



Welcome to [E-XFL.COM](#)

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	Not For New Designs
Core Processor	RX
Core Size	32-Bit Single-Core
Speed	100MHz
Connectivity	CSI, I ² C, SPI, UART/USART
Peripherals	DMA, LVD, POR, PWM, WDT
Number of I/O	50
Program Memory Size	64KB (64K x 8)
Program Memory Type	FLASH
EEPROM Size	8K x 8
RAM Size	8K x 8
Voltage - Supply (Vcc/Vdd)	2.7V ~ 3.6V
Data Converters	A/D 8x12b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 105°C (TA)
Mounting Type	Surface Mount
Package / Case	64-LQFP
Supplier Device Package	64-LFQFP (10x10)
Purchase URL	https://www.e-xfl.com/product-detail/renesas-electronics-america/r5f563t6egfm-v0

Table 1.2 Comparison of Functions for Different Packages

Functions			RX63T Group						
Package			144 Pins	120 Pins	112 Pins	100 Pins	64 Pins	48 Pins	
External bus			16 bits				—		
External address space			1 Mbyte × 4 areas				—		
DMA	DMA controller (DMACA)		Ch. 0 to 3						
	Data transfer controller (DTCa)		Supported						
Interrupt controller (ICUb)	NMI pin		Supported						
	IRQ pin		Supported (x 8)				Supported (x 6)		
Timers	Multi-function timer pulse unit 3 (MTU3)* ¹		Ch. 0 to 7						
	General PWM timer (GPT)* ¹	Generation of delays in PWM, not supported	Ch. 0 to 7				Ch. 0 to 3		
		Generation of delays in PWM, supported	Ch. 0 to 3				—		
	Port output enable 3 (POE3)		Supported (POE pins × 6)			Supported (POE pins × 5)	Supported (POE pins × 4)		
	Compare match timer (CMT)		Ch. 0 to 3						
	Watchdog timer (WDTA)		Supported						
	Independent watchdog timer (IWDTa)		Supported						
	Communication function	USB2.0 host/function module (USBa)		Ch. 0		—			
Serial communications interfaces (SClC)		Ch. 0 to 3			Ch. 0 to 2	Ch. 0, 1			
Serial communications interfaces (SCId)		Ch. 12							
I ² C bus interfaces (RIIC)		Ch. 0, 1		Ch. 0					
Serial peripheral interfaces (RSPI)		Ch. 0, 1				Ch. 0			
CAN module (CAN) (as an optional function)* ¹		Ch. 0				—			
12-bit A/D converter (S12ADB)			4 channels × 2 units				8 channels × 1 unit (AN000 to 007)	8 channels × 1 unit (AN000 to 004, 007)	
			Three-channel simultaneous sampling function		2 units			1 unit	
			Programmable gain amplifier		3 channels × 2 units			—	
			Window comparator		3 channels × 2 units			3 channels × 1 unit	
10-bit A/D converter (ADA)			20 channels	12 channels			—		
D/A converter (DAa)			Ch. 0, 1				—		
Clock Frequency Accuracy Measurement Circuit			Supported						
Digital power supply controller (DPC)* ²			Supported				Not supported		

Note 1. For the MTU3 and GPT, the number of pins will differ with the package. See the list of pins and pin functions for details.

In addition, the CAN module is an optional function. For details, see Table 1.3.

Note 2. Not provided for the product ID code O.

Table 1.3 List of Products (4/4)

Group	Part No.	Order Part No.	Package	On-chip ROM Capacity	On-chip RAM Capacity	Option	Operating Voltage	Operating Temperature
RX63T	R5F563TBAGFA	R5F563TBAGFA#V1	PLQP0120KA-A	256 Kbytes	24 Kbytes	CAN module included	VCC/ PLL/VCC 4.0 to 5.5V VCC_USB 3.0 to 3.6V AVCC/ AVCC0 4.0 to 5.5V	-40 to +105°C (G Version)*1
	R5F563TBAGFH	R5F563TBAGFH#V1	PLQP0112JA-A	256 Kbytes	24 Kbytes	CAN module included		
	R5F563TBAGFP	R5F563TBAGFP#V1	PLQP0100KB-A	256 Kbytes	24 Kbytes	CAN module included		
	R5F563TEBGFB	R5F563TEBGFB#V1	PLQP0144KA-A	512 Kbytes	48 Kbytes	CAN module included	VCC/ PLL/VCC/ VCC_USB 2.7 to 3.6V AVCC/ AVCC0 3.0 to 3.6V or 4.0 to 5.5V	
	R5F563TEBGFA	R5F563TEBGFA#V1	PLQP0120KA-A	512 Kbytes	48 Kbytes	CAN module included		
	R5F563TEBGFH	R5F563TEBGFH#V1	PLQP0112JA-A	512 Kbytes	48 Kbytes	CAN module included		
	R5F563TEBGFP	R5F563TEBGFP#V1	PLQP0100KB-A	512 Kbytes	48 Kbytes	CAN module included		
	R5F563TCBGFB	R5F563TCBGFB#V1	PLQP0144KA-A	384 Kbytes	32 Kbytes	CAN module included		
	R5F563TCBGFA	R5F563TCBGFA#V1	PLQP0120KA-A	384 Kbytes	32 Kbytes	CAN module included		
	R5F563TCBGFH	R5F563TCBGFH#V1	PLQP0112JA-A	384 Kbytes	32 Kbytes	CAN module included		
	R5F563TCBGFP	R5F563TCBGFP#V1	PLQP0100KB-A	384 Kbytes	32 Kbytes	CAN module included		
	R5F563TBBGFB	R5F563TBBGFB#V1	PLQP0144KA-A	256 Kbytes	24 Kbytes	CAN module included		
	R5F563TBBGFA	R5F563TBBGFA#V1	PLQP0120KA-A	256 Kbytes	24 Kbytes	CAN module included		
	R5F563TBBGFH	R5F563TBBGFH#V1	PLQP0112JA-A	256 Kbytes	24 Kbytes	CAN module included		
	R5F563TBBGFP	R5F563TBBGFP#V1	PLQP0100KB-A	256 Kbytes	24 Kbytes	CAN module included		
	R5F563T6EGFM	R5F563T6EGFM#V0	PLQP0064KB-A	64 Kbytes	8 Kbytes	CAN module not included	VCC/ PLL/VCC 2.7 to 3.6V AVCC0 3.0 to 3.6V	
	R5F563T5EGFM	R5F563T5EGFM#V0	PLQP0064KB-A	48 Kbytes	8 Kbytes	CAN module not included		
	R5F563T4EGFM	R5F563T4EGFM#V0	PLQP0064KB-A	32 Kbytes	8 Kbytes	CAN module not included		
	R5F563T6EGFL	R5F563T6EGFL#V0	PLQP0048KB-A	64 Kbytes	8 Kbytes	CAN module not included		
	R5F563T5EGFL	R5F563T5EGFL#V0	PLQP0048KB-A	48 Kbytes	8 Kbytes	CAN module not included		
	R5F563T4EGFL	R5F563T4EGFL#V0	PLQP0048KB-A	32 Kbytes	8 Kbytes	CAN module not included		

Note: • Orderable part numbers are current as of when this manual was published. Please make sure to refer to the relevant product page on the Renesas website for the latest part numbers.

Note: • The products with the product ID code 1 (ex. R5F563TEADFB#V1) are the revised version to the specification constraints of technical update TX-RX*-A84A / E described.

Note 1. Please contact Renesas Electronics sales office for derating of operation under Ta = +85°C to +105°C. Derating is the systematic reduction of load for the sake of improved reliability.

1.3 Block Diagram

Figure 1.2 shows a block diagram.

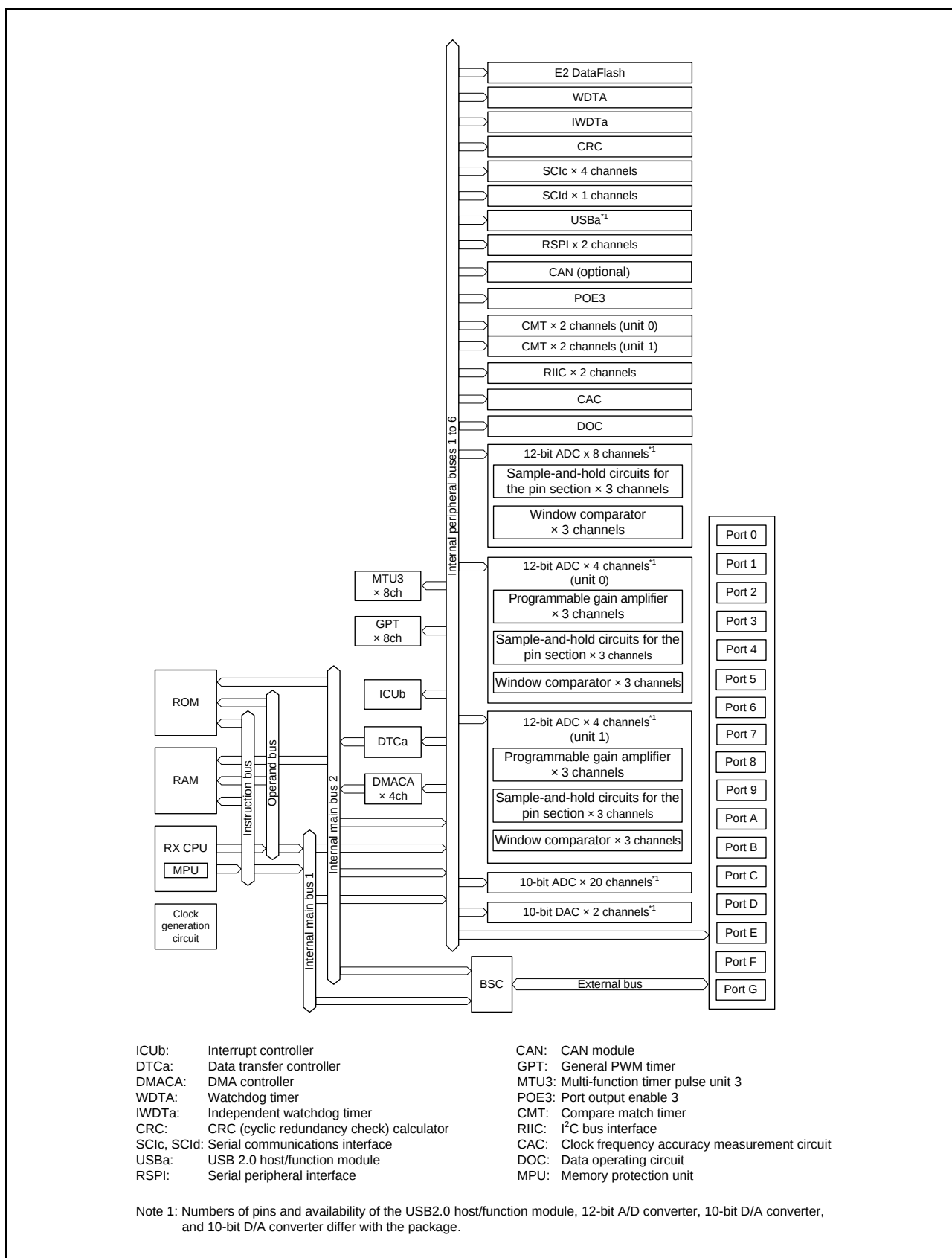


Figure 1.2 Block Diagram



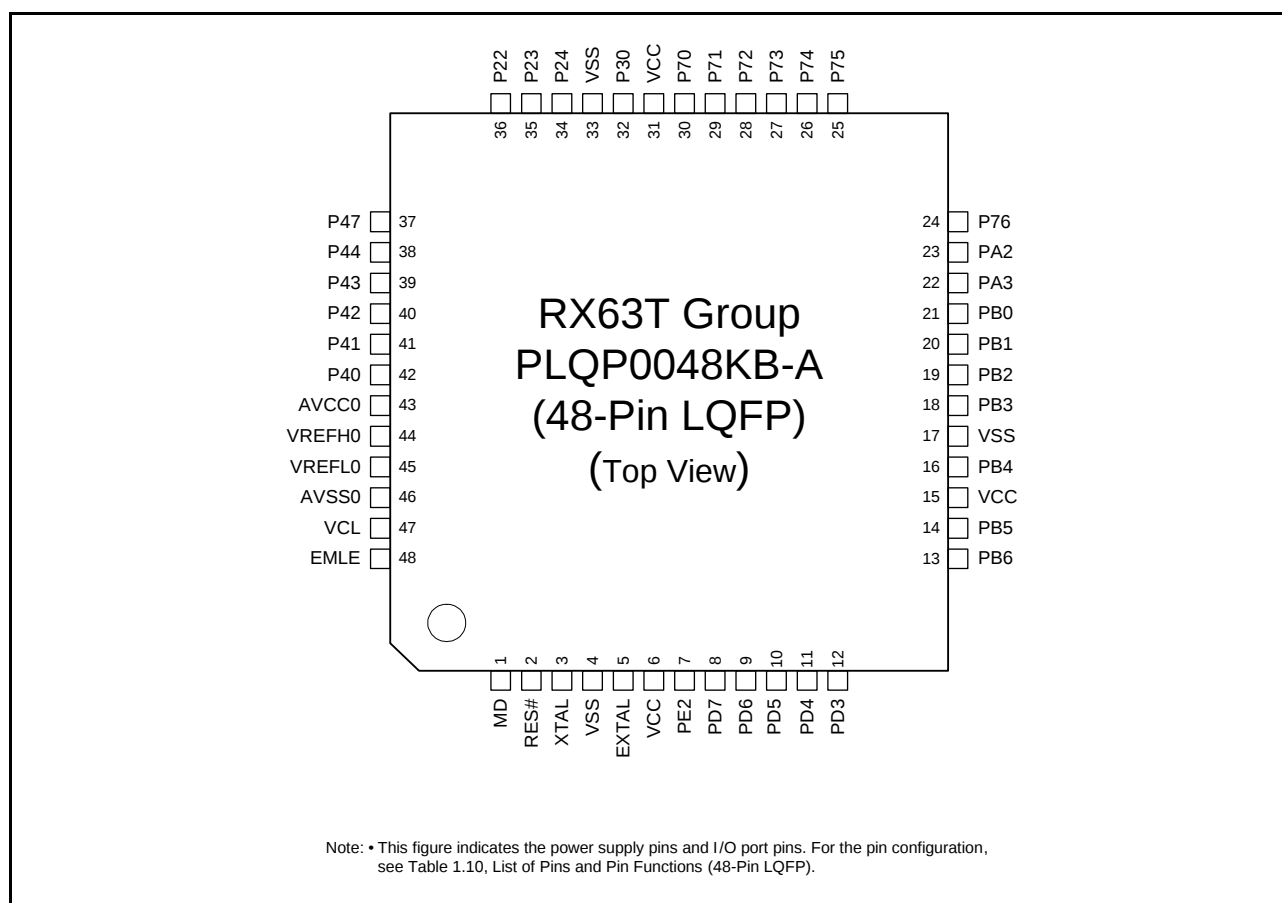


Figure 1.8 Pin Assignment (48-Pin LQFP)

Table 1.5 List of Pins and Pin Functions (144-Pin LQFP) (1/4)

Pin Number 144-Pin LQFP	Power Supply Clock System Control	I/O Port	Bus	Timer (MTU3, GPT, POE3, CAC)	Communications (SCIC, SCID, RSPI, RIIC, CAN, USB)	Interrupt	S12ADB, AD, DA
1	VCC_USB						
2		PE5	BCLK		USB0_VBUS	IRQ0	
3	EMLE						
4	TRSYNC	P03			RXD2/SMISO2/SSCL2	IRQ7	
5	TRDATA3	P02			TXD2/SMOSI2/SSDA2		
6	VSS						
7		P01	RD#		CTS0#/RTS0#/SS0#/ USB0_DRPD		
8	VCL						
9		P00	CS1#	CACREF			
10	MD/FINED						
11		PE4	A10	POE10#/MTCLKC		IRQ1	
12		PE3	A11	POE11#/MTCLKD		IRQ2-DS	
13	TRDATA2	P14			SCK2		
14	VCC						
15		P13			CTS2#/RTS2#/SS2#/ USB0_VBUSEN		
16	RES#						
17	XTAL						
18	VSS						
19	EXTAL						
20	VCC						
21		PE2		POE10#		NMI	
22		PE1	WR0#/WR#		CTS12#/RTS12#/ SS12#/SSLA3/SSLB3/ USB0_OVRCURA		
23		PE0	WR1#/BC1#/ WAIT#		SSLA2/SSLB2/CRX1/ USB0_OVRCURB	IRQ7	
24		PD7		GTIOC0A	CTS0#/RTS0#/SS0#/ SSLA1/SSLB1/CTX1		
25		PD6		GTIOC0B	SSLA0/SSLB0		
26		PD5		GTIOC1A	RXD1/SMISO1/SSCL1	IRQ6	
27	VSS						
28		PD4		GTIOC1B	SCK1		
29		PD3		GTIOC2A	TXD1/SMOSI1/SSDA1		
30		PD2	CS2#	GTIOC2B	MOSIA/MOSIB/ USB0_ID		
31		PD1	CS0#	GTIOC3A	MISOA/MISOB/ USB0_EXICEN		
32		PD0	A12	GTIOC3B	RSPCKA/RSPCKB		
33		PF4	CS3#				
34		PF3			TXD1/SMOSI1/SSDA1		
35		PF2	CS1#		RXD1/SMISO1/SSCL1	IRQ5	
36	TRST#	PF1					
37	TMS	PF0					
38		PB7	A19		SCK12		

Table 1.6 List of Pins and Pin Functions (120-Pin LQFP) (4/4)

Pin Number 120-Pin LQFP	Power Supply Clock System Control	I/O Port	Bus	Timer (MTU3, GPT, POE3, CAC)	Communications (SClC, SClD, RSPI, RIIC, CAN, USB)	Interrupt	S12ADB, AD, DA
111		P82	WAIT#	MTIC5U	SCK12	IRQ3	
112		P81	A8	MTIC5V	TXD12/SMOSI12/ SSDA12/TXDX12/ SIOX12		
113		P80	A9	MTIC5W	RXD12/SMISO12/ SSCL12/RXDX12	IRQ5	
114		P12	CS3#		USB0_DPRPD		
115		P11	ALE	MTCLKC		IRQ1-DS	
116		P10		MTCLKD		IRQ0-DS	
117					USB0_DPUPE		
118	VSS_USB						
119					USB0_DM		
120					USB0_DP		

Table 1.7 List of Pins and Pin Functions (112-Pin LQFP) (3/4)

Pin Number 112-Pin LQFP	Power Supply Clock System Control	I/O Port	Bus	Timer (MTU3, GPT, POE3, CAC)	Communications (SCIC, SCID, RSPI, RIIC, CAN)	Interrupt	S12ADB, AD, DA
74		P23	D12/[A12/ D12]	CACREF	TXD0/SMOSI0/ SSDA0/MOSIA/ MOSIB/CTX1		
75		P22	D13/[A13/ D13]		RXD0/SMISO0/ SSCL0/MISOA/ MISOB/CRX1		ADTRG#
76		P21	D14/[A14/ D14]	MTCLKA		IRQ6-DS	ADTRG1#
77		P20	D15/[A15/ D15]	MTCLKB		IRQ7-DS	ADTRG0#
78		P65	A0/BC0#				AN5
79		P64	A1				AN4
80	AVCC						
81	VREF						
82	AVSS						
83		P63	A2				AN3
84		P62	A3				AN2
85		P61	A4				AN1
86		P60	A5				AN0
87		P55					AN11/DA1
88		P54					AN10/ DA0
89		P53	A6				AN9
90		P52	A7				AN8
91		P51					AN7
92		P50					AN6
93		P47					AN103/ CVREFH
94		P46					AN102
95		P45					AN101
96		P44					AN100
97		P43					AN003/ CVREFL
98		P42					AN002
99		P41					AN001
100		P40					AN000
101	AVCC0						
102	VREFH0						
103	VREFL0						
104	AVSS0						
105		P82	WAIT#	MTIC5U	SCK12	IRQ3	
106		P81	A8	MTIC5V	TXD12/SMOSI12/ SSDA12/TXD12/ SIOX12		
107		P80	A9	MTIC5W	RXD12/SMISO12/ SSCL12/RXD12	IRQ5	
108		P12	CS3#				
109		P11	ALE	MTCLKC		IRQ1-DS	

Table 1.9 List of Pins and Pin Functions (64-Pin LQFP) (2/3)

Pin Number 64-Pin LQFP	Power Supply Clock System Control	I/O Port	POE3	Timer (MTU3, GPT, CAC)	Communications		Interrupt	S12ADB
					(SClC, SClD)	(RSPI, RIIC)		
27		PA3		MTIOC2A		SSLA0		
28		PA2		MTIOC2B		SSLA1		
29		P94			TXD1 SMOSI1 SSDA1			
30		P93			RXD1 SMISO1 SSCL1		IRQ1	
31		P92			SCK1			
32		P91			CTS1# RTS1# SS1#			
33		P76		MTIOC4D GTIOC2B MTIOC7D				
34		P75		MTIOC4C GTIOC1B MTIOC7C				
35		P74		MTIOC3D GTIOC0B MTIOC6D				
36		P73		MTIOC4B GTIOC2A MTIOC7B				
37		P72		MTIOC4A GTIOC1A MTIOC7A				
38		P71		MTIOC3B GTIOC0A MTIOC6B				
39		P70	POE0#		CTS1# RTS1# SS1#		IRQ5-DS	
40		P33		MTIOC3A MTIOC6A		SSLA3		
41		P32		MTIOC3C MTIOC6C		SSLA2		
42	VCC							
43		P31		MTIOC0A		SSLA1		
44	VSS							
45		P30		MTIOC0B MTCLKD	TXD0 SMOSI0 SSDA0	SSLA0		
46		P24		MTIC5U MTCLKC	RXD0 SMISO0 SSCL0	RSPCKA		
47		P23		MTIC5V MTCLKB CACREF	SCK0	MOSIA		
48		P22		MTIC5W MTCLKA	CTS0# RTS0# SS0#	MISOA		
49		P47						AN007 CVREFH

4. I/O Registers

This section gives information on the on-chip I/O register addresses. The information is given as shown below. Notes on writing to registers are also given at the end.

(1) I/O register addresses (address order)

- Registers are listed from the lower allocation addresses.
- Registers are classified according to module symbols.
- The number of access cycles indicates the number of cycles based on the specified reference clock.
- Among the internal I/O register area, addresses not listed in the list of registers are reserved. Reserved addresses must not be accessed. Do not access these addresses; otherwise, the operation when accessing these bits and subsequent operations cannot be guaranteed.

(2) Notes on writing to I/O registers

When writing to an I/O register, the CPU starts executing the subsequent instruction before completing I/O register write. This may cause the subsequent instruction to be executed before the post-update I/O register value is reflected on the operation.

As described in the following examples, special care is required for the cases in which the subsequent instruction must be executed after the post-update I/O register value is actually reflected.

[Examples of cases requiring special care]

- The subsequent instruction must be executed while an interrupt request is disabled with the IENj bit in IERN of the ICU (interrupt request enable bit) cleared to 0.
- A WAIT instruction is executed immediately after the preprocessing for causing a transition to the low power consumption state.

In the above cases, after writing to an I/O register, wait until the write operation is completed using the following procedure and then execute the subsequent instruction.

- Write to an I/O register.
- Read the value from the I/O register to a general register.
- Execute the operation using the value read.
- Execute the subsequent instruction.

[Instruction examples]

- Byte-size I/O registers

```
MOV.L #SFR_ADDR, R1
MOV.B #SFR_DATA, [R1]
CMP [R1].UB, R1
;; Next process
```

- Word-size I/O registers

```
MOV.L #SFR_ADDR, R1
MOV.W #SFR_DATA, [R1]
CMP [R1].W, R1
;; Next process
```

Table 4.1 List of I/O Registers (Address Order) (8/48)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Module Name	Remarks
						ICLK ≥ PCLK	ICLK < PCLK		
0008 711Bh	ICU	DTC Activation Enable Register 027	DTCER027	8	8	2 ICLK		ICUb	
0008 711Ch	ICU	DTC Activation Enable Register 028	DTCER028	8	8	2 ICLK			
0008 711Dh	ICU	DTC Activation Enable Register 029	DTCER029	8	8	2 ICLK			
0008 711Eh	ICU	DTC Activation Enable Register 030	DTCER030	8	8	2 ICLK			
0008 711Fh	ICU	DTC Activation Enable Register 031	DTCER031	8	8	2 ICLK			
0008 7121h	ICU	DTC Activation Enable Register 033	DTCER033	8	8	2 ICLK			Not present in versions with 112, 100, 64 or 48 pins.
0008 7122h	ICU	DTC Activation Enable Register 034	DTCER034	8	8	2 ICLK			Not present in versions with 112, 100, 64 or 48 pins.
0008 7127h	ICU	DTC Activation Enable Register 039	DTCER039	8	8	2 ICLK			
0008 7128h	ICU	DTC Activation Enable Register 040	DTCER040	8	8	2 ICLK			
0008 712Ah	ICU	DTC Activation Enable Register 042	DTCER042	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 712Bh	ICU	DTC Activation Enable Register 043	DTCER043	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7131h	ICU	DTC Activation Enable Register 049	DTCER049	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7132h	ICU	DTC Activation Enable Register 050	DTCER050	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7133h	ICU	DTC Activation Enable Register 051	DTCER051	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7134h	ICU	DTC Activation Enable Register 052	DTCER052	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7135h	ICU	DTC Activation Enable Register 053	DTCER053	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7136h	ICU	DTC Activation Enable Register 054	DTCER054	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7137h	ICU	DTC Activation Enable Register 055	DTCER055	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7138h	ICU	DTC Activation Enable Register 056	DTCER056	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 713Ah	ICU	DTC Activation Enable Register 058	DTCER058	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 713Bh	ICU	DTC Activation Enable Register 059	DTCER059	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 713Ch	ICU	DTC Activation Enable Register 060	DTCER060	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 713Dh	ICU	DTC Activation Enable Register 061	DTCER061	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 713Eh	ICU	DTC Activation Enable Register 062	DTCER062	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7140h	ICU	DTC Activation Enable Register 064	DTCER064	8	8	2 ICLK			
0008 7141h	ICU	DTC Activation Enable Register 065	DTCER065	8	8	2 ICLK			
0008 7142h	ICU	DTC Activation Enable Register 066	DTCER066	8	8	2 ICLK			
0008 7143h	ICU	DTC Activation Enable Register 067	DTCER067	8	8	2 ICLK			
0008 7144h	ICU	DTC Activation Enable Register 068	DTCER068	8	8	2 ICLK			
0008 7145h	ICU	DTC Activation Enable Register 069	DTCER069	8	8	2 ICLK			
0008 7146h	ICU	DTC Activation Enable Register 070	DTCER070	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7147h	ICU	DTC Activation Enable Register 071	DTCER071	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7162h	ICU	DTC Activation Enable Register 098	DTCER098	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7166h	ICU	DTC Activation Enable Register 102	DTCER102	8	8	2 ICLK			
0008 7167h	ICU	DTC Activation Enable Register 103	DTCER103	8	8	2 ICLK			
0008 7168h	ICU	DTC Activation Enable Register 104	DTCER104	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7169h	ICU	DTC Activation Enable Register 105	DTCER105	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 717Eh	ICU	DTC Activation Enable Register 126	DTCER126	8	8	2 ICLK			

Table 4.1 List of I/O Registers (Address Order) (12/48)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Module Name	Remarks
						ICLK $\geq$ PCLK	ICLK $<$ PCLK		
0008 732C	ICU	Interrupt Source Priority Register 044	IPR044	8	8	2 ICLK		ICUb	Not present in versions with 64 or 48 pins.
0008 732Dh	ICU	Interrupt Source Priority Register 045	IPR045	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7331h	ICU	Interrupt Source Priority Register 049	IPR049	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7334h	ICU	Interrupt Source Priority Register 052	IPR052	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7336h	ICU	Interrupt Source Priority Register 054	IPR054	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7337h	ICU	Interrupt Source Priority Register 055	IPR055	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7338h	ICU	Interrupt Source Priority Register 056	IPR056	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7339h	ICU	Interrupt Source Priority Register 057	IPR057	8	8	2 ICLK			
0008 733Ah	ICU	Interrupt Source Priority Register 058	IPR058	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 733Bh	ICU	Interrupt Source Priority Register 059	IPR059	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 733Ch	ICU	Interrupt Source Priority Register 060	IPR060	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 733Dh	ICU	Interrupt Source Priority Register 061	IPR061	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 733Eh	ICU	Interrupt Source Priority Register 062	IPR062	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7340h	ICU	Interrupt Source Priority Register 064	IPR064	8	8	2 ICLK			
0008 7341h	ICU	Interrupt Source Priority Register 065	IPR065	8	8	2 ICLK			
0008 7342h	ICU	Interrupt Source Priority Register 066	IPR066	8	8	2 ICLK			
0008 7343h	ICU	Interrupt Source Priority Register 067	IPR067	8	8	2 ICLK			
0008 7344h	ICU	Interrupt Source Priority Register 068	IPR068	8	8	2 ICLK			
0008 7345h	ICU	Interrupt Source Priority Register 069	IPR069	8	8	2 ICLK			
0008 7346h	ICU	Interrupt Source Priority Register 070	IPR070	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7347h	ICU	Interrupt Source Priority Register 071	IPR071	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 735Ah	ICU	Interrupt Source Priority Register 090	IPR090	8	8	2 ICLK			Not present in versions with 112, 100, 64 or 48 pins.
0008 7362h	ICU	Interrupt Source Priority Register 098	IPR098	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7366h	ICU	Interrupt Source Priority Register 102	IPR102	8	8	2 ICLK			
0008 7367h	ICU	Interrupt Source Priority Register 103	IPR103	8	8	2 ICLK			
0008 7368h	ICU	Interrupt Source Priority Register 104	IPR104	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7369h	ICU	Interrupt Source Priority Register 105	IPR105	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 736Ah	ICU	Interrupt Source Priority Register 106	IPR106	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 7372h	ICU	Interrupt Source Priority Register 114	IPR114	8	8	2 ICLK			
0008 737Ah	ICU	Interrupt Source Priority Register 122	IPR122	8	8	2 ICLK			
0008 737Eh	ICU	Interrupt Source Priority Register 126	IPR126	8	8	2 ICLK			
0008 7382h	ICU	Interrupt Source Priority Register 130	IPR130	8	8	2 ICLK			
0008 7385h	ICU	Interrupt Source Priority Register 133	IPR133	8	8	2 ICLK			
0008 7387h	ICU	Interrupt Source Priority Register 135	IPR135	8	8	2 ICLK			
0008 7389h	ICU	Interrupt Source Priority Register 137	IPR137	8	8	2 ICLK			
0008 738Bh	ICU	Interrupt Source Priority Register 139	IPR139	8	8	2 ICLK			
0008 738Dh	ICU	Interrupt Source Priority Register 141	IPR141	8	8	2 ICLK			
0008 7391h	ICU	Interrupt Source Priority Register 145	IPR145	8	8	2 ICLK			
0008 7392h	ICU	Interrupt Source Priority Register 146	IPR146	8	8	2 ICLK			
0008 7396h	ICU	Interrupt Source Priority Register 150	IPR150	8	8	2 ICLK			
0008 7397h	ICU	Interrupt Source Priority Register 151	IPR151	8	8	2 ICLK			

Table 4.1 List of I/O Registers (Address Order) (13/48)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Module Name	Remarks
						ICLK $\geq$ PCLK	ICLK $<$ PCLK		
0008 739Ah	ICU	Interrupt Source Priority Register 154	IPR154	8	8	2 ICLK		ICUB	
0008 739Eh	ICU	Interrupt Source Priority Register 158	IPR158	8	8	2 ICLK			
0008 73A1h	ICU	Interrupt Source Priority Register 161	IPR161	8	8	2 ICLK			
0008 73A3h	ICU	Interrupt Source Priority Register 163	IPR163	8	8	2 ICLK			
0008 73A5h	ICU	Interrupt Source Priority Register 165	IPR165	8	8	2 ICLK			
0008 73A6h	ICU	Interrupt Source Priority Register 166	IPR166	8	8	2 ICLK			
0008 73ABh	ICU	Interrupt Source Priority Register 171	IPR171	8	8	2 ICLK			
0008 73ACh	ICU	Interrupt Source Priority Register 172	IPR172	8	8	2 ICLK			
0008 73ADh	ICU	Interrupt Source Priority Register 173	IPR173	8	8	2 ICLK			
0008 73AEh	ICU	Interrupt Source Priority Register 174	IPR174	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 73B1h	ICU	Interrupt Source Priority Register 177	IPR177	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 73B4h	ICU	Interrupt Source Priority Register 180	IPR180	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 73B7h	ICU	Interrupt Source Priority Register 183	IPR183	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 73B9h	ICU	Interrupt Source Priority Register 185	IPR185	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 73BCh	ICU	Interrupt Source Priority Register 188	IPR188	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 73BEh	ICU	Interrupt Source Priority Register 190	IPR190	8	8	2 ICLK			Not present in versions with 112, 100, 64 or 48 pins.
0008 73C2h	ICU	Interrupt Source Priority Register 194	IPR194	8	8	2 ICLK			
0008 73C6h	ICU	Interrupt Source Priority Register 198	IPR198	8	8	2 ICLK			
0008 73C7h	ICU	Interrupt Source Priority Register 199	IPR199	8	8	2 ICLK			
0008 73C8h	ICU	Interrupt Source Priority Register 200	IPR200	8	8	2 ICLK			
0008 73C9h	ICU	Interrupt Source Priority Register 201	IPR201	8	8	2 ICLK			
0008 73D6h	ICU	Interrupt Source Priority Register 214	IPR214	8	8	2 ICLK			
0008 73D9h	ICU	Interrupt Source Priority Register 217	IPR217	8	8	2 ICLK			
0008 73DCh	ICU	Interrupt Source Priority Register 220	IPR220	8	8	2 ICLK			Not present in versions with 64 or 48 pins.
0008 73DFh	ICU	Interrupt Source Priority Register 223	IPR223	8	8	2 ICLK			Not present in versions with 100, 64 or 48 pins.
0008 73E2h	ICU	Interrupt Source Priority Register 226	IPR226	8	8	2 ICLK			
0008 73E5h	ICU	Interrupt Source Priority Register 229	IPR229	8	8	2 ICLK			
0008 73E8h	ICU	Interrupt Source Priority Register 232	IPR232	8	8	2 ICLK			
0008 73EBh	ICU	Interrupt Source Priority Register 235	IPR235	8	8	2 ICLK			
0008 73EEh	ICU	Interrupt Source Priority Register 238	IPR238	8	8	2 ICLK			
0008 73F1h	ICU	Interrupt Source Priority Register 241	IPR241	8	8	2 ICLK			
0008 73F4h	ICU	Interrupt Source Priority Register 244	IPR244	8	8	2 ICLK			
0008 73F7h	ICU	Interrupt Source Priority Register 247	IPR247	8	8	2 ICLK			
0008 73FAh	ICU	Interrupt Source Priority Register 250	IPR250	8	8	2 ICLK			
0008 7400h	ICU	DMAC Activation Request Select Register 0	DMRSR0	8	8	2 ICLK			
0008 7404h	ICU	DMAC Activation Request Select Register 1	DMRSR1	8	8	2 ICLK			
0008 7408h	ICU	DMAC Activation Request Select Register 2	DMRSR2	8	8	2 ICLK			
0008 740Ch	ICU	DMAC Activation Request Select Register 3	DMRSR3	8	8	2 ICLK			
0008 7500h	ICU	IRQ Control Register 0	IRQCR0	8	8	2 ICLK			
0008 7501h	ICU	IRQ Control Register 1	IRQCR1	8	8	2 ICLK			
0008 7502h	ICU	IRQ Control Register 2	IRQCR2	8	8	2 ICLK			
0008 7503h	ICU	IRQ Control Register 3	IRQCR3	8	8	2 ICLK			
0008 7504h	ICU	IRQ Control Register 4	IRQCR4	8	8	2 ICLK			
0008 7505h	ICU	IRQ Control Register 5	IRQCR5	8	8	2 ICLK			
0008 7506h	ICU	IRQ Control Register 6	IRQCR6	8	8	2 ICLK			Not present in versions with 64 or 48 pins.

Table 4.1 List of I/O Registers (Address Order) (20/48)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Module Name	Remarks
						ICLK ≥ PCLK	ICLK < PCLK		
0008 9873h	AD	A/D Sampling State Register 1	ADSSTR1	8	8	2, 3 PCLKB	2 ICLK	AD	Not present in versions with 64 or 48 pins.
0008 9874h	AD	A/D Sampling State Register 2	ADSSTR2	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 9875h	AD	A/D Sampling State Register 3	ADSSTR3	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 9876h	AD	A/D Sampling State Register 4	ADSSTR4	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 9877h	AD	A/D Sampling State Register 5	ADSSTR5	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 9878h	AD	A/D Sampling State Register 6	ADSSTR6	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 9879h	AD	A/D Sampling State Register 7	ADSSTR7	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 987Dh	AD	Digital Power Supply Control Circuit Output Register	ADDPCONR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64, or 48 pins.
0008 A000h	SCI0	Serial Mode Register	SMR	8	8	2, 3 PCLKB	2 ICLK	SCIc, SCId	
0008 A001h	SCI0	Bit Rate Register	BRR	8	8	2, 3 PCLKB	2 ICLK		
0008 A002h	SCI0	Serial Control Register	SCR	8	8	2, 3 PCLKB	2 ICLK		
0008 A003h	SCI0	Transmit Data Register	TDR	8	8	2, 3 PCLKB	2 ICLK		
0008 A004h	SCI0	Serial Status Register	SSR	8	8	2, 3 PCLKB	2 ICLK		
0008 A005h	SCI0	Receive Data Register	RDR	8	8	2, 3 PCLKB	2 ICLK		
0008 A006h	SCI0	Smart Card Mode Register	SCMR	8	8	2, 3 PCLKB	2 ICLK		
0008 A007h	SCI0	Serial Extended Mode Register	SEMR	8	8	2, 3 PCLKB	2 ICLK		
0008 A008h	SCI0	Noise Filter Setting Register	SNFR	8	8	2, 3 PCLKB	2 ICLK		
0008 A009h	SCI0	I ² C Mode Register 1	SIMR1	8	8	2, 3 PCLKB	2 ICLK		
0008 A00Ah	SCI0	I ² C Mode Register 2	SIMR2	8	8	2, 3 PCLKB	2 ICLK		
0008 A00Bh	SCI0	I ² C Mode Register 3	SIMR3	8	8	2, 3 PCLKB	2 ICLK		
0008 A00Ch	SCI0	I ² C Status Register	SISR	8	8	2, 3 PCLKB	2 ICLK		
0008 A00Dh	SCI0	SPI Mode Register	SPMR	8	8	2, 3 PCLKB	2 ICLK		
0008 A020h	SCI1	Serial Mode Register	SMR	8	8	2, 3 PCLKB	2 ICLK		
0008 A021h	SCI1	Bit Rate Register	BRR	8	8	2, 3 PCLKB	2 ICLK		
0008 A022h	SCI1	Serial Control Register	SCR	8	8	2, 3 PCLKB	2 ICLK		
0008 A023h	SCI1	Transmit Data Register	TDR	8	8	2, 3 PCLKB	2 ICLK		
0008 A024h	SCI1	Serial Status Register	SSR	8	8	2, 3 PCLKB	2 ICLK		
0008 A025h	SCI1	Receive Data Register	RDR	8	8	2, 3 PCLKB	2 ICLK		
0008 A026h	SCI1	Smart Card Mode Register	SCMR	8	8	2, 3 PCLKB	2 ICLK		
0008 A027h	SCI1	Serial Extended Mode Register	SEMR	8	8	2, 3 PCLKB	2 ICLK		
0008 A028h	SCI1	Noise Filter Setting Register	SNFR	8	8	2, 3 PCLKB	2 ICLK		
0008 A029h	SCI1	I ² C Mode Register 1	SIMR1	8	8	2, 3 PCLKB	2 ICLK		
0008 A02Ah	SCI1	I ² C Mode Register 2	SIMR2	8	8	2, 3 PCLKB	2 ICLK		
0008 A02Bh	SCI1	I ² C Mode Register 3	SIMR3	8	8	2, 3 PCLKB	2 ICLK		
0008 A02Ch	SCI1	I ² C Status Register	SISR	8	8	2, 3 PCLKB	2 ICLK		
0008 A02Dh	SCI1	SPI Mode Register	SPMR	8	8	2, 3 PCLKB	2 ICLK		
0008 A040h	SCI2	Serial Mode Register	SMR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 A041h	SCI2	Bit Rate Register	BRR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 A042h	SCI2	Serial Control Register	SCR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 A043h	SCI2	Transmit Data Register	TDR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 A044h	SCI2	Serial Status Register	SSR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 A045h	SCI2	Receive Data Register	RDR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 A046h	SCI2	Smart Card Mode Register	SCMR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.

Table 4.1 List of I/O Registers (Address Order) (22/48)

Address	Module Symbol	Register Name	Register Symbol	Number of Bits	Access Size	Number of Access States		Module Name	Remarks
						ICLK ≥ PCLK	ICLK < PCLK		
0008 B308h	SCI12	Noise Filter Setting Register	SNFR	8	8	2, 3 PCLKB	2 ICLK	SCId, SCId	
0008 B309h	SCI12	I ² C Mode Register 1	SIMR1	8	8	2, 3 PCLKB	2 ICLK		
0008 B30Ah	SCI12	I ² C Mode Register 2	SIMR2	8	8	2, 3 PCLKB	2 ICLK		
0008 B30Bh	SCI12	I ² C Mode Register 3	SIMR3	8	8	2, 3 PCLKB	2 ICLK		
0008 B30Ch	SCI12	I ² C Status Register	SISR	8	8	2, 3 PCLKB	2 ICLK		
0008 B30Dh	SCI12	SPI Mode Register	SPMR	8	8	2, 3 PCLKB	2 ICLK		
0008 B320h	SCI12	Extended Serial Module Enable Register	ESMER	8	8	2, 3 PCLKB	2 ICLK		
0008 B321h	SCI12	Control Register 0	CR0	8	8	2, 3 PCLKB	2 ICLK		
0008 B322h	SCI12	Control Register 1	CR1	8	8	2, 3 PCLKB	2 ICLK		
0008 B323h	SCI12	Control Register 2	CR2	8	8	2, 3 PCLKB	2 ICLK		
0008 B324h	SCI12	Control Register 3	CR3	8	8	2, 3 PCLKB	2 ICLK		
0008 B325h	SCI12	Port Control Register	PCR	8	8	2, 3 PCLKB	2 ICLK		
0008 B326h	SCI12	Interrupt Control Register	ICR	8	8	2, 3 PCLKB	2 ICLK		
0008 B327h	SCI12	Status Register	STR	8	8	2, 3 PCLKB	2 ICLK		
0008 B328h	SCI12	Status Clear Register	STCR	8	8	2, 3 PCLKB	2 ICLK		
0008 B329h	SCI12	Control Field 0 Data Register	CF0DR	8	8	2, 3 PCLKB	2 ICLK		
0008 B32Ah	SCI12	Control Field 0 Compare Enable Register	CF0CR	8	8	2, 3 PCLKB	2 ICLK		
0008 B32Bh	SCI12	Control Field 0 Receive Data Register	CF0RR	8	8	2, 3 PCLKB	2 ICLK		
0008 B32Ch	SCI12	Primary Control Field 1 Data Register	PCF1DR	8	8	2, 3 PCLKB	2 ICLK		
0008 B32Dh	SCI12	Primary Control Field 1 Data Register	SCF1DR	8	8	2, 3 PCLKB	2 ICLK		
0008 B32Eh	SCI12	Secondary Control Field 1 Data Register	CF1CR	8	8	2, 3 PCLKB	2 ICLK		
0008 B32Fh	SCI12	Control Field 1 Receive Data Register	CF1RR	8	8	2, 3 PCLKB	2 ICLK		
0008 B330h	SCI12	Timer Control Register	TCR	8	8	2, 3 PCLKB	2 ICLK		
0008 B331h	SCI12	Timer Mode Register	TMR	8	8	2, 3 PCLKB	2 ICLK		
0008 B332h	SCI12	Timer Prescaler Register	TPRE	8	8	2, 3 PCLKB	2 ICLK		
0008 B333h	SCI12	Timer Count Register	TCNT	8	8	2, 3 PCLKB	2 ICLK		
0008 C000h	PORT0	Port Direction Register	PDR	8	8	2, 3 PCLKB	2 ICLK	I/O Ports	Not present in versions with 48 pins.
0008 C001h	PORT1	Port Direction Register	PDR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 48 pins.
0008 C002h	PORT2	Port Direction Register	PDR	8	8	2, 3 PCLKB	2 ICLK		
0008 C003h	PORT3	Port Direction Register	PDR	8	8	2, 3 PCLKB	2 ICLK		
0008 C007h	PORT7	Port Direction Register	PDR	8	8	2, 3 PCLKB	2 ICLK		
0008 C008h	PORT8	Port Direction Register	PDR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C009h	PORT9	Port Direction Register	PDR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 48 pins.
0008 C00Ah	PORTA	Port Direction Register	PDR	8	8	2, 3 PCLKB	2 ICLK		
0008 C00Bh	PORTB	Port Direction Register	PDR	8	8	2, 3 PCLKB	2 ICLK		
0008 C00Dh	PORTD	Port Direction Register	PDR	8	8	2, 3 PCLKB	2 ICLK		
0008 C00Eh	PORTE	Port Direction Register	PDR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C00Fh	PORTF	Port Direction Register	PDR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 100, 64, or 48 pins.
0008 C010h	PORTG	Port Direction Register	PDR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 100, 64, or 48 pins.
0008 C020h	PORT0	Port Output Data Register	PODR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 48 pins.
0008 C021h	PORT1	Port Output Data Register	PODR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 48 pins.
0008 C022h	PORT2	Port Output Data Register	PODR	8	8	2, 3 PCLKB	2 ICLK		
0008 C023h	PORT3	Port Output Data Register	PODR	8	8	2, 3 PCLKB	2 ICLK		
0008 C027h	PORT7	Port Output Data Register	PODR	8	8	2, 3 PCLKB	2 ICLK		
0008 C028h	PORT8	Port Output Data Register	PODR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 64 or 48 pins.
0008 C029h	PORT9	Port Output Data Register	PODR	8	8	2, 3 PCLKB	2 ICLK		Not present in versions with 48 pins.

5.2 DC Characteristics

Table 5.2 DC Characteristics (1)

Note: Common standard values for conditions not given in the table are listed as “Condition 1” to “Condition 3” below.

Condition 1: VCC = PLLVCC = VCC_USB = 2.7 to 3.6 V, VSS = PLLVSS = VSS_USB = AVSS0 = AVSS = VREFL0 = 0 V

AVCC0 = AVCC = VREF = 3.0 to 3.6 V, VREFH0 = 3.0 V to AVCC0

Condition 2: VCC = PLLVCC = VCC_USB = 2.7 to 3.6 V, VSS = PLLVSS = VSS_USB = AVSS0 = AVSS = VREFL0 = 0 V

AVCC0 = AVCC = VREF = 4.0 to 5.5 V, VREFH0 = 4.0 V to AVCC0

Condition 3: VCC = PLLVCC = 4.0 to 5.5 V, VCC_USB = 3.0 to 3.6 V, VSS = PLLVSS = VSS_USB = AVSS0 = AVSS = VREFL0 = 0 V

AVCC0 = AVCC = VREF = 4.0 to 5.5 V, VREFH0 = 4.0 V to AVCC0

The following relation applies when the USB is in use under condition 1 or condition 2: Vcc = PLLVcc = Vcc_USB = 3.0 to 3.6 V.

T_a = T_{opr}. T_a is common to conditions 1 to 3.

Item	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Schmitt trigger input voltage	CAN input pin	V _{IH}	VCC × 0.8	—	VCC + 0.3	V
	IRQ input pin	V _{IL}	−0.3	—	VCC × 0.2	
	MTU3 input pin	ΔV _T	VCC × 0.06	—	—	
	POE3 input pin					
	SCI input pin					
	A/D trigger input pin					
	GPT input pin					
	RES#, NMI					
	RIIC input pin (IICBus operating)	V _{IH}	VCC × 0.7	—	VCC + 0.3	
		V _{IL}	−0.3	—	VCC × 0.3	
		ΔV _T	VCC × 0.05	—	—	
	USB0_VBUS input pin	V _{IH}	VCC × 0.7	—	VCC + 0.3	
		V _{IL}	−0.3	—	VCC × 0.2	
		ΔV _T	VCC × 0.06	—	—	
	Port 4*1 (also used as an analog port)	V _{IH}	AVCC0 × 0.8	—	AVCC0 + 0.3	
		V _{IL}	−0.3	—	AVCC0 × 0.2	
Input high voltage (except for Schmitt trigger input pin)	MD pin, EMLE EXTAL, WAIT#, TCK RSPI input pin D0 to D15 RIIC input pin (SMBus operating)	V _{IH}	AVCC × 0.8	—	AVCC + 0.3	V
		V _{IL}	−0.3	—	AVCC × 0.2	
		V _{IH}	VCC × 0.8	—	VCC + 0.3	
		V _{IL}	−0.3	—	VCC × 0.2	
Input low voltage (except for Schmitt trigger input pin)	MD pin, EMLE EXTAL, WAIT#, TCK RSPI input pin D0 to D15 RIIC input pin (SMBus operating)	V _{IH}	VCC × 0.8	—	VCC + 0.3	V
		V _{IL}	−0.3	—	VCC × 0.2	
		V _{IH}	VCC × 0.8	—	VCC + 0.3	
		V _{IL}	−0.3	—	VCC × 0.2	

Note 1. This includes the multiplexed pin functions, except for P25, P26, PB1, or PB2 when the RIIC input functions are in use, P22 to P24, P30, PA3 to PA5, PB0, PD0 to PD2, or PD6 when the RSPI input functions are in use, and PD4 or PF3 when the TCK input function is in use.

5.3.2 Clock Timing

Table 5.9 Clock Timing

Note: Common standard values for conditions not given in the table are listed as “Condition 1” to “Condition 3” below.

Condition 1: VCC = PLLVCC = VCC_USB = 2.7 to 3.6 V, VSS = PLLVSS = VSS_USB = AVSS0 = AVSS = VREFL0 = 0 V

AVCC0 = AVCC = VREF = 3.0 to 3.6 V, VREFH0 = 3.0 V to AVCC0

Condition 2: VCC = PLLVCC = VCC_USB = 2.7 to 3.6 V, VSS = PLLVSS = VSS_USB = AVSS0 = AVSS = VREFL0 = 0 V

AVCC0 = AVCC = VREF = 4.0 to 5.5 V, VREFH0 = 4.0 V to AVCC0

Condition 3: VCC = PLLVCC = 4.0 to 5.5 V, VCC_USB = 3.0 to 3.6 V, VSS = PLLVSS = VSS_USB = AVSS0 = AVSS = VREFL0 = 0 V

AVCC0 = AVCC = VREF = 4.0 to 5.5 V, VREFH0 = 4.0 V to AVCC0

T_a = T_{opr}. T_a is common to conditions 1 to 3.

Item		Symbol	Min.	Typ.	Max.	Unit	Test Conditions
BCLK pin output cycle time	Only condition 3	t _{Bcyc}	20	—	—	ns	Figure 5.3
	Other than condition 3	t _{Bcyc}	40	—	—	ns	
BCLK pin output high pulse width		t _{CH}	5	—	—	ns	
BCLK pin output low pulse width		t _{CL}	5	—	—	ns	
BCLK pin output rising time		t _{Cr}	—	—	5	ns	
BCLK pin output falling time		t _{Cf}	—	—	5	ns	
EXTAL external clock input cycle time		t _{EXcyc}	70	—	—	ns	Figure 5.4
EXTAL external clock input high pulse width		t _{EXH}	35	—	—	ns	
EXTAL external clock input low pulse width		t _{EXL}	35	—	—	ns	
EXTAL external clock rising time		t _{EXr}	—	—	5	ns	
EXTAL external clock falling time		t _{EXf}	—	—	5	ns	
EXTAL external clock input wait time*1		t _{EXWT}	1	—	—	ms	
Main clock oscillator oscillation frequency		f _{MAIN}	8	—	12.5	MHz	Figure 5.5
Main clock oscillator stabilization time (crystal)		t _{MAINOSC}	—	—	*2	ms	
Main clock oscillator stabilization wait time (crystal)		t _{MAINOSCW}	—	—	*3	ms	
LOCO, IWDTCCLK clock cycle time		t _{LOCOCYC}	6.96	8	9.4	μs	
LOCO, IWDTCCLK clock oscillation frequency		f _{LOCO}	106.25	125	143.75	kHz	
LOCO, IWDTCCLK clock oscillation stabilization wait time		t _{LOCOWT}	—	—	20	μs	Figure 5.6
PLL clock frequency		f _{PLL}	104	—	200	MHz	
PLL clock oscillation stabilization time	PLL operation started after main clock oscillation has settled	t _{PLL1}	—	—	500	μs	Figure 5.7
PLL clock oscillation stabilization wait time		t _{PLLWT1}	—	—	*4	ms	
PLL clock oscillation stabilization time	PLL operation started before main clock oscillation has settled	t _{PLL2}	—	—	t _{MAINOSC} + t _{PLL1}	ms	Figure 5.8
PLL clock oscillation stabilization wait time		t _{PLLWT2}	—	—	*4	ms	

Note 1. This is the time until the clock is used after clearing the main clock oscillator stop bit (MOSCCR.MOSTP) to 0 (selecting operation).

Note 2. When using a main clock, ask the manufacturer of the oscillator to evaluate its oscillation. Refer to the results of evaluation provided by the manufacturer for the oscillation stabilization time.

Note 3. This is calculated from the formula below, where n is the number of cycles set by the MOSCWTCR.MSTS[4:0] bits.

$$t_{\text{MAINOSCW}} = t_{\text{MAINOSC}} + \frac{n + 16384}{f_{\text{MAIN}}}$$

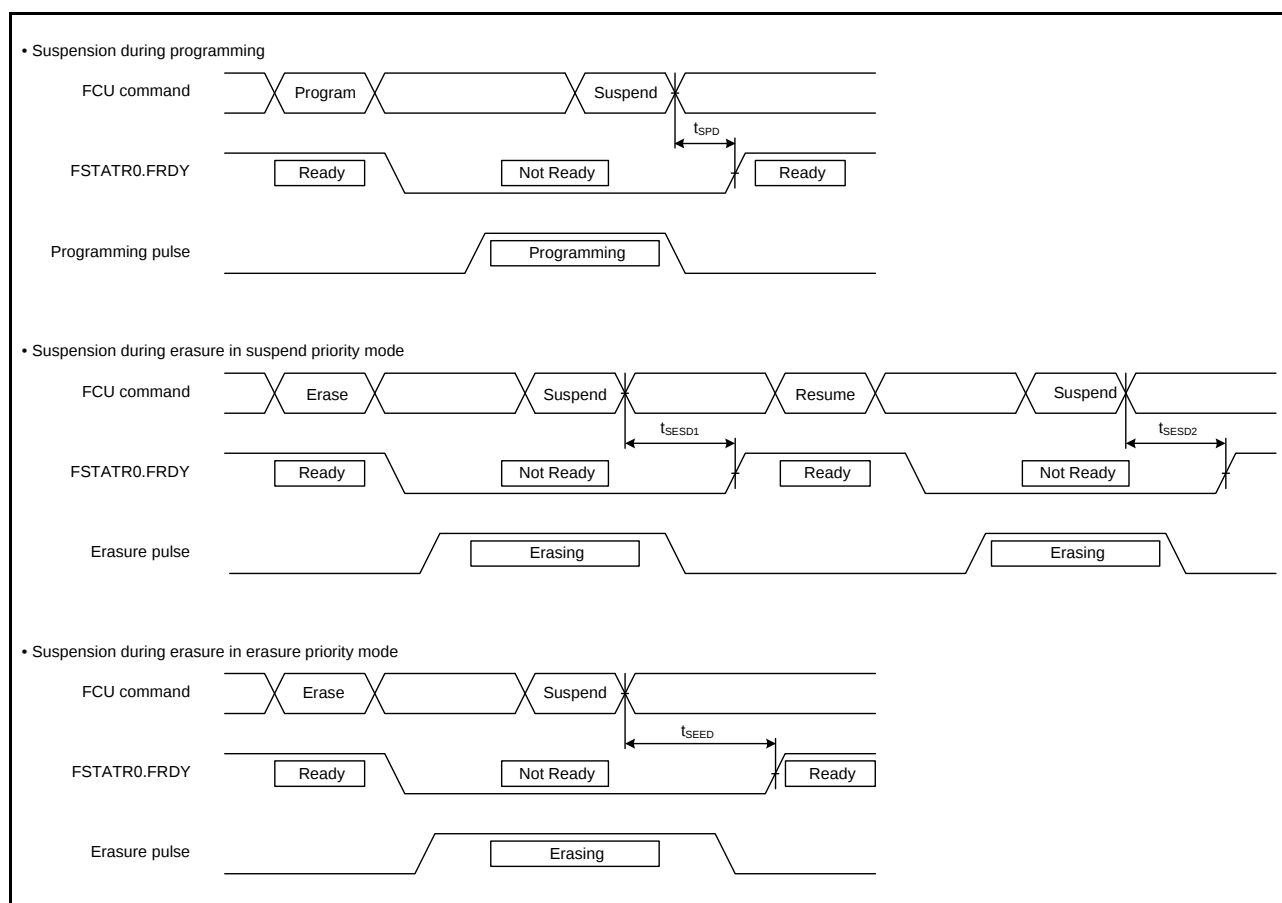


Figure 5.44 Flash Memory Program/Erase Suspend Timing

Appendix 1. Package Dimensions

Information on the latest version of the package dimensions or mountings has been displayed in “Packages” on Renesas Electronics Corporation website.

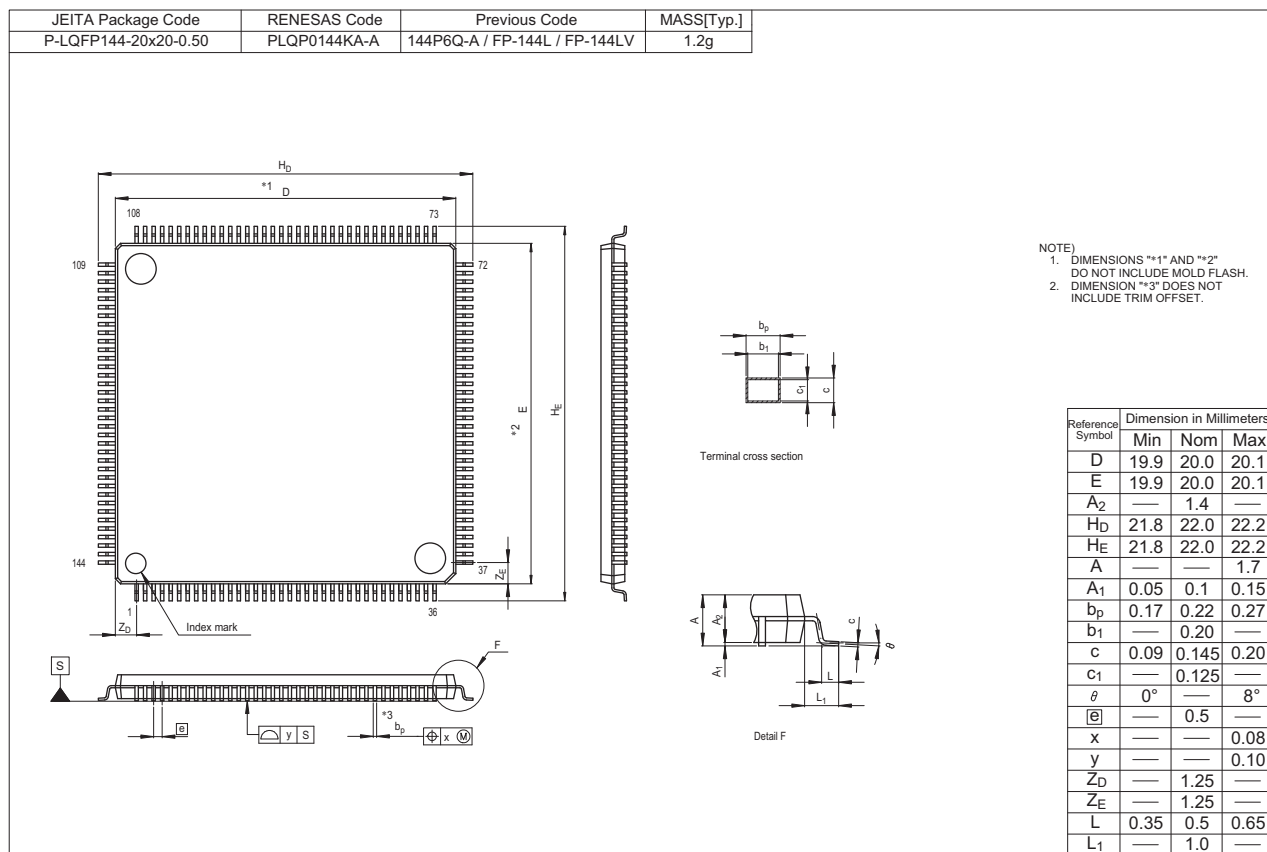


Figure A 144-Pin LQFP (PLQP0144KA-A)

REVISION HISTORY	RX63T Group Datasheet
------------------	-----------------------

Rev.	Date	Description	
		Page	Summary
1.00	Aug 28, 2012	—	First Edition issued
2.00	Mar 11, 2013	Features	
		1	Changed
		1. Overview	
		2	1.1 Outline of Specifications, description changed
		2 to 8	Table 1.1 Outline of Specifications, changed
		9	Table 1.2 Comparison of Functions for Different Packages, changed
		10 to 12	Table 1.3 List of Products, changed
		12	Figure 1.1 How to Read the Product Part Number, changed
		13	Figure 1.2 Block Diagram, changed
		14 to 18	Table 1.4 Pin Functions, changed
		19	Figure 1.3 Pin Assignment (144-Pin LQFP), added
		20	Figure 1.4 Pin Assignment (120-Pin LQFP), added
		21	Figure 1.5 Pin Assignment (112-Pin LQFP), added
		22	Figure 1.6 Pin Assignment (100-Pin LQFP), added
		23	Figure 1.7 Pin Assignment (64-Pin LQFP), notes changed
		24	Figure 1.8 Pin Assignment (48-Pin LQFP), notes changed
		25 to 28	Table 1.5 List of Pins and Pin Functions (144-Pin LQFP), added
		29 to 32	Table 1.6 List of Pins and Pin Functions (120-Pin LQFP), added
		33 to 36	Table 1.7 List of Pins and Pin Functions (112-Pin LQFP), added
		37 to 39	Table 1.8 List of Pins and Pin Functions (100-Pin LQFP), added
		3. Address Space	
		49	Figure 3.1 Memory Map in Each Operating Mode, changed
		50	3.2 External Address Space, added
		4. I/O Registers	
		52	(3) Number of Access Cycles to I/O Registers, description changed
		53 to 103	Table 4.1 List of I/O Registers (Address Order), changed
		5. Electrical Characteristics [144-, 120-, 112- and 100-Pin Versions]	
		104 to 148	Added
		6. Electrical Characteristics [64- and 48-Pin Versions]	
		149	Title changed
		152	Table 6.6 Clock Timing, changed
		158	Table 6.10 Timing of On-Chip Peripheral Modules (1), changed
		160	Table 6.12 Timing of On-Chip Peripheral Modules (3), changed
		170	6.6 Oscillation Stop Detection Circuit Characteristics, title changed
		170	Table 6.18 Oscillation Stop Detection Circuit Characteristics, title changed
		171	Table 6.19 ROM (Flash Memory for Code Storage) Characteristics (1), added
		171	Table 6.20 ROM (Flash Memory for Code Storage) Characteristics (2), title and description changed
		172	Table 6.21 DataFlash (Flash Memory for Data Storage) Characteristics (1), added
		172	Table 6.22 DataFlash (Flash Memory for Data Storage) Characteristics (2), title and description changed
		Appendix 1. Package Dimensions	
		174 to 177	Figure A 144-Pin LQFP (PLQP0144KA-A) to Figure D 100-Pin LQFP (PLQP0100KB-A), added
2.10	Sep 26, 2013	The RX63T Group and RX63T changed to this MCU	
		Features	
		1	Changed
		1. Overview	
		2 to 8	Table 1.1 Outline of Specifications, changed, Note 1, added.
		9	Table 1.2 Comparison of Functions for Different Packages, changed, Note 2, added.
		10 to 14	Table 1.3 List of Products, changed, Note 1, added
		15	Figure 1.1 How to Read the Product Part Number, changed
		28 to 31	Table 1.5 List of Pins and Pin Functions (144-Pin LQFP), changed
		32 to 35	Table 1.6 List of Pins and Pin Functions (120-Pin LQFP), changed