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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	Obsolete
Core Processor	ARM® Cortex®-M0+
Core Size	32-Bit Single-Core
Speed	40MHz
Connectivity	CSIO, I²C, LINbus, SmartCard, UART/USART, USB
Peripherals	I²S, LVD, POR, PWM, WDT
Number of I/O	65
Program Memory Size	560KB (560K x 8)
Program Memory Type	FLASH
EEPROM Size	-
RAM Size	64K x 8
Voltage - Supply (Vcc/Vdd)	1.65V ~ 3.6V
Data Converters	A/D 16x12b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 105°C (TA)
Mounting Type	Surface Mount
Package / Case	80-LQFP
Supplier Device Package	80-LQFP (12x12)
Purchase URL	https://www.e-xfl.com/product-detail/infineon-technologies/s6e1b36e0agv20000

4. List of Pin Functions

List of Pin Numbers

The number after the underscore ("_") in a pin name such as XXX_1 and XXX_2 indicates the relocated port number. The channel on such pin has multiple functions, each of which has its own pin name. Use the Extended Port Function Register (EPFR) to select the pin to be used.

Pin No.			Pin Name	I/O Circuit Type	Pin State Type
LQFP-120	LQFP-100	LQFP-80			
1	1	1	VCC	-	
2	2	2	P50	I	J
			SIN3_1		
			INT00_0		
3	3	3	P51	I	J
			SOT3_1		
			INT01_0		
4	4	4	P52	I	J
			SCK3_1		
			INT02_0		
5	5	5	P53	I	J
			SIN6_0		
			TIOA1_2		
			INT07_2		
6	6	6	P54	I	J
			SOT6_0		
			TIOB1_2		
			INT18_1		
7	7	7	P55	I	J
			SCK6_0		
			ADTG_1		
			INT19_1		
8	8	8	P56	I	O
			MI2SMCK6_1		
			CEC1_1		
			INT08_2		
			WKUP9		
	-	-	SIN1_0		
9	-	-	P57	F	I
			SOT1_0		
10	-	-	P58	F	I
			SCK1_0		
11	-	-	P59	F	J
			SIN7_0		
			INT16_1		
12	-	-	P5A	F	J
			SOT7_0		
			INT16_2		

Pin No.			Pin Name	I/O Circuit Type	Pin State Type
LQFP-120	LQFP-100	LQFP-80			
51	-	-	P70 TIOA4_2 SCS71_1	F	I
52	-	-	P71 TIOB4_2 SCS72_1 INT13_2	F	J
53	-	-	P72 SIN2_0 TIOA6_0 INT14_2	F	J
54	-	-	P73 SOT2_0 TIOB6_0 INT15_2	F	J
55	-	-	P74 SCK2_0	F	I
56	46	36	PE0 MD1	C	D
57	47	37	MD0	J	M
58	48	38	PE2 X0	A	A
59	49	39	PE3 X1	A	B
60	50	40	VSS	-	-
61	51	41	VCC	-	-
62	52	42	P10 IC1_CLK_1 CTS1_1 AN00	H	K
63	53	43	P11 IC1_VCC_1 SIN1_1 FRCK0_2 INT02_1 WKUP1 AN01	H	P
64	54	44	P12 IC1_VPEN_1 SOT1_1 IC00_2 AN02	H	K
65	55	45	P13 IC1_RST_1 SCK1_1 RTCCO_1 IC01_2 SUBOUT_1 AN03	H	K

List of Pin Functions

The number after the underscore ("_") in a pin name such as XXX_1 and XXX_2 indicates the relocated port number. The channel on such pin has multiple functions, each of which has its own pin name. Use the Extended Port Function Register (EPFR) to select the pin to be used.

Pin Function	Pin Name	Function Description	Pin No.		
			LQFP-120	LQFP-100	LQFP-80
ADC	ADTG_0	A/D converter external trigger input pin	99	84	66
	ADTG_1		7	7	7
	ADTG_2		23	18	13
	ADTG_3		114	94	74
	ADTG_4		81	-	-
	ADTG_5		80	70	-
	ADTG_6		17	12	12
	ADTG_7		35	30	-
	AN00	A/D converter analog input pin. ANxx describes ADC ch.xx.	62	52	42
	AN01		63	53	43
	AN02		64	54	44
	AN03		65	55	45
	AN04		66	56	46
	AN05		67	57	47
	AN06		68	58	48
	AN07		69	59	49
	AN08		74	64	54
	AN09		75	65	55
	AN10		76	66	56
	AN11		77	67	57
	AN12		78	68	-
	AN13		79	69	-
	AN14		80	70	-
	AN15		82	-	-
	AN16		86	71	58
	AN17		87	72	59
	AN18		88	73	60
	AN19		89	74	-
	AN20		97	82	-
	AN21		98	83	-
	AN22		99	84	66
	AN23		100	85	-
Base Timer 0	TIOA0_0	Base timer ch.0 TIOA pin	32	27	-
	TIOA0_1		24	19	14
	TIOA0_2		100	85	-
	TIOB0_0	Base timer ch.0 TIOB pin	47	42	32
	TIOB0_1		14	9	9
	TIOB0_2		101	86	-

Pin Function	Pin Name	Function Description	Pin No.		
			LQFP-120	LQFP-100	LQFP-80
External Interrupt	INT15_0	External interrupt request 15 input pin	68	58	48
	INT15_1		116	96	76
	INT15_2		54	-	-
	INT16_0	External interrupt request 16 input pin	100	85	-
	INT16_1		11	-	-
	INT16_2		12	-	-
	INT17_0	External interrupt request 17 input pin	101	86	-
	INT17_1		85	-	-
	INT17_2		13	-	-
	INT18_0	External interrupt request 18 input pin	103	88	68
	INT18_1		6	6	6
	INT18_2		26	21	16
	INT19_0	External interrupt request 19 input pin	104	89	69
	INT19_1		7	7	7
	INT19_2		28	23	18
	INT20_0	External interrupt request 20 input pin	105	90	70
	INT20_1		117	97	77
	INT20_2		77	67	57
	INT21_0	External interrupt request 21 input pin	106	91	71
	INT21_1		47	42	32
	INT21_2		78	68	-
	INT22_0	External interrupt request 22 input pin	109	-	-
	INT22_1		48	43	33
	INT22_2		79	69	-
	INT23_0	External interrupt request 23 input pin	111	-	-
	INT23_1		99	84	66
	INT23_2		80	70	-
	NMIX	Non-Maskable Interrupt input pin	107	92	72
GPIO	P00	General-purpose I/O port 0	92	77	61
	P01		93	78	62
	P02		94	79	63
	P03		95	80	64
	P04		96	81	65
	P05		97	82	-
	P06		98	83	-
	P07		99	84	66
	P08		100	85	-
	P09		101	86	-
	P0A		102	87	67
	P0B		103	88	68
	P0C		104	89	69
	P0D		105	90	70
	P0E		106	91	71
	P0F		107	92	72

Pin Function	Pin Name	Function Description	Pin No.		
			LQFP-120	LQFP-100	LQFP-80
GPIO	P40	General-purpose I/O port 4	32	27	-
	P41		33	28	-
	P42		34	29	-
	P43		35	30	-
	P44		36	31	21
	P45		37	32	22
	P46		42	37	27
	P47		43	38	28
	P48		44	39	29
	P49		45	40	30
	P4A		47	42	32
	P4B		48	43	33
	P4C		49	44	34
	P4D		50	45	35
	P50	General-purpose I/O port 5	2	2	2
	P51		3	3	3
	P52		4	4	4
	P53		5	5	5
	P54		6	6	6
	P55		7	7	7
	P56		8	8	8
	P57		9	-	-
	P58		10	-	-
	P59		11	-	-
	P5A		12	-	-
	P5B		13	-	-
	P60	General-purpose I/O port 6	116	96	76
	P61		115	95	75
	P62		114	94	74
	P63		113	93	73
	P64		112	-	-
	P65		111	-	-
	P66		110	-	-
	P67		109	-	-
	P68		108	-	-
	P70	General-purpose I/O port 7	51	-	-
	P71		52	-	-
	P72		53	-	-
	P73		54	-	-
	P74		55	-	-
	P80	General-purpose I/O port 8	117	97	77
	P81		118	98	78
	P82		119	99	79
	PE0*	General-purpose I/O port E	56	46	36
	PE2		58	48	38
	PE3		59	49	39

Pin Function	Pin Name	Function Description	Pin No.		
			LQFP-120	LQFP-100	LQFP-80
Multi-function Serial 7	SIN7_0	Multi-function serial interface ch.7 input pin	11	-	-
	SIN7_1		48	43	33
	SIN7_2		117	97	77
	SOT7_0 (SDA7_0)	Multi-function serial interface ch.7 output pin. This pin operates as SOT7 when used as a UART/CSIO/LIN pin (operation mode 0 to 3) and as SDA7 when used as an I^2C pin (operation mode 4).	12	-	-
	SOT7_1 (SDA7_1)		49	44	34
	SOT7_2 (SDA7_2)		118	98	78
	SCK7_0 (SCL7_0)	Multi-function serial interface ch.7 clock I/O pin. This pin operates as SCK7 when used as a CSIO (operation mode 2) and as SCL7 when used as an I^2C pin (operation mode 4).	13	-	-
	SCK7_1 (SCL7_1)		50	45	35
	SCK7_2 (SCL7_2)		119	99	79
	SCS70_1	Multi-function serial interface ch.7 serial chip select 0 input/output pin.	47	42	32
	SCS71_1	Multi-function serial interface ch.7 serial chip select 1 input/output pin.	51	-	-
	SCS72_1	Multi-function serial interface ch.7 serial chip select 2 input/output pin.	52	-	-
Smart Card interface 0	IC0_VCC_0	Smart card ch.0 power enable output pin	106	91	71
	IC0_VCC_1		33	28	-
	IC0_VPEN_0	Smart card ch.0 programming output pin	105	90	70
	IC0_VPEN_1		34	29	-
	IC0_RST_0	Smart card ch.0 reset output pin	114	94	74
	IC0_RST_1		35	30	-
	IC0_CIN_0	Smart card ch.0 insert detection input pin	102	87	67
	IC0_CIN_1		37	32	22
	IC0_CLK_0	Smart card ch.0 serial interface clock output pin	107	92	72
	IC0_CLK_1		32	27	-
	IC0_DATA_0	Smart card ch.0 serial interface data input/output pin	113	93	73
	IC0_DATA_1		36	31	21
Smart Card interface 1	IC1_VCC_0	Smart card ch.1 power enable output pin	28	23	18
	IC1_VCC_1		63	53	43
	IC1_VPEN_0	Smart card ch.1 programming output pin	27	22	17
	IC1_VPEN_1		64	54	44
	IC1_RST_0	Smart card ch.1 reset output pin	26	21	16
	IC1_RST_1		65	55	45
	IC1_CIN_0	Smart card ch.1 insert detection input pin	24	19	14
	IC1_CIN_1		67	57	47
	IC1_CLK_0	Smart card ch.1 serial interface clock output pin	29	24	19
	IC1_CLK_1		62	52	42
	IC1_DATA_0	Smart card ch.1 serial interface data input/output pin	25	20	15
	IC1_DATA_1		66	56	46
USB	UDM0	USB device/host D – pin	103	88	68
	UDP0	USB device/host D + pin	104	89	69
	UHCONX0	USB external pull-up control pin	102	87	67

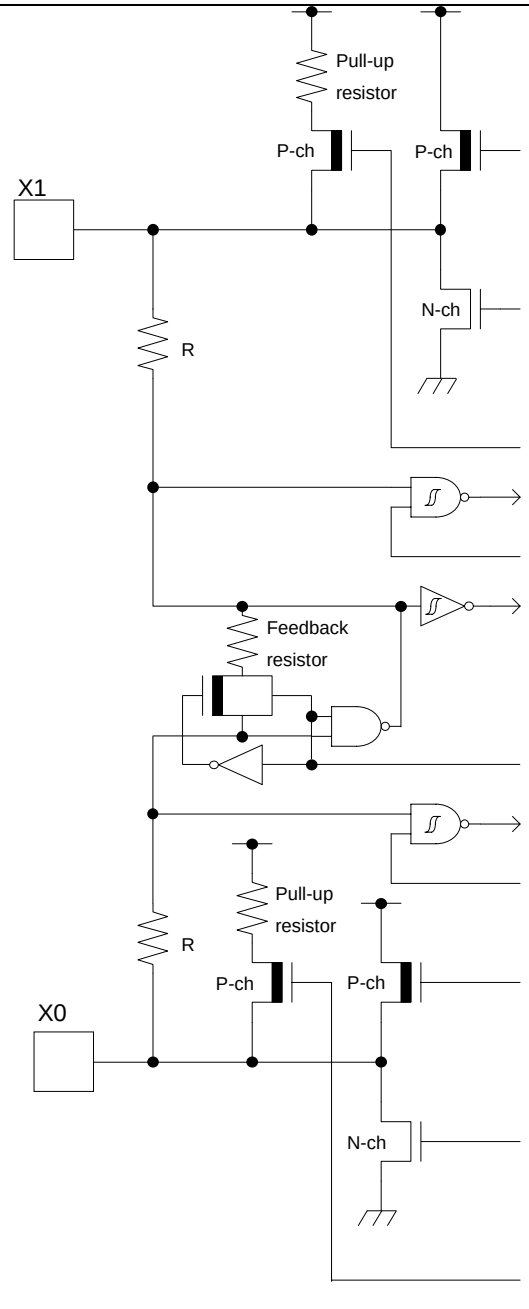
Pin Function	Pin Name	Function Description	Pin No.		
			LQFP-120	LQFP-100	LQFP-80
Multi-function Timer 0	DTTI0X_0	Input signal of waveform generator controlling RTO00 to RTO05 outputs of Multi-function Timer 0.	23	18	13
	DTTI0X_1		79	69	-
	DTTI0X_2		115	95	75
	FRCK0_0	16-bit free-run timer ch.0 external clock input pin.	18	13	-
	FRCK0_1		80	70	-
	FRCK0_2		63	53	43
	IC00_0	16-bit input capture input pin of Multi-function timer 0. ICxx describes channel number.	22	17	-
	IC00_1		75	65	55
	IC00_2		64	54	44
	IC01_0		21	16	-
	IC01_1		76	66	56
	IC01_2		65	55	45
	IC02_0		20	15	-
	IC02_1		77	67	57
	IC02_2		66	56	46
	IC03_0		19	14	-
	IC03_1		78	68	-
	IC03_2		67	57	47
	RTO00_0 (PPG00_0)	Waveform generator output pin of Multi-function timer 0. This pin operates as PPG00 when it is used in PPG0 output mode.	24	19	14
	RTO00_1 (PPG00_1)		86	71	58
	RTO01_0 (PPG00_0)	Waveform generator output pin of Multi-function timer 0. This pin operates as PPG00 when it is used in PPG0 output mode.	25	20	15
	RTO01_1 (PPG00_1)		85	-	-
	RTO02_0 (PPG02_0)	Waveform generator output pin of Multi-function timer 0. This pin operates as PPG02 when it is used in PPG0 output mode.	26	21	16
	RTO02_1 (PPG02_1)		84	-	-
	RTO03_0 (PPG02_0)	Waveform generator output pin of Multi-function timer 0. This pin operates as PPG02 when it is used in PPG0 output mode.	27	22	17
	RTO03_1 (PPG02_1)		83	-	-
	RTO04_0 (PPG04_0)	Waveform generator output pin of Multi-function timer 0. This pin operates as PPG04 when it is used in PPG0 output mode.	28	23	18
	RTO04_1 (PPG04_1)		82	-	-
	RTO05_0 (PPG04_0)	Waveform generator output pin of Multi-function timer 0. This pin operates as PPG04 when it is used in PPG0 output mode.	29	24	19
	RTO05_1 (PPG04_1)		81	-	-
	IGTRG0_0	PPG IGBT mode external trigger input pin	48	43	33
	IGTRG0_1		116	96	76

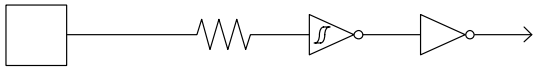
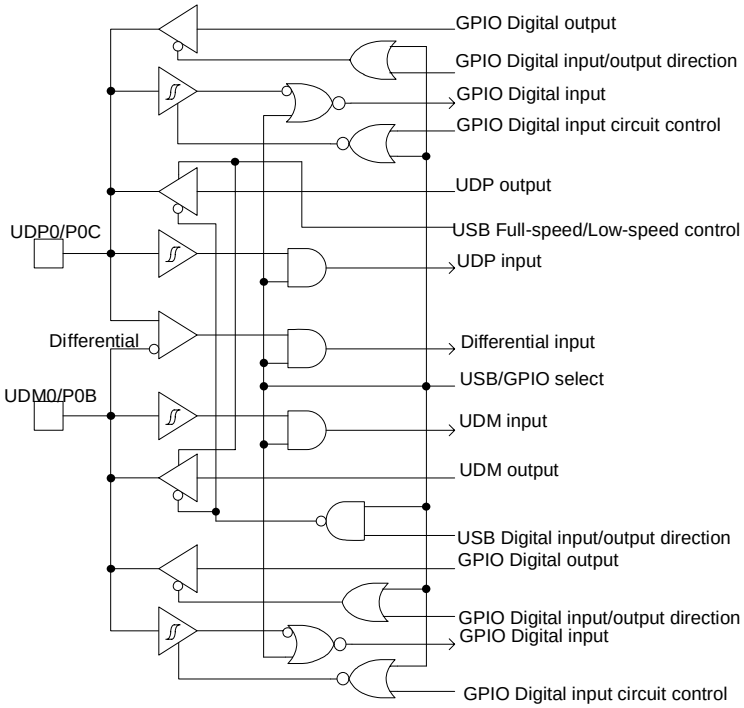
Pin Function	Pin Name	Function Description	Pin No.		
			LQFP-120	LQFP-100	LQFP-80
Real-time Clock	RTCCO_0	0.5-seconds pulse output pin of Real-time clock	107	92	72
	RTCCO_1		65	55	45
	RTCCO_2		24	19	14
	SUBOUT_0	Sub clock output pin	107	92	72
	SUBOUT_1		65	55	45
	SUBOUT_2		24	19	14
HDMI-CEC/ Remote Control Reception	CEC0_0	HDMI-CEC/Remote Control Reception ch.0 input/output pin	49	44	34
	CEC0_1		102	87	67
	CEC1_0	HDMI-CEC/Remote Control Reception ch.1 input/output pin	116	96	76
	CEC1_1		8	8	8
Low-Power Consumption Mode	WKUP0	Deep standby mode return signal input pin	107	92	72
	WKUP1		63	53	43
	WKUP2		88	73	60
	WKUP3		116	96	76
	WKUP4		14	9	9
	WKUP5		102	87	67
	WKUP6		50	45	35
	WKUP7		48	43	33
	WKUP8		28	23	18
	WKUP9		8	8	8
	WKUP10		97	82	-
	WKUP11		20	15	-
VBAT	LVDI	Input pin to monitor the external voltage.	37	32	22
	VWAKEUP	The return signal input pin from a hibernation state	45	40	30
	VREGCTL	On-board regulator control pin	44	39	29
Reset	INITX	External Reset Input pin. A reset is valid when INITX="L".	41	36	26
Mode	MD0	Mode 0 pin. During normal operation, input MD0="L". During serial programming to Flash memory, input MD0="H".	57	47	37
	MD1	Mode 1 pin. During normal operation, input is not needed. During serial programming to Flash memory, MD1 = "L" must be input.	56	46	36
Power	VCC	Power supply pin	1	1	1
			31	26	-
			40	35	25
			61	51	41
			91	76	-
VBAT Power	VBAT	VBAT power supply pin Backup power supply (battery etc.) and system power supply	46	41	31

Pin Function	Pin Name	Function Description	Pin No.		
			LQFP-120	LQFP-100	LQFP-80
GND	VSS	GND pin	30	25	20
			39	34	24
			60	50	40
			90	75	-
			120	100	80
Clock	X0	Main clock (oscillation) input pin	58	48	38
	X0A	Sub clock (oscillation) input pin	42	37	27
	X1	Main clock (oscillation) I/O pin	59	49	39
	X1A	Sub clock (oscillation) I/O pin	43	38	28
	CROUT_0	Built-in high-speed CR oscillation clock output port	89	74	-
	CROUT_1	Built-in high-speed CR oscillation clock output port	107	92	72
Analog Power	AVCC	A/D converter analog power supply pin	70	60	50
	AVRH	A/D converter analog reference voltage input pin	73	63	53
Analog GND	AVSS	A/D converter analog reference voltage input pin	71	61	51
C pin	C	Power supply stabilization capacitance pin	38	33	23

*: PE0 is an open drain pin, cannot output high.

5. I/O Circuit Type

Type	Circuit	Remarks
A		It is possible to select the main oscillation / GPIO function When the main oscillation is selected. Oscillation feedback resistor : Approximately 1 MΩ With standby mode control When the GPIO is selected. CMOS level output. CMOS level hysteresis input With pull-up resistor control With standby mode control Pull-up resistor : Approximately 33 kΩ I_{OH} = -4mA, I_{OL}= 4 mA

Type	Circuit	Remarks
J		・CMOS level hysteresis input
K		It is possible to select the USB I/O / GPIO function. When the USB I/O is selected. ・Full-speed, Low-speed control When the GPIO is selected. ・CMOS level output ・CMOS level hysteresis input ・With standby mode control

6. Handling Precautions

Any semiconductor devices have inherently a certain rate of failure. The possibility of failure is greatly affected by the conditions in which they are used (circuit conditions, environmental conditions, etc.). This page describes precautions that must be observed to minimize the chance of failure and to obtain higher reliability from your Spansion semiconductor devices.

6.1 Precautions for Product Design

This section describes precautions when designing electronic equipment using semiconductor devices.

Absolute Maximum Ratings

Semiconductor devices can be permanently damaged by application of stress (voltage, current, temperature, etc.) in excess of certain established limits, called absolute maximum ratings. Do not exceed these ratings.

Recommended Operating Conditions

Recommended operating conditions are normal operating ranges for the semiconductor device. All the device's electrical characteristics are warranted when operated within these ranges.

Always use semiconductor devices within the recommended operating conditions. Operation outside these ranges may adversely affect reliability and could result in device failure.

No warranty is made with respect to uses, operating conditions, or combinations not represented on the data sheet. Users considering application outside the listed conditions are advised to contact their sales representative beforehand.

Processing and Protection of Pins

These precautions must be followed when handling the pins which connect semiconductor devices to power supply and input/output functions.

(1) Preventing Over-Voltage and Over-Current Conditions

Exposure to voltage or current levels in excess of maximum ratings at any pin is likely to cause deterioration within the device, and in extreme cases leads to permanent damage of the device. Try to prevent such overvoltage or over-current conditions at the design stage.

(2) Protection of Output Pins

Shorting of output pins to supply pins or other output pins, or connection to large capacitance can cause large current flows. Such conditions if present for extended periods of time can damage the device.

Therefore, avoid this type of connection.

(3) Handling of Unused Input Pins

Unconnected input pins with very high impedance levels can adversely affect stability of operation. Such pins should be connected through an appropriate resistance to a power supply pin or ground pin.

Notes on Power-on

Turn power on/off in the following order or at the same time.

Turning on : VBAT → VCC
VCC → AVCC → AVRH
Turning off : VCC → VBAT
AVRH → AVCC → VCC

Serial Communication

There is a possibility to receive wrong data due to the noise or other causes on the serial communication.
Therefore, design a printed circuit board so as to avoid noise.
Consider the case of receiving wrong data due to noise; perform error detection such as by applying a checksum of data at the end.
If an error is detected, retransmit the data.

Differences in Features Among the Products with Different Memory Sizes and Between Flash Memory Products and MASK Products

The electric characteristics including power consumption, ESD, latch-up, noise characteristics, and oscillation characteristics among the products with different memory sizes and between Flash memory products and MASK products are different because chip layout and memory structures are different.

If you are switching to use a different product of the same series, please make sure to evaluate the electric characteristics.

Pull-Up Function of 5 V Tolerant I/O

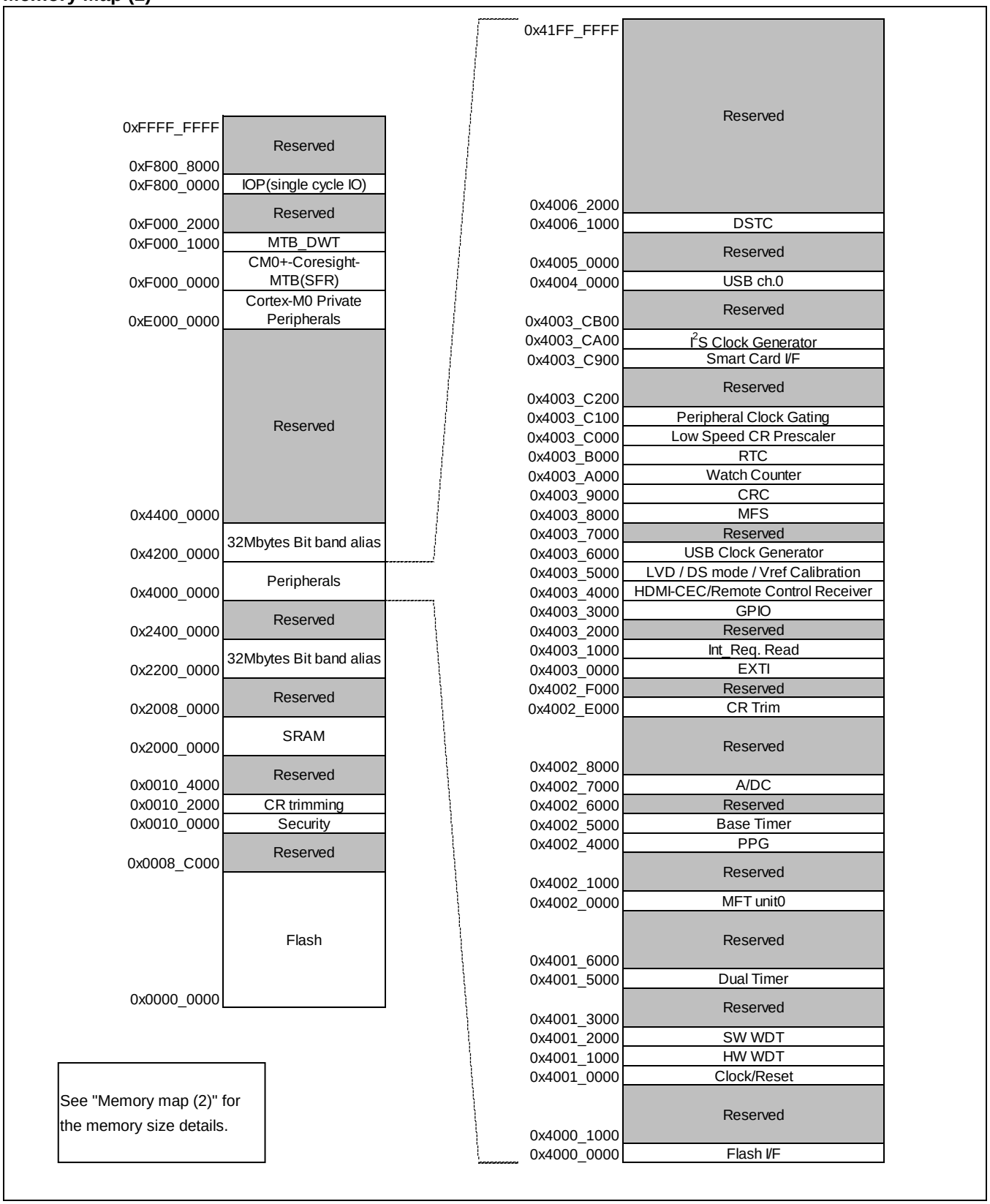
Please do not input the signal more than VCC voltage at the time of Pull-Up function use of 5 V tolerant I/O.

Handling when Using Debug Pins

When debug pins (SWDIO/SWCLK) are set to GPIO or other peripheral functions, set them as output only; do not set them as input.

9. Memory Map

Memory Map (1)



11.2 Recommended Operating Conditions

(V_{SS}=AV_{SS}=0.0 V)

Parameter	Symbol	Conditions	Value		Unit	Remarks
			Min	Max		
Power supply voltage	V_{CC}	-	1.65 *3	3.6	V	
			3.0	3.6	V	*1
Sub Oscillation frequency	Fin	-	-	-	kHz	Typical is 32.768 kHz
Analog power supply voltage	AV_{CC}	-	1.65	3.6	V	AV_{CC}=V_{CC}
Analog reference voltage	AVRH	-	2.7	AV_{CC}	V	AV_{CC} ≥ 2.7 V
			AV_{CC}	AV_{CC}	V	AV_{CC} < 2.7 V
	AVRL	-	AV_{SS}	AV_{SS}	V	
Smoothing capacitor	C_S	-	1	10	µF	For regulator*2
Operating temperature	T_A	-	- 40	+ 105	°C	

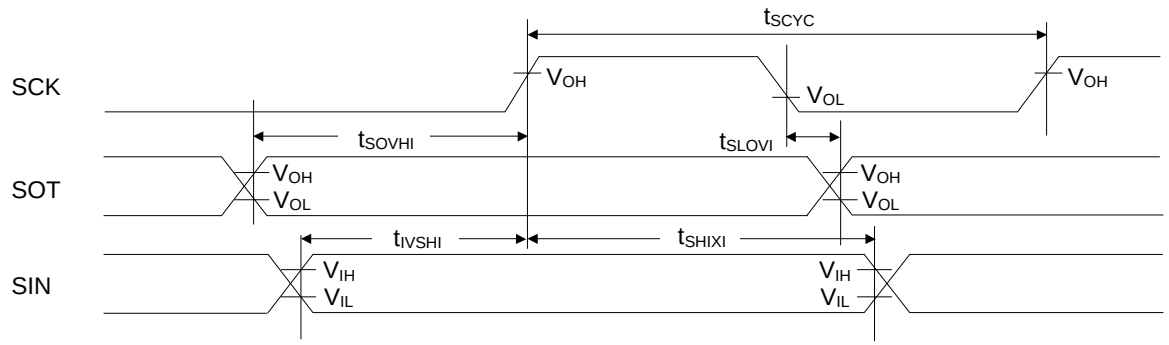
*1: When P0C/UDP0 and P0B/UDM0 pins are used as USB (UDP0, UDM0).

*2: See "C Pin" in "7. Handling Devices" for the connection of the smoothing capacitor.

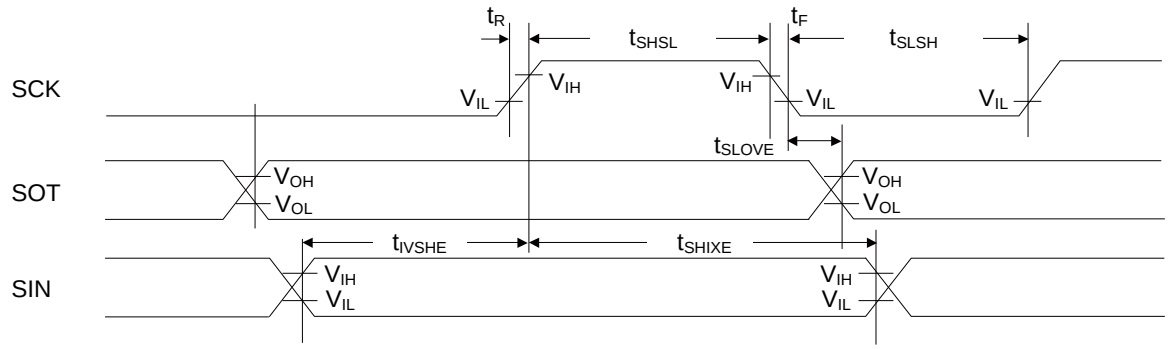
*3: In between less than the minimum power supply voltage reset / interrupt detection voltage or more, instruction execution and low voltage detection function by built-in High-speed CR (including Main PLL is used) or built-in Low-speed CR is possible to operate only.

<WARNING>

1. *The recommended operating conditions are required in order to ensure the normal operation of the semiconductor device. All of the device's electrical characteristics are warranted when the device is operated within these ranges.*
2. *Always use semiconductor devices within their recommended operating condition ranges. Operation outside these ranges may adversely affect reliability and could result in device failure.*
3. *No warranty is made with respect to uses, operating conditions, or combinations not represented on the data sheet.*
4. *Users considering application outside the listed conditions are advised to contact their representatives beforehand.*



Master mode



Slave mode

When Using CSIO/SPI Chip Select (SCINV=1, CSLVL=1)

(V_{CC}=AV_{CC}=1.65 V to 3.6 V, V_{SS}=AV_{SS}=0 V, T_A=- 40°C to +105°C)

Parameter	Symbol	Conditions	V_{CC} < 2.7 V		V_{CC} ≥ 2.7 V		Unit
			Min	Max	Min	Max	
SCS↓→SCK↑ setup time	t_{CSSI}	Master mode	(*1)-50	(*1)+0	(*1)-50	(*1)+0	ns
SCK↓→SCS↑ hold time	t_{CSHI}		(*2)+0	(*2)+50	(*2)+0	(*2)+50	ns
SCS deselect time	t_{CSDI}		(*3)-50	(*3)+50	(*3)-50	(*3)+50	ns
SCS↓→SCK↑ setup time	t_{CSSE}	Slave mode	$3t_{CYCP}$+30	-	$3t_{CYCP}$+30	-	ns
SCK↓→SCS↑ hold time	t_{CSHE}		0	-	0	-	ns
SCS deselect time	t_{CSDE}		$3t_{CYCP}$+30	-	$3t_{CYCP}$+30	-	ns
SCS↓→SOT delay time	t_{DSE}		-	55	-	43	ns
SCS↑→SOT delay time	t_{DEE}		0	-	0	-	ns

*1: CSSU bit value × serial chip select timing operating clock cycle.

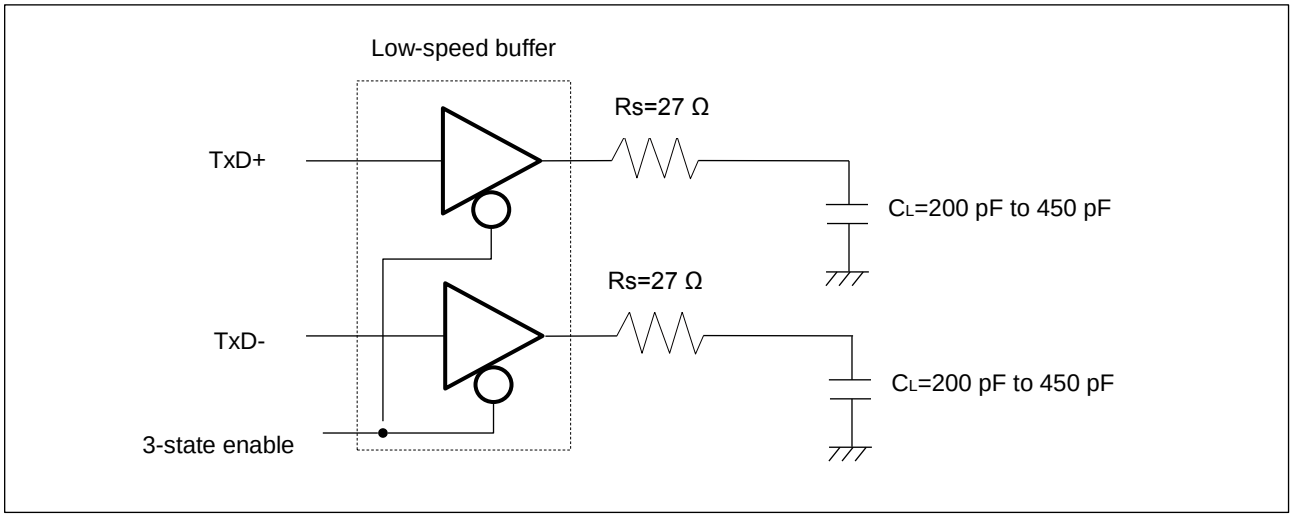
*2: CSHD bit value × serial chip select timing operating clock cycle.

*3: CSDS bit value × serial chip select timing operating clock cycle.
Irrespective of CSDS bit setting, $5t_{CYCP}$ or more are required for the period the time when the serial chip select pin becomes inactive to the time when the serial chip select pin becomes active again.

Notes:

- *t_{CYCP} indicates the APB bus clock cycle time.*
  For information about the APB bus number which Multi-function Serial is connected to, see "8. Block Diagram ".
- *For information about CSSU, CSHD, CSDS, serial chip select timing operating clock, see "FM0+ Family Peripheral Manual".*
- *These characteristics only guarantee the same relocate port number.*
  For example, the combination of SCKx_0 and SCSIx_1 is not guaranteed.
- *When the external load capacitance C_L=30 pF.*

・Low-Speed Load (Compliance Load)



11.8 Flash Memory Write/Erase Characteristics

(V_{CC}=1.65 V to 3.6 V, T_A=- 40°C to +105°C)

Parameter		Value			Unit	Remarks
		Min	Typ*	Max*		
Sector erase time	Large sector	-	1.1	2.7	s	The sector erase time includes the time of writing prior to internal erase.
	Small sector	-	0.3	0.9		
Halfword (16-bit) write time		-	30	528	µs	The halfword (16-bit) write time excludes the system-level overhead.
Chip erase time		-	11.2	28.8	s	The chip erase time includes the time of writing prior to internal erase.

*:The typical value is immediately after shipment, the maximum value is guarantee value under 10,000 cycle of erase/write.

Write/Erase Cycle and Data Hold Time (Target Value)

Write/Erase Cycle	Data Hold Time (Year)	Remarks
1,000	20*	
10,000	10*	

*: At average + 85°C

11.9 Return Time from Low-Power Consumption Mode

11.9.1 Return Factor: Interrupt/WKUP

The return time from Low-Power consumption mode is indicated as follows. It is from receiving the return factor to starting the program operation.

Return Count Time

(V_{CC}=1.65 V to 3.6 V, T_A=-40°C to +105°C)

Parameter	Symbol	Value		Unit	Remarks
		Typ	Max*1		
Sleep mode	t_{ICNT}	6*HCLK	7*HCLK	µs	
High-speed CR Timer mode, Main Timer mode, PLL Timer mode		12*HCLK	13*HCLK	µs	
Low-speed CR Timer mode		20+12*HCLK	42+13*HCLK	µs	
Sub Timer mode		20+12*HCLK	42+13*HCLK	µs	
RTC mode, Stop mode		38 (*3) 38+t_{OSCWT} (*2*4)	71 71+t_{OSCWT} (*2*4)	µs	The count time is different in different clock mode
Deep RTC mode, Deep Stop mode		45	80	µs	

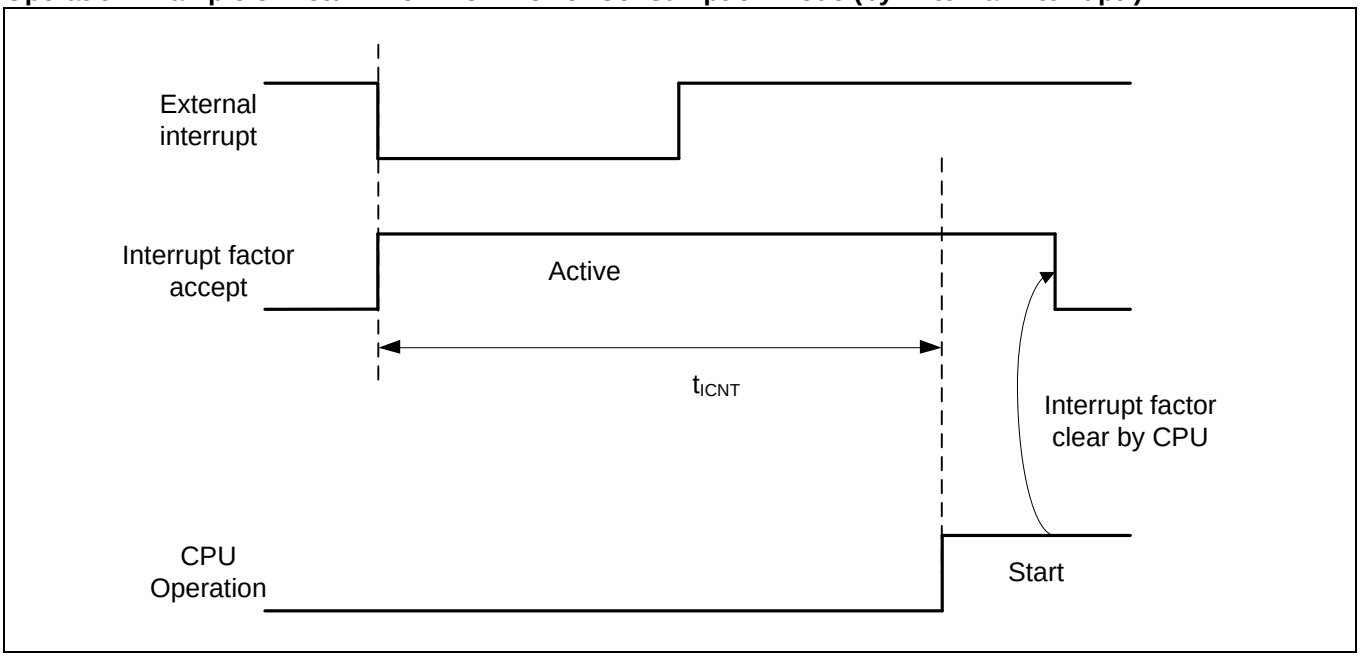
*1: The maximum value depends on the condition of environment.

*2: t_{OSCWT} : Oscillator stabilization time.

*3: It is for HCR mode.

*4: For clock mode except HCR mode.

Operation Example of Return from Low-Power Consumption Mode (by External Interrupt*)



*: External interrupt is set to detecting fall edge.