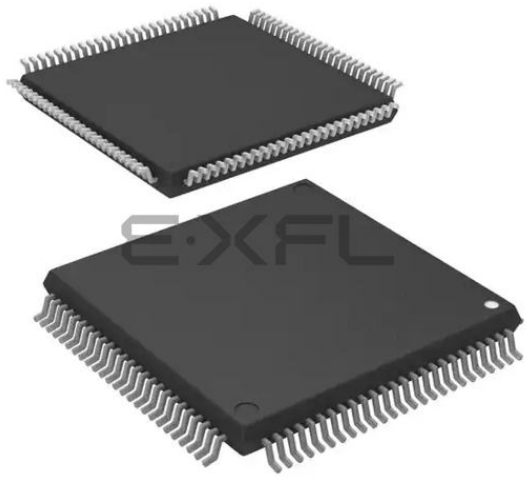
Renesas Electronics America Inc - M30853FHGP#U5 Datasheet



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	M32C/80
Core Size	16/32-Bit
Speed	32MHz
Connectivity	CANbus, I²C, IEBus, SIO, UART/USART
Peripherals	DMA, WDT
Number of I/O	85
Program Memory Size	384KB (384K x 8)
Program Memory Type	FLASH
EEPROM Size	4K x 8
RAM Size	24K x 8
Voltage - Supply (Vcc/Vdd)	3V ~ 5.5V
Data Converters	A/D 26x10b; D/A 2x8b
Oscillator Type	Internal
Operating Temperature	-20°C ~ 85°C (TA)
Mounting Type	Surface Mount
Package / Case	100-LQFP
Supplier Device Package	100-LFQFP (14x14)
Purchase URL	https://www.e-xfl.com/product-detail/renesas-electronics-america/m30853fhgp-u5

Notice

1. All information included in this document is current as of the date this document is issued. Such information, however, is subject to change without any prior notice. Before purchasing or using any Renesas Electronics products listed herein, please confirm the latest product information with a Renesas Electronics sales office. Also, please pay regular and careful attention to additional and different information to be disclosed by Renesas Electronics such as that disclosed through our website.
2. Renesas Electronics does not assume any liability for infringement of patents, copyrights, or other intellectual property rights of third parties by or arising from the use of Renesas Electronics products or technical information described in this document. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
3. You should not alter, modify, copy, or otherwise misappropriate any Renesas Electronics product, whether in whole or in part.
4. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation of these circuits, software, and information in the design of your equipment. Renesas Electronics assumes no responsibility for any losses incurred by you or third parties arising from the use of these circuits, software, or information.
5. When exporting the products or technology described in this document, you should comply with the applicable export control laws and regulations and follow the procedures required by such laws and regulations. You should not use Renesas Electronics products or the technology described in this document for any purpose relating to military applications or use by the military, including but not limited to the development of weapons of mass destruction. Renesas Electronics products and technology may not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations.
6. Renesas Electronics has used reasonable care in preparing the information included in this document, but Renesas Electronics does not warrant that such information is error free. Renesas Electronics assumes no liability whatsoever for any damages incurred by you resulting from errors in or omissions from the information included herein.
7. Renesas Electronics products are classified according to the following three quality grades: "Standard", "High Quality", and "Specific". The recommended applications for each Renesas Electronics product depends on the product's quality grade, as indicated below. You must check the quality grade of each Renesas Electronics product before using it in a particular application. You may not use any Renesas Electronics product for any application categorized as "Specific" without the prior written consent of Renesas Electronics. Further, you may not use any Renesas Electronics product for any application for which it is not intended without the prior written consent of Renesas Electronics. Renesas Electronics shall not be in any way liable for any damages or losses incurred by you or third parties arising from the use of any Renesas Electronics product for an application categorized as "Specific" or for which the product is not intended where you have failed to obtain the prior written consent of Renesas Electronics. The quality grade of each Renesas Electronics product is "Standard" unless otherwise expressly specified in a Renesas Electronics data sheets or data books, etc.

   "Standard": Computers; office equipment; communications equipment; test and measurement equipment; audio and visual equipment; home electronic appliances; machine tools; personal electronic equipment; and industrial robots.

   "High Quality": Transportation equipment (automobiles, trains, ships, etc.); traffic control systems; anti-disaster systems; anti-crime systems; safety equipment; and medical equipment not specifically designed for life support.

   "Specific": Aircraft; aerospace equipment; submersible repeaters; nuclear reactor control systems; medical equipment or systems for life support (e.g. artificial life support devices or systems), surgical implantations, or healthcare intervention (e.g. excision, etc.), and any other applications or purposes that pose a direct threat to human life.
8. You should use the Renesas Electronics products described in this document within the range specified by Renesas Electronics, especially with respect to the maximum rating, operating supply voltage range, movement power voltage range, heat radiation characteristics, installation and other product characteristics. Renesas Electronics shall have no liability for malfunctions or damages arising out of the use of Renesas Electronics products beyond such specified ranges.
9. Although Renesas Electronics endeavors to improve the quality and reliability of its products, semiconductor products have specific characteristics such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Further, Renesas Electronics products are not subject to radiation resistance design. Please be sure to implement safety measures to guard them against the possibility of physical injury, and injury or damage caused by fire in the event of the failure of a Renesas Electronics product, such as safety design for hardware and software including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult, please evaluate the safety of the final products or system manufactured by you.
10. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. Please use Renesas Electronics products in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. Renesas Electronics assumes no liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
11. This document may not be reproduced or duplicated, in any form, in whole or in part, without prior written consent of Renesas Electronics.
12. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products, or if you have any other inquiries.

(Note 1) "Renesas Electronics" as used in this document means Renesas Electronics Corporation and also includes its majority-owned subsidiaries.

(Note 2) "Renesas Electronics product(s)" means any product developed or manufactured by or for Renesas Electronics.

1.4 Product Information

Table 1.3 lists the product information. Figure 1.2 shows the product numbering system.

Table 1.3 M32C/85 Group (1) (M32C/85) **As of July, 2005**

Type Number	Package Type	ROM Capacity	RAM Capacity	Remarks
M30855FJGP	PLQP0144KA-A (144P6Q-A)	512K+4K	24K	Flash Memory
M30853FJGP	PLQP0100KB-A (100P6Q-A)			
M30853FJFP	PRQP0100JB-A (100P6S-A)			
M30855FHGP	PLQP0144KA-A (144P6Q-A)	384K+4K		
M30853FHGP	PLQP0100KB-A (100P6Q-A)			
M30853FHFP	PRQP0100JB-A (100P6S-A)			
M30855FWGP	PLQP0144KA-A (144P6Q-A)	320K+4K		
M30853FWGP	PLQP0100KB-A (100P6Q-A)			
M30853FWFP	PRQP0100JB-A (100P6S-A)			
M30855MW-XXXGP	PLQP0144KA-A (144P6Q-A)	320K		Mask ROM
M30853MW-XXXGP	PLQP0100KB-A (100P6Q-A)			
M30853MW-XXXFP	PRQP0100JB-A (100P6S-A)			

Table 1.3 M32C/85 Group (2) (T Version, M32C/85T) **As of July, 2005**

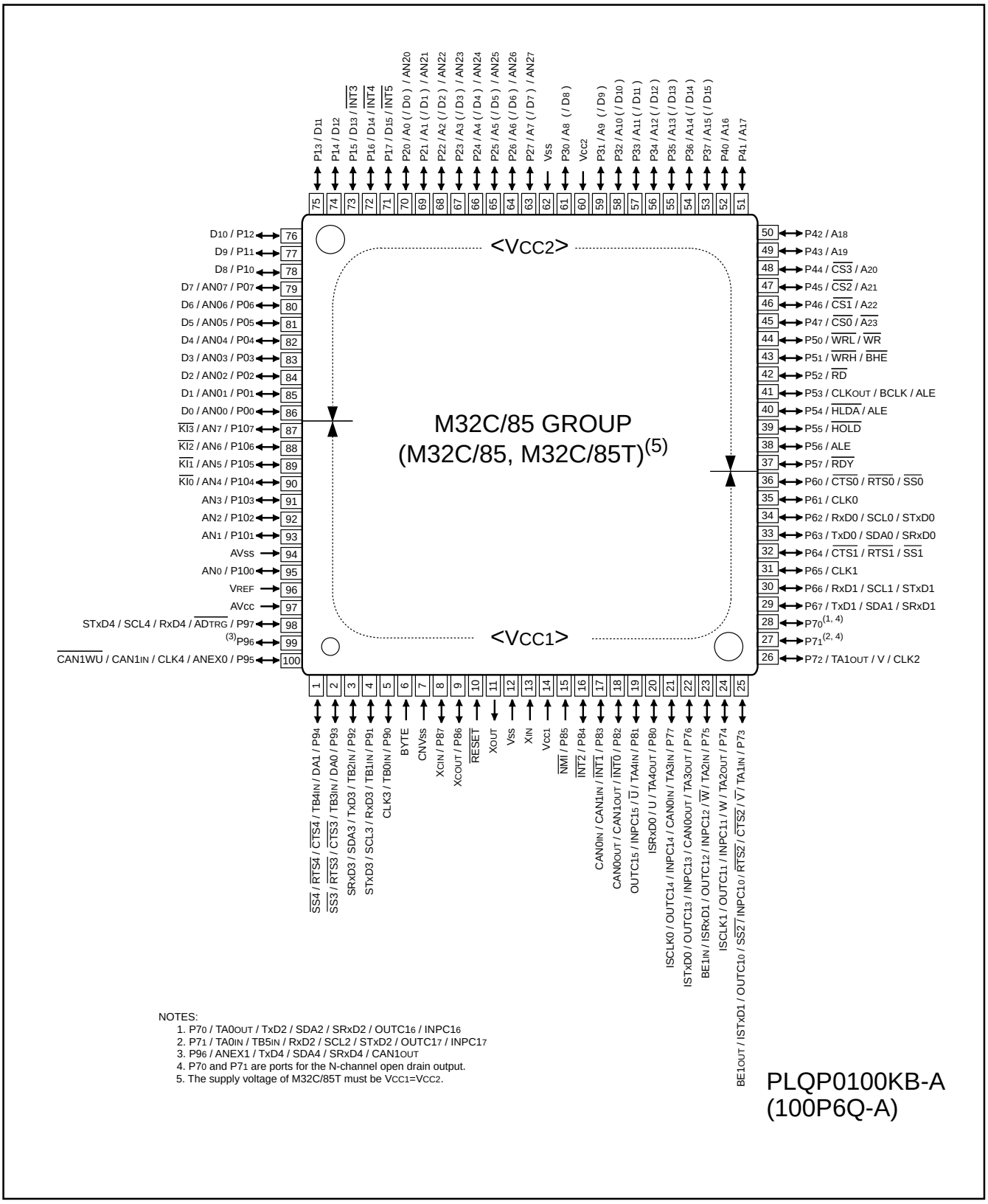
Type Number	Package Type	ROM Capacity	RAM Capacity	Remarks
M30855FJTGP	PLQP0144KA-A (144P6Q-A)	512K+4K	24K	Flash Memory T Version (High-reliability 85°C Version)
M30853FJTGP	PLQP0100KB-A (100P6Q-A)			
M30855FHTGP	PLQP0144KA-A (144P6Q-A)	384K+4K		
M30853FHTGP	PLQP0100KB-A (100P6Q-A)			
M30855FWTGP	PLQP0144KA-A (144P6Q-A)	320K+4K		
M30853FWTGP	PLQP0100KB-A (100P6Q-A)			

Table 1.4 Pin Characteristics for 144-Pin Package (Continued)

Pin No.	Control Pin	Port	Interrupt Pin	Timer Pin	UART/CAN Pin	Intelligent I/O Pin	Analog Pin	Bus Control Pin(1)
97		$P2_4$					$AN2_4$	A_4(/D_4)
98		$P2_3$					$AN2_3$	A_3(/D_3)
99		$P2_2$					$AN2_2$	A_2(/D_2)
100		$P2_1$					$AN2_1$	A_1(/D_1)
101		$P2_0$					$AN2_0$	A_0(/D_0)
102		$P1_7$	$\overline{INT5}$					D_{15}
103		$P1_6$	$\overline{INT4}$					D_{14}
104		$P1_5$	$\overline{INT3}$					D_{13}
105		$P1_4$						D_{12}
106		$P1_3$						D_{11}
107		$P1_2$						D_{10}
108		$P1_1$						D_9
109		$P1_0$						D_8
110		$P0_7$					$AN0_7$	D_7
111		$P0_6$					$AN0_6$	D_6
112		$P0_5$					$AN0_5$	D_5
113		$P0_4$					$AN0_4$	D_4
114		$P11_4$						
115		$P11_3$				$INPC1_3$/$OUTC1_3$		
116		$P11_2$				$INPC1_2$/$OUTC1_2$/ISRxD1/$BE1_{IN}$		
117		$P11_1$				$INPC1_1$/$OUTC1_1$/ISCLK1		
118		$P11_0$				$INPC1_0$/$OUTC1_0$/ISTxD1/$BE1_{OUT}$		
119		$P0_3$					$AN0_3$	D_3
120		$P0_2$					$AN0_2$	D_2
121		$P0_1$					$AN0_1$	D_1
122		$P0_0$					$AN0_0$	D_0
123		$P15_7$					$AN15_7$	
124		$P15_6$					$AN15_6$	
125		$P15_5$					$AN15_5$	
126		$P15_4$					$AN15_4$	
127		$P15_3$					$AN15_3$	
128		$P15_2$				ISRxD0	$AN15_2$	
129		$P15_1$				ISCLK0	$AN15_1$	
130	V_{SS}							
131		$P15_0$				ISTxD0	$AN15_0$	
132	V_{CC1}							
133		$P10_7$	$\overline{KI_3}$				AN_7	
134		$P10_6$	$\overline{KI_2}$				AN_6	
135		$P10_5$	$\overline{KI_1}$				AN_5	
136		$P10_4$	$\overline{KI_0}$				AN_4	
137		$P10_3$					AN_3	
138		$P10_2$					AN_2	
139		$P10_1$					AN_1	
140	AV_{SS}							
141		$P10_0$					AN_0	
142	V_{REF}							
143	AV_{CC}							
144		$P9_7$			RxD4/SCL4/STxD4		$\overline{ADTRG}$	

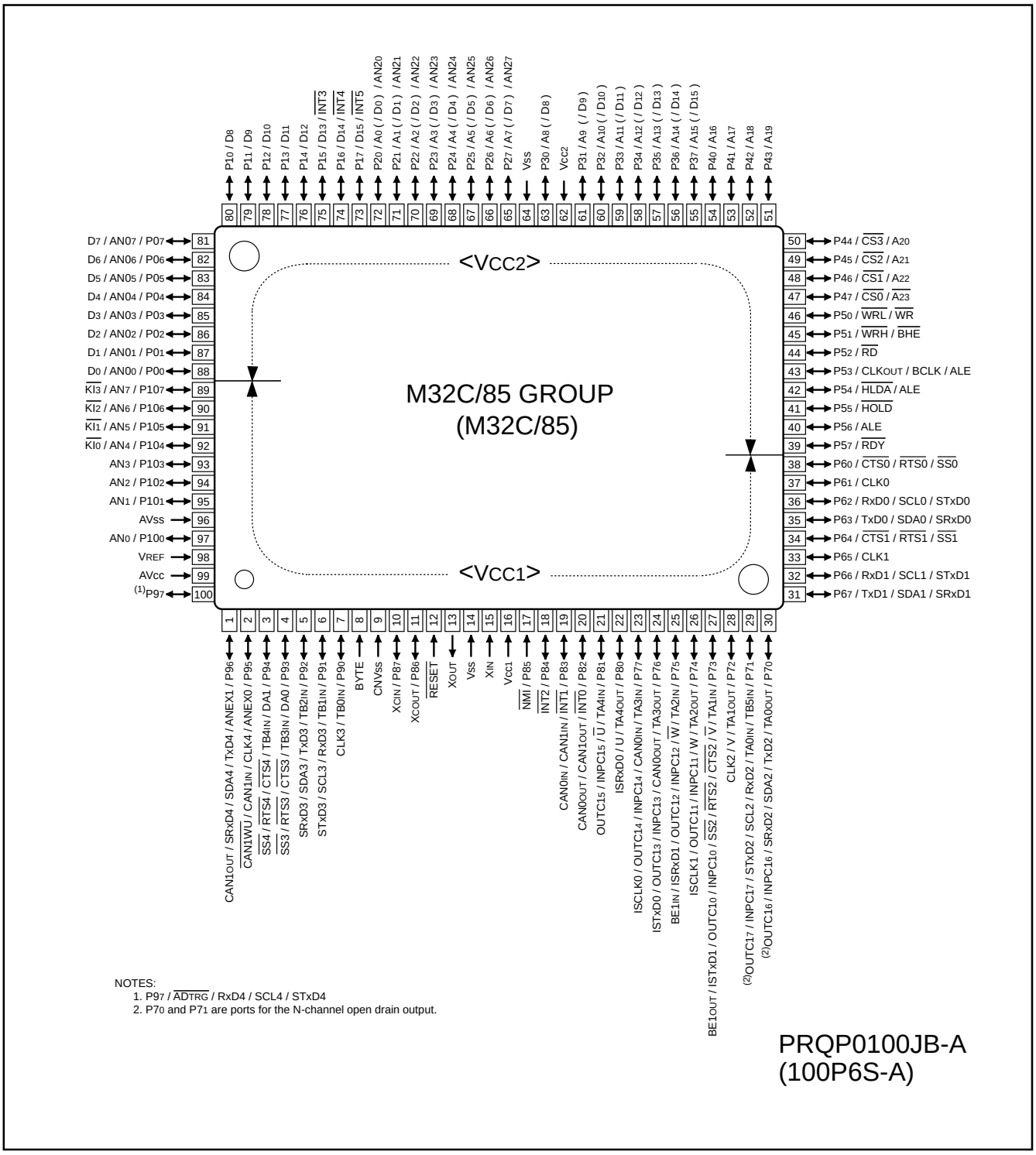
NOTES:

1. Bus control pins in M32C/85T cannot be used,



NOTES:
1. P70 / TA0OUT / TxD2 / SDA2 / SRxD2 / OUTC16 / INPC16
2. P71 / TA0IN / TB5IN / RxD2 / SCL2 / STxD2 / OUTC17 / INPC17
3. P96 / ANEX1 / TxD4 / SDA4 / SRxD4 / CAN1OUT
4. P70 and P71 are ports for the N-channel open drain output.
5. The supply voltage of M32C/85T must be VCC1=VCC2.

Figure 1.4 Pin Assignment for 100-Pin Package



NOTES:
1. P97 / ADTRG / RxD4 / SCL4 / STxD4
2. P70 and P71 are ports for the N-channel open drain output.

Figure 1.5 Pin Assignment for 100-Pin Package

1.6 Pin Description

Table 1.6 Pin Description (100-Pin and 144-Pin Packages)

Classsfication	Symbol	I/O Type	Supply Voltage	Function
Power Supply	V_{CC1}, V_{CC2} V_{SS}	I	–	Apply 3.0 to 5.5V to both V_{CC1} and V_{CC2} pins. Apply 0V to the V_{SS} pin. $V_{CC1} \geq V_{CC2}$(1, 2)
Analog Power Supply	AVCC AVSS	I	V_{CC1}	Supplies power to the A/D converter. Connect the AVCC pin to V_{CC1} and the AVSS pin to V_{SS}
Reset Input	$\overline{RESET}$	I	V_{CC1}	The microcomputer is in a reset state when "L" is applied to the $\overline{RESET}$ pin
CNVSS	CNVSS	I	V_{CC1}	Switches processor mode. Connect the CNVSS pin to V_{SS} to start up in single-chip mode or to V_{CC1} to start up in microprocessor mode
Input to Switch External Data Bus Width(3)	BYTE	I	V_{CC1}	Switches data bus width in external memory space 3. The data bus is 16 bits wide when the BYTE pin is held "L" and 8 bits wide when it is held "H". Set to either. Connect the BYTE pin to V_{SS} to use the microcomputer in single-chip mode
Bus Control Pins(3)	D_0 to D_7	I/O	V_{CC2}	Inputs and outputs data (D_0 to D_7) while accessing an external memory space with separate bus
	D_8 to D_{15}	I/O	V_{CC2}	Inputs and outputs data (D_8 to D_{15}) while accessing an external memory space with 16-bit separate bus
	A_0 to A_{22}	O	V_{CC2}	Outputs address bits A_0 to A_{22}
	$\overline{A_{23}}$	O	V_{CC2}	Outputs inversed address bit A_{23}
	A_0/D_0 to A_7/D_7	I/O	V_{CC2}	Inputs and outputs data (D_0 to D_7) and outputs 8 low-order address bits (A_0 to A_7) by time-sharing while accessing an external memory space with multiplexed bus
	A_8/D_8 to A_{15}/D_{15}	I/O	V_{CC2}	Inputs and outputs data (D_8 to D_{15}) and outputs 8 middle-order address bits (A_8 to A_{15}) by time-sharing while accessing an external memory space with 16-bit multiplexed bus
	$\overline{CS0}$ to $\overline{CS3}$	O	V_{CC2}	Outputs $\overline{CS0}$ to $\overline{CS3}$ that are chip-select signals specifying an external space
	$\overline{WRL}$ / $\overline{WR}$ $\overline{WRH}$ / $\overline{BHE}$ $\overline{RD}$	O	V_{CC2}	Outputs $\overline{WRL}$, $\overline{WRH}$, ($\overline{WR}$, $\overline{BHE}$) and $\overline{RD}$ signals. $\overline{WRL}$ and $\overline{WRH}$ can be switched with $\overline{WR}$ and $\overline{BHE}$ by program ■ $\overline{WRL}$, $\overline{WRH}$ and $\overline{RD}$ selected: If external data bus is 16 bits wide, data is written to an even address in external memory space when $\overline{WRL}$ is held "L". Data is written to an odd address when $\overline{WRH}$ is held "L". Data is read when $\overline{RD}$ is held "L". ■ $\overline{WR}$, $\overline{BHE}$ and $\overline{RD}$ selected: Data is written to external memory space when $\overline{WR}$ is held "L". Data in an external memory space is read when $\overline{RD}$ is held "L". An odd address is accessed when $\overline{BHE}$ is held "L". Select $\overline{WR}$, $\overline{BHE}$ and $\overline{RD}$ for external 8-bit data bus.
	ALE	O	V_{CC2}	ALE is a signal latching the address
	$\overline{HOLD}$	I	V_{CC2}	The microcomputer is placed in a hold state while the $\overline{HOLD}$ pin is held "L"
	$\overline{HLDA}$	O	V_{CC2}	Outputs an "L" signal while the microcomputer is placed in a hold state
	$\overline{RDY}$	I	V_{CC2}	Bus is placed in a wait state while the $\overline{RDY}$ pin is held "L"

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

NOTES:
1. V_{CC1} is hereinafter referred to as V_{CC} unless otherwise noted.
2. Apply 4.2 to 5.5V to the V_{CC1} and V_{CC2} pins when using M32C/85T. V_{CC1}=V_{CC2}.
3. Bus control pins in M32C/85T cannot be used.

Table 1.6 Pin Description (100-Pin and 144-Pin Packages) (Continued)

Classsfication	Symbol	I/O Type	Supply Voltage	Function
Main Clock Input	XIN	I	VCC1	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
Main Clock Output	XOUT	O	VCC1	
Sub Clock Input	XCIN	I	VCC1	I/O pins for the sub clock oscillation circuit. Connect a crystal oscillator between XCIN and XCOUT. To apply external clock, apply it to XCIN and leave XCOUT open
Sub Clock Output	XCOUT	O	VCC1	
BCLK Output(1)	BCLK	O	VCC2	Outputs BCLK signal
Clock Output	CLKOUT	O	VCC2	Outputs the clock having the same frequency as fC, f8 or f32
$\overline{\text{INT}}$ Interrupt Input	$\overline{\text{INT0}}$ to $\overline{\text{INT2}}$	I	VCC1	Input pins for the $\overline{\text{INT}}$ interrupt
	$\overline{\text{INT3}}$ to $\overline{\text{INT5}}$		VCC2	
$\overline{\text{NMI}}$ Interrupt Input	$\overline{\text{NMI}}$	I	VCC1	Input pin for the $\overline{\text{NMI}}$ interrupt
Key Input Interrupt	$\overline{\text{KI0}}$ to $\overline{\text{KI3}}$	I	VCC1	Input pins for the key input interrupt
Timer A	TA0OUT to TA4OUT	I/O	VCC1	I/O pins for the timer A0 to A4 (TA0OUT is a pin for the N-channel open drain output.)
	TA0IN to TA4IN	I	VCC1	Input pins for the timer A0 to A4
Timer B	TB0IN to TB5IN	I	VCC1	Input pins for the timer B0 to B5
Three-phase Motor Control Timer Output	U, $\overline{\text{U}}$, V, $\overline{\text{V}}$, W, $\overline{\text{W}}$	O	VCC1	Output pins for the three-phase motor control timer
Serial I/O	$\overline{\text{CTS0}}$ to $\overline{\text{CTS4}}$	I	VCC1	Input pins for data transmission control
	$\overline{\text{RTS0}}$ to $\overline{\text{RTS4}}$	O	VCC1	Output pins for data reception control
	CLK0 to CLK4	I/O	VCC1	Inputs and outputs the transfer clock
	RxD0 to RxD4	I	VCC1	Inputs serial data
	TxD0 to TxD4	O	VCC1	Outputs serial data (TxD2 is a pin for the N-channel open drain output.)
I^2C Mode	SDA0 to SDA4	I/O	VCC1	Inputs and outputs serial data (SDA2 is a pin for the N-channel open drain output.)
	SCL0 to SCL4			Inputs and outputs the transfer clock (SCL2 is a pin for the N-channel open drain output.)
Serial I/O Special Function	STxD0 to STxD4	O	VCC1	Outputs serial data when slave mode is selected (STxD2 is a pin for the N-channel open drain output.)
	SRxD0 to SRxD4	I		Inputs serial data when slave mode is selected
	$\overline{\text{SS0}}$ to $\overline{\text{SS4}}$	I	VCC1	Input pins to control serial I/O special function

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

NOTES:

1. Bus control pins in M32C/85T cannot be used.

Address	Register	Symbol	Value after RESET
012016	Base Timer Register 1	G1BT	XX16
012116			XX16
012216	Base Timer Control Register 10	G1BCR0	0016
012316	Base Timer Control Register 11	G1BCR1	X000 000X2
012416	Time Measurement Prescaler Register 16	G1TPR6	0016
012516	Time Measurement Prescaler Register 17	G1TPR7	0016
012616	Function Enable Register 1	G1FE	0016
012716	Function Select Register 1	G1FS	0016
012816	SI/O Receive Buffer Register 1	G1RB	XXXX XXXX2
012916			X000 XXXX2
012A16	Transmit Buffer/Receive Data Register 1	G1TB/G1DR	XX16
012B16			
012C16	Receive Input Register 1	G1RI	XX16
012D16	SI/O Communication Mode Register 1	G1MR	0016
012E16	Transmit Output Register 1	G1TO	XX16
012F16	SI/O Communication Control Register 1	G1CR	0000 X0112
013016	Data Compare Register 10	G1CMP0	XX16
013116	Data Compare Register 11	G1CMP1	XX16
013216	Data Compare Register 12	G1CMP2	XX16
013316	Data Compare Register 13	G1CMP3	XX16
013416	Data Mask Register 10	G1MSK0	XX16
013516	Data Mask Register 11	G1MSK1	XX16
013616			
013716			
013816	Receive CRC Code Register 1	G1RCRC	XX16
013916			XX16
013A16	Transmit CRC Code Register 1	G1TCRC	0016
013B16			0016
013C16	SI/O Extended Mode Register 1	G1EMR	0016
013D16	SI/O Extended Receive Control Register 1	G1ERC	0016
013E16	SI/O Special Communication Interrupt Detection Register 1	G1IRF	0016
013F16	SI/O Extended Transmit Control Register 1	G1ETC	0000 0XXX2
014016			
014116			
014216			
014316			
014416			
014516			
014616			
014716			
014816			
014916			
014A16			
014B16			
014C16			
014D16			
014E16			
014F16			

X: Indeterminate

Blank spaces are reserved. No access is allowed.

Address	Register	Symbol	Value after RESET
0210$_{16}$ 0211$_{16}$	CAN0 Slot Interrupt Mask Register	C0SIMKR	00$_{16}$(2) 00$_{16}$(2)
0212$_{16}$			
0213$_{16}$			
0214$_{16}$	CAN0 Error Interrupt Mask Register	C0EIMKR	XXXX X000$_2$(2)
0215$_{16}$	CAN0 Error Interrupt Status Register	C0EISTR	XXXX X000$_2$(2)
0216$_{16}$	CAN0 Error Cause Register	C0EFR	00$_{16}$(2)
0217$_{16}$	CAN0 Baud Rate Prescaler	C0BRP	0000 0001$_2$(2)
0218$_{16}$			
0219$_{16}$	CAN0 Mode Register	C0MDR	XXXX XX00$_2$(2)
021A$_{16}$			
021B$_{16}$			
021C$_{16}$			
021D$_{16}$			
021E$_{16}$			
021F$_{16}$			
0220$_{16}$ 0221$_{16}$	CAN0 Single Shot Control Register	C0SSCTLR	00$_{16}$(2) 00$_{16}$(2)
0222$_{16}$			
0223$_{16}$			
0224$_{16}$ 0225$_{16}$	CAN0 Single Shot Status Register	C0SSSTR	00$_{16}$(2) 00$_{16}$(2)
0226$_{16}$			
0227$_{16}$			
0228$_{16}$	CAN0 Global Mask Register Standard ID0	C0GMR0	XXX0 0000$_2$(2)
0229$_{16}$	CAN0 Global Mask Register Standard ID1	C0GMR1	XX00 0000$_2$(2)
022A$_{16}$	CAN0 Global Mask Register Extended ID0	C0GMR2	XXXX 0000$_2$(2)
022B$_{16}$	CAN0 Global Mask Register Extended ID1	C0GMR3	00$_{16}$(2)
022C$_{16}$	CAN0 Global Mask Register Extended ID2	C0GMR4	XX00 0000$_2$(2)
022D$_{16}$			
022E$_{16}$			
022F$_{16}$			
0230$_{16}$	CAN0 Message Slot 0 Control Register / CAN0 Local Mask Register A Standard ID0	C0MCTL0/ C0LMAR0	0000 0000$_2$(2) XXX0 0000$_2$(2)
0231$_{16}$	CAN0 Message Slot 1 Control Register / CAN0 Local Mask Register A Standard ID1	C0MCTL1/ C0LMAR1	0000 0000$_2$(2) XX00 0000$_2$(2)
0232$_{16}$	CAN0 Message Slot 2 Control Register / CAN0 Local Mask Register A Extended ID0	C0MCTL2/ C0LMAR2	0000 0000$_2$(2) XXXX 0000$_2$(2)
0233$_{16}$	CAN0 Message Slot 3 Control Register / CAN0 local Mask Register A Extended ID1	C0MCTL3/ C0LMAR3	00$_{16}$(2) 00$_{16}$(2)
0234$_{16}$	CAN0 Message Slot 4 Control Register / CAN0 Local Mask Register A Extended ID2	C0MCTL4/ C0LMAR4	0000 0000$_2$(2) XX00 0000$_2$(2)
0235$_{16}$	CAN0 Message Slot 5 Control Register	C0MCTL5	00$_{16}$(2)
0236$_{16}$	CAN0 Message Slot 6 Control Register	C0MCTL6	00$_{16}$(2)
0237$_{16}$	CAN0 Message Slot 7 Control Register	C0MCTL7	00$_{16}$(2)
0238$_{16}$	CAN0 Message Slot 8 Control Register / CAN0 Local Mask Register B Standard ID0	C0MCTL8/ C0LMBR0	0000 0000$_2$(2) XXX0 0000$_2$(2)
0239$_{16}$	CAN0 Message Slot 9 Control Register / CAN0 Local Mask Register B Standard ID1	C0MCTL9/ C0LMBR1	0000 0000$_2$(2) XX00 0000$_2$(2)

(Note 1)

X: Indeterminate

Blank spaces are reserved. No access is allowed.

NOTES:

1. The BANKSEL bit in the C0CTLR1 register switches functions for addresses 0220$_{16}$ to 023F$_{16}$.
2. Values are obtained by setting the SLEEP bit in the C0SLPR register to "1" (sleep mode exited) after reset and applying the clock to the CAN module.

Address	Register	Symbol	Value after RESET
023A16	CAN0 Message Slot 10 Control Register / CAN0 Local Mask Register B Extended ID0	C0MCTL10/ C0LMBR2	0000 00002(2) XXXX 00002(2)
023B16	CAN0 Message Slot 11 Control Register / CAN0 Local Mask Register B Extended ID1	C0MCTL11/ C0LMBR3	0016(2) 0016(2)
023C16	CAN0 Message Slot 12 Control Register / CAN0 Local Mask Register B Extended ID2	C0MCTL12/ C0LMBR4	0000 00002(2) XX00 00002(2)
023D16	CAN0 Message Slot 13 Control Register	C0MCTL13	0016(2)
023E16	CAN0 Message Slot 14 Control Register	C0MCTL14	0016(2)
023F16	CAN0 Message Slot 15 Control Register	C0MCTL15	0016(2)
024016	CAN0 Slot Buffer Select Register	C0SBS	0016(2)
024116	CAN0 Control Register 1	C0CTLR1	X000 00XX2(2)
024216	CAN0 Sleep Control Register	C0SLPR	XXXX XXX02
024316			
024416 024516	CAN0 Acceptance Filter Support Register	C0AFS	0016(2) 0116(2)
024616			
024716			
024816			
024916			
024A16			
024B16			
024C16			
024D16			
024E16			
024F16			
025016	CAN1 Slot Buffer Select Register	C1SBS	0016(3)
025116	CAN1 Control Register 1	C1CTLR1	X000 00XX2(3)
025216	CAN1 Sleep Control Register	C1SLPR	XXXX XXX02
025316			
025416 025516	CAN1 Acceptance Filter Support Register	C1AFS	0016(3) 0116(3)
025616			
025716			
025816			
025916			
025A16			
025B16			
025C16			
025D16			
025E16			
025F16			

(Note 1)

X: Indeterminate

Blank spaces are reserved. No access is allowed.

NOTES:

1. The BANKSEL bit in the C0CTLR1 register switches functions for addresses 022016 to 023F16.
2. Values are obtained by setting the SLEEP bit in the C0SLPR register to "1" (sleep mode exited) after reset and applying the clock to the CAN module.
3. Values are obtained by setting the SLEEP bit in the C1SLPR register to "1" (sleep mode exited) after reset and applying the clock to the CAN module.

Address	Register	Symbol	Value after RESET
026016	CAN1 Message Slot Buffer 0 Standard ID0	C1SLOT0_0	XX16
026116	CAN1 Message Slot Buffer 0 Standard ID1	C1SLOT0_1	XX16
026216	CAN1 Message Slot Buffer 0 Extended ID0	C1SLOT0_2	XX16
026316	CAN1 Message Slot Buffer 0 Extended ID1	C1SLOT0_3	XX16
026416	CAN1 Message Slot Buffer 0 Extended ID2	C1SLOT0_4	XX16
026516	CAN1 Message Slot Buffer 0 Data Length Code	C1SLOT0_5	XX16
026616	CAN1 Message Slot Buffer 0 Data 0	C1SLOT0_6	XX16
026716	CAN1 Message Slot Buffer 0 Data 1	C1SLOT0_7	XX16
026816	CAN1 Message Slot Buffer 0 Data 2	C1SLOT0_8	XX16
026916	CAN1 Message Slot Buffer 0 Data 3	C1SLOT0_9	XX16
026A16	CAN1 Message Slot Buffer 0 Data 4	C1SLOT0_10	XX16
026B16	CAN1 Message Slot Buffer 0 Data 5	C1SLOT0_11	XX16
026C16	CAN1 Message Slot Buffer 0 Data 6	C1SLOT0_12	XX16
026D16	CAN1 Message Slot Buffer 0 Data 7	C1SLOT0_13	XX16
026E16	CAN1 Message Slot Buffer 0 Time Stamp High-Order	C1SLOT0_14	XX16
026F16	CAN1 Message Slot Buffer 0 Time Stamp Low-Order	C1SLOT0_15	XX16
027016	CAN1 Message Slot Buffer 1 Standard ID0	C1SLOT1_0	XX16
027116	CAN1 Message Slot Buffer 1 Standard ID1	C1SLOT1_1	XX16
027216	CAN1 Message Slot Buffer 1 Extended ID0	C1SLOT1_2	XX16
027316	CAN1 Message Slot Buffer 1 Extended ID1	C1SLOT1_3	XX16
027416	CAN1 Message Slot Buffer 1 Extended ID2	C1SLOT1_4	XX16
027516	CAN1 Message Slot Buffer 1 Data Length Code	C1SLOT1_5	XX16
027616	CAN1 Message Slot Buffer 1 Data 0	C1SLOT1_6	XX16
027716	CAN1 Message Slot Buffer 1 Data 1	C1SLOT1_7	XX16
027816	CAN1 Message Slot Buffer 1 Data 2	C1SLOT1_8	XX16
027916	CAN1 Message Slot Buffer 1 Data 3	C1SLOT1_9	XX16
027A16	CAN1 Message Slot Buffer 1 Data 4	C1SLOT1_10	XX16
027B16	CAN1 Message Slot Buffer 1 Data 5	C1SLOT1_11	XX16
027C16	CAN1 Message Slot Buffer 1 Data 6	C1SLOT1_12	XX16
027D16	CAN1 Message Slot Buffer 1 Data 7	C1SLOT1_13	XX16
027E16	CAN1 Message Slot Buffer 1 Time Stamp High-Order	C1SLOT1_14	XX16
027F16	CAN1 Message Slot Buffer 1 Time Stamp Low-Order	C1SLOT1_15	XX16
028016 028116	CAN1 Control Register 0	C1CTLR0	XX01 0X012(1) XXXX 00002(1)
028216 028316	CAN1 Status Register	C1STR	0000 00002(1) X000 0X012(1)
028416 028516	CAN1 Extended ID Register	C1IDR	0016(1) 0016(1)
028616 028716	CAN1 Configuration Register	C1CONR	0000 XXXX2(1) 0000 00002(1)
028816 028916	CAN1 Time Stamp Register	C1TSR	0016(1) 0016(1)
028A16	CAN1 Transmit Error Count Register	C1TEC	0016(1)
028B16	CAN1 Receive Error Count Register	C1REC	0016(1)
028C16 028D16	CAN1 Slot Interrupt Status Register	C1SISTR	0016(1) 0016(1)
028E16			
028F16			

X: Indeterminate

Blank spaces are reserved. No access is allowed.

NOTES:

1. Values are obtained by setting the SLEEP bit in the C1SLPR register to "1" (sleep mode exited) after reset and supplying the clock to the CAN module.

Address	Register	Symbol	Value after RESET
037016			
037116			
037216			
037316			
037416			
037516			
037616			
037716			
037816	DMA0 Request Source Select Register	DM0SL	0X00 00002
037916	DMA1 Request Source Select Register	DM1SL	0X00 00002
037A16	DMA2 Request Source Select Register	DM2SL	0X00 00002
037B16	DMA3 Request Source Select Register	DM3SL	0X00 00002
037C16 037D16	CRC Data Register	CRCD	XX16 XX16
037E16	CRC Input Register	CRCIN	XX16
037F16			
038016 038116	A/D0 Register 0	AD00	XXXX XXXX2 0000 00002
038216 038316	A/D0 Register 1	AD01	XX16 XX16
038416 038516	A/D0 Register 2	AD02	XX16 XX16
038616 038716	A/D0 Register 3	AD03	XX16 XX16
038816 038916	A/D0 Register 4	AD04	XX16 XX16
038A16 038B16	A/D0 Register 5	AD05	XX16 XX16
038C16 038D16	A/D0 Register 6	AD06	XX16 XX16
038E16 038F16	A/D0 Register 7	AD07	XX16 XX16
039016			
039116			
039216	A/D0 Control Register 4	AD0CON4	XXXX 00XX2
039316			
039416	A/D0 Control Register 2	AD0CON2	XX0X X0002
039516	A/D0 Control Register 3	AD0CON3	XXXX X0002
039616	A/D0 Control Register 0	AD0CON0	0016
039716	A/D0 Control Register 1	AD0CON1	0016
039816	D/A Register 0	DA0	XX16
039916			
039A16	D/A Register 1	DA1	XX16
039B16			
039C16	D/A Control Register	DACON	XXXX XX002
039D16			
039E16			
039F16			

X: Indeterminate

Blank spaces are reserved. No access is allowed.

$V_{CC1}=V_{CC2}=5V$

Table 5.3 Electrical Characteristics

($V_{CC1}=V_{CC2}=4.2$ to 5.5V, $V_{SS}=0V$ at Topr= –20 to 85°C, f(BCLK)=32MHz unless otherwise specified)

Symbol	Parameter		Condition	Standard			Unit
				Min.	Typ.	Max.	
V_{OH}	Output High ("H") Voltage	$P0_0$-$P0_7$, $P1_0$-$P1_7$, $P2_0$-$P2_7$, $P3_0$-$P3_7$, $P4_0$-$P4_7$, $P5_0$-$P5_7$, $P11_0$-$P11_4$, $P12_0$-$P12_7$, $P13_0$-$P13_7$	I_{OH}=-5mA	V_{CC2}-2.0		V_{CC2}	V
		$P6_0$-$P6_7$, $P7_2$-$P7_7$, $P8_0$-$P8_4$, $P8_6$, $P8_7$, $P9_0$-$P9_7$, $P10_0$-$P10_7$, $P14_0$-$P14_6$, $P15_0$-$P15_7$(1)	I_{OH}=-5mA	V_{CC1}-2.0		V_{CC1}	
		$P0_0$-$P0_7$, $P1_0$-$P1_7$, $P2_0$-$P2_7$, $P3_0$-$P3_7$, $P4_0$-$P4_7$, $P5_0$-$P5_7$, $P11_0$-$P11_4$, $P12_0$-$P12_7$, $P13_0$-$P13_7$	I_{OH}=-200µA	V_{CC2}-0.3		V_{CC2}	V
		$P6_0$-$P6_7$, $P7_2$-$P7_7$, $P8_0$-$P8_4$, $P8_6$, $P8_7$, $P9_0$-$P9_7$, $P10_0$-$P10_7$,$P14_0$-$P14_6$, $P15_0$-$P15_7$(1)	I_{OH}=-200µA	V_{CC1}-0.3		V_{CC1}	
		X_{OUT}	I_{OH}=-1mA	3.0		V_{CC1}	V
		X_{COUT} High Power	No load applied		2.5		V
		X_{COUT} Low Power	No load applied		1.6		
V_{OL}	Output Low ("L") Voltage	$P0_0$-$P0_7$, $P1_0$-$P1_7$, $P2_0$-$P2_7$, $P3_0$-$P3_7$, $P4_0$-$P4_7$, $P5_0$-$P5_7$, $P6_0$-$P6_7$, $P7_0$-$P7_7$, $P8_0$-$P8_4$, $P8_6$, $P8_7$, $P9_0$-$P9_7$, $P10_0$-$P10_7$, $P11_0$-$P11_4$, $P12_0$-$P12_7$, $P13_0$-$P13_7$, $P14_0$-$P14_6$, $P15_0$-$P15_7$(1)	I_{OL}=5mA			2.0	V
		$P0_0$-$P0_7$, $P1_0$-$P1_7$, $P2_0$-$P2_7$, $P3_0$-$P3_7$, $P4_0$-$P4_7$, $P5_0$-$P5_7$, $P6_0$-$P6_7$, $P7_0$-$P7_7$, $P8_0$-$P8_4$, $P8_6$, $P8_7$, $P9_0$-$P9_7$, $P10_0$-$P10_7$, $P11_0$-$P11_4$, $P12_0$-$P12_7$, $P13_0$-$P13_7$, $P14_0$-$P14_6$, $P15_0$-$P15_7$(1)	I_{OL}=200µA			0.45	V
		X_{OUT}	I_{OL}=1mA			2.0	V
		X_{COUT} High Power	No load applied		0		V
		X_{COUT} Low Power	No load applied		0		
V_{T+}-V_{T-}	Hysteresis	$\overline{HOLD}$, $\overline{RDY}$, $TA0_{IN}$-$TA4_{IN}$, $TB0_{IN}$-$TB5_{IN}$, $\overline{INT0}$-$\overline{INT5}$, $\overline{ADTRG}$, $\overline{CTS0}$-$\overline{CTS4}$, CLK0-CLK4, $TA0_{OUT}$-$TA4_{OUT}$, $\overline{NMI}$, $\overline{KI0}$-$\overline{KI3}$, RxD0-RxD4, SCL0-SCL4, SDA0-SDA4		0.2		1.0	V
		$\overline{RESET}$		0.2		1.8	V
I_{IH}	Input High ("H") Current	$P0_0$-$P0_7$, $P1_0$-$P1_7$, $P2_0$-$P2_7$, $P3_0$-$P3_7$, $P4_0$-$P4_7$, $P5_0$-$P5_7$, $P6_0$-$P6_7$, $P7_0$-$P7_7$, $P8_0$-$P8_7$, $P9_0$-$P9_7$, $P10_0$-$P10_7$, $P11_0$-$P11_4$, $P12_0$-$P12_7$, $P13_0$-$P13_7$, $P14_0$-$P14_6$, $P15_0$-$P15_7$(1), X_{IN}, $\overline{RESET}$, CNV_{SS}, BYTE	V_I=5V			5.0	µA
I_{IL}	Input Low ("L") Current	$P0_0$-$P0_7$, $P1_0$-$P1_7$, $P2_0$-$P2_7$, $P3_0$-$P3_7$, $P4_0$-$P4_7$, $P5_0$-$P5_7$, $P6_0$-$P6_7$, $P7_0$-$P7_7$, $P8_0$-$P8_7$, $P9_0$-$P9_7$, $P10_0$-$P10_7$, $P11_0$-$P11_4$, $P12_0$-$P12_7$, $P13_0$-$P13_7$, $P14_0$-$P14_6$, $P15_0$-$P15_7$(1), X_{IN}, $\overline{RESET}$, CNV_{SS}, BYTE	V_I=0V			-5.0	µA
R_{PULLUP}	Pull-up Resistance	$P0_0$-$P0_7$, $P1_0$-$P1_7$, $P2_0$-$P2_7$, $P3_0$-$P3_7$, $P4_0$-$P4_7$, $P5_0$-$P5_7$, $P6_0$-$P6_7$, $P7_2$-$P7_7$, $P8_0$-$P8_4$, $P8_6$, $P8_7$, $P9_0$-$P9_7$, $P10_0$-$P10_7$, $P11_0$-$P11_4$, $P12_0$-$P12_7$, $P13_0$-$P13_7$, $P14_0$-$P14_6$, $P15_0$-$P15_7$(1)	V_I=0V Flash Memory	30	50	167	kΩ
			Masked ROM	20	40	167	
Rf_{XIN}	Feedback Resistance	X_{IN}			1.5		MΩ
Rf_{XCIN}	Feedback Resistance	X_{CIN}			10		MΩ
V_{RAM}	RAM Standby Voltage	In stop mode		2.0			V

NOTES:

1. P11 to P15 are provided in the 144-pin package only.

$V_{CC1}=V_{CC2}=5V$

Table 5.4 A/D Conversion Characteristics ($V_{CC1}=V_{CC2}=AV_{CC}=V_{REF}$=4.2 to 5.5V, V_{SS}= AV_{SS} = 0V at Topr=–20 to 85°C, f(BCLK) = 32MHz unless otherwise specified)

Symbol	Parameter	Measurement Condition		Standard			Unit
				Min.	Typ.	Max.	
-	Resolution	$V_{REF}=V_{CC1}$				10	Bits
INL	Integral Nonlinearity Error	$V_{REF}=V_{CC1}=V_{CC2}$=5V	AN_0 to AN_7, $AN0_0$ to $AN0_7$, $AN2_0$ to $AN2_7$, $AN15_0$ to $AN15_7$, ANEX0, ANEX1			±3	LSB
							LSB
			External op-amp connection mode			±7	LSB
							LSB
DNL	Differential Nonlinearity Error					±1	LSB
-	Offset Error					±3	LSB
-	Gain Error					±3	LSB
R_{LADDER}	Resistor Ladder	$V_{REF}=V_{CC1}$		8		40	kΩ
t_{CONV}	10-bit Conversion Time(1, 2)			2.06			µs
t_{CONV}	8-bit Conversion Time(1, 2)			1.75			µs
t_{SAMP}	Sampling Time(1)			0.188			µs
V_{REF}	Reference Voltage			2		V_{CC1}	V
V_{IA}	Analog Input Voltage			0		V_{REF}	V

NOTES:
1. Divide f(X_{IN}), if exceeding 16 MHz, to keep ϕAD frequency at 16 MHz or less.
2. With using the sample and hold function.

Table 5.5 D/A Conversion Characteristics ($V_{CC1}=V_{CC2}=V_{REF}$=4.2 to 5.5V, $V_{SS}=AV_{SS}$=0V at Topr=–20 to 85°C, f(BCLK) = 32MHz unless otherwise specified)

Symbol	Parameter	Measurement Condition	Standard			Unit
			Min.	Typ.	Max.	
-	Resolution				8	Bits
-	Absolute Accuracy				1.0	%
t_{SU}	Setup Time				3	µs
R_O	Output Resistance		4	10	20	kΩ
I_{VREF}	Reference Power Supply Input Current	(Note 1)			1.5	mA

NOTES:
1. Measurement when using one D/A converter. The DAi register (i=0, 1) of the D/A converter, not being used, is set to "00_{16}". The resistor ladder in the A/D converter is excluded.
I_{VREF} flows even if the VCUT bit in the AD0CON1 register is set to "0" (no V_{REF} connection).

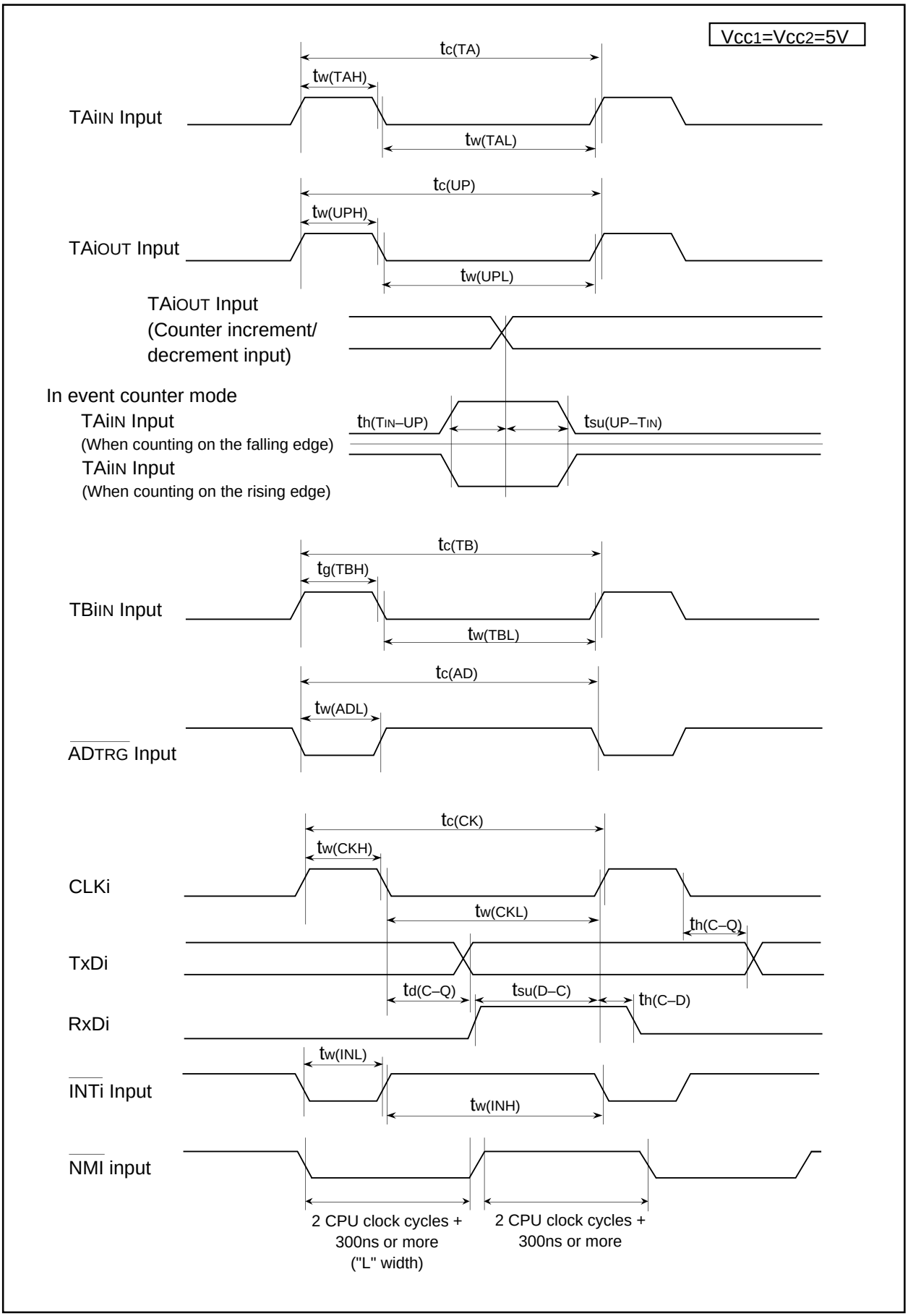


Figure 5.5 Vcc1=Vcc2=5V Timing Diagram (3)

5.2 Electrical Characteristics (M32C/85T)

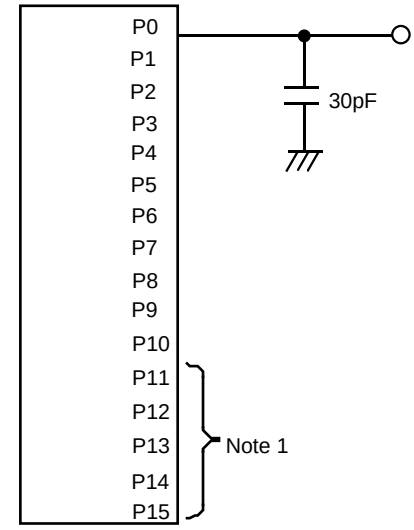
Table 5.42 Absolute Maximum Ratings

Symbol	Parameter		Condition	Value	Unit
V_{CC1}, V_{CC2}	Supply Voltage		V_{CC1}=V_{CC2}=AVcc	-0.3 to 6.0	V
AVcc	Analog Supply Voltage		V_{CC1}=V_{CC2}=AVcc	-0.3 to 6.0	V
V_I	Input Voltage	$\overline{RESET}$, CNVss, BYTE, $P6_0$-$P6_7$, $P7_2$-$P7_7$, $P8_0$-$P8_7$, $P9_0$-$P9_7$, $P10_0$-$P10_7$, $P14_0$-$P14_6$, $P15_0$-$P15_7$(1), V_{REF}, X_{IN}		-0.3 to V_{CC1}+0.3	V
		$P0_0$-$P0_7$, $P1_0$-$P1_7$, $P2_0$-$P2_7$, $P3_0$-$P3_7$, $P4_0$-$P4_7$, $P5_0$-$P5_7$, $P11_0$-$P11_4$, $P12_0$-$P12_7$, $P13_0$-$P13_7$(1)		-0.3 to V_{CC2}+0.3	
		$P7_0$, $P7_1$		-0.3 to 6.0	
V_O	Output Voltage	$P6_0$-$P6_7$, $P7_2$-$P7_7$, $P8_0$-$P8_4$, $P8_6$, $P8_7$, $P9_0$-$P9_7$, $P10_0$-$P10_7$, $P14_0$-$P14_6$, $P15_0$-$P15_7$(1), X_{OUT}		-0.3 to V_{CC1}+0.3	V
		$P0_0$-$P0_7$, $P1_0$-$P1_7$, $P2_0$-$P2_7$, $P3_0$-$P3_7$, $P4_0$-$P4_7$, $P5_0$-$P5_7$, $P11_0$-$P11_4$, $P12_0$-$P12_7$, $P13_0$-$P13_7$(1)		-0.3 to V_{CC2}+0.3	
		$P7_0$, $P7_1$		-0.3 to 6.0	
Pd	Power Dissipation		Topr=25° C	500	mW
Topr	Operating Ambient Temperature	during CPU operation	T version	-40 to 85	° C
		during flash memory program and erase operation		0 to 60	
Tstg	Storage Temperature			-65 to 150	° C

NOTES:

1. P11 to P15 are provided in the 144-pin package only.

$V_{CC1}=V_{CC2}=5V$



NOTES:
1. P11 to P15 are provided in the 144-pin package only.

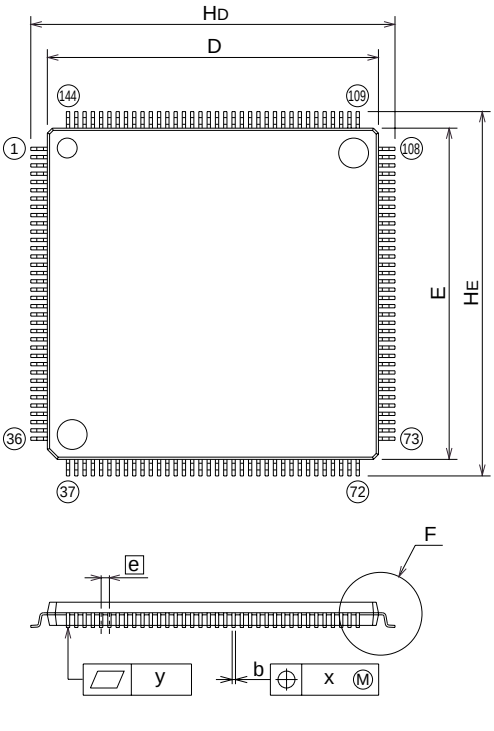
Figure 5.12 P0 to P15 Measurement Circuit

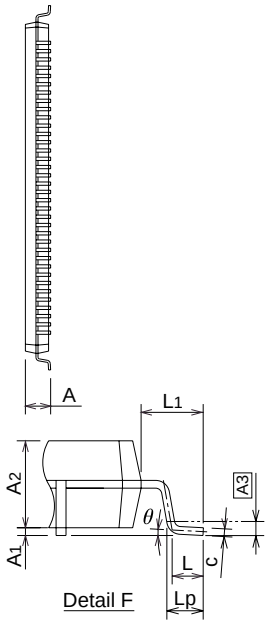
Package Dimensions

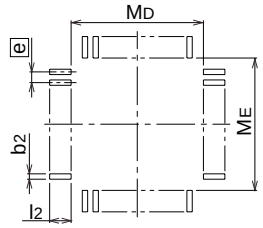
PLQP0144KA-A (144P6Q-A)

Plastic 144pin 20×20mm body LQFP

JEITA Package Code	RENESAS Code	Previous Code	Mass[Typ.]
P-LQFP144-20x20-0.50	PLQP0144KA-A	144P6Q-A	1.2g







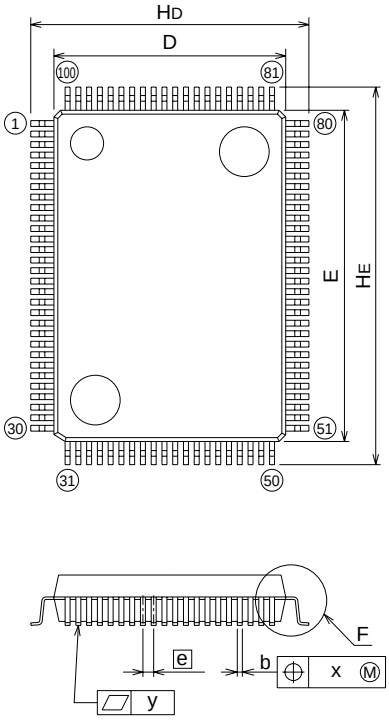
Recommended Mount Pad

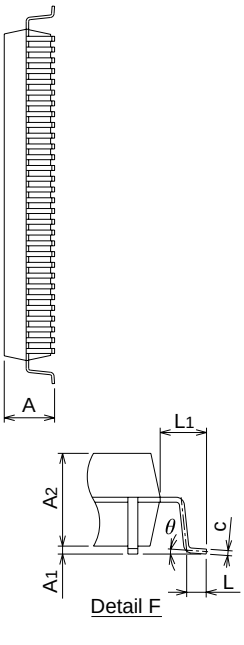
Symbol	Dimension in Millimeters		
	Min	Nom	Max
A	–	–	1.7
A1	0.05	0.125	0.2
A2	–	1.4	–
b	0.17	0.22	0.27
c	0.105	0.125	0.175
D	19.9	20.0	20.1
E	19.9	20.0	20.1
e	–	0.5	–
HD	21.8	22.0	22.2
HE	21.8	22.0	22.2
L	0.35	0.5	0.65
L1	–	1.0	–
Lp	0.45	0.6	0.75
A3	–	0.25	–
x	–	–	0.08
y	–	–	0.1
θ	0°	–	8°
b2	–	0.225	–
l2	0.95	–	–
MD	–	20.4	–
ME	–	20.4	–

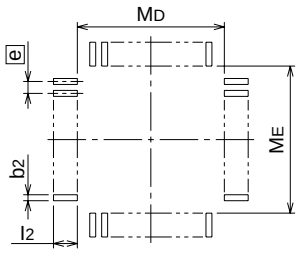
PRQP0100JB-A (100P6S-A)

Plastic 100pin 14×20mm body QFP

JEITA Package Code	RENESAS Code	Previous Code	Mass[Typ.]
P-QFP100-14x20-0.65	PRQP0100JB-A	100P6S-A	1.6g







Recommended Mount Pad

Symbol	Dimension in Millimeters		
	Min	Nom	Max
A	–	–	3.05
A1	0	0.1	0.2
A2	–	2.8	–
b	0.25	0.3	0.4
c	0.13	0.15	0.2
D	13.8	14.0	14.2
E	19.8	20.0	20.2
e	–	0.65	–
HD	16.5	16.8	17.1
HE	22.5	22.8	23.1
L	0.4	0.6	0.8
L1	–	1.4	–
x	–	–	0.13
y	–	–	0.1
θ	0°	–	10°
b2	–	0.35	–
l2	1.3	–	–
MD	–	14.6	–
ME	–	20.6	–

REVISION HISTORY	M32C/85 Group (M32C/85, M32C/85T) Datasheet

Rev.	Date	Description	
		Page	Summary
			Electrical Characteristics
		50	• **Table 5.3 Electrical Characteristics** Maximum values for Power Supply Current modified
		52	• **Table 5.6 Flash Memory Version Electrical Characteristics** Note 1. 100-cycle Products (D3, D5, U3, U5) deleted; Note 4 modified
			• **Table 5.7 Flash Memory Version Program and Erase Voltage and Read Operation Voltage Characteristics (at Topr=0 to 60°C)** deleted
		63	• **Table 5.22 Electrical Characteristics** Maximum values for Power Supply Consumption modified and standard values when "Topr=85°C while clock is stopped" deleted
1.00	Jun.01, 2004	-	**M32C/85T (High-reliability version)** added
		All Pages	Words standardized: On-chip oscillator, A/D converter and D/A converter
			Overview
		1	• **1.1 Applications** Automobiles added
		2, 3	• **Table 1.1** and **Table 1.2 M32C/85 Group (M32C/85, M32C/85T) Performance** M32C/85T added; note 3 added
		4	• **Figure 1.1 M32C/85 Group (M32C/85, M32C/85T) Block Diagram** Note 3 added
		5	• **1.4 Product Information** Description modified
			• **Figure 1.2 ROM/RAM Capacity** figure modified
		5, 6	• **Table 1.3 M32C/85 Group** M32C/85T added
		6	• **Figure 1.3 Product Numbering System** M32C/85T added
		7	• **Figure 1.4 Pin Assignment for 144-Pin Package** Note 3 added
		12	• **Figure 1.6 Pin Assignment for 100-Pin Pacakage** Note 5 added
		8 to 10	• **Table 1.5 Pin Characteristics for 144-Pin Package** Note 1 added
		13, 14	• **Table 1.6 Pin Characteristics for 100-Pin Package** Note 1 added
		15 to 18	• **Table 1.7 Pin Description** Notes added
			Memory
		22	• **Figure 3.1 Memory Map** Tables of internal ROM/internal RAM modified; note 2 modified; notes 4 and 5 added
			SFR
		23	• Note 2 added
		24	• PWCR0 and PWCR1 registers deleted
			• "Values after RESET" of the masked ROM version added to the FMR0 register
			• Note 1 added
			Electrical Characteristics
		46	• **Table 5.2 Recommended Operating Conditions** $f_{(ripple)}$, $V_{p-p(ripple)}$, V_{CC}, SV_{CC} and note 1 deleted
		47	• **Table 5.3 Electrical Characteristics** R_{PULLUP} value for the masked ROM version added

Rev.	Date	Description	
		Page	Summary
		65	• **Table 5.28 Memory Expansion Mode and Microprocessor Mode** tac1(AD-DB) expression modified
		77	• **Table 5.44 Electrical Characteristics** ICC standard value revised
		80	• **Table 5.47 Flash Memory Electrical Characteristics** Topr value modified
1.21	Jul.01, 2005	All pages	Package code changed: 144P6Q-A to PLQP0144KA-A, 100P6Q-A to PLQP0100KB-A, 100P6S-A to PRQP0100JB-A
		All pages	**"**Low Voltage Detection Reset**"** changed to **"**Brown-out Detection Reset**"**
			Special Function Register (SFR)
		27	• The G0RB register Value after reset modified
		39	• The TCSPR register Value after reset modified
			Electrical Characteristics
		47	• **Table 5.2 Electrical Characteristics** Parameter f(BCLK) and its values added
		51	• **Table 5.6 Flash Memory Version Electrical Characteristics** Mesurement condition changed
		53	• **Table 5.10 Memory Expansion Mode and Microprocessor Mode** *tac1(RD-DB)* expression on Note 1 modified; *tac2(RD-DB)* expression on Note 1 added
		59	• **Figure 5.3 Vcc1=Vcc2=5V Timing Diagram (1)** *tW(ER)* expression on Note 3 modified; *tcyc* expression added
		60	• **Figure 5.4 Vcc1=Vcc2=5V Timing Diagram (2)** *tac2(AD-DB)* expression on Note 1 modified; *th(ALE-AD)* expressions on Notes 1 and 2 modified; *tcyc* expression added
		65	• **Table 5.28 Memory Expansion Mode and Microprocessor Mode** *tac1(RD-DB)* expression on Note 1 modified; *tac2(RD-DB)* expression on Note 1 added
		70	• **Figure 5.7 Vcc1=Vcc2=3.3V Timing Diagram (1)** *tW(ER)* expression on Note 3 modified; *tcyc* expression added
		71	• **Figure 5.8 Vcc1=Vcc2=3.3V Timing Diagram (2)** *tac2(RD-DB)* expression on Note 1 modified; *th(ALE-AD)* expressions on Notes 1 and 2 modified; *th(WR-CS)* expression on Note 2 modified; *tcyc* expression added
		76	• **Table 5.43 Electrical Characteristics** Parameter f(BCLK) and its values added
		80	• **Table 5.47 Flash Memory Version Electrical Characteristics** Mesurement condition changed