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Renesas Electronics Corporation

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3858 Group, 3850A Group (QzROM version)

Difference between 3858 Group and 3850A Group (QzROM version)

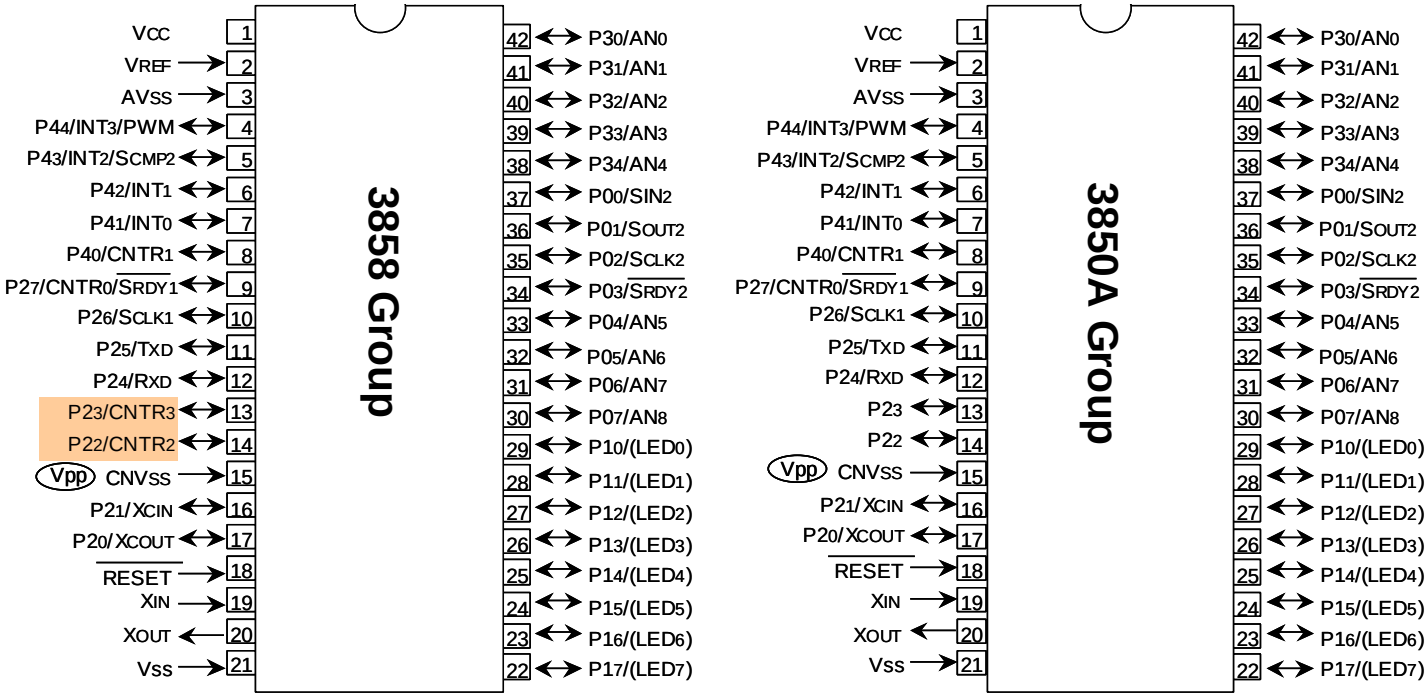
1. Comparison of 3858 Group & 3850A Group QzROM version

Table 1. Comparison of 3858 Group & 3850A Group QzROM version

	3858 Group	3850A Group QzROM version
	M38588GC-XXXFP/SP M38588GCFP/SP	M38503G4A-XXXFP/SP M38503G4AFP/SP
ROM/RAM Size	48K/1536	16K/512
The number of selectable count source for 8bit Timer (Prescaler)	Timer 1, 2 : 10 Timer X, Y : 11	Timer 1, 2, X, Y : 2
16-bit Timer	Timer Z1,Timer Z2	-
A/D Converter	8 Bits x 9 ch	10 Bits x 9 ch
	Not available in low-speed mode(32KHz)	Available in low-speed mode(32KHz)
	Be sure to refer to the each data sheet as for detailed specification of A/D converter.	
P22, P23 Output Structure	CMOS 3-state	N-channel open-drain output
	Refer to each data sheet for details of absolute maximum ratings, electrical characteristics and recommended operating conditions due to differences of output structure.	
Supply Voltage	2.7 to 5.5V	1.8 to 5.5V
Supply Voltage (When A/D converter is used)	2.7 to 5.5V	2.2 to 5.5V
RAM hold voltage	2.0 to 5.5V	1.8 to 5.5V

2. Pin Configuration Comparison between 3858 Group and 3850A Group QzROM version

: Difference between the 3858 Group and the 3850A Group



Package type : SP PRDP0042BA-A (42P4B)

Package type : FP PRSP0042GA-B (42P2R-E)

3. Interrupt Vector Comparison between 3858 Group and 3850A Group QzROM version

: Difference between the 3858 Group and the 3850A Group

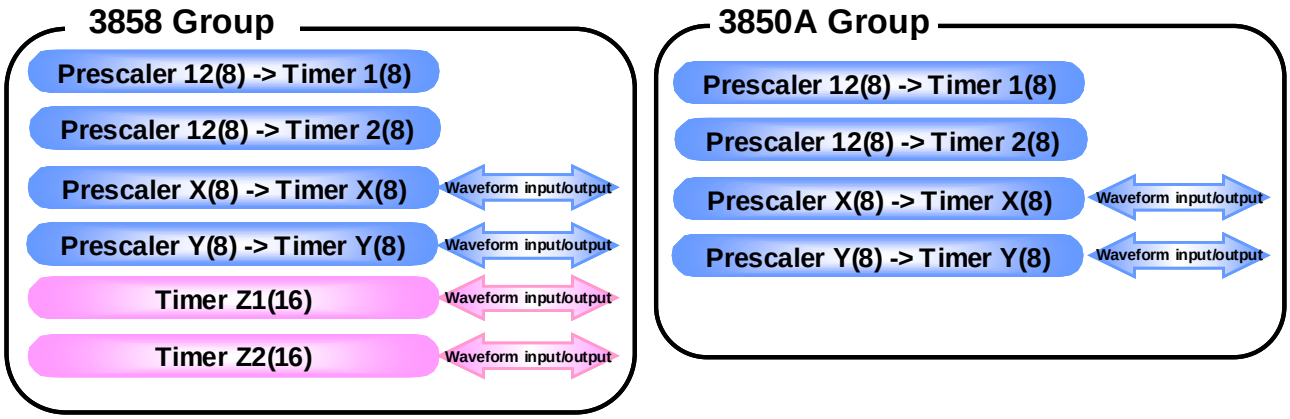
Vector addresses		Priority	3858 Group Interrupt Source	3850A Group Interrupt Source
High	Low			
$FFFD_{16}$	$FFFC_{16}$	1	Reset	Reset
$FFFB_{16}$	$FFFA_{16}$	2	INT_0	INT_0
$FFF9_{16}$	$FFF8_{16}$	3	Timer Z1/$CNTR_2$	Reservsd
$FFF7_{16}$	$FFF6_{16}$	4	INT_1	INT_1
$FFF5_{16}$	$FFF4_{16}$	5	INT_2	INT_2
$FFF3_{16}$	$FFF2_{16}$	6	INT_3/Serial I/O2	INT_3/Serial I/O2
$FFF1_{16}$	$FFF0_{16}$	7	Timer Z_2/$CNTR_3$	Reservsd
$FFEF_{16}$	$FFEE_{16}$	8	Timer X	Timer X
$FFED_{16}$	$FFEC_{16}$	9	Timer Y	Timer Y
$FFEB_{16}$	$FFEA_{16}$	10	Timer 1	Timer 1
$FFE9_{16}$	$FFE8_{16}$	11	Timer 2	Timer 2
$FFE7_{16}$	$FFE6_{16}$	12	Serial I/O1 reception	Serial I/O1 reception
$FFE5_{16}$	$FFE4_{16}$	13	Serial I/O1 transmission	Serial I/O1 transmission
$FFE3_{16}$	$FFE2_{16}$	14	$CNTR_0$/$CNTR_2$	$CNTR_0$
$FFE1_{16}$	$FFE0_{16}$	15	$CNTR_1$/$CNTR_3$	$CNTR_1$
$FFDF_{16}$	$FFDE_{16}$	16	A/D converter	A/D converter
$FFDD_{16}$	$FFDC_{16}$	17	BRK instruction	BRK instruction

4. SFR Comparison between 3858 Group and 3850A Group QzROM version

	3858 Group	3850A Group
0000₁₆	Port P0 (P0)	Port P0 (P0)
0001₁₆	Port P0 direction register (P0D)	Port P0 direction register (P0D)
0002₁₆	Port P1 (P1)	Port P1 (P1)
0003₁₆	Port P1 direction register (P1D)	Port P1 direction register (P1D)
0004₁₆	Port P2 (P2)	Port P2 (P2)
0005₁₆	Port P2 direction register (P2D)	Port P2 direction register (P2D)
0006₁₆	Port P3 (P3)	Port P3 (P3)
0007₁₆	Port P3 direction register (P3D)	Port P3 direction register (P3D)
0008₁₆	Port P4 (P4)	Port P4 (P4)
0009₁₆	Port P4 direction register (P4D)	Port P4 direction register (P4D)
000A₁₆		
000B₁₆		
000C₁₆		
000D₁₆		
000E₁₆		
000F₁₆		
0010₁₆	Port P0 pull-up control register (PULL0)	
0011₁₆	Port P1 pull-up control register (PULL1)	
0012₁₆	Port P2 pull-up control register (PULL2)	Port P0, P1, P2 pull-up control register (PULL012)
0013₁₆	Port P3 pull-up control register (PULL3)	Port P3 pull-up control register (PULL3)
0014₁₆	Port P4 pull-up control register (PULL4)	Port P4 pull-up control register (PULL4)
0015₁₆	Serial I/O2 control register1 (SIO2CON1)	Serial I/O2 control register1 (SIO2CON1)
0016₁₆	Serial I/O2 control register2 (SIO2CON2)	Serial I/O2 control register2 (SIO2CON2)
0017₁₆	Serial I/O2 register (SIO2)	Serial I/O2 register (SIO2)
0018₁₆	Transmit/Receive buffer register (TB/RB)	Transmit/Receive buffer register (TB/RB)
0019₁₆	Serial I/O1 status register (SIOSTS)	Serial I/O1 status register (SIOSTS)
001A₁₆	Serial I/O1 control register (SIOCON)	Serial I/O1 control register (SIOCON)
001B₁₆	UART control register (UARTCON)	UART control register (UARTCON)
001C₁₆	Baud rate generator (BRG)	Baud rate generator (BRG)
001D₁₆	PWM control register (PWMCON)	PWM control register (PWMCON)
001E₁₆	PWM prescaler (PREPWM)	PWM prescaler (PREPWM)
001F₁₆	PWM register (PWM)	PWM register (PWM)
0020₁₆	Prescaler 12 (PRE12)	Prescaler 12 (PRE12)
0021₁₆	Timer 1 (T1)	Timer 1 (T1)
0022₁₆	Timer 2 (T2)	Timer 2 (T2)
0023₁₆	Timer XY mode register (TM)	Timer XY mode register (TM)
0024₁₆	Prescaler X (PREX)	Prescaler X (PREX)
0025₁₆	Timer X (TX)	Timer X (TX)
0026₁₆	Prescaler Y (PREY)	Prescaler Y (PREY)
0027₁₆	Timer Y (TY)	Timer Y (TY)
0028₁₆	Timer Z1 mode register (TZ1M)	Timer count source selection register (TCSS)
0029₁₆	Timer Z1 low-order (TZ1L)	
002A₁₆	Timer Z1 high-order (TZ1H)	
002B₁₆	Timer Z2 mode register (TZ2M)	Reserved
002C₁₆	Timer Z2 low-order (TZ2L)	Reserved
002D₁₆	Timer Z2 high-order (TZ2H)	Reserved
002E₁₆	Timer 12,X count source selection register (T12XCSS)	Reserved
002F₁₆	Timer Y,Z1 count source selection register (TYZ1CSS)	Reserved
0030₁₆	Timer Z2 count source selection register (TZ2CSS)	Reserved
0031₁₆		Reserved
0032₁₆		
0033₁₆		
0034₁₆	AD control register (ADCON)	AD control register (ADCON)
0035₁₆	AD conversion register (AD)	AD conversion low-order register (ADL)
0036₁₆	Interrupt source selection register (INTSEL)	AD conversion high-order register (ADH)
0037₁₆	Reserved	AD input selection register (ADSELL)
0038₁₆	MISRG	MISRG
0039₁₆	Watchdog timer control register (WDTCON)	Watchdog timer control register (WDTCON)
003A₁₆	Interrupt edge selection register (INTEDGE)	Interrupt edge selection register (INTEDGE)
003B₁₆	CPU mode register (CPUM)	CPU mode register (CPUM)
003C₁₆	Interrupt request register 1 (IREQ1)	Interrupt request register 1 (IREQ1)
003D₁₆	Interrupt request register 2 (IREQ2)	Interrupt request register 2 (IREQ2)
003E₁₆	Interrupt control register 1 (ICON1)	Interrupt control register 1 (ICON1)
003F₁₆	Interrupt control register 2 (ICON2)	Interrupt control register 2 (ICON2)

: Different function with same name
: Only 3858 Group
: Reduced on 3858 Group
: Only 3850A Group

5. Timer Comparison between 3858 Group and 3850A Group QzROM version

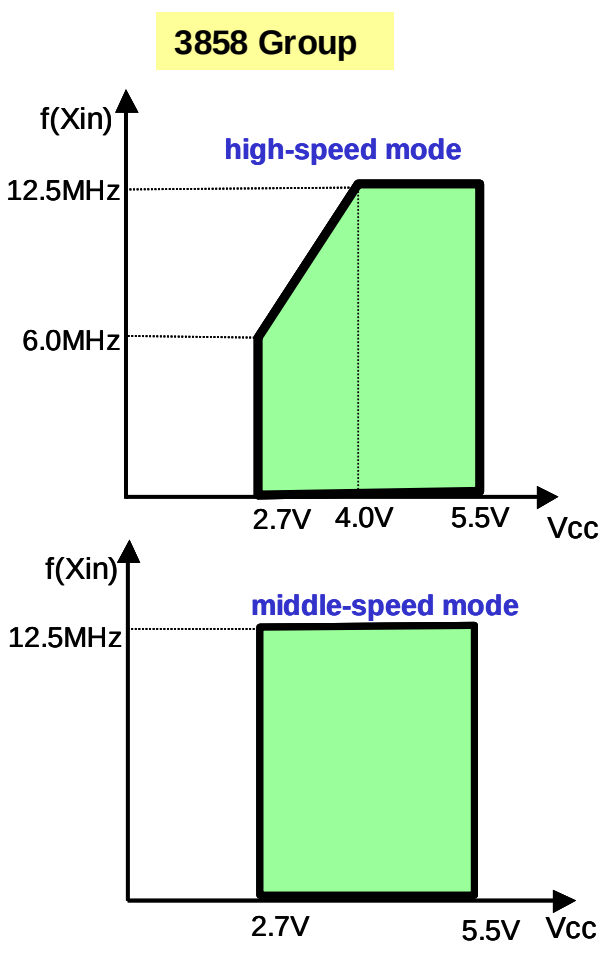


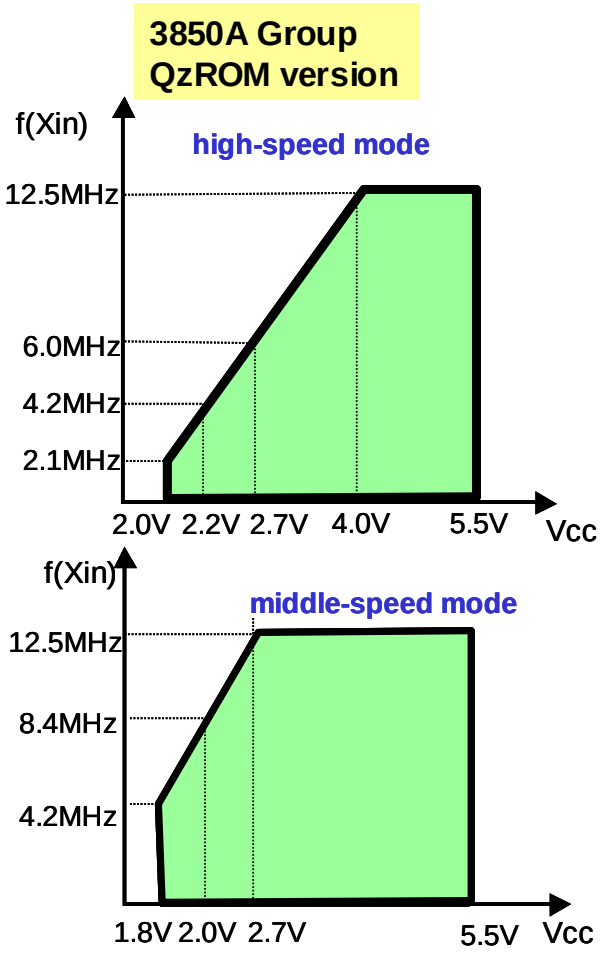
In the 3858 Group, there are two additional 16-bit timers; timer Z1, and timer Z2.

Both groups have the same 8-bit timers; timer1, timer2, timer X, and timer Y, however, count source options of the timers are different for each group.

Timer	Timer count source on the 3858 Group	Timer count source on the 3850A Group
Timer1,Timer2 (Prescaler 12)	f (XIN)(f(XCIN)at low-speed mode) **divided by 2,**4,8,16,32,64,128,256, 512,or 1024	f (XIN)(f(XCIN)at low-speed mode) **divided by** 16 or f(XCIN)
Timer X (Prescaler X) Timer Y (Prescaler Y)	f (XIN)(f(XCIN)at low-speed mode) **divided by 2,**4,8,16,32,64,128,256, 512,1024 or f(XCIN)	f (XIN)(f(XCIN)at low-speed mode) **divided by** 16 or 2
Timer Z1,Timer Z2	The same as the above	

6. Operating Frequency Characteristics





7. Notes on Replacement

1. The 3858 Group has an 8-bit A/D converter, whereas the 3850A Group has a 10-bit A/D converter. Also, A/D converter characteristics are different. Perform sufficient evaluations for each individual sample. And, functions of several registers regarding the A/D converter have been changed.

Address	3858 Group	3850 Group	
0034$_{16}$	AD control register (ADCON)	AD control register (ADCON)	←Refer to following table
0035$_{16}$	AD conversion register (AD)	AD conversion low-order register (ADL)	←conversion result
0036$_{16}$	Interrupt source selection register (INTSEL)	AD conversion high-order register (ADH)	←On the 3858 Group, Interrupt function
0037$_{16}$	Reserved	AD input selection register (ADSEL)	←Refer to following table

Difference between 0034$_{16}$ and 0037$_{16}$

Address (register name)	Bit	3858 Group	3850A Group
0034$_{16}$ (AD control register)	Bit 0	Analog input pin selection bits	Analog input pin selection bits
	Bit 1		
	Bit 2		
	Bit 3		Not used (returns “0” when read)
0037$_{16}$ (3850 : AD input selection register)	Bit 0	Reserved	Analog input port selection switch bit

2. The setting methods to control pull-up of ports P0, P1, and P2 in the 3858 Group are different from the 3850A Group. In the 3858 Group, pull-up control is able to be set each pin. In the 3850 Group, pull-up control is set each port (8 pins). Associated registers are as follows.

address	3858 group	3850A group
0010$_{16}$	Port PO pull-up control register (PULL0)	(blank area)
0011$_{16}$	Port P1 pull-up control register (PULL1)	(blank area)
0012$_{16}$	Port P2 pull-up control register (PULL2)	Port P1,P1,P2 pull-up control register (PULL012)

8. Notes on Replacement (continued)

3. In the 3858 Group, there are two additional 16-bit timers; timer Z1 and timer Z2. And count source options of timers have been added. Therefore, functions of following registers have been added and changed.
The address of the timer count source selection register has been changed.
3858 Group : $002E_{16}$ to 0030_{16} 3850 Group : 0028_{16}

Address	3858 Group	3850 Group
0028_{16}	Timer Z1 mode register (TZ1M)	Timer count source selection register (TCSS)
0029_{16}	Timer Z1 low-order (TZ1L)	(blank area)
$002A_{16}$	Timer Z1 high-order (TZ1H)	(blank area)
$002B_{16}$	Timer Z2 mode register (TZ2M)	Reserved
$002C_{16}$	Timer Z2 low-order (TZ2L)	Reserved
$002D_{16}$	Timer Z2 high-order (TZ2H)	Reserved
$002E_{16}$	Timer 12,X count source selection register (T12XCSS)	Reserved
$002F_{16}$	Timer Y,Z1 count source selection register (TYZ1CSS)	Reserved
0030_{16}	Timer Z2 count source selection register (TZ2CSS)	Reserved

4. In the 3858 Group, some bits functions of following registers have been changed due to additions of the interrupt source.

Address (register name)	Bit	3858 Group	3850A Group
0036_{16} (Interrupt source selection register)	Bit 0	INT3/Serial I/O2 interrupt source selection bit	A/D conversion high-order register
	Bit 1	Timer Z1/CNTR2 interrupt source selection bit	
	Bit 2	Timer Z2/CNTR3 interrupt source selection bit	
	Bit 3	CNTR0/ CNTR2 interrupt source selection bit	
	Bit 4	CNTR1/ CNTR3 interrupt source selection bit	
$003A_{16}$ (Interrupt edge selection register)	Bit 4	Not used (return "0" when read)	Serial I/O2/INT3 interrupt source bit
$003C_{16}$ (Interrupt request register 1)	Bit 1	Timer Z1/CNTR2 interrupt request bit	Reserved
	Bit 5	Timer Z2/CNTR3 interrupt request bit	Reserved
$003D_{16}$ (Interrupt request register 2)	Bit 4	CNTR0/ CNTR2 interrupt request bit	CNTR0 interrupt request bit
	Bit 5	CNTR1/ CNTR3 interrupt request bit	CNTR1 interrupt request bit
$003E_{16}$ (Interrupt control register 1)	Bit 1	Timer Z1/CNTR2 interrupt enable bit	Reserved (Do not write "1" to this bit.)
	Bit 3	Timer Z2/CNTR3 interrupt enable bit	Reserved (Do not write "1" to this bit.)
$003F_{16}$ (Interrupt control register2)	Bit 4	CNTR0/ CNTR2 interrupt enable bit	CNTR0 interrupt enable bit
	Bit 5	CNTR1/ CNTR3 interrupt enable bit	CNTR1 interrupt enable bit

9. Notes on Replacement (continued)

5. The supply voltage of the 3858 Group is 2.7 to 5.5V whereas the supply voltage of the 3850A Group QzROM version is 1.8 to 5.5V (2.2 to 5.5V when A/D converter is used).

6. Although the 3858 Group and the 3850A Group have been considered compatibility and designed for characteristics, actual values such as operation margin, A/D conversion accuracy, noise immunity, and noise radiation in electrical characteristics depending on the differences in the manufacturing processes may be different. Perform sufficient evaluations every individual product.

7. Be sure to refer to the each Group data sheet as for the details in an absolute maximum ratings, an electrical characteristics and a recommended operating conditions.
Contact an oscillator manufacturer. Select an oscillator and oscillation circuit constants to obtain the stabilized operation clock on the user system and its condition for mass-production since oscillation circuit constants of XIN-XOUT, XCIN-XCOUT are different every product.
Be careful especially when range of voltage and temperature is wide.
We recommend to design the circuit in consideration of the wiring pattern of the feed-back resistor, the dumping resistor and the load capacity in advance.

10. Reference

Data Sheet

3858 Group Datasheet

3850 Group (Spec.A QzROM version) Datasheet

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REVISION HISTORY	Difference between 3858 Group and 3850 Group QzROM version

Rev.	Date	Description	
		Page	Summary
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