

# S1C17M20/M21/M22/M23/M24/M25 (rev1.2)

## **16-bit Single Chip Microcontroller**

- 16KB/32KB Flash ROM with read/program protection function
- 1.8 to 5.5 V wide range operating voltage
- Ultra low standby power consumption (0.7 µA during HALT state)
- Embedded A/D converter to support various sensing applications
- Various kinds of interfaces (UART, SPI, I<sup>2</sup>C)
- EEPROM emulation

### DESCRIPTIONS

The S1C17M20/M21/M22/M23/M24/M25 is a 16-bit embedded Flash MCU that features low power consumption. The embedded Flash memory can also be used as an EEPROM emulation data memory via software. The S1C17M20/M21/M22/M23/M24/M25 includes various serial interfaces, an A/D converter, and various timers as well as a high-performance 16-bit CPU. It is suitable for applications that require an A/D conversion function, such as household equipment and FA products.

## ■ FEATURES

Model		S1C17	M20/M23	S1C17M21/M24	S1C17M22/M25			
		24-pin PKG	32-pin PKG					
CPU								
CPU core		Seiko Epson o	riginal 16-bit RISC C	PU core S1C17				
Other		On-chip debug	gger					
Embedded Flash memor	у							
Capacity		16K bytes (S1	C17M20/M21/M22)					
for both instructions and da	ata)	32K bytes (S1	C17M23/M24/M25)					
Erase/program count		1,000 times (m	nin.) * Programming k	by the debugging tool ICDm	ini			
Other				ading/programming by ICD				
		On-board prog	gramming function us	sing ICDmini				
			ming voltage can be					
Embedded RAM				5				
Capacity		2K bytes						
Clock generator (CLG)		, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,						
System clock source		4 sources (IOS	SC/OSC1/OSC3/EXO	SC)				
System clock frequency		21 MHz (max.)		/				
(operating frequency)								
IOSC oscillator circuit		700 kHz (typ.)	embedded oscillator					
(boot clock source)					e to vector table read by the			
		CPU)						
OSC1 oscillator circuit		<ul> <li>32.768 kHz (typ.) crystal oscillator</li> </ul>						
		32 kHz (typ.) embedded oscillator						
		<ul> <li>Oscillation stop detection circuit included</li> </ul>						
OSC3 oscillator circuit		<ul> <li>– 21 MHz (max.) crystal/ceramic oscillator</li> </ul>						
		12, 16, and 20 MHz-switchable embedded oscillator						
		_	<ul> <li>Auto-trimming function for the embedded oscillator</li> </ul>					
EXOSC clock input		21 MHz (max.)	21 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.						
I/O port (PPORT)			· · ·					
Number of general-	I/O port	17 bits (max.)	23 bits (max.)		39 bits (max.)			
purpose ports		t 1 bit (max.)						
	Other		d with the peripheral	I/O.				
Number of input interrupt		15 bits (max.)	19 bits (max.)		35 bits (max.)			
Number of ports that supp			19 bits		32 bits			
port multiplexer (UPMUX)				ected via software can be a				
Timers		1 100101010101						
Watchdog timer (WDT2)		Generates NM	II or watchdog timer	reset.				
			NMI/reset generation					
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						
16-bit timer (T16)		Alarm and stopwatch functions 4 channels						
		4 channels Generates the SPIA master clocks and the ADC12A trigger signal.						
16-bit PWM timer (T16B)		2 channels	SI IA MASLEI CIUCKS	and the ADOTZA thyger sig	nai.			
			/capture function					
				-				
		PWM waveform generation function Number of PWM output or capture input ports: 2 ports/channel						

24-pin PKG         32-pin PKG           Detection voitage         Vico or external voitage (one external voitage input port is provided and an external voitage level can be detected even if it exceeds Vico.)           Detection level         Vico: 28 levels (1.8 to 5.0 V/external voitage: 32 levels (1.2 to 5.0 V)           Other         Intermittent operation mode           Generates an interrupt or reset according to the detection level evaluation.           Serial interfaces         2 channels           UART (UART3)         2 channels           Baud-rate generator included, IrOA1.0 supported         Open drain output, signal polarity, and baud rate division ratio are configurable. Infrared communication carrier modulation output function           Synchronous serial interface (SPIA)         2 channels         2 to 16-bit variable data length           The 16-bit time (T16) can be used for the baud-rate generator in master mode.         PC (I2C) *1         1 channel           Baud-rate generator included         Sound generator (SNDA)         Baud-rate generator included           Buzer output function         512 Hz to 16 KHz output frequencies         One-shot output function           Orber shot output function         Dit kHz = C3 to C6         Duration:: T notes/rest (Half note/rest to thirty-second note/rest)           Tempo:         16 tempos (20 to 480)         Tempos:         Tempos:           Orber of conversion channels         1 chan	Madal		01017100/1100	C1017N01/N04	01017100/1405				
Supply voltage detector (SVD3)         Viso or external voltage input port is provided and an external voltage level can be detected even if it exceeds Viso.)           Detection level         Viso 28 levels (1.8 to 5.0 Vyettrand voltage 32 levels (1.2 to 5.0 V).           Other         Intermittent operation mode           Generates an interrupt or reset according to the detection level evaluation.         Eacl interfaces           UART (Variat)         2 channels:           Baud-ante generator included, IrDA1.0 supported         Oper drain voltage data points, and baud rate division ratio are configurable.           Oper drain voltage data points, and baud rate division ratio are configurable.         Detection level evaluation.           Synchronous serial Interface (SPIA)         2 channels:         Detection level evaluation.           Synchronous serial Interface (SPIA)         2 to 16-bit turner (T16) can be used for the baud-rate generator in master mode.           PG (ICC) <sup>-1</sup> 1 channel         Detection level         Detection level           Supported cancer (SNDA)         St2 Hz to 16 kHz output frequencies         Detection level         Detection level           Buzer output function         St2 Hz to 16 kHz a C3 to C6         Detection level         Detection level           Remote controller (REMC3)         Number of conversion function         Pattor in turbino         Detaction: nother/set to 16 for an application example.           Conv	Model		S1C17M20/M23	S1C17M21/M24	S1C17M22/M25				
Detection voltage         Visio or external voltage (one external voltage input port is provided and an external voltage invel port is provided and an external voltage inveloced is provided and and an external voltage inveloced is provided is provided and and an external voltage inveloced is	Supply voltage detector (	SVD3)							
level can be detected even if it exceeds Voc.)           Detection level         Voc. 28 levels (1, 2 to 5.0 V)           Other         Intermittent operation mode           Generates an interrupt or reset according to the detection level evaluation.           Strain interfaces         2 channels           Baud-rate generator included, iDA1.0 supported         Dependration output, signal polity and baud rate division ratio are configurable. Infrared communication carrier modulation output function           Synchronous serial interface (SPA)         2 channels           Baud-rate generator included         2 channels           Baud-rate generator included         2 channels           Baud-rate generator included         3 channel           Synchronous serial interface (SPA)         2 channels           Baud-rate generator included         3 channel           Caronetaion function         1 channel           Remote controller (REMC3)         1 channel           Number of transmitter channels         1 channel           Output inversion functi		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	VDD or external voltage (one externa	al voltage input port is provi	ded and an external voltage				
Other         Internitent operation mode           Serial interruptor         Generates an interruptor reset according to the detection level evaluation.           Serial interruptor         2 channels           Baud-rate generator included, IrDA1.0 supported         Open drain output, signal polarity, and baud rate division ratio are configurable.           Synchronous senial interface (SPIA)         2 channels           Synchronous senial interface (SPIA)         2 channels           Quart rate generator included         2 channels           Sound generator (SNDA)         Baud-rate generator included           Baud-rate generator included         Baud-rate generator included           Baud-rate generator included         Demetation rate design rate de									
Generates an interrupt or reset according to the detection level evaluation.           Scrial Interface           UART (UARTS)         2 channels           Baud-rate generator included, IrDA1.0 supported           Open drain output, signal polarity, and baud rate division ratio are configurable.           Infrared communication cartier modulation output function           Synchronous senial interface (SPIA)         2 channels           F(12C) <sup>-1</sup> 1 channel           CP (2C) <sup>-1</sup> 1 channel           Sound generator (SNDA)         2 bit 16-bit warable data length The 16-bit timer (ThIO) can be used for the baud-rate generator in master mode.           PC (2C) <sup>-1</sup> 1 channel           Sudd-rate generator included         312 Hz to 16 kHz actput frequencies           Orne-shot output function         One-shot output function to functive set to thirty-second note/rest)           Member of transmiter channels         1 channel           Remote controller (REMC3)         1 channel           Number of conversion nethod         1 channel           Conversion method         -           Conversion method         -           Conversion nethod         1 channel           Number of conversion channels         1 channel           Number of conversion channels         6 ports           Resolution	Detection level		VDD: 28 levels (1.8 to 5.0 V)/external	voltage: 32 levels (1.2 to 5.	0 V)				
Serial interfaces         2 channels           UART (UARTS)         2 channels           Bad/rate generator included, IrDA1.0 supported         Open drain orbuth, signal polarity, and bad rate division ratio are configurable.           Synchronous serial interface (SPIA)         2 channels           2 to 16-bit variable data length	Other			U	,				
UART (UARTS) 2 channels Baud-rate generator included, IrDA1.0 supported Open drain output, signal polarity, and baud rate division ratio are configurable. Infrared communication carrier modulation output function Synchronous serial interface (SPIA) 2 to 16-bit variable data length The 16-bit time (T16) can be used for the baud-rate generator in master mode. FC (ICO) <sup>-1</sup> 1 channel Baud-rate generator included, IrDA1.0 supported One-shot output function Differed controller (REMC3) Buzzer output function Differed controller (REMC3) Number of transmitter channels 1 channel Conversion channels 1 channel 1 channel 1 channel Conversion channels 1 channel 1 channel 1 channel 1 channel Conversion channels 1 channel 1 chane 1 channel 1 channel 1 channel 1 channel 1 channel 1 channel 1			Generates an interrupt or reset acco	ording to the detection level	evaluation.				
Baud-rate generator included, IF0A1.0 supported           Open drian output, signal polarity, and baud rate division ratio are configurable. Infrared communication carrier modulation output function           Synchronous serial interface (SPIA)         2 channels           Z to 16-bit variable data length         ————————————————————————————————————									
Open drain output, signal polarity, and baad rate division ratio are configurable. Infrared communication carrier modulation output function           Synchronous serial interface (SPIA)         2 channels           2 to 16-bit warable data length The 18-bit time (T16) can be used for the baad-rate generator in master mode.         PC (PC (2C) <sup>-1</sup> Bazd-rate generator included         Bazd-rate generator included           Sound generator (SNDA)         Deschort output function           Bluzd-rate generator included         One-shot output function           Melody generation function         Dite: 128 Hz to 16 KHz a C3 to C6 Duration: 7 notes/rests (Haff note/rest) to thry-second note/rest)           Terepos: 16 tempos (30 to 480)         Tereformer           Number of transmitter channels         1 channel           Output inversion function         File Conversion nethod           Recoversion channels         -           Windber of conversion channels         -           Supported sensore         2 obtosessive approximation type           To bit 1 Conversion channels         1 channel           Number of conversion channels <t< td=""><td>UART (UART3)</td><td></td><td></td><td></td><td></td></t<>	UART (UART3)								
Synchronous serial interface (SPIA) 2 channels 2 to 16-bit variable data length 7 to 16-bit variable data length 8 data length 7 to 16 to 10 data length 8 data length 7 to 16 to 10 data length 7 to 10 data length									
Synchronous serial interface (SPIA) Synchronous serial interface (SPIA) C (ZC) -1 C to 15-bit triange (TG) can be used for the baud-rate generator in master mode. PC (ZC) -1 C to 16-bit triange (TG) can be used for the baud-rate generator in master mode. PC (ZC) -1 C to 16 bit variable data length The 16-bit triange (TG) can be used for the baud-rate generator in master mode. PC (ZC) -1 C (ZC) -1 C to 16 bit variable data length The 16-bit triange (TG) can be used for the baud-rate generator in master mode. PC (ZC) -1 C					are configurable.				
2 to 16-bit variable data length         The 16-bit timer (T16) can be used for the baud-rate generator in master mode.         PC (I2C) **       1 channel.         Baud-rate generator included         Sound generator (SNDA)         Buzzer output function       51 2 Hz to 16 kHz output frequencies         Melody generation function       Pite to 16 kHz output frequencies         Melody generation function       Pite: 128 Hz to 16 kHz output frequencies         Mumber of transmitter channels       Output inversion function         Number of transmitter channels       1 channel         Conversion method       Successive approximation type         Resolution       12 bits         Number of conversion channels       1 channel         Number of conversion method       Successive approximation type         Resolution       12 bits         Number of conversion channels       1 channel         Number of applications       1 ports         Beset       1 beht n= 0 bit Ni (Vider (COPRO2)         Arithmetic functions       16-bit x 16-bit multiplier         16-bit x 16-bit nic 32-bit divider       8 ports<		(0.51.4.)		dulation output function					
PC (12C) ·1       1 channel         PC (12C) ·1       1 channel         Baud-rate generator included         Buzzer output function       512 Hz to 16 kHz a dynut frequencies         Melody generation function       Pitch::::::::::::::::::::::::::::::::::::	Synchronous serial interfac	e (SPIA)							
PC (RC) *1       1 channel         Baud-rate generator included         Sound generator (SNDA)         Buzzer output function       512 Hz to 16 kHz output frequencies         One-shot output function       Pitch: 128 Hz to 16 kHz = C3 to C6         Duration: 7 notes/rests (Haf note/rest to thirty-second note/rest)       Tempo: 16 tempos (30 to 480)         Tempo: 16 tempos (30 to 480)       To/s/s/max         Number of transmitter channels       1 channel         Conversion method       Pitch: 128 Hz or 6 kHz = C3 to C8         Output inversion function       CR oscillation type         R/F converter (RFC)       Output inversion function         Conversion method       -       CR oscillation type         Supported sensors       -       CR oscillation type         Supported sensors       1 channel       1 binameli)         Number of analog signal input ports       4 ports       6 ports       8 ports         Muthighter/duker (COPRO2)       -       -       CR oscillation unit       2 bin to 10					Secure ender ander				
Baud-rate generator included           Buzer output function         512 Hz to 16 MHz output frequencies           One-shot output function         One-shot output function           Melody generation function         Diration: 7 notes/rests (Half note/rest to thirty-second note/rest)           Tempo: 16 tempos (30 to 480)         The/siur may be specified.           IR remote controller (REMC3)         The/siur may be specified.           Number of transmitter channels         1 channel           Other         CR oscillation type           R* converter (RFC)         CR oscillation type           Conversion method         -           With 24-bit counters         2 channels (Up to two senso can be connected to each channel.)           Supported sensors         Successive approximation type           Resolution         12 bit x 16-bit multiplier           Number of conversion channels         16-bit x 16-bit multiplier           Number of analog signal input ports         4 ports [8 ports         8 ports           Multipler/divider (COPRO2)         Arithmetic functions         16-bit x 16-bit multiplier           Arithmetic functions         16-bit x 16-bit multiplier         16-bit x 16-bit multiplier           Horts / Beset when the reset pin is set to low.         Power on.         Power on.           Reset         Reset when the powe	120 (100) *1			for the baud-rate generator	In master mode.				
Sound generator (SNDA)           Buzer output function         51 Hz to 16 kHz output frequencies           One-shot output function         One-shot output function           Melody generation function         Pitch: Itempos: 16 lempos (30 to 460)           Tieris/sur may be specified.           Number of transmitter channels         1 channel           Other         EL lamp drive waveform can be generated for an application example. Output inversion function           Order statistics         -           Order statistics         -           Conversion method         -           Number of transmitter channels         -           Output inversion function         2 channels (Up to two senso can be connected to each channel).           Supported sensors         -           Supported sensors         1 channel           Number of conversion channels         6 ports           Number of conversion channels         6 ports           Number of analg signal input ports         4 ports           Supported sensors         1 channel           Number of analg signal input ports         4 ports           16-bit x 16-bi	1 <sup>2</sup> C (12C) **								
Buzze output function S12 Hz to 16 kHz output frequencies One-shot output function One-shot output function	Sound gonorotor (SNDA)		Baud-rate generator included						
One-shot output function         Pitch:           Melody generation function         Pitch:         12 RHz 10 RHz 23 to C6           Duration: 7 notes/rests (Half note/rest to thirty-second note/rest)         Tempo:         16 tempos (30 to 480)           Tierabu: may be specified.         Immediate the specified.         Immediate the specified.           Remote controller (REMC3)         Immediate the specified.         Immediate the specified.           With P4-bit counters         I channel         Immediate the specified.           Conversion method         Immediate the specified.         Immediate the specified.           Number of conversion channels         Immediate the specified the specint specified the specified the specified the specified			512 Hz to 16 kHz output froquencie						
Melody generation function         Pitch:         128 Hz to 16 kHz = C3 to C6           Duration: 7. notes/resist (half note/rest to thirty-second note/rest)         Image: Tempo:         16 tempos (30 to 480)           IR remote controller (REMC3)         Tiel/situr may be specified.         Controller           Number of transmitter channels         1 channel         Conversion function         Conversion example.           Other         Cutput inversion function         CR oscillation type         CR oscillation type           Conversion method         -         CR oscillation type         Can be connected to each channels.           Number of conversion channels         -         CR oscillation type         Can be connected to each channel.           Number of conversion method         Successive approximation type         Resolution         B ports         B ports           Number of analog signal input ports         4 ports         6 ports         B ports         B ports           Multiplier/divider (COPRO2)         I 6-bit x 16-bit x 16-bit multiplier         If 6-bit x 16-bit x 1									
Duration: 7 notes/rests (Half note/rest to thirty-second note/rest)           Tempo:         16 tempos (30 to 480)           Tie/slur may be specified.         Tie/slur may be specified.           Number of transmitter channels         1 channel           Other         EL lamp drive waveform can be generated for an application example.           Output inversion function         Other           R/F converter (RFC)         Conversion method           Conversion method         -           Supported sensors         DC- bias resistive sensors           Conversion method         Successive approximation type           Resolution         12 bits           Number of conversion channels         1 channel           Number of conversion channels         1 channel           Number of conversion channels         1 channel           Number of analog signal input ports         4 ports         6 ports         8 ports           Mutipier/divider (COPRO2)         16-bit x 16-bit multipier         16-bit x 32-bit multiply and accumulation unit           Reset         -         Reset when the reset pin is set to low.           Power on reset         Reset when the PO0 to P01/PO2/PO2 keys are pressed simultaneously (can be enabled/disabled using a register).           Rower on reset         Reset when the watchdog timer overflows (can be enabled/disabled u	Melody generation function			C6					
Tempo: 16 tempos (30 to 480)         IR remote controller (REMC3)         Number of transmitter channels       1 channel         Other       EL lamp drive waveform can be generated for an application example. Output inversion function         RF converter (RFC)       CR oscillation type with 24-bit counters 2 channels (Up to two sense can be connected to each channel.)         Number of conversion channels       -       CR oscillation type with 24-bit counters 2 channels (Up to two sense can be connected to each channel.)         Supported sensors       -       CD-bias resistive sensors         2 bit AD converter (ADC12A)       -       -         Conversion method       12 bits       -         Number of conversion channels       1 channel       -         Number of analog signal input ports       4 ports       6 ports         Multiplier/divider COPROD       -       -       -         Arithmetic functions       16-bit x16-bit multiplier       -       -         16-bit x 16-bit a-2-bit divider       -       -       -         Reset       -       -       -       -         Authplier/divider COPROD       -       -       -       -         Authplier/divider COPROD       -       -       -       -         Authplier       -	mology generation function				t)				
Terfeatur may be specified.         IR remote controller (REMC3)         Number of transmitter channels       1 channel         Other       EL lamp drive waveform can be generated for an application example. Output inversion function         RF converter (RFC)       -         Conversion method       -         Supported sensors       -         Supported sensors       -         Conversion method       Successive approximation type         Resolution       12 bits         Number of conversion channels       -         Ornversion method       Successive approximation type         Resolution       12 bits         Number of conversion channels       6 ports         Multiplier/divider (COPRO2)       Antimetic functions         Antimetic functions       16-bit × 16-bit multiplier         10-bit × 16-bit + 32-bit multiply and accumulation unit       32-bit - 32-bit multiply and accumulation unit         32-bit × 16-bit + 32-bit multiply and accumulation unit       32-bit - 32-bit multiply and accumulation unit         32-bit × 16-bit + 32-bit multiply and accumulation unit       32-bit - 32-bit multiply and accumulation unit         32-bit × 16-bit + 32-bit multiply and accumulation unit       32-bit - 32-bit multiply and accumulation unit         32-bit × 16-bit + 32-bit multiply       Beset when the power supp									
IR remote controller (REMC3)         Number of transmitter channels       1 channel         Other       EL lamp drive waveform can be generated for an application example. Output inversion function         R/F converter (RFC)       -         Conversion method       -         Number of conversion channels       -         Supported sensors       2 channels (Up to two senso channels)         2 bit A/D converter (ADC12A)       DC-bias resistive sensors         2 bit A/D converter (ADC12A)       Successive approximation type         Resolution       12 bits         Number of conversion channels       1 channel         Number of conversion channels       1 channel         Number of conversion channels       1 channel         Number of analog signal input ports       4 ports       6 ports         Multiplier/divider (COPROPC)       4 ports       8 ports         Arithmetic functions       16-bit x 16-bit multiplier       8 ports         16-bit x 16-bit x 14-bit x 14-bit x 14-bit x 16-bit									
Number of transmitter channels         1 channel           Other         EL lamp drive waveform can be generated for an application example. Output inversion function <i>RI</i> convertion (RFC)         CR oscillation type           Conversion method         -           Supported sensors         -           12-bit <i>AD</i> conversion channels         -           Supported sensors         -           12-bit <i>AD</i> conversion channels         Successive approximation type           Resolution         12 bits           Number of conversion channels         1 channel           Number of analog signal input ports         4 ports           16-bit x 16-bit + 32-bit multiplier         -           Multiplier/divider (COPRO2)         -           Arithmetic functions         16-bit x 16-bit + 32-bit multiply and accumulation unit           32-bit x 16-bit x 16-bit + 32-bit multiply and accumulation unit         -           32-bit x 16-bit x 16-bit + 32-bit multiply and accumulation unit         -           32-bit x 16-bit x 16-bit + 32-bit multiply and accumulation unit         -           32-bit divider         -         - <i>Reset</i> Reset when the reset pin is set to low.         -           Power-on reset         Reset when the supply voltage drops.         -	IR remote controller (REM	IC3)							
R/F convertion method       -       CR oscillation type with 24-bit counters         Number of conversion channels       -       CR oscillation type with 24-bit counters         Supported sensors       -       2 channels (Up to two senso can be connected to each channel).         Supported sensors       -       -         12-bit A/D conversion famility       5000000000000000000000000000000000000		,	1 channel						
R/F convertion method       -       CR oscillation type with 24-bit counters         Number of conversion channels       -       CR oscillation type with 24-bit counters         Supported sensors       -       2 channels (Up to two senso can be connected to each channel).         Supported sensors       -       -         12-bit A/D conversion famility       5000000000000000000000000000000000000	Other		EL lamp drive waveform can be ger	nerated for an application ex	kample.				
R/F converter (RFC)       CR oscillation type with 24-bit counters         Conversion method       2 channels (Up to two senso can be connected to each channel.)         Supported sensors       2 channels (Up to two senso can be connected to each channel.)         12-bit A/D converter (ADC12A)       DC-bias resistive sensors         Conversion method       12 bits         Number of conversion channels       1 channel         Number of conversion channels       1 channel         Number of analog signal input ports       4 ports       6 ports         Mutiplier/divider (COPRO2)       I6-bit x 16-bit multiplier         Arithmetic functions       16-bit x 16-bit multiplier         16-bit x 16-bit x 16-bit multiplier       32-bit + 32-bit multiplier         Reset       16-bit x 16-bit with 92-bit multiplier         Reset to power on.       Brownout reset       Reset when the reset pin is set to low.         Power-on reset       Reset when the reset pin is set to low.         Powerset       Reset when the Pool to P01/P02/P03 keys are pressed simultaneously (can be enabled/disabled using a register).         Watchdog timer reset       Reset when the supply voltage detector detects the set voltage level (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). </td <td></td> <td></td> <td></td> <td></td> <td>•</td>					•				
Number of conversion channels       with 24-bit counters         Supported sensors       2 channels (Up to two sensor can be connected to each channel.) <b>12-bit</b> A/D converter (ADC12A)       DC-bias resistive sensors <b>12-bit</b> A/D converter (ADC12A)       DC-bias resistive sensors <b>12-bit</b> A/D converter (ADC12A)       Execution         Conversion method       12 bits         Number of conversion channels       1 channel         Number of analog signal input ports       4 ports <b>Multiplier/divider (COPRO2)</b> If-bit x 16-bit multiplier         Arithmetic functions       16-bit x 16-bit multiplier         16-bit x 16-bit multiplier       16-bit x 16-bit multiplier         18-bit x 16-bit multiplier       16-bit x 16-bit multiplier         18-bit x 16-bit multiplier       16-bit x 16-bit multiplier         18-bit x 16-bit multiplier       16-bit x 16-bit multiplier         19-bit x 16-bit multiplier       18-bit x 16-bit multiplier         19-bit x 16-bit multiplier       18-bit x 16-bit multiplier         19-bit x 16-bit multiplier       18-bit x 16-bit multiplier         19-bit x 16-bit multiplier       19-bit x 16-bit multiplier         19-bit x 16-bit multiplier       19-bit x 16-bit multiplier         19-bit x 16-bit multiplier       19-bit x 16-bit multiplier <tr< td=""><td>R/F converter (RFC)</td><td></td><td></td><td></td><td></td></tr<>	R/F converter (RFC)								
Number of conversion channels       2 channels (Up to two sensors can be connected to each channel.)         Supported sensors       DC-bias resistive sensors         12-bit A/D converter (ADC12A)       Conversion method         Conversion method       Successive approximation type         Resolution       12 bits         Number of conversion channels       1 channel         Number of conversion channels       1 channel         Number of analog signal input ports       4 ports       6 ports         Multiplier/divider (COPRO2)       To-bit × 16-bit + 32-bit multiplier         Arithmetic functions       16-bit × 16-bit + 32-bit multiply and accumulation unit 32-bit + 32-bit divider         Reset       #Reset at power on.         Brownout reset       Reset at power on.         Brownout reset       Reset when the power supply voltage drops.         Key entry 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).         Non-maskable interrupt       4 systems (Reset, address misaligned interrupt, debug, NMI)         Programmable interrupt       17 systems (8 levels)         Programmable interrupt       1.8 to 5.5 V         Voo operating voltage for Flash	Conversion method		-		CR oscillation type				
Supported sensors       can be connected to each channel.)         Supported sensors       DC-bias resistive sensors         12-bit A/D converter (ADC12A)       Conversion method         Conversion method       Successive approximation type         Resolution       12 bits         Number of conversion channels       1 channel         Reset       16-bit x 16-bit multiplier         Arithmetic functions       16-bit x 16-bit multiplier         Reset       Reset when the reset pin is set to low.         Power-on reset       Reset when the PO0 to P01/P02/P03 keys are pressed simultaneously (can be enabled/disable/ disable/ disabled using a register).         Supply voltage detector reset       Reset when the watchdog timer overflows (can be enabled/disabled using a register).         Non-maskable interrupt       4 systems (Reset, address misaligned interrupt, debug, NMI)					with 24-bit counters				
Supported sensors         channel.)           Supported sensors         DC-bias resistive sensors           12-bit A/D converter (ADC12A)         Conversion method         Successive approximation type           Resolution         12 bits         Number of conversion channels         1 channel           Number of conversion channels         1 channel         8 ports           Multiplier/divider (COPRO2)         4 ports         6 ports         8 ports           Arithmetic functions         16-bit × 16-bit multiplier         16-bit × 16-bit + 32-bit multiply and accumulation unit           32-bit 32-bit 32-bit divider         8 ports         8           Power-on reset         Reset when the reset pin is set to low.         9           Power-on reset         Reset when the power supply voltage drops.         8           Key entry reset         Reset when the PO0 to P01/P02/P03 keys are pressed simultaneously (can be enabled/disabled using a register).           Supply voltage detector 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).           Non-maskable interrupt         4 systems (Reset, address misaligned interrupt, debug, NMI)           Programmable interrupt         4 systems (8 levels)	Number of conversion char	nels			2 channels (Up to two sensors				
Supported sensors         DC-bias resistive sensors           12-bit A/D converter (ADC12A)         Conversion method         Successive approximation type           Resolution         12 bits         1 channel         Number of conversion channels         1 channel           Number of analog signal input ports         4 ports         6 ports         8 ports         8 ports           Multiplier/divider (COPRO2)         16-bit × 16-bit multiplier         16-bit × 16-bit + 32-bit multiplier         16-bit × 16-bit + 32-bit multiplier           Arithmetic functions         16-bit × 16-bit + 32-bit divider         8         8           #RESET pin         Reset when the reset pin is set to low.         8         8           Power-on reset         Reset when the Power supply voltage drops.         8         8           Key entry reset         Reset when the Power supply voltage drops.         8         8           Supply voltage detector reset         Reset when the watchdog timer overflows (can be enabled/disabled using a register).         8           Non-maskable interrupt         4 systems (Reset, address misaligned interrupt, debug, NMI)         19 systems (8 levels)           Programmable interrupt         4 systems (8 levels)         19 systems (8 levels)         19 systems (8 levels)           Porgramming         2.4 to 5.5 V (When VPP (7.5 V) is supplied externally)									
12-bit A/D converter (ADC12A)       Successive approximation type         Conversion method       Successive approximation type         Resolution       12 bits         Number of conversion channels       1 channel         Number of conversion channels       1 channel         Number of analog signal input ports       4 ports       6 ports         Multiplier/divider (COPRO2)       Arithmetic functions       16-bit x 16-bit + 32-bit multiply and accumulation unit         32-bit + 32-bit divider       32-bit + 32-bit divider       8         Reset       Reset when the reset pin is set to low.       9         Power-on reset       Reset when the power supply voltage drops.       8         Key entry reset       Reset when the PO0 to P01/P02/P03 keys are pressed simultaneously (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).         Supply voltage detector reset       Reset when the supply voltage detector detects the set voltage level (can be enabled/disabled using a register).         Non-maskable interrupt       4 systems (Reset, address misaligned interrupt, debug, NMI)         Programmable interrupt       4 systems (Reset, address misaligned interrupt, debug, NMI)         Programmable interrupt       4 systems (8 levels)       19 systems (8 levels)					,				
Conversion method       Successive approximation type         Resolution       12 bits         Number of conversion channels       1 channel         Number of analog signal input ports       4 ports       6 ports       8 ports         Multiplier/divider (COPRO2)       I6-bit x 16-bit multiplier       8 ports         Arithmetic functions       16-bit x 16-bit multiplier       16-bit x 16-bit x 16-bit multiplier         16-bit x 16-bit x 16-bit multiplier       16-bit x 16-bit x 16-bit multiplier       16-bit x 16-bit x 16-bit x 16-bit multiplier         Reset       16-bit x 16-bit x 16-bit multiplier       16-bit x 16-bit x 16-bit x 16-bit multiplier       16-bit x 16-bit x 16-bit x 16-bit x 16-bit multiplier         Reset       16-bit x 16-bit x 16-bit multiplier       16-bit x					DC-bias resistive sensors				
Resolution       12 bits       1         Number of conversion channels       1 channel         Number of analog signal input ports       4 ports       6 ports         Muttiplier/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         Power-on reset       Reset then the reset pin is set to low.         Power-on reset       Reset when the power supply voltage drops.         Key entry reset       Reset when the PO0 to P01/P02/P03 keys are pressed simultaneously (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).         Supply voltage detector reset       Reset, address misaligned interrupt, debug, NMI)         Programmable interrupt       4 systems (Reset, address misaligned interrupt, debug, NMI)         Programmable interrupt       4 systems (8 levels)         Poorer supply voltage       1.8 to 5.5 V         Vob operating voltage       1.8 to 5.5 V         Vob operating voltage for Flash       2.4 to 5.5 V (When VPP (7.5 V) is supplied externally)         Operating temperature range       -40 to 85°C         Current c		;12A)							
Number of conversion channels       1 channel         Number of analog signal input ports       4 ports       6 ports       8 ports         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       32-bit + 32-bit divider         Reset       #RESET pin       Reset when the reset pin is set to low.         Power-on reset       Reset at power on.       8         Brownout reset       Reset when the PO0 to P01/P02/P03 keys are pressed simultaneously (can be enabled/disabled using a register).         Key entry 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       4 systems (Reset, address misaligned interrupt, debug, NMI)         Programmable interrupt       4 systems (8 levels)         Interrupt       17 systems (8 levels)         Vob operating voltage       1.8 to 5.5 V         Vob operating voltage for Flash       2.4 to 5.5 V (When VPP (7.5 V) is supplied externally)         Operating temperature Operating temperature range       -40 to 85°C         Current consumption (typ, value)       0.36 µA         SLEEP mod									
Number of analog signal input ports       4 ports       6 ports       8 ports         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         Power-on reset         Brownout reset         Reset when the power supply voltage drops.         Key entry reset         Breaded using a register).         Watchdog timer reset         Reset when the supply voltage detector reset         Reset when the supply voltage detector detects the set voltage level (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       4 systems (Reset, address misaligned interrupt, debug, NMI)         Programmable interrupt       4 systems (8 levels)         Internal int. 1 system (8 levels)       19 systems (8 levels)         Power supply voltage       1.8 to 5.5 V         Vob operating voltage for Flash       2.4 to 5.5 V (When VPP (7.5 V) is supplied externally)         Operating temperature       2.4 to 5.5 V (When VPP is generated internally)         Operating temperature range       -40 to 85°C									
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 when the power supply voltage drops.         Key entry reset       Reset when the PO0 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       A systems (Reset, address misaligned interrupt, debug, NMI)         Programmable interrupt       4 systems (Reset, address misaligned interrupt, debug, NMI)         Programmable interrupt       4 systems (8 levels)         Interral int.       1 system (8 levels)         Vob operating voltage       1.8 to 5.5 V         Vob operating voltage for Flash       2.4 to 5.5 V (When VPP (7.5 V) is supplied externally)         Operating temperature       -40 to 85°C         Current consumption (typ. value)       0.36 µA         IOSC = OFF, OSC1 = OFF, OSC3 = OFF         HALT mode       0.7 µA    <					9 porto				
Arithmetic functions       16-bit × 16-bit multiplier         16-bit × 16-bit multiplier       16-bit × 16-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 when the power supply voltage drops.         Key entry reset       Reset when the PO0 to P01/P02/P03 keys are pressed simultaneously (can be enabled/disabled using a register).         Watchdog timer reset       Reset when the supply voltage detector detects the set voltage level (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       4 systems (Reset, address misaligned interrupt, debug, NMI)         Programmable interrupt       4 systems (Reset, address misaligned interrupt, debug, NMI)         Programmable interrupt       4 systems (Reset, address misaligned interrupt, debug, NMI)         Programmable interrupt       1 system (8 levels)         Interrupt       2.4 to 5.5 V         Vob operating voltage       1.8 to 5.5 V         Vob operating temperature range       -40 to 85°C         Operating temperature range       -40 to 85°C         Current consumption (typ. value)       0.36 µA         IOSC = OFF, OSC1 = OFF,			14 ports 16 ports		18 ports				
16-bit × 16-bit + 32-bit multiply and accumulation unit         32-bit + 32-bit divider <b>Reset</b> #RESET pin       Reset when the reset pin is set to low.         Power-on reset       Reset at power on.         Brownout reset       Reset when the power supply voltage drops.         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 supply voltage detector detects the set voltage level (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       4 systems (Reset, address misaligned interrupt, debug, NMI)         Programmable interrupt       4 systems (Reset, address misaligned interrupt, debug, NMI)         Programmable interrupt       1 system (8 levels)         Internal int. 1 systems (8 levels)       19 systems (8 levels)         Vob operating voltage       1.8 to 5.5 V         Vob operating voltage for Flash       2.4 to 5.5 V (When VPP (7.5 V) is supplied externally)         Operating temperature range       -40 to 85°C         Current consumption (typ. value)       SLEEP mode *2         SLEEP mode *2       0.36 µA         IOSC = OFF, OSC1 = OFF, OSC3 = OFF		(2)	16 bit v 16 bit multiplier						
32-bit 4 32-bit divider         Reset         Reset when the reset pin is set to low.         Power-on reset       Reset at power on.         Brownout reset       Reset when the power supply voltage drops.         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 supply voltage detector detects the set voltage level (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       Reset when the supply voltage detector detects the set voltage level (can be enabled/disabled using a register).         Non-maskable interrupt       4 systems (Reset, address misaligned interrupt, debug, NMI)         Programmable interrupt       4 systems (8 levels)         Internal int. 17 systems (8 levels)       19 systems (8 levels)         Power supply voltage       1.8 to 5.5 V         Vob operating voltage for Flash       2.4 to 5.5 V (When VPP (7.5 V) is supplied externally)         Operating temperature range       -40 to 85°C         Current consumption (typ. value)       0.36 µA         SLEEP mode *2       0.36 µA         IOSC = OFF, OSC1 = OFF, OSC3 = OFF         HALT mode <td< td=""><td></td><td></td><td></td><td></td><td></td></td<>									
Reset         #RESET pin       Reset when the reset pin is set to low.         Power-on reset       Reset at power on.         Brownout reset       Reset when the power supply voltage drops.         Key entry reset       Reset when the P00 to P01/P02/P03 keys are pressed simultaneously (can be enabled/dis- abled 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).         Non-maskable interrupt       4 systems (Reset, address misaligned interrupt, debug, NMI)         Programmable interrupt       4 systems (8 levels)         Interrupt       17 systems (8 levels)         Vob operating voltage       1.8 to 5.5 V         Vob operating voltage for Flash       2.4 to 5.5 V (When VPP (7.5 V) is supplied externally)         programming       2.4 to 5.5 V (When VPP is generated internally)         Operating temperature range       -40 to 85°C         Current consumption (typ. value)       0.36 µA         SLEP mode *2       0.36 µA         IOSC = OFF, OSC1 = OFF, OSC3 = OFF         HALT mode       0.7 µA									
#RESET pin       Reset when the reset pin is set to low.         Power-on reset       Reset at power on.         Brownout reset       Reset when the power supply voltage drops.         Key entry reset       Reset when the PO0 to P01/P02/P03 keys are pressed simultaneously (can be enabled/dis- abled 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       4 systems (Reset, address misaligned interrupt, debug, NMI)         Programmable interrupt       4 systems (Reset, address misaligned interrupt, debug, NMI)         Programmable interrupt       4 systems (8 levels)         Internal int. 1 system (8 levels)       19 systems (8 levels)         Vob operating voltage       1.8 to 5.5 V         Vob operating voltage for Flash       2.4 to 5.5 V (When VPP (7.5 V) is supplied externally)         programming       2.4 to 5.5 V (When VPP (7.5 V) is supplied externally)         Operating temperature range       -40 to 85°C         Current consumption (typ. value)       0.36 µA         IOSC = OFF, OSC1 = OFF, OSC3 = OFF       IOSC = OFF, OSC1 = OFF, OSC3 = OFF         HALT mode       0.7 µA	Reset								
Power-on reset       Reset at power on.         Brownout reset       Reset when the power supply voltage drops.         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       4 systems (Reset, address misaligned interrupt, debug, NMI)         Programmable interrupt       4 systems (Reset, address misaligned interrupt, debug, NMI)         Programmable interrupt       1 system (8 levels)         Internal int.       1 systems (8 levels)         Internal int.       1 systems (8 levels)         Vob operating voltage       1.8 to 5.5 V         Vob operating voltage for Flash       2.4 to 5.5 V (When VPP (7.5 V) is supplied externally)         programming       2.4 to 5.5 V (When VPP is generated internally)         Operating temperature       -40 to 85°C         Current consumption (typ. value)       0.36 μA         IOSC = OFF, OSC1 = OFF, OSC3 = OFF       0.7 μA			Reset when the reset nin is set to b	)W.					
Brownout reset       Reset when the power supply voltage drops.         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       Reset when the supply voltage detector detects the set voltage level (can be enabled/disabled using a register).         Interrupt       4 systems (Reset, address misaligned interrupt, debug, NMI)         Programmable interrupt       External int. 1 system (8 levels)         Internal int.       17 systems (8 levels)         Vob operating voltage       1.8 to 5.5 V         Vob operating voltage for Flash       2.4 to 5.5 V (When VPP (7.5 V) is supplied externally)         programming       2.4 to 5.5 V (When VPP is generated internally)         Operating temperature       -40 to 85°C         Current consumption (typ. value)       0.36 μA         SLEEP mode *2       0.36 μA         IOSC = OFF, OSC1 = OFF, OSC3 = OFF         HALT mode       0.7 μA									
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       Reset when the supply voltage detector detects the set voltage level (can be enabled/disabled using a register).         Non-maskable interrupt       4 systems (Reset, address misaligned interrupt, debug, NMI)         Programmable interrupt       External int. 1 system (8 levels)         Internal int.       17 systems (8 levels)         Internal voltage       1.8 to 5.5 V         Vob operating voltage for Flash       2.4 to 5.5 V (When VPP (7.5 V) is supplied externally)         operating temperature       2.4 to 5.5 V (When VPP is generated internally)         Operating temperature range       -40 to 85°C         Current consumption (typ. value)       0.36 μA         IOSC = OFF, OSC1 = OFF, OSC3 = OFF       IOSC = OFF, OSC1 = OFF, OSC3 = OFF         HALT mode       0.7 μA				ge drops.					
abled 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       Reset when the supply voltage detector detects the set voltage level (can be enabled/disabled using a register).         Interrupt       4 systems (Reset, address misaligned interrupt, debug, NMI)         Programmable interrupt       External int. 1 system (8 levels)         Internal int.       17 systems (8 levels)         Internal int.       17 systems (8 levels)         Vob operating voltage       1.8 to 5.5 V         Vob operating voltage for Flash       2.4 to 5.5 V (When VPP (7.5 V) is supplied externally)         programming       2.4 to 5.5 V (When VPP is generated internally)         Operating temperature range       -40 to 85°C         Current consumption (typ. value)       SLEEP mode *2         SLEEP mode *2       0.36 μA IOSC = OFF, OSC1 = OFF, OSC3 = OFF         HALT mode       0.7 μA									
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       4 systems (Reset, address misaligned interrupt, debug, NMI)         Programmable interrupt       4 systems (Reset, address misaligned interrupt, debug, NMI)         Programmable interrupt       External int. 1 system (8 levels)         Internal int.       17 systems (8 levels)         Internal int.       17 systems (8 levels)         Vob operating voltage       1.8 to 5.5 V         Vob operating voltage for Flash       2.4 to 5.5 V (When VPP (7.5 V) is supplied externally)         operating temperature       Operating temperature range         -40 to 85°C       C         Current consumption (typ. value)       0.36 µA         SLEEP mode *2       0.36 µA         IOSC = OFF, OSC1 = OFF, OSC3 = OFF         HALT mode       0.7 µA									
Supply voltage detector reset       Reset when the supply voltage detector detects the set voltage level (can be enabled/disabled using a register).         Interrupt       4 systems (Reset, address misaligned interrupt, debug, NMI)         Programmable interrupt       4 systems (Reset, address misaligned interrupt, debug, NMI)         Programmable interrupt       External int. 1 system (8 levels)         Internal int.       17 systems (8 levels)         Internal voltage       1.8 to 5.5 V         Vob operating voltage for Flash       2.4 to 5.5 V (When VPP (7.5 V) is supplied externally)         programming       2.4 to 5.5 V (When VPP is generated internally)         Operating temperature       -40 to 85°C         Current consumption (typ. value)       0.36 µA         SLEEP mode *2       0.36 µA         IOSC = OFF, OSC1 = OFF, OSC3 = OFF         HALT mode       0.7 µA	Watchdog timer reset			erflows (can be enabled/dis	abled using a register).				
Interrupt       4 systems (Reset, address misaligned interrupt, debug, NMI)         Programmable interrupt       External int. 1 system (8 levels)         Internal int.       17 systems (8 levels)         Power supply voltage       1.8 to 5.5 V         VDD operating voltage for Flash       2.4 to 5.5 V (When VPP (7.5 V) is supplied externally)         programming       2.4 to 5.5 V (When VPP is generated internally)         Operating temperature       -40 to 85°C         Current consumption (typ. value)       0.36 μA         SLEEP mode *2       0.36 μA         HALT mode       0.7 μA	•	set	Reset when the supply voltage detector detects the set voltage level (can be enabled/disabled						
Non-maskable interrupt       4 systems (Reset, address misaligned interrupt, debug, NMI)         Programmable interrupt       External int.       1 system (8 levels)         Internal int.       17 systems (8 levels)       19 systems (8 levels)         Power supply voltage       1.8 to 5.5 V       19 systems (8 levels)         Vob operating voltage for Flash       2.4 to 5.5 V (When VPP (7.5 V) is supplied externally)       2.4 to 5.5 V (When VPP is generated internally)         Operating temperature       -40 to 85°C       -40 to 85°C         Current consumption (typ. value)       SLEEP mode *2       0.36 μA         IOSC = OFF, OSC1 = OFF, OSC3 = OFF       0.7 μA			using a register).		-				
Programmable interrupt       External int.       1 system (8 levels)         Internal int.       17 systems (8 levels)       19 systems (8 levels)         Power supply voltage       1.8 to 5.5 V       VDD operating voltage for Flash       2.4 to 5.5 V (When VPP (7.5 V) is supplied externally)         VDD operating temperature       2.4 to 5.5 V (When VPP is generated internally)       0         Operating temperature range       -40 to 85°C         Current consumption (typ. value)       0.36 μA         SLEEP mode *2       0.36 μA         HALT mode       0.7 μA	Interrupt								
Internal int.       17 systems (8 levels)       19 systems (8 levels)         Power supply voltage       1.8 to 5.5 V         Vob operating voltage for Flash       2.4 to 5.5 V (When VPP (7.5 V) is supplied externally)         programming       2.4 to 5.5 V (When VPP is generated internally)         Operating temperature       -40 to 85°C         Current consumption (typ. value)       -40 to 85°C         SLEEP mode *2       0.36 μA         IOSC = OFF, OSC1 = OFF, OSC3 = OFF         HALT mode       0.7 μA				ed interrupt, debug, NMI)					
Power supply voltage       1.8 to 5.5 V         Vob operating voltage for Flash       2.4 to 5.5 V (When VPP (7.5 V) is supplied externally)         programming       2.4 to 5.5 V (When VPP is generated internally)         Operating temperature       -40 to 85°C         Current consumption (typ. value)       0.36 μA         SLEEP mode *2       0.36 μA         HALT mode       0.7 μA									
VDD operating voltage       1.8 to 5.5 V         VDD operating voltage for Flash       2.4 to 5.5 V (When VPP (7.5 V) is supplied externally)         programming       2.4 to 5.5 V (When VPP is generated internally)         Operating temperature       0         Operating temperature range       -40 to 85°C         Current consumption (typ. value)       0.36 μA         SLEEP mode *2       0.36 μA         IOSC = OFF, OSC1 = OFF, OSC3 = OFF         HALT mode       0.7 μA		Internal int.	17 systems (8 levels)		19 systems (8 levels)				
Vob operating voltage for Flash programming       2.4 to 5.5 V (When VPP (7.5 V) is supplied externally)         Operating temperature       2.4 to 5.5 V (When VPP is generated internally)         Operating temperature range       -40 to 85°C         Current consumption (typ. value)       0.36 μA         SLEEP mode *2       0.36 μA         IOSC = OFF, OSC1 = OFF, OSC3 = OFF         HALT mode       0.7 μA									
programming       2.4 to 5.5 V (When VPP is generated internally)         Operating temperature       Operating temperature range         -40 to 85°C       -40 to 85°C         Current consumption (typ. value)       0.36 μA         SLEEP mode *2       0.36 μA         IOSC = OFF, OSC1 = OFF, OSC3 = OFF         HALT mode       0.7 μA	VDD operating voltage								
Operating temperature           Operating temperature range         -40 to 85°C           Current consumption (typ. value)         0.36 μA           SLEEP mode *2         0.36 μA           IOSC = OFF, OSC1 = OFF, OSC3 = OFF           HALT mode         0.7 μA		ash							
Operating temperature range         -40 to 85°C           Current consumption (typ. value)	VDD operating voltage for F		2.4 to 5.5 V (When VPP is generated)	internally)					
Current consumption (typ. value)           SLEEP mode *2         0.36 μA           IOSC = OFF, OSC1 = OFF, OSC3 = OFF           HALT mode         0.7 μA	VDD operating voltage for F programming								
SLEEP mode *2         0.36 μA           IOSC = OFF, OSC1 = OFF, OSC3 = OFF           HALT mode         0.7 μA	VDD operating voltage for F programming <b>Operating temperature</b>		40.10.0500						
IOSC = OFF, OSC1 = OFF, OSC3 = OFF           HALT mode         0.7 μA	VDD operating voltage for F programming <b>Operating temperature</b> Operating temperature rang		-40 to 85°C						
HALT mode 0.7 µA	VDD operating voltage for F programming <b>Operating temperature</b> Operating temperature rang <b>Current consumption (typ</b>								
	VDD operating voltage for F programming <b>Operating temperature</b> Operating temperature rang <b>Current consumption (typ</b>		0.36 µA	OEE					
	VDD operating voltage for F programming Operating temperature Operating temperature rang Current consumption (typ SLEEP mode *2		0.36 μA IOSC = OFF, OSC1 = OFF, OSC3 =	OFF					

Model	S1C17	M20/M23	S1C17M21/M24	S1C17M22/M25
	24-pin PKG	32-pin PKG		
Current consumption (typ. va	lue)			
RUN mode	5 µA			
	OSC1 = 32.768	3 kHz (crystal os	cillator), RTC = ON, CPU = OS	SC1
	160 µA			
	OSC3 = 1 MHz	(ceramic oscillat	or), OSC1 = 32.768 kHz (crysta	al oscillator), RTC = ON, CPU =
	OSC3			
Shipping form				
Package *3	SQFN4-24PIN	SQFN5-32PIN	TQFP12-32PIN	TQFP12-48PIN
	(P-VQFN024-	(P-VQFN032-	(P-TQFP032-0707-0.80,	(P-TQFP048-0707-0.50,
	0404-0.50,	0505-0.50,	7 × 7 mm, t = 1.2 mm,	7 × 7 mm, t = 1.2 mm,
	4 × 4 mm,	5 × 5 mm,	0.8 mm pitch)	0.5 mm pitch)
	t = 1 mm,	t = 1 mm,		
	0.5 mm pitch)	0.5 mm pitch)		

\*1 The input filter in I2C (SDA and SCL inputs) does not comply with the standard for removing noise spikes less than 50 ns.

\*2 The RAM retains data even in SLEEP mode.

\*3 Shown in parentheses are JEITA package names.

## BLOCK DIAGRAM



\* The pin configuration and peripheral circuit function depends on the model. For more information, refer to "PIN DESCRIPTIONS."

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## PIN CONFIGURATION DIAGRAMS

### S1C17M20/M23 Pin Configuration Diagram (SQFN4-24PIN)



### S1C17M20/M23 Pin Configuration Diagram (SQFN5-32PIN)



### S1C17M21/M24 Pin Configuration Diagram (TQFP12-32PIN)



### S1C17M22/M25 Pin Configuration Diagram (TQFP12-48PIN)



## ■ 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).

		0
I/O:	I	= Input
	0	= Output
	I/O	= Input/output
	Р	= Power supply
	А	= Analog signal
	Hi-Z	= High impedance state
Initial state:	l (Pull-up)	= Input with pulled up
	l (Pull-dowr	n) = Input with pulled down
	Hi-Z	= High impedance state
	O (H)	= High level output
	O (L)	= Low level output
Tolerant fail-sa	fe structure:	
	1	= Over voltage tolerant fai

= 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<sub>DD</sub> is applied to the port. Also unnecessary current is not consumed when the port is externally biased without supplying V<sub>DD</sub>.

Pin/pad name	Assigned signal	I/O	Initial state	Tolerant fail-safe structure	Function		M20/M23 M21/M24 (32-pin)	M22/M25 (48-pin)
Vdd	Vdd	Р	-	-	Power supply (+)	1	1	1
Vss	Vss	Р	-	-	GND	1	<ul> <li>✓</li> </ul>	1
Vpp	Vpp	Р	-	-	Power supply for Flash programming	1	<ul> <li>Image: A set of the set of the</li></ul>	1
VD1	VD1	Α	-	-	VD1 regulator output	1	~	1
OSC1	OSC1	Α	-	-	OSC1 oscillator circuit input	-	1	1
OSC2	OSC2	Α	-	-	OSC1 oscillator circuit output	-	1	1
#RESET	#RESET	I	I (Pull-up)	-	Reset input	1	1	1
P00	P00	I/O	Hi-Z	1	I/O port	1	<ul> <li>Image: A second s</li></ul>	1
	EXCL00	I			16-bit PWM timer Ch.0 event counter input 0	1	1	1
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	1	1	1
P01	P01	I/O	Hi-Z	1	I/O port	1	1	1
	EXCL01	I			16-bit PWM timer Ch.0 event counter input 1	1	1	1
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	1	<ul> <li>✓</li> </ul>	1
P02	P02	I/O	Hi-Z	1	I/O port	1	1	1
	BZOUT	0			Sound generator output	1	<ul> <li>✓</li> </ul>	1
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	1	<ul> <li>Image: A start of the start of</li></ul>	1
P03	P03	I/O	Hi-Z	1	I/O port	1	1	1
	#BZOUT	0			Sound generator inverted output	1	1	1
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	1	1	1
P04	P04	I/O	Hi-Z	1	I/O port	-	-	1
	RFCLKO0	0			R/F converter Ch.0 clock monitor output	-	-	1
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	-	-	1
P05	P05	I/O	Hi-Z	1	I/O port	-	-	1
	RFCLKO1	0			R/F converter Ch.1 clock monitor output	-	-	1
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	-	-	1
P06	P06	I/O	Hi-Z	1	I/O port	-	-	1
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	-	-	1
P07	P07	I/O	Hi-Z	✓	I/O port	-	-	1
	UPMUX	I/O	1		User-selected I/O (universal port multiplexer)	-	-	1
P10	P10	I/O	Hi-Z	1	I/O port	-	1	1
	UPMUX	I/O	1		User-selected I/O (universal port multiplexer)	-	1	1
P11	P11	I/O	Hi-Z	1	I/O port	-	1	1
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	-	1	1

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Pin/pad name	Assigned signal	I/O	Initial state	Tolerant fail-safe structure	Function	M20/M23 (24-pin)	M20/M23 M21/M24 (32-pin)	M22/M25 (48-pin)
P12	P12	I/O	Hi-Z	1	I/O port			
	REMO	0			IR remote controller transmit data output	1	1	1
	UPMUX	I/O	]		User-selected I/O (universal port multiplexer)	1	1	1
P13	P13	I/O	Hi-Z	1	I/O port	1	1	1
	FOUT	0	]		Clock external output	1	1	✓
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	1	1	1
P14	P14	I/O	Hi-Z	$\checkmark$	I/O port	1	1	1
	#ADTRG0	I			12-bit A/D converter Ch.0 trigger input	1	1	1
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	1	1	1
P15	P15	I/O	Hi-Z	$\checkmark$	I/O port	<ul> <li>✓</li> </ul>	1	1
	CLPLS	0	-		IR remote controller clear pulse output		1	1
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	✓	1	<ul> <li>Image: A state of the state of</li></ul>
P16	P16	I/O	Hi-Z	$\checkmark$	I/O port	-	-	<i>\</i>
D17	UPMUX	I/O		,	User-selected I/O (universal port multiplexer)	-	-	<i>\</i>
P17	P17	1/0	Hi-Z	$\checkmark$	I/O port		-	<i>\</i>
Doo	UPMUX	I/O	11. 7		User-selected I/O (universal port multiplexer)		-	<i>\</i>
P20	P20	1/0	Hi-Z	-	I/O port		-	<i>\</i>
	UPMUX ADIN07	I/O	-		User-selected I/O (universal port multiplexer)	-	-	<i>\</i>
P21	P21	A I/O	Hi-Z	_	12-bit A/D converter Ch.0 analog signal input 7		-	✓ ✓
	UPMUX	1/O		-	User-selected I/O (universal port multiplexer)		-	✓ ✓
	ADIN06	A	-		12-bit A/D converter Ch.0 analog signal input 6		_	✓ ✓
P22	P22	1/0	Hi-Z	_	I/O port			✓ ✓
1 22	UPMUX	1/0			User-selected I/O (universal port multiplexer)			✓ ✓
	ADIN05	A	-		12-bit A/D converter Ch.0 analog signal input 5	_		· ·
P23	P23	1/0	Hi-Z	_	I/O port			1
	UPMUX	1/O			User-selected I/O (universal port multiplexer)			· ·
	ADIN04	A	1		12-bit A/D converter Ch.0 analog signal input 4			· ·
P24	P24	I/O	Hi-Z	-	I/O port	1	1	1
	EXCL10	I			16-bit PWM timer Ch.1 event counter input 0	1	1	1
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	1	1	1
	ADIN03	А			12-bit A/D converter Ch.0 analog signal input 3	1	1	1
P25	P25	I/O	Hi-Z	-	I/O port	1	$\checkmark$	1
	EXCL11	I			16-bit PWM timer Ch.1 event counter input 1	1	1	1
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	1	1	1
	ADIN02	Α			12-bit A/D converter Ch.0 analog signal input 2	1	1	1
P26	P26	I/O	Hi-Z	-	I/O port	1	1	1
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	1	1	1
	ADIN01	Α			12-bit A/D converter Ch.0 analog signal input 1	1	1	1
P27	P27	I/O	Hi-Z	-	I/O port	✓	1	1
	UPMUX	I/O	-		User-selected I/O (universal port multiplexer)		1	1
200	ADIN00	A			12-bit A/D converter Ch.0 analog signal input 0			<ul> <li>Image: A state of the state of</li></ul>
P30	P30	1/0	Hi-Z	-	I/O port			
	UPMUX	I/O	-		User-selected I/O (universal port multiplexer)	✓ ✓	<ul> <li>Image: A state of the state of</li></ul>	<i>✓</i>
Dod	VREFA0	A		,	12-bit A/D converter Ch.0 reference voltage input	✓ ✓	<ul> <li>Image: A state</li> <li>Image: A state<td><i>✓</i></td></li></ul>	<i>✓</i>
P31	P31	1/0	Hi-Z	$\checkmark$	I/O port		<i>✓</i>	<i>\</i>
	EXOSC		-		Clock generator external clock input			
P32	UPMUX	1/O	Hi-Z	1	User-selected I/O (universal port multiplexer)			
F 32	P32 RTC1S	I/O 0		1	I/O port Real-time clock 1-second cycle pulse output			✓ ✓
	UPMUX	1/0	-		User-selected I/O (universal port multiplexer)			<i>✓</i>
	EXSVD0	A			External power supply voltage detection input		✓ ✓	<i>✓</i>
P33	P33	I/O	Hi-Z	1	I/O port	-	- V	<i>✓</i>
	SENB0	A		v	R/F converter Ch.0 sensor B oscillator pin			✓ ✓
	UPMUX	1/0			User-selected I/O (universal port multiplexer)			✓ ✓
P34	P34	1/O	Hi-Z	1	I/O port		_	✓ ✓
	SENA0	A	- '" <i>L</i>	•	R/F converter Ch.0 sensor A oscillator pin		_	✓ ✓
	UPMUX	1/0			User-selected I/O (universal port multiplexer)		_	✓ ✓

Pin/pad name	Assigned signal	I/O	Initial state	Tolerant fail-safe structure	Function	M20/M23 (24-pin)	M20/M23 M21/M24 (32-pin)	M22/M25 (48-pin)
P35	P35	I/O	Hi-Z	1	I/O port	-	-	1
	REF0	Α			R/F converter Ch.0 reference oscillator pin	-	-	1
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	-	-	1
P36	P36	I/O	Hi-Z	1	I/O port	-	-	1
	RFIN0	Α			R/F converter Ch.0 oscillation input	-	-	1
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	-	-	1
P37	P37	I/O	Hi-Z	1	I/O port	-	-	1
	SENB1	Α			R/F converter Ch.1 sensor B oscillator pin	-	-	1
	UPMUX	I/O			User-selected I/O (universal port multiplexer)	-	-	1
P40	P40	I/O	Hi-Z	1	I/O port	-	-	1
	SENA1	Α			R/F converter Ch.1 sensor A oscillator pin	-	-	1
P41	P41	I/O	Hi-Z	<i>√</i>	I/O port	-	-	$\checkmark$
	REF1	Α			R/F converter Ch.1 reference oscillator pin	-	-	1
P42	P42	I/O	Hi-Z	$\checkmark$	I/O port	-	-	$\checkmark$
	RFIN1	Α			R/F converter Ch.1 oscillation input	-	-	1
PD0	DST2	0	O (L)	$\checkmark$	On-chip debugger status output	1	1	1
	PD0	I/O			I/O port	1	1	1
PD1	DSIO	I/O	I (Pull-up)	1	On-chip debugger data input/output	1	1	1
	PD1	I/O			I/O port	1	1	1
PD2	DCLK	0	O (H)	-	On-chip debugger clock output	1	1	1
	PD2	0			Output port	1	1	1
PD3	PD3	I/O	Hi-Z	$\checkmark$	I/O port	-	1	1
	OSC3	Α			OSC3 oscillator circuit input	-	1	1
PD4	PD4	I/O	Hi-Z	$\checkmark$	I/O port	-	1	1
	OSC4	А			OSC3 oscillator circuit output	-	1	1

### 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)	SDIn	Ι	<i>n</i> = 0, 1	SPIA Ch.n data input
	SDOn	0		SPIA Ch.n data output
	SPICLKn	I/O		SPIA Ch.n clock input/output
	#SPISSn	Ι		SPIA Ch.n slave-select input
I <sup>2</sup> C (I2C)	SCLn	I/O	<i>n</i> = 0	I2C Ch.n clock input/output
	SDAn	I/O		I2C Ch.n data input/output
UART (UART3)	USINn	Ι	<i>n</i> = 0, 1	UART3 Ch.n data input
	USOUT <i>n</i>	0		UART3 Ch.n data output
16-bit PWM timer (T16B)	TOUTn0/CAPn0	I/O	<i>n</i> = 0, 1	T16B Ch.n PWM output/capture input 0
	TOUTn1/CAPn1	I/O		T16B Ch.n PWM output/capture input 1

## BASIC EXTERNAL CONNECTION DIAGRAM



\*1: For Flash programming

\*2: When the OSC1 crystal oscillator is used (except for the S1C17M20/M23 (24-pin package))

\*3: When the OSC3 crystal/ceramic oscillator is used (except for the S1C17M20/M23 (24-pin package))

\*4: When the R/F converter is used (available in the S1C17M22/M25)

(): Do not mount components if unnecessary.

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Document Code: 413530302 First Issue July 2016 Revised August 2022 in JAPAN ©