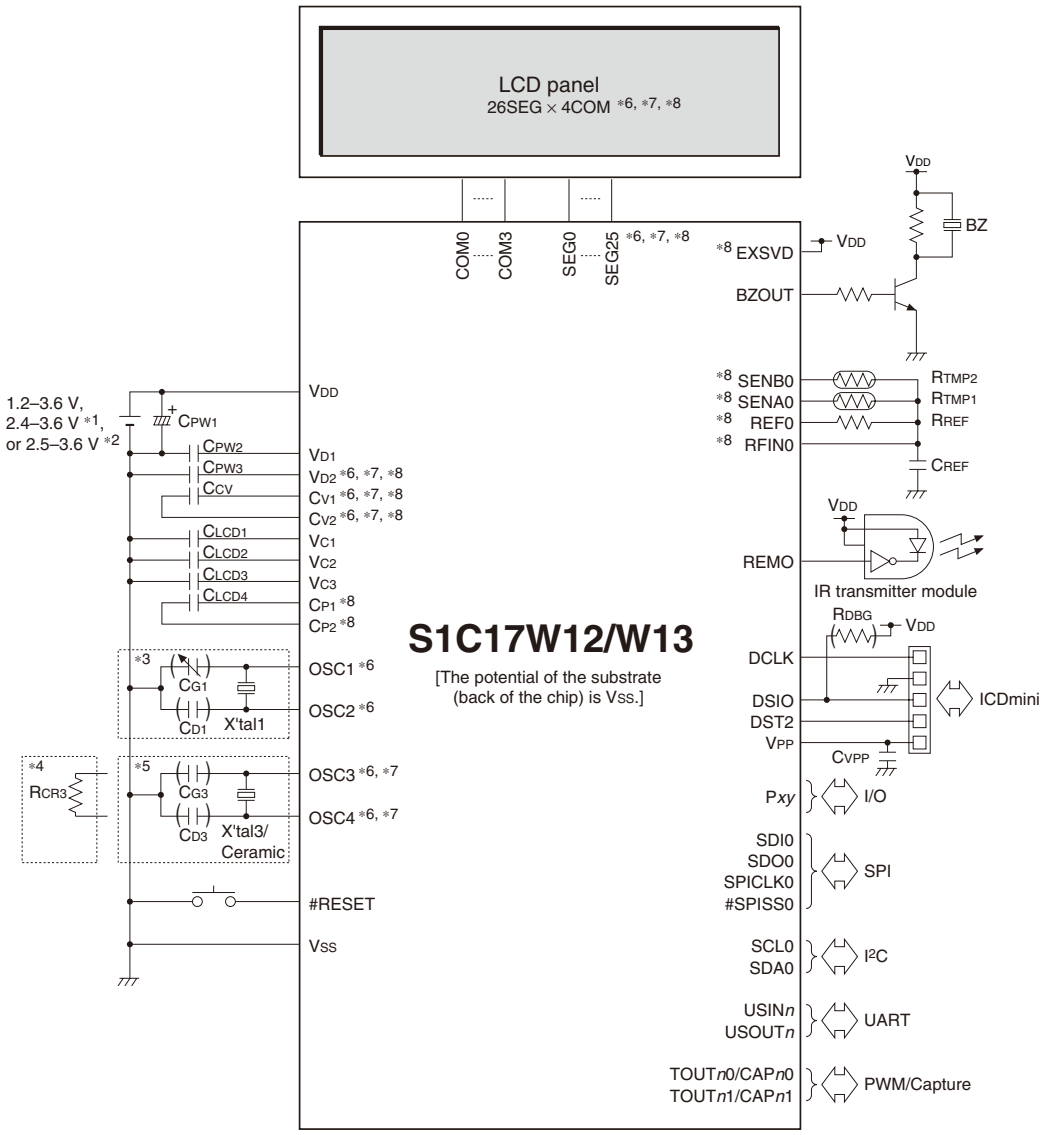
Pin/pad name	Assigned signal	I/O	Initial state	Tolerant fail-safe structure	Function	W12		W13		
						Chip	SQFN7-48pin	64pin/Chip	SQFN7-48pin	TQFP12-48pin
P31	P31	O	Hi-Z	–	LED drive port	✓	✓	✓	–	–
	TOUT11	O			16-bit PWM timer Ch.1 PWM output 1	✓	✓	✓	–	–
P40	P40	I/O	Hi-Z	✓	I/O port	✓	–	✓	–	–
	SEG25	A			LCD segment output	✓	–	✓	–	–
P41	P41	I/O	Hi-Z	✓	I/O port	✓	–	✓	–	–
	SEG24	A			LCD segment output	✓	–	✓	–	–
P42	P42	I/O	Hi-Z	✓	I/O port	✓	–	✓	–	–
	SEG23	A			LCD segment output	✓	–	✓	–	–
P43	P43	I/O	Hi-Z	✓	I/O port	✓	–	✓	–	–
	SEG22	A			LCD segment output	✓	–	✓	–	–
PD0	DST2	O	O (L)	✓	On-chip debugger status output	✓	✓	✓	✓	✓
	PD0	I/O			I/O port	✓	✓	✓	✓	✓
PD1	DSIO	I/O	I (Pull-up)	✓	On-chip debugger data input/output	✓	✓	✓	✓	✓
	PD1	I/O			I/O port	✓	✓	✓	✓	✓
PD2	DCLK	O	O (H)	–	On-chip debugger clock output	✓	✓	✓	✓	✓
	PD2	O			Output port	✓	✓	✓	✓	✓
PD3	PD3	I/O	Hi-Z	–	I/O port	✓	–	✓	–	✓
	OSC3	A			OSC3 oscillator circuit input	✓	–	✓	–	✓
PD4	PD4	I/O	Hi-Z	–	I/O port	✓	–	✓	–	✓
	OSC4	A			OSC3 oscillator circuit output	✓	–	✓	–	✓
COM0–3	COM0–3	A	Hi-Z	–	LCD common output	✓	✓	✓	✓	✓
SEG0–1	SEG0–1	A	Hi-Z	–	LCD segment output	✓	–	✓	–	✓
SEG2–7	SEG2–7	A	Hi-Z	–	LCD segment output	✓	✓	✓	✓	✓
SEG20–21	SEG20–21	A	Hi-Z	–	LCD segment output	✓	–	✓	–	–

Universal port multiplexer (UPMUX)

The universal port multiplexer (UPMUX) allows software to select the peripheral circuit input/output function to be assigned to each pin from those listed below. Note, however, that a function cannot be assigned to two or more pins simultaneously.

Peripheral circuit	Signal to be assigned	I/O	Channel number *n*	Function
Synchronous serial interface (SPIA)	SDI*n*	I	*n* = 0	SPIA Ch.*n* data input
	SDO*n*	O		SPIA Ch.*n* data output
	SPICLK*n*	I/O		SPIA Ch.*n* clock input/output
	#SPISS*n*	I		SPIA Ch.*n* slave-select input
I²C (I2C)	SCL*n*	I/O	*n* = 0	I2C Ch.*n* clock input/output
	SDA*n*	I/O		I2C Ch.*n* data input/output
UART (UART2)	USIN*n*	I	*n* = 0, 1	UART2 Ch.*n* data input
	USOUT*n*	O		UART2 Ch.*n* data output
16-bit PWM timer (T16B)	TOUT*n*0/CAP*n*0	I/O	*n* = 0, 1	T16B Ch.*n* PWM output/capture input 0
	TOUT*n*1/CAP*n*1	I/O		T16B Ch.*n* PWM output/capture input 1

■ BASIC EXTERNAL CONNECTION DIAGRAM



*1: For Flash programming (when VPP is supplied externally)
*2: For Flash programming (when VPP is generated internally)
*3: When the OSC1 crystal oscillator is used (except for the S1C17M20/M23 (24-pin package))
*4: When the OSC3 crystal/ceramic oscillator is used (except for the S1C17M20/M23 (24-pin package))
*5: When the R/F converter is used (available in the S1C17M22/M25)
( ): Do not mount components if unnecessary.

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Document Code: 413567301
First Issue November 2017
Revised December 2017 in JAPAN Ⓛ