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April 1st, 2010
Renesas Electronics Corporation

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M16C/30P, M16C/30 Group

Differences between M16C/30P and M16C/30

1. Abstract

The following document describes differences between M16C/30P and M16C/30.

2. Introduction

The explanation of this issue is applied to the following condition:
Applicable MCU: M16C/30P, M16C/30

3. Contents

3.1 Function Differences

Table 3.1.1 and table 3.1.2 show the Function Differences.

Table 3.1.1 Function Differences (1) [1]

Item	M16C/30P	M16C/30
Shortest instruction Execution Time	62.5ns(f(XIN)=16MHz, VCC=3.0 to 5.5V) 100ns(f(XIN)=10MHz, VCC=2.7 to 5.5V)	62.5ns(f(XIN)=16MHz, VCC=4.2 to 5.5V) 100ns(f(XIN)=10MHz, VCC=2.7 to 5.5V, 1 wait)
Supply Voltage	VCC1=VCC2=3.0 to 5.5V(f(XIN)=16MHz) VCC1=VCC2=2.7 to 5.5V(f(XIN)=10MHz, no wait)	VCC=4.2 to 5.5V(f(XIN)=16MHz, no wait) VCC=2.7 to 5.5V(f(XIN)=10MHz, 1wait)
Memory	Mask ROM Flash Memory One time Flash Memory ROMLess	Mask ROM
Power Consumption	10mA(VCC1=VCC2=5V, f(XIN)=16MHz) 8mA(VCC1=VCC2=3V, f(XIN)=10MHz) 1.8μA(VCC1=VCC2=3V, f(XCIN)=32kHz, wait mode) 0.7μA(VCC1=VCC2=3V, stop mode)	30.0mA(VCC=5V, f(XIN)=16MHz) 8.5mA(VCC=3V, f(XIN)=10MHz, 1wait) 0.9μA(VCC=3V, f(XCIN)=32kHz, wait mode)
External Device Connect Area	04000h to 07FFFh 08000h to 0FFFFh (PM10=0) 10000h to 26FFFh 28000h to 7FFFFh 80000h to CFFFFh) (PM13=0 or without PM13 bit) D0000h to FFFFFh (Microprocessor mode).	04000h to 05FFFh 06000h to CFFFFh D0000h to FFFFFh (Microprocessor mode)
Protect	Can be set for PM0, PM1, CM0, CM1, PD9, PCLKR registers	Can be set for PM0, PM1, CM0, CM1, PD9 registers
$\overline{\text{INT}}$ Interrupt	5 ($\overline{\text{INT0}}$ to $\overline{\text{INT4}}$)	3 ($\overline{\text{INT0}}$ to $\overline{\text{INT2}}$)
DMAC	2 channels	1 channels
Multifunction Timer	6 channels Timer A x 3 channels, Timer B x 3 channels	5 channels Timer A x 3 channels, Timer B x 2 channels
Timer A, Timer B Count Source	Select from f1, f2, f8, f32, fC32	Select from f1, f8, f32, fC32

NOTES:
1. About the details and the characteristics, refer to hardware manual.

Table 3.1.2 Function Differences (2) (Note1)

Item	M16C/30P	M16C/30
Serial Interface (UART0 to UART2)	(UART, Clock synchronous, I²C bus (2)) x 2 (UART, Clock synchronous, I²C bus (2), IEBus (3)) x 1	(UART, Clock synchronous) x 2 (UART, Clock synchronous, I²C bus (2), IEBus (3)) x 1
UART0 to UART2 Count Source	Select from f1SIO, f2SIO, f8SIO, f32SIO	Select from f1, f8, f32
Serial Interface $\overline{\text{RTS}}$ Timing	Assert low when receive buffer is read	Assert low when reception is completed
UART0 to UART2 Overrun Error Generation Timing	This error occurs if the serial interface started receiving the next data before reading the UiRB register (i=0 to 2) and received the 7th bit of the next data (clock synchronous) This error occurs if the serial interface started receiving the next data before reading the UiRB register and received the bit one before the last stop bit of the next data (UART)	This error occurs when the next data is ready before contents of UARTi receive buffer register are read out.
Serial Interface $\overline{\text{CTS}}$ / $\overline{\text{RTS}}$ Separate Function	Built-in	None
UART2 Data Transmit Timing	After data was written, transfer starts at the 2nd BRG overflow timing (same as UART0 and UART1)	After data was written, transfer starts at the 1st BRG overflow timing (output starts one cycle of BRG overflow earlier than UART0 and UART1)
Serial Interface Sleep Function	None	Built-in
Serial Interface I²C Mode	Start condition, stop condition: Auto-generationable	Start condition, stop condition: Not auto-generationable
Serial Interface I²C Mode SDA Delay	Only digital delay is selected as SDA delay SDA digital delay count source: BRG	Analog or digital delay is selected as SDA delay SDA digital delay count source: 1/f(XIN)
A/D Converter	10 bits x 8 channels Expandable up to 18 channels	10 bits x 8 channels Expandable up to 10 channels
A/D Converter Operation Clock	Select from fAD, fAD divided by 2, 3, 4, 6, 12	Select from fAD, fAD/2, fAD/4
A/D Converter Operation Mode	One-shot mode, Repeat mode	One-shot mode
A/D Converter Input Pin	Select from Ports P0, P10	Fixed at Port P10
CRC Calculation	Built-in	None
Package	100P6Q-A, 100P6S-A	100P6Q-A, 100P6S-A

NOTES:

1. About the details and the characteristics, refer to hardware manual.
2. I²C bus is a registered trademark of Koninklijke Philips Electronics N. V.
3. IEBus is a registered trademark of NEC Electronics Corporation.

3.2 Pin Function Differences

Table 3.2.1 shows the Pin Function Differences.

Table 3.2.1 Pin Function Differences

M16C/30P	M16C/30	Remarks
P9_0/TB0IN	P9_0	Add TB0IN
VCC1	VCC	
P7_1/ RxD2/ SCL2/TA0IN	P7_1/ RxD2/ SCL/TA0IN	
P7_0/ TxD2/SDA2/TA0OUT	P7_0/ TxD2/SDA/TA0OUT	
P6_7/TxD1/SDA1	P6_7/TxD1	Add SDA1
P6_6/RxD1/SCL1	P6_6/RxD1	Add SCL1
P6_4/ $\overline{\text{CTS1}}$ / $\overline{\text{RTS1}}$ / $\overline{\text{CTS0}}$ /CLKS1	P6_4/ $\overline{\text{CTS1}}$ / $\overline{\text{RTS1}}$ /CLKS1	Add $\overline{\text{CTS0}}$
P6_3/TxD0/SDA0	P6_3/TxD0	Add SDA0
P6_2/RxD0/SCL0	P6_2/RxD0	Add SCL0
VCC2	VCC	
P3_0/A8	P3_0/A8(/--/D7)	Delete (/--/D7)
P2_7/A7	P2_7/A7(/D7/D6)	Delete (/D7/D6)
P2_6/A6	P2_6/A6(/D6/D5)	Delete (/D6/D5)
P2_5/A5	P2_5/A5(/D5/D4)	Delete (/D5/D4)
P2_4/A4	P2_4/A4(/D4/D3)	Delete (/D4/D3)
P2_3/A3	P2_3/A3(/D3/D2)	Delete (/D3/D2)
P2_2/A2	P2_2/A2(/D2/D1)	Delete (/D2/D1)
P2_1/A1	P2_1/A1(/D1/D0)	Delete (/D1/D0)
P2_0/A0	P2_0/A0(/D0/--)	Delete (/D0/--)
P1_6/D14/ $\overline{\text{INT4}}$	P1_6/D14	Add $\overline{\text{INT4}}$
P1_5/D13/ $\overline{\text{INT3}}$	P1_5/D13	Add $\overline{\text{INT3}}$
P0_7/AN0_7/D7	P0_7/D7	Add AN0_7
P0_6/AN0_6/D6	P0_6/D6	Add AN0_6
P0_5/AN0_5/D5	P0_5/D5	Add AN0_5
P0_4/AN0_4/D4	P0_4/D4	Add AN0_4
P0_3/AN0_3/D3	P0_3/D3	Add AN0_3
P0_2/AN0_2/D2	P0_2/D2	Add AN0_2
P0_1/AN0_1/D1	P0_1/D1	Add AN0_1
P0_0/AN0_0/D0	P0_0/D0	Add AN0_0

SFR Differences

Table 3.3.1 shows the SFR Differences.

Table 3.3.1 SFR Differences

M16C/30P	M16C/30	Remarks
PM0	PM0	Change function
PM1	PM1	Change function
PRCR	PRCR	Change function
WDC	WDC	Add bit 5
SAR1	-	
DAR1	-	
TCR1	-	
DM1CON	-	
INT3IC	-	
U1BCNIC	-	
U0BCNIC	-	
INT4IC	-	
DM1IC	-	
TB0IC	-	
PCLKR	-	
IFSR2A	-	
U0SMR4	-	
U0SMR3	-	
U0SMR2	-	
U0SMR	-	
U1SMR4	-	
U1SMR3	-	
U1SMR2	-	
U1SMR	-	
U2SMR4	-	
U2SMR3	U2SMR3	Change function
U2SMR2	U2SMR2	Change function
U2SMR	U2SMR	Change function
TABSR	TABSR	Add bit 5
TB0	-	
TB0MR	-	
U0MR	U0MR	Change function
U0C0	U0C0	Change function
U0C1	U0C1	Add bits 6, 7
U1MR	U1MR	Change function
U1C0	U1C0	Change function
U1C1	U1C1	Add bits 6, 7
UCON	UCON	Add bits 6
DM1SL	-	
CRCD	-	
CRCIN	-	
ADCON2	ADCON2	Change function

3.3 Interrupt Vector Differences

Table 3.4.1 shows the Relocatable Vector Table Differences.

Table 3.4.1 Relocatable Differences

M16C/30P Interrupt Factor	M16C/30 Interrupt Factor	Software Interrupt Number
$\overline{\text{INT3}}$	-	4
UART1 bus collision detect	-	6
UART0 bus collision detect	-	7
$\overline{\text{INT4}}$	-	9
DMA1	-	12
UART0 transmission, NACK0	UART0 transmission,	17
UART0 reception, ACK0	UART0 reception	18
UART1 transmission, NACK1	UART1 transmission	19
UART1 reception,ACK1	UART1 reception	20
Timer B0	-	26

3.4 Support tool Differences

Table 3.5.1 shows the Support Tool Differences.

Table 3.5.1 Support Tool Differences

Tool Information	M16C/30P Tool Product		M16C/30 Tool Product	Change
C Compiler	M3T-NC30WA		M3T-NC30WA	
Real-time OS	M3T-MR30		M3T-MR30	
Simulator Debugger	M3T-PD30SIM		M3T-PD30SIM	
Emulator Debugger	M3T-PD30F	M3T-PD30	M3T-PD30	√
Emulator	PC7501	PC4701U	PC4701U	√
Emulation Pod. Emulation probe	M3062PT-EPB M3062PT2-EPB	M3062PT3-RPD-E	M30620T2-RPD-E	√

4. Reference

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Data Sheet

M16C/30 Group Data Sheet Rev.1.1
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Hardware Manual

M16C/30P Group Hardware Manual Rev.1.21
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REVISION HISTORY

Rev.	Date	Description	
		Page	Summary
1.00	Mar 31, 2005	-	First edition issued
1.10	Nov 01, 2005	1 3 4 5	Table 3.1.1 Function Differences is partly revised and deleted Table 3.2.1 Pin Function Differences is partly revised and deleted. Table 3.3.1 SFR Differences is partly deleted. Table 3.5.1 Support Tool Differences is partly added.
1.11	Jan 16, 2007	1	Add memory

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