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"[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	M16C/60
Core Size	16-Bit
Speed	20MHz
Connectivity	I ² C, IEBus, SIO, UART/USART
Peripherals	DMA, POR, PWM, Voltage Detect, WDT
Number of I/O	71
Program Memory Size	128KB (128K x 8)
Program Memory Type	FLASH
EEPROM Size	4K x 8
RAM Size	12K x 8
Voltage - Supply (Vcc/Vdd)	2.7V ~ 5.5V
Data Converters	A/D 24x10b
Oscillator Type	Internal
Operating Temperature	-20°C ~ 85°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/renesas-electronics-america/m30280fchp-u5b

1. Overview

The M16C/28 Group (M16C/28 and M16C/28B) MCU are single-chip control MCU, fabricated using high-performance silicon gate CMOS technology with the M16C/60 series CPU core. The M16C/28 Group (M16C/28 and M16C/28B) are housed in 64-pin and 80-pin plastic molded LQFP packages and also in 85-pin plastic molded TFLGA (Thin Fine Pitch Land Grid Array) package. With a 1-Mbyte address space, this MCU combines advanced instruction manipulation capabilities to process complex instructions by less bytes and execute instructions at higher speed. It includes a multiplier and DMAC adequate for office automation, communication devices and other high-speed processing applications.

The M16C/28 has Normal-ver., T-ver., and V-ver.. The M16C/28B has Normal-ver. only.

This hardware manual describes the Normal-ver. only. Please contact Renesas Technology Corp. for T-ver./V-ver. information.

1.1 Applications

Audio, cameras, office equipment, communication equipment, portable equipment, home appliances (inverter solution), motor control, industrial equipment, etc.

1.2 Performance Overview

Table 1.1 and **1.2** outline performance overview of the M16C/28 Group (M16C/28, M16C/28B).

Table 1.1 M16C/28 Group (M16C/28, M16C/28B) Performance (80/85-Pin Package)

	Item	Performance
CPU	Number of basic instructions	91 instructions
	Minimum instruction execution time	41.7 ns (f(BCLK) = 24 MHz, Vcc = 4.2 V to 5.5 V) (M16C/28B) 50 ns (f(BCLK) = 20 MHz, Vcc = 3.0 V to 5.5 V) (M16C/28, M16C/28B) 100 ns (f(BCLK) = 10 MHz, Vcc = 2.7 V to 5.5 V) (M16C/28, M16C/28B)
	Operation mode	Single chip mode
	Address space	1M bytes
	Memory capacity	See Table 1.3
Peripheral Function	I/O port	Input/Output : 71 lines
	Multifunction timer	TimerA:16 bits x 5 channels, TimerB:16 bits x 3 channels Three-phase Motor Control Timer TimerS (Input Capture/Output Compare) : 16bit base timer x 1 channel (Input/Output x 8 channels)
	Serial I/O	2 channels (UART0, UART1) UART, clock synchronous 1 channel (UART2) UART, clock synchronous, I ² C bus ⁽¹⁾ , or IEBus ⁽²⁾ 2 channels (SI/O3, SI/O4) Clock synchronous 1 channel (Multi-Master I ² C bus ⁽¹⁾)
	A/D converter	10 bits x 24 channels
	DMAC	2 channels
	Watchdog timer	15 bits x 1 (with prescaler)
	Interrupt	25 internal and 8 external sources, 4 software sources, 7 levels
	Clock generation circuit	4 circuits • Main clock (*) • Sub-clock (*) • On-chip oscillator • PLL frequency synthesizer (*) Equipped with a built-in feedback resistor
	Oscillation Stop Detect Function	Main clock oscillation stop, re-oscillation detect function
	Voltage detection circuit	Available
Electrical Characteristics	Power supply voltage	Vcc = 4.2 V to 5.5 V (f(BCLK) = 24 MHz) (M16C/28B) Vcc = 3.0 V to 5.5 V (f(BCLK) = 20 MHz) (M16C/28, M16C/28B) Vcc = 2.7 V to 5.5 V (f(BCLK) = 10 MHz) (M16C/28, M16C/28B)
	Power consumption	16 mA (Vcc = 5V, f(BCLK) = 20 MHz) 25 μ A (f(XCIN) = 32 KHz on RAM) 3.0 μ A (Vcc = 3V, f(XCIN) = 32 KHz, in wait mode) 0.7 μ A (Vcc = 3V, in stop mode)
Flash Memory	Program/erase supply voltage	2.7 V to 5.5 V
	Program and erase endurance	100 times (all space) or 1,000 times (Blocks 0 to 5) /10,000 times (Block A, Block B ⁽³⁾)
Operating Ambient Temperature		-20 to 85°C/-40 to 85°C ⁽³⁾
Package		80-pin plastic mold LQFP, 85-pin plastic mold TFLGA

NOTES:

1. I²C bus is a trademark of Koninklijke Philips Electronics N. V.
2. IEBus is a trademark of NEC Electronics Corporation.
3. Refer to **Table 1.5** to **1.7** for number of program/erase.
4. Use PLL frequency synthesizer to use M16C/28B at f(BCLK) = 24 MHz.

Table 1.2 M16C/28 Group (M16C/28, M16C/28B) (64-Pin Package)

	Item	Performance
CPU	Number of basic instructions	91 instructions
	Minimum instruction execution time	41.7 ns (f(BCLK) = 24 MHz, VCC = 4.2 V to 5.5 V) (M16C/28B) 50 ns (f(BCLK) = 20 MHz, VCC = 3.0V to 5.5V) (M16C/28, M16C/28B) 100 ns (f(BCLK) = 10 MHz, VCC = 2.7V to 5.5V) (M16C/28, M16C/28B)
	Operation mode	Single chip mode
	Address space	1M bytes
	Memory capacity	See Table 1.3
Peripheral Function	I/O Port	Input/Output : 55 lines
	Multifunction timer	TimerA:16 bits x 5 channels, TimerB:16 bits x 3 channels Three-phase Motor Control Timer TimerS (Input Capture/Output Compare) : 16bit base timer x 1 channel (Input/Output x 8 channels)
	Serial I/O	2 channels (UART0, UART1) UART, clock synchronous 1 channel (UART2) UART, clock synchronous, I ² C bus ⁽¹⁾ , or IEBus ⁽²⁾ 1 channels (SI/O3, SI/O4) Clock synchronous 1 channel (Multi-Master I ² C bus ⁽¹⁾)
	A/D converter	10 bits x 13 channels
	DMAC	2 channels
	Watchdog timer	15 bits x 1 (with prescaler)
	Interrupt	24 internal and 8 external sources, 4 software sources, 7 levels
	Clock generation circuit	4 circuits • Main clock(*) • Sub-clock(*) • On-chip oscillator • PLL frequency synthesizer (*) Equipped with a built-in feedback resistor
	Oscillation Stop Detect Function	Main clock oscillation stop, re-oscillation detect function
	Voltage detection circuit	Available
Electrical Characteristics	Power supply voltage	Vcc = 4.2 V to 5.5 V (f(BCLK) = 24 MHz) (M16C/28) Vcc = 3.0 V to 5.5 V (f(BCLK) = 20 MHz) (M16C/28, M16C/28B) Vcc = 2.7 V to 5.5 V (f(BCLK) = 10 MHz) (M16C/28, M16C/28B)
	Power consumption	16 mA (Vcc = 5 V, f(BCLK) = 20 MHz) 25 μ A (f(XCIN) = 32 KHz on RAM) 3.0 μ A (Vcc = 3 V, f(XCIN) = 32 KHz, in wait mode) 0.7 μ A (Vcc = 3 V, in stop mode)
Flash Memory	Program/erase supply voltage	2.7 V to 5.5 V
	Program and erase endurance	100 times (all space) or 1,000 times (Blocks 0 to 5) /10,000 times (Block A, Block B ⁽³⁾)
Operating Ambient Temperature		-20 to 85C°/-40 to 85C° ⁽³⁾
Package		64-pin plastic mold LQFP

NOTES:

1. I²C bus is a trademark of Koninklijke Philips Electronics N. V.
2. IEBus is a trademark of NEC Electronics Corporation.
3. Refer to **Table 1.5** to **1.7** for number of program/erase.
4. Use PLL frequency synthesizer to use M16C/28B at f(BCLK) = 24 MHz.

1.3 Block Diagram

Figure 1.1 is a block diagram of the M16C/28 Group (M16C/28, M16C/28B), 80-pin and 85-pin package.

Figure 1.2 is a block diagram of the M16C/28 Group (M16C/28, M16C/28B), 64-pin package.

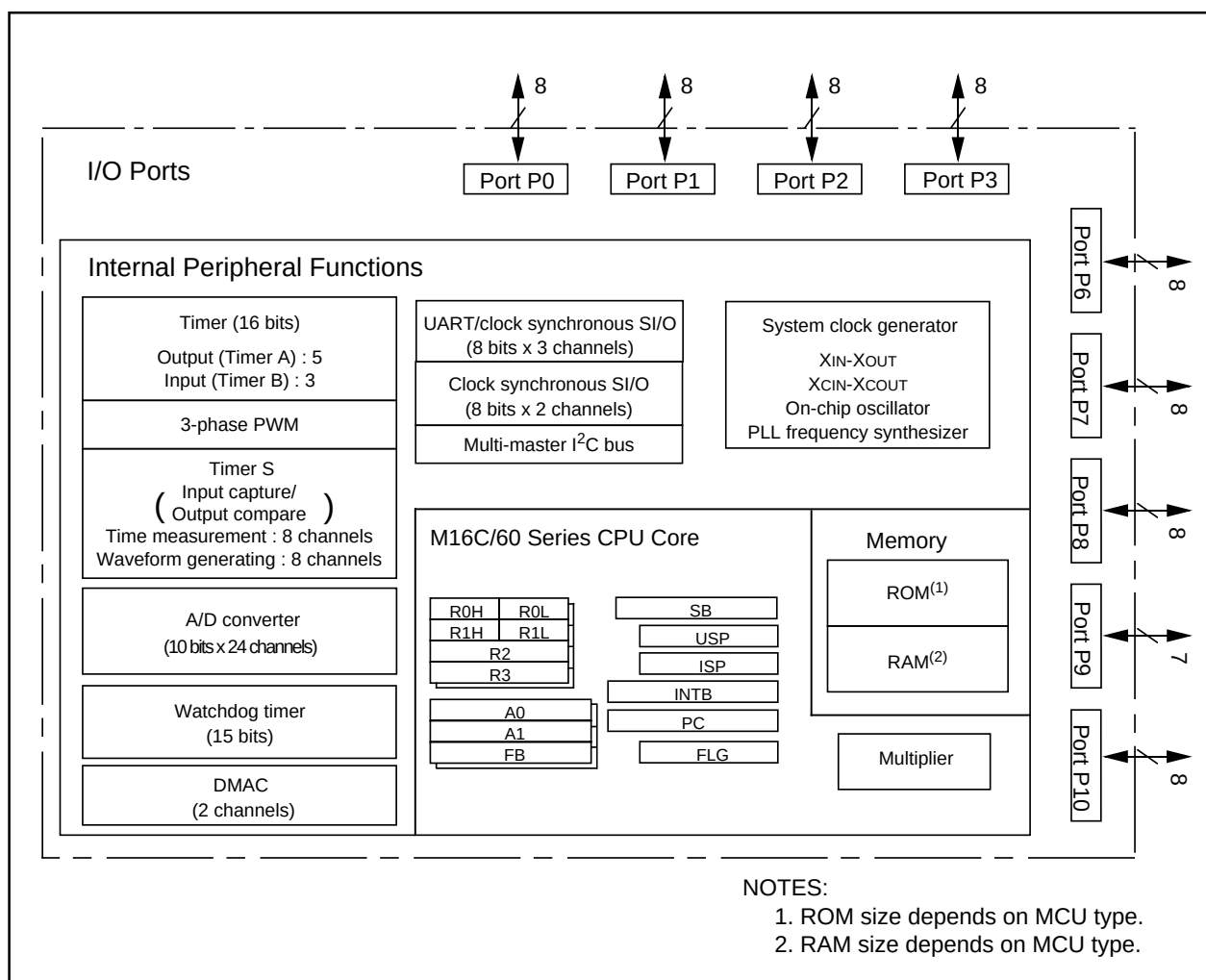


Figure 1.1 M16C/28 Group (M16C/28, M16C/28B), 80-Pin/85-Pin Block Diagram

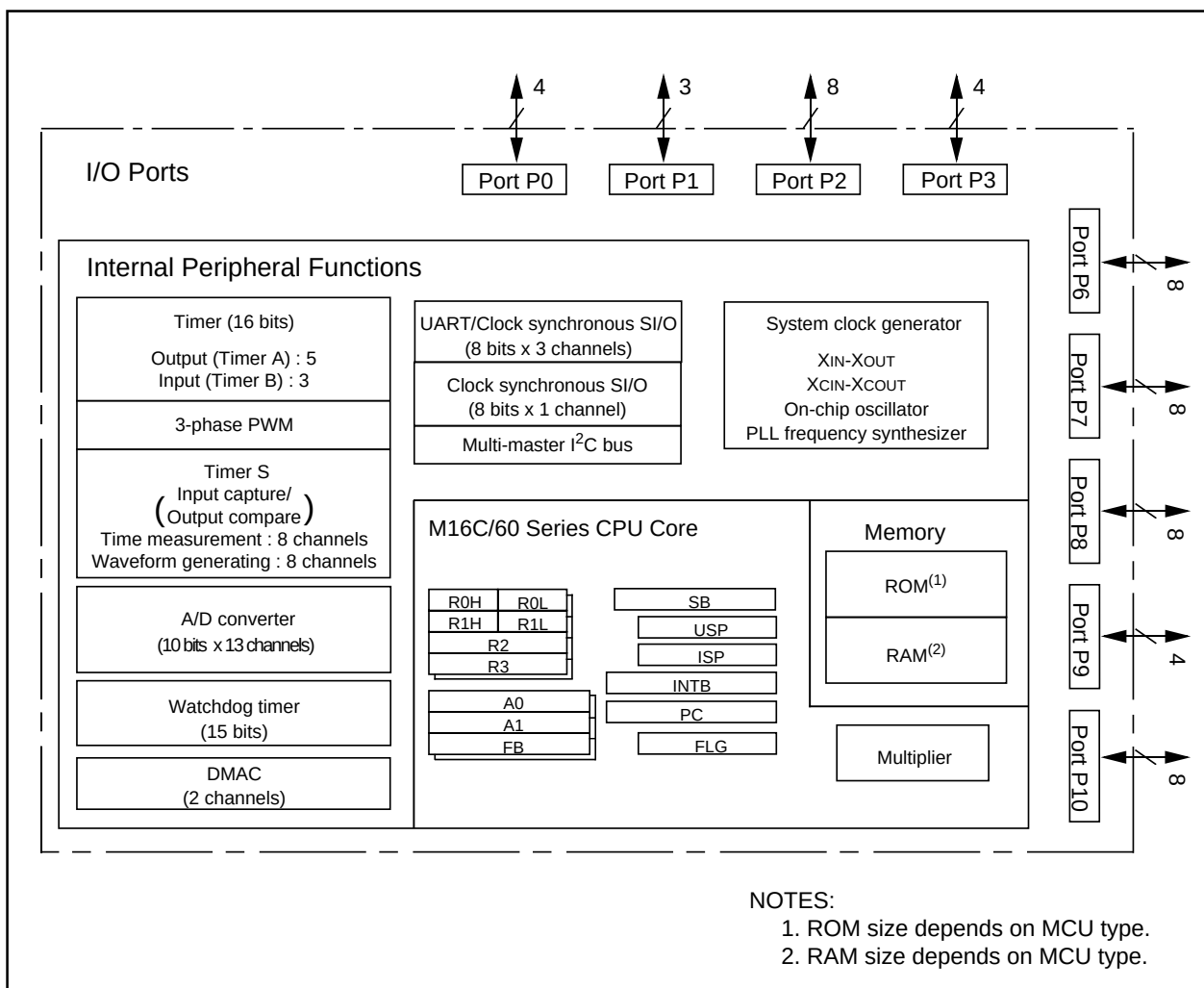


Figure 1.2 M16C/28 Group (M16C/28, M16C/28B), 64-Pin Block Diagram

1.4 Product Information

Tables 1.3 and 1.4 list the M16C/28 Group product information and Figure 1.3 shows the product numbering system. The specifications are partially different between normal-ver. and T/ V-ver..

Table 1.3 M16C/28 Product List -Normal-ver.

As of September, 2006

Type Number	ROM Capacity	RAM Capacity	Package Type	Remarks	Product Code
M30280F6WG (N)	48 K + 4 K	4 K	PTLG0085JB-A (85F0G)	Flash Memory	U3, U5, U7, U9
M30280F8WG (N)	64 K + 4 K	4 K			
M30280FAWG (N)	96 K + 4 K	8 K			
M30280F6HP (N)	48 K + 4 K	4 K	PLQP0080KB-A (80P6Q-A)		
M30280F8HP (N)	64 K + 4 K	4 K			
M30280FAHP (N)	96 K + 4 K	8 K			
M30280FCHP (N)	128 K + 4 K	12 K			
M30281F6HP (N)	48 K + 4 K	4 K	PLQP0064KB-A (64P6Q-A)		
M30281F8HP (N)	64 K + 4 K	4 K			
M30281FAHP (N)	96 K + 4 K	8 K			
M30281FCHP (N)	128 K + 4 K	12 K			
M30280M8-XXXHP (N)	64 K	4 K	PLQP0080KB-A (80P6Q-A)	Mask ROM	U3, U5
M30280MA-XXXHP (N)	96 K	8 K			
M30280MC-XXXHP (N)	128 K	12 K			
M30281M8-XXXHP (N)	64 K	4 K	PLQP0064KB-A (64P6Q-A)		
M30281MA-XXXHP (N)	96 K	8 K			
M30281MC-XXXHP (N)	128 K	12 K			

(N): New

Table 1.4 M16C/28B Product List -Normal-ver.

As of September, 2006

Type Number	ROM Capacity	RAM Capacity	Package Type	Remarks	Product Code
M30280FCBHP (D)	128 K + 4 K	12 K	PLQP0080KB-A (80P6Q-A)	Flash memory	U7
M30281FCBHP (D)	128 K + 4 K	12 K	PLQP0064KB-A (64P6Q-A)		

(D): Under development

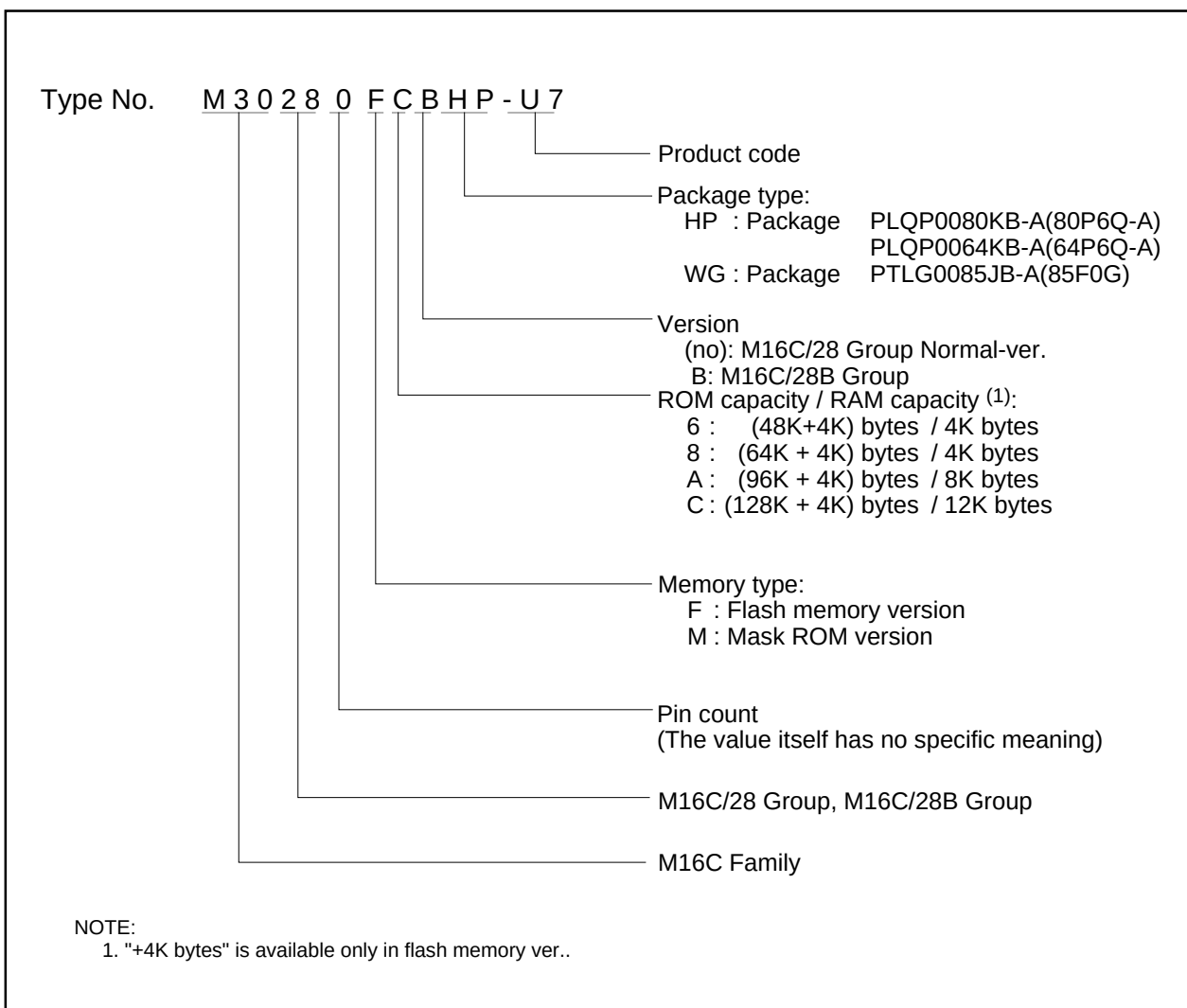


Figure 1.3 Product Numbering System

Table 1.8 Pin Characteristics for 85-pin Package (continued)

Pin No.	Control Pin	Port	Interrupt Pin	Timer Pin	Timer S Pin	UART Pin	Multi-master I ² C bus Pin	Analog Pin	PLQP0080KB-A Pin Number
E8		P15	$\overline{\text{INT}}_3$	IDV				ADTRG	54
E9		P16	$\overline{\text{INT}}_4$	IDW					53
E10		P17	$\overline{\text{INT}}_5$	IDU	INPC17				52
F1	Vcc								13
F2	Vcc								13
F3		P85	$\overline{\text{NMI}}$	$\overline{\text{SD}}$					14
F8	Vss ⁽¹⁾								(11)
F9		P20			OUTC10 / INPC10		SDAMM		51
F10		P21			OUTC11 / INPC11		SCLMM		50
G1		P84	$\overline{\text{INT}}_2$	ZP					15
G2		P83	$\overline{\text{INT}}_1$						16
G3		P82	$\overline{\text{INT}}_0$						17
G8		P22			OUTC12 / INPC12				49
G9		P23			OUTC13 / INPC13				48
G10		P24			OUTC14 / INPC14				47
H1		P81		TA4IN / $\overline{\text{U}}$					18
H2		P80		TA4OUT / U					19
H3		P71		TA0IN		RxD2 / SCL2 / CLK1			26
H4		P66				RxD1			29
H5	Vss ⁽¹⁾								(11)
H6		P35							34
H7		P32				SOUT3			37
H8		P25			OUTC15 / INPC15				46
H9		P26			OUTC16 / INPC16				45
H10		P27			OUTC17 / INPC17				44
J1		P76		TA3OUT					21
J2		P74		TA2OUT / W					23
J3		P72		TA1OUT / V		CLK2 / RxD1			25
J4		P67				TxD1			28
J5		P64				$\overline{\text{RTS}}_1 / \overline{\text{CTS}}_1 / \overline{\text{CTS}}_0 / \text{CLKS}_1$			31
J6		P36							33
J7		P33							36
J8		P62				RxD0			41
J9		P60				$\overline{\text{RTS}}_0 / \overline{\text{CTS}}_0$			43
J10		P61				CLK0			42
K1		P77		TA3IN					20
K2		P75		TA2IN / $\overline{\text{W}}$					22
K3		P73		TA1IN / $\overline{\text{V}}$		$\overline{\text{CTS}}_2 / \overline{\text{RTS}}_2 / \overline{\text{TxD}}_1$			24
K4		P70		TA0OUT		TxD2 / SDA2 / $\overline{\text{RTS}}_1 / \overline{\text{CTS}}_1 / \overline{\text{CTS}}_0 / \text{CLKS}_1$			27
K5		P65				CLK1			30
K6		P37							32
K7		P34							35
K8		P63				TxD0			40
K9		P30				CLK3			39
K10		P31				SIN3			38

Table 1.9 Pin Characteristics for 80-Pin Package

Pin No.	Control Pin	Port	Interrupt Pin	Timer Pin	Timer S Pin	UART Pin	Multi-master I ² C bus Pin	Analog Pin
1		P95				CLK4		AN25
2		P93						AN24
3		P92		TB2IN				
4		P91		TB1IN				
5		P90		TB0IN				
6	CNVss							
7	XCIN	P87						
8	XCOUT	P86						
9	RESET							
10	XOUT							
11	Vss							
12	XIN							
13	Vcc							
14		P85	NMI	SD				
15		P84	INT ₂	ZP				
16		P83	INT ₁					
17		P82	INT ₀					
18		P81		TA4IN / $\bar{U}$				
19		P80		TA4OUT / U				
20		P77		TA3IN				
21		P76		TA3OUT				
22		P75		TA2IN / $\bar{W}$				
23		P74		TA2OUT / W				
24		P73		TA1IN / $\bar{V}$		CTS ₂ / RTS ₂ / TxD ₁		
25		P72		TA1OUT / V		CLK ₂ / RxD ₁		
26		P71		TA0IN		RxD ₂ / SCL ₂ / CLK ₁		
27		P70		TA0OUT		TxD ₂ / SDA ₂ / RTS ₁ / CTS ₁ / CTS ₀ / CLKS ₁		
28		P67				TxD ₁		
29		P66				RxD ₁		
30		P65				CLK ₁		
31		P64				RTS ₁ / CTS ₁ / CTS ₀ / CLKS ₁		
32		P37						
33		P36						
34		P35						
35		P34						
36		P33						
37		P32				SOUT3		
38		P31				SIN3		
39		P30				CLK3		
40		P63				TxD0		

Table 1.9 Pin Characteristics for 80-Pin Package (Continued)

Pin No.	Control Pin	Port	Interrupt Pin	Timer Pin	Timer S Pin	UART Pin	Multi-master I ² C bus Pin	Analog Pin
41		P62				RxD0		
42		P61				CLK0		
43		P60				$\overline{\text{RTS}}_0 / \overline{\text{CTS}}_0$		
44		P27			OUTC17 / INPC17			
45		P26			OUTC16 / INPC16			
46		P25			OUTC15 / INPC15			
47		P24			OUTC14 / INPC14			
48		P23			OUTC13 / INPC13			
49		P22			OUTC12 / INPC12			
50		P21			OUTC11 / INPC11		SCLMM	
51		P20			OUTC10 / INPC10		SDAMM	
52		P17	$\overline{\text{INT}}_5$	IDU	INPC17			
53		P16	$\overline{\text{INT}}_4$	IDW				
54		P15	$\overline{\text{INT}}_3$	IDV				$\overline{\text{ADTRG}}$
55		P14						
56		P13						AN23
57		P12						AN22
58		P11						AN21
59		P10						AN20
60		P07						AN07
61		P06						AN06
62		P05						AN05
63		P04						AN04
64		P03						AN03
65		P02						AN02
66		P01						AN01
67		P00						AN00
68		P107	$\overline{\text{KI}}_3$					AN7
69		P106	$\overline{\text{KI}}_2$					AN6
70		P105	$\overline{\text{KI}}_1$					AN5
71		P104	$\overline{\text{KI}}_0$					AN4
72		P103						AN3
73		P102						AN2
74		P101						AN1
75	AVss							
76		P100						AN0
77	VREF							
78	AVcc							
79		P97				SIN4		AN27
80		P96				SOUT4		AN26

Table 10 Pin Characteristics for 64-Pin Package (Continued)

Pin No.	Control Pin	Port	Interrupt Pin	Timer Pin	Timer S Pin	UART Pin	Multi-master I ² C bus Pin	Analog Pin
41		P23			OUTC13 / INPC13			
42		P22			OUTC12 / INPC12			
43		P21			OUTC11 / INPC11		SCLMM	
44		P20			OUTC10 / INPC10		SDAMM	
45		P17	$\overline{\text{INT}}_5$	IDU	INPC17			
46		P16	$\overline{\text{INT}}_4$	IDW				
47		P15	$\overline{\text{INT}}_3$	IDV				$\overline{\text{ADTRG}}$
48		P03						AN03
49		P02						AN02
50		P01						AN01
51		P00						AN00
52		P107	$\overline{\text{KI}}_3$					AN7
53		P106	$\overline{\text{KI}}_2$					AN6
54		P105	$\overline{\text{KI}}_1$					AN5
55		P104	$\overline{\text{KI}}_0$					AN4
56		P103						AN3
57		P102						AN2
58		P101						AN1
59	AVss							
60		P100						AN0
61	VREF							
62	AVcc							
63		P93						AN24
64		P92		TB2IN				

1.6 Pin Description

Table 1.10 Pin Description (64-Pin, 80-Pin and 85-Pin Packages)

Classification	Symbol	I/O Type	Function
Power Supply	VCC, VSS	I	Apply 2.7 to 5.5V to the VCC pin. Apply 0V to the VSS pin.
Analog Power Supply	AVCC AVSS	I	Supplies power to the A/D converter. Connect the AVCC pin to VCC and the AVSS pin to VSS.
Reset Input	RESET	I	The MCU is in a reset state when "L" is applied to the RESET pin
CNVSS	CNVSS	I	Connect the CNVSS pin to VSS.
Main Clock Input	XIN	I	I/O pins for the main clock oscillation circuit. Connect a ceramic resonator or crystal oscillator between XIN and XOUT. To apply external clock, apply it to XIN and leave XOUT open. If XIN is not used (for external oscillator or external clock) connect XIN pin to VCC and leave XOUT open.
Main Clock Output	XOUT	O	
Sub Clock Input	XCIN	I	I/O pins for the sub clock oscillation circuit. Connect a crystal oscillator between XCIN and XCOUT.
Sub Clock Output	XCOUT	O	
INT Interrupt Input	INT0 to INT5	I	Input pins for the INT interrupt. INT2 can be used for Timer A Z-phase function.
NMI Interrupt Input	NMI	I	Input pin for the NMI interrupt. NMI cannot be used as I/O port while the three-phase motor control is enabled. Apply a stable "H" to NMI after setting it's direction register to "0" when the three-phase motor control is enabled.
Key Input Interrupt	KI0 to KI3	I	Input pins for the key input interrupt
Timer A	TA0OUT to TA4OUT	I/O	I/O pins for the timer A0 to A4
	TA0IN to TA4IN	I	Input pins for the timer A0 to A4
	ZP	I	Input pin for Z-phase
Timer B	TB0IN to TB2IN	I	Input pins for the timer B0 to B2
Three-phase Motor Control Timer Output	U, $\bar{U}$, V, $\bar{V}$, W, $\bar{W}$	O	Output pins for the three-phase motor control timer
	IDU, IDW, IDV, $\bar{S}$	I/O	Input and output pins for the three-phase motor control timer
Serial I/O	CTS0 to CTS2	I	Input pins for data transmission control
	RTS0 to RTS2	O	Output pins for data reception control
	CLK0 to CLK3	I/O	Inputs and outputs the transfer clock
	RxD0 to RxD2	I	Inputs serial data
	TxD0 to TxD2	O	Outputs serial data
	CLKS1	O	Output pin for transfer clock
I ² C Mode	SDA2	I/O	Inputs and outputs serial data
	SCL2		Inputs and outputs the transfer clock
Multi-master I ² C bus	SDAMM	I/O	Inputs and outputs serial data
	SCLMM		Inputs and outputs the transfer clock
Reference Voltage Input	VREF	I	Applies reference voltage to the A/D converter
A/D Converter	AN0 to AN7 AN00 to AN03 AN24	I	Analog input pins for the A/D converter
	ADTRG		Input pin for an external A/D trigger

I : Input O : Output I/O : Input and output

Table 4.4 SFR Information(4)(1)

Address	Register	Symbol	After Reset
0300 ₁₆ 0301 ₁₆	TM, WG register 0	G1TM0, G1PO0	XX ₁₆ XX ₁₆
0302 ₁₆ 0303 ₁₆	TM, WG register 1	G1TM1, G1PO1	XX ₁₆ XX ₁₆
0304 ₁₆ 0305 ₁₆	TM, WG register 2	G1TM2, G1PO2	XX ₁₆ XX ₁₆
0306 ₁₆ 0307 ₁₆	TM, WG register 3	G1TM3, G1PO3	XX ₁₆ XX ₁₆
0308 ₁₆ 0309 ₁₆	TM, WG register 4	G1TM4, G1PO4	XX ₁₆ XX ₁₆
030A ₁₆ 030B ₁₆	TM, WG register 5	G1TM5, G1PO5	XX ₁₆ XX ₁₆
030C ₁₆ 030D ₁₆	TM, WG register 6	G1TM6, G1PO6	XX ₁₆ XX ₁₆
030E ₁₆ 030F ₁₆	TM, WG register 7	G1TM7, G1PO7	XX ₁₆ XX ₁₆
0310 ₁₆	WG control register 0	G1POCR0	0X00XX002
0311 ₁₆	WG control register 1	G1POCR1	0X00XX002
0312 ₁₆	WG control register 2	G1POCR2	0X00XX002
0313 ₁₆	WG control register 3	G1POCR3	0X00XX002
0314 ₁₆	WG control register 4	G1POCR4	0X00XX002
0315 ₁₆	WG control register 5	G1POCR5	0X00XX002
0316 ₁₆	WG control register 6	G1POCR6	0X00XX002
0317 ₁₆	WG control register 7	G1POCR7	0X00XX002
0318 ₁₆	TM control register 0	G1TMCR0	00 ₁₆
0319 ₁₆	TM control register 1	G1TMCR1	00 ₁₆
031A ₁₆	TM control register 2	G1TMCR2	00 ₁₆
031B ₁₆	TM control register 3	G1TMCR3	00 ₁₆
031C ₁₆	TM control register 4	G1TMCR4	00 ₁₆
031D ₁₆	TM control register 5	G1TMCR5	00 ₁₆
031E ₁₆	TM control register 6	G1TMCR6	00 ₁₆
031F ₁₆	TM control register 7	G1TMCR7	00 ₁₆
0320 ₁₆ 0321 ₁₆	Base timer register	G1BT	XX ₁₆ XX ₁₆
0322 ₁₆	Base timer control register 0	G1BCR0	00 ₁₆
0323 ₁₆	Base timer control register 1	G1BCR1	00 ₁₆
0324 ₁₆	TM prescale register 6	G1TPR6	00 ₁₆
0325 ₁₆	TM prescale register 7	G1TPR7	00 ₁₆
0326 ₁₆	Function enable register	G1FE	00 ₁₆
0327 ₁₆	Function select register	G1FS	00 ₁₆
0328 ₁₆ 0329 ₁₆	Base timer reset register	G1BTRR	XX ₁₆ XX ₁₆
032A ₁₆ 032B ₁₆	Divider register	G1DV	00 ₁₆
032C ₁₆			
032D ₁₆			
032E ₁₆			
032F ₁₆			
0330 ₁₆	Interrupt request register	G1IR	XX ₁₆
0331 ₁₆	Interrupt enable register 0	G1IE0	00 ₁₆
0332 ₁₆	Interrupt enable register 1	G1IE1	00 ₁₆
0333 ₁₆			
0334 ₁₆			
0335 ₁₆			
0336 ₁₆			
0337 ₁₆			
0338 ₁₆			
0339 ₁₆			
033A ₁₆			
033B ₁₆			
033C ₁₆			
033D ₁₆			
033E ₁₆	NMI digital debounce register	NDDR	FF ₁₆
033F ₁₆	P17 digital debounce register	P17DDR	FF ₁₆

Note 1: The blank spaces are reserved. No access is allowed.

X : Undefined

Table 4.5 SFR Information(5)(1)

Address	Register	Symbol	After Reset
0340 ₁₆			
0341 ₁₆			
0342 ₁₆	Timer A1-1 register	TA11	XX16
0343 ₁₆			XX16
0344 ₁₆	Timer A2-1 register	TA21	XX16
0345 ₁₆			XX16
0346 ₁₆	Timer A4-1 register	TA41	XX16
0347 ₁₆			XX16
0348 ₁₆	Three-phase PWM control register 0	INVC0	0016
0349 ₁₆	Three-phase PWM control register 1	INVC1	0016
034A ₁₆	Three-phase output buffer register 0	IDB0	001111112
034B ₁₆	Three-phase output buffer register 1	IDB1	001111112
034C ₁₆	Dead time timer	DTT	XX16
034D ₁₆	Timer B2 interrupt occurrence frequency set counter	ICTB2	XX16
034E ₁₆	Position-data-retain function control register	PDRF	XXXX00002
034F ₁₆			
0350 ₁₆			
0351 ₁₆			
0352 ₁₆			
0353 ₁₆			
0354 ₁₆			
0355 ₁₆			
0356 ₁₆			
0357 ₁₆			
0358 ₁₆			
0359 ₁₆			
035A ₁₆			
035B ₁₆			
035C ₁₆			
035D ₁₆			
035E ₁₆	Interrupt request cause select register 2	IFSR2A	00XXXXX02(2)
035F ₁₆	Interrupt request cause select register	IFSR	0016
0360 ₁₆	SI/O3 transmit/receive register	S3TRR	XX16
0361 ₁₆			
0362 ₁₆	SI/O3 control register	S3C	010000002
0363 ₁₆	SI/O3 bit rate generator	S3BRG	XX16
0364 ₁₆	SI/O4 transmit/receive register	S4TRR	XX16
0365 ₁₆			
0366 ₁₆	SI/O4 control register	S4C	010000002
0367 ₁₆	SI/O4 bit rate generator	S4BRG	XX16
0368 ₁₆			
0369 ₁₆			
036A ₁₆			
036B ₁₆			
036C ₁₆			
036D ₁₆			
036E ₁₆			
036F ₁₆			
0370 ₁₆			
0371 ₁₆			
0372 ₁₆			
0373 ₁₆			
0374 ₁₆	UART2 special mode register 4	U2SMR4	0016
0375 ₁₆	UART2 special mode register 3	U2SMR3	000X0X0X2
0376 ₁₆	UART2 special mode register 2	U2SMR2	X00000002
0377 ₁₆	UART2 special mode register	U2SMR	X00000002
0378 ₁₆	UART2 transmit/receive mode register	U2MR	0016
0379 ₁₆	UART2 bit rate generator	U2BRG	XX16
037A ₁₆	UART2 transmit buffer register	U2TB	XX16
037B ₁₆			XX16
037C ₁₆	UART2 transmit/receive control register 0	U2C0	000010002
037D ₁₆	UART2 transmit/receive control register 1	U2C1	000000102
037E ₁₆	UART2 receive buffer register	U2RB	XX16
037F ₁₆			XX16

Note 1: The blank spaces are reserved. No access is allowed.

Note 2: Write 1 to bit 0 after reset.

X : Undefined

Table 4.6 SFR Information(6)⁽¹⁾

Address	Register	Symbol	After Reset
0380 ₁₆	Count start flag	TABSR	00 ₁₆
0381 ₁₆	Clock prescaler reset flag	CPSRF	0XXXXXX2
0382 ₁₆	One-shot start flag	ONSF	00 ₁₆
0383 ₁₆	Trigger select register	TRGSR	00 ₁₆
0384 ₁₆	Up-down flag	UDF	00 ₁₆
0385 ₁₆			
0386 ₁₆	Timer A0 register	TA0	XX ₁₆
0387 ₁₆			XX ₁₆
0388 ₁₆	Timer A1 register	TA1	XX ₁₆
0389 ₁₆			XX ₁₆
038A ₁₆	Timer A2 register	TA2	XX ₁₆
038B ₁₆			XX ₁₆
038C ₁₆	Timer A3 register	TA3	XX ₁₆
038D ₁₆			XX ₁₆
038E ₁₆	Timer A4 register	TA4	XX ₁₆
038F ₁₆			XX ₁₆
0390 ₁₆	Timer B0 register	TB0	XX ₁₆
0391 ₁₆			XX ₁₆
0392 ₁₆	Timer B1 register	TB1	XX ₁₆
0393 ₁₆			XX ₁₆
0394 ₁₆	Timer B2 register	TB2	XX ₁₆
0395 ₁₆			XX ₁₆
0396 ₁₆	Timer A0 mode register	TA0MR	00 ₁₆
0397 ₁₆	Timer A1 mode register	TA1MR	00 ₁₆
0398 ₁₆	Timer A2 mode register	TA2MR	00 ₁₆
0399 ₁₆	Timer A3 mode register	TA3MR	00 ₁₆
039A ₁₆	Timer A4 mode register	TA4MR	00 ₁₆
039B ₁₆	Timer B0 mode register	TB0MR	00XX00002
039C ₁₆	Timer B1 mode register	TB1MR	00XX00002
039D ₁₆	Timer B2 mode register	TB2MR	00XX00002
039E ₁₆	Timer B2 special mode register	TB2SC	X00000002
039F ₁₆			
03A0 ₁₆	UART0 transmit/receive mode register	U0MR	00 ₁₆
03A1 ₁₆	UART0 bit rate generator	U0BRG	XX ₁₆
03A2 ₁₆	UART0 transmit buffer register	U0TB	XX ₁₆
03A3 ₁₆			XX ₁₆
03A4 ₁₆	UART0 transmit/receive control register 0	U0C0	000010002
03A5 ₁₆	UART0 transmit/receive control register 1	U0C1	000000102
03A6 ₁₆	UART0 receive buffer register	U0RB	XX ₁₆
03A7 ₁₆			XX ₁₆
03A8 ₁₆	UART1 transmit/receive mode register	U1MR	00 ₁₆
03A9 ₁₆	UART1 bit rate generator	U1BRG	XX ₁₆
03AA ₁₆	UART1 transmit buffer register	U1TB	XX ₁₆
03AB ₁₆			XX ₁₆
03AC ₁₆	UART1 transmit/receive control register 0	U1C0	000010002
03AD ₁₆	UART1 transmit/receive control register 1	U1C1	000000102
03AE ₁₆	UART1 receive buffer register	U1RB	XX ₁₆
03AF ₁₆			XX ₁₆
03B0 ₁₆	UART transmit/receive control register 2	UCON	X00000002
03B1 ₁₆			
03B2 ₁₆			
03B3 ₁₆			
03B4 ₁₆			
03B5 ₁₆			
03B6 ₁₆			
03B7 ₁₆			
03B8 ₁₆	DMA0 request cause select register	DM0SL	00 ₁₆
03B9 ₁₆			
03BA ₁₆	DMA1 request cause select register	DM1SL	00 ₁₆
03BB ₁₆			
03BC ₁₆			
03BD ₁₆			
03BE ₁₆			
03BF ₁₆			

Note 1: The blank spaces are reserved. No access is allowed.

X : Undefined

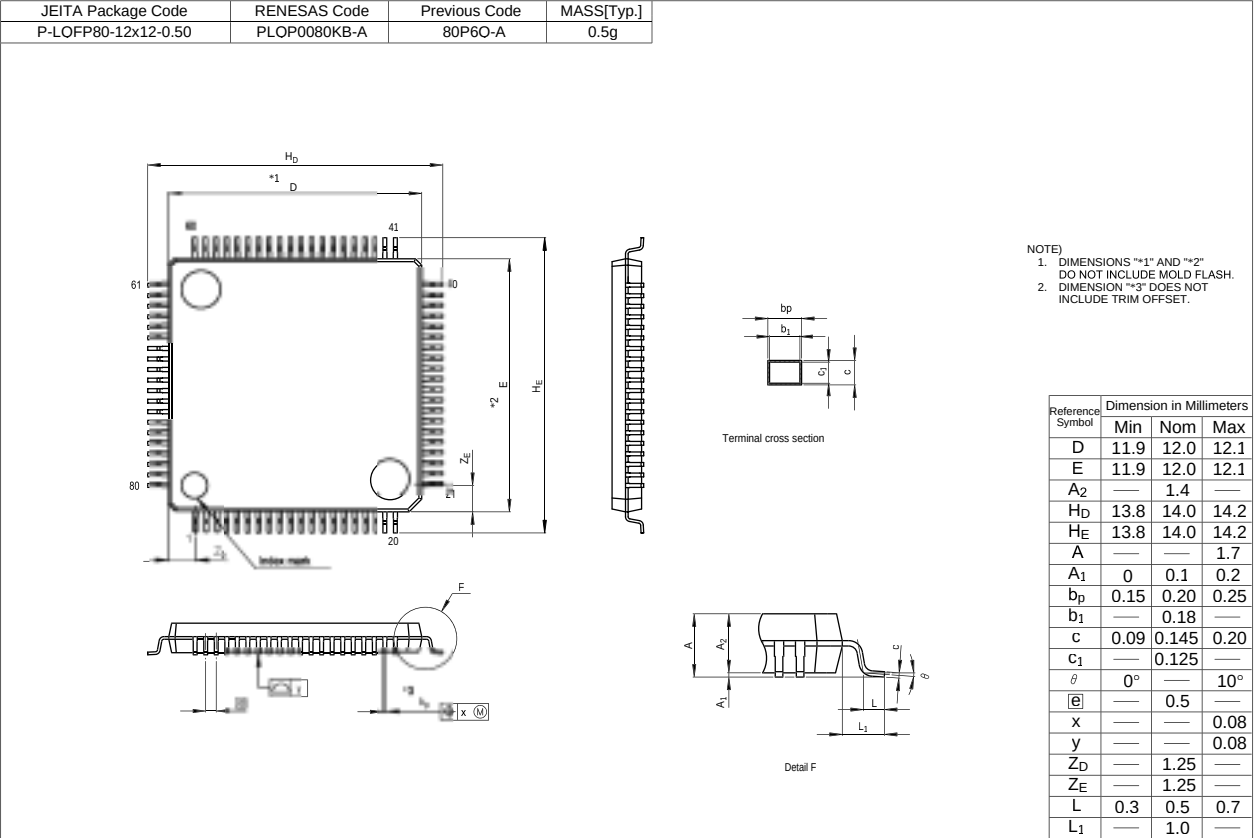
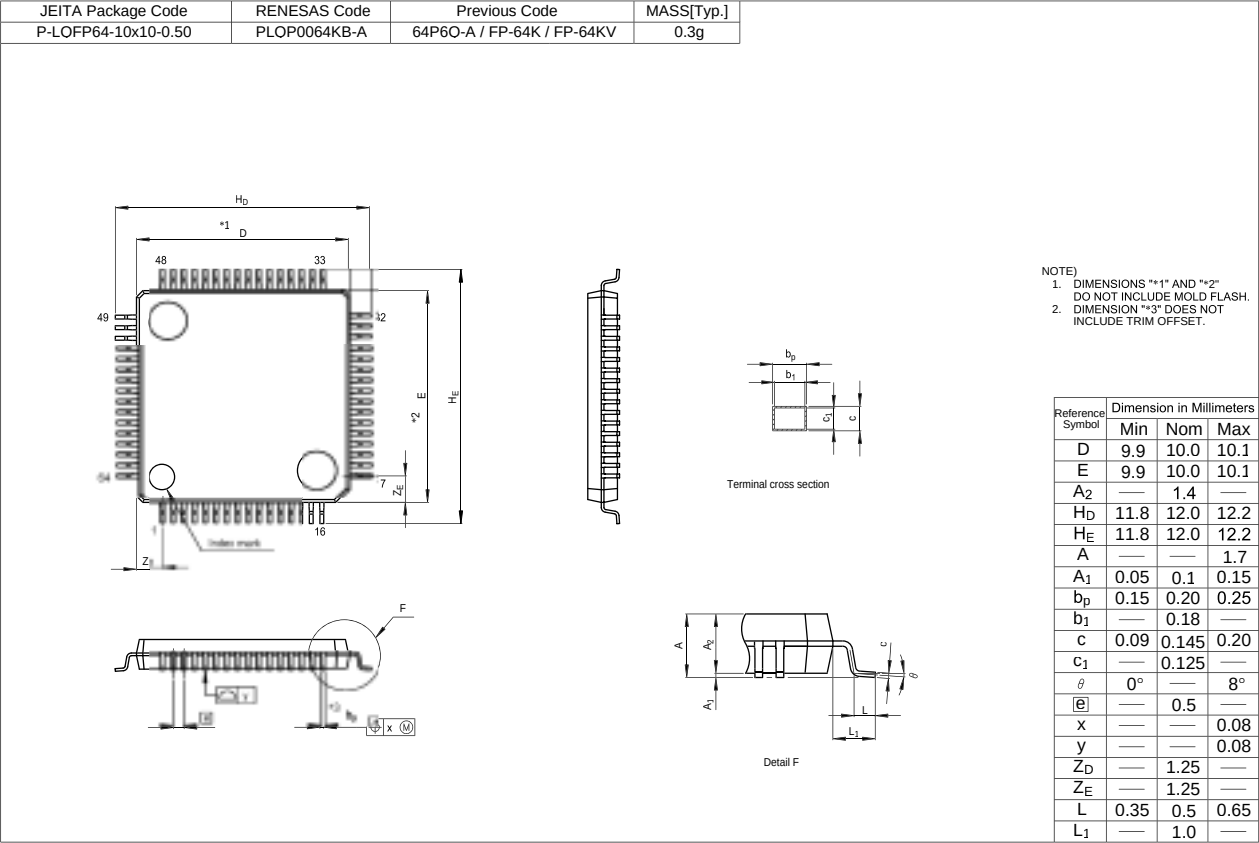
Table 4.7 SFR Information(7)(1)

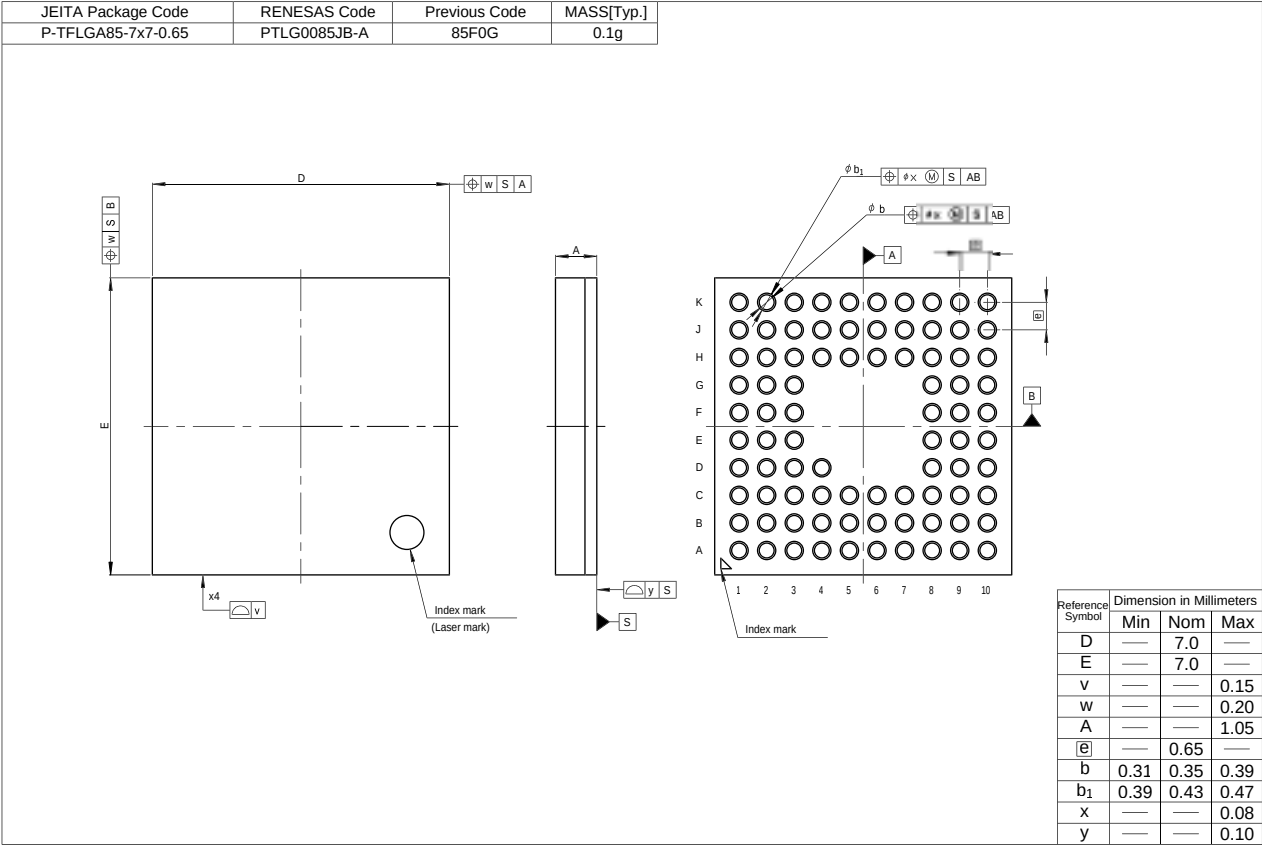
Address	Register	Symbol	After Reset
03C0 ₁₆ 03C1 ₁₆	A/D register 0	AD0	XX ₁₆ XX ₁₆
03C2 ₁₆ 03C3 ₁₆	A/D register 1	AD1	XX ₁₆ XX ₁₆
03C4 ₁₆ 03C5 ₁₆	A/D register 2	AD2	XX ₁₆ XX ₁₆
03C6 ₁₆ 03C7 ₁₆	A/D register 3	AD3	XX ₁₆ XX ₁₆
03C8 ₁₆ 03C9 ₁₆	A/D register 4	AD4	XX ₁₆ XX ₁₆
03CA ₁₆ 03CB ₁₆	A/D register 5	AD5	XX ₁₆ XX ₁₆
03CC ₁₆ 03CD ₁₆	A/D register 6	AD6	XX ₁₆ XX ₁₆
03CE ₁₆ 03CF ₁₆	A/D register 7	AD7	XX ₁₆ XX ₁₆
03D0 ₁₆			
03D1 ₁₆			
03D2 ₁₆	A/D trigger control register	ADTRGCON	00 ₁₆
03D3 ₁₆	A/D convert status register 0	ADSTAT0	00000X002
03D4 ₁₆	A/D control register 2	ADCON2	00 ₁₆
03D5 ₁₆			
03D6 ₁₆	A/D control register 0	ADCON0	00000XXX2
03D7 ₁₆	A/D control register 1	ADCON1	00 ₁₆
03D8 ₁₆			
03D9 ₁₆			
03DA ₁₆			
03DB ₁₆			
03DC ₁₆			
03DD ₁₆			
03DE ₁₆			
03DF ₁₆			
03E0 ₁₆	Port P0 register	P0	XX ₁₆
03E1 ₁₆	Port P1 register	P1	XX ₁₆
03E2 ₁₆	Port P0 direction register	PD0	00 ₁₆
03E3 ₁₆	Port P1 direction register	PD1	00 ₁₆
03E4 ₁₆	Port P2 register	P2	XX ₁₆
03E5 ₁₆	Port P3 register	P3	XX ₁₆
03E6 ₁₆	Port P2 direction register	PD2	00 ₁₆
03E7 ₁₆	Port P3 direction register	PD3	00 ₁₆
03E8 ₁₆			
03E9 ₁₆			
03EA ₁₆			
03EB ₁₆			
03EC ₁₆	Port P6 register	P6	XX ₁₆
03ED ₁₆	Port P7 register	P7	XX ₁₆
03EE ₁₆	Port P6 direction register	PD6	00 ₁₆
03EF ₁₆	Port P7 direction register	PD7	00 ₁₆
03F0 ₁₆	Port P8 register	P8	XX ₁₆
03F1 ₁₆	Port P9 register	P9	XX ₁₆
03F2 ₁₆	Port P8 direction register	PD8	00 ₁₆
03F3 ₁₆	Port P9 direction register	PD9	000X00002
03F4 ₁₆	Port P10 register	P10	XX ₁₆
03F5 ₁₆			
03F6 ₁₆	Port P10 direction register	PD10	00 ₁₆
03F7 ₁₆			
03F8 ₁₆			
03F9 ₁₆			
03FA ₁₆			
03FB ₁₆			
03FC ₁₆	Pull-up control register 0	PUR0	00 ₁₆
03FD ₁₆	Pull-up control register 1	PUR1	00 ₁₆
03FE ₁₆	Pull-up control register 2	PUR2	00 ₁₆
03FF ₁₆	Port control register	PCR	00 ₁₆

Note 1: The blank spaces are reserved. No access is allowed.

X : Undefined

Appendix 1. Package Dimensions





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