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April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

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3826A Group, 7560A Group

Difference between 3826A Group and 7560A Group

1. Target device

- 7560 Group Mask ROM version: M37560M8A-XXXFP/GP, M37560MFA-XXXFP/GP
- 7560 Group One Time PROM version: M37560EFFP/GP
- 3826A Group Mask ROM version: M38268MCA-XXXFP/GP, M3826AMFA-XXXFP/GP
- 3826 Group One Time PROM version: M3826AEFFP/GP

2. Difference between 3826A Group and 7560A Group

Table 1. Difference between 3826A Group and 7560A Group

		3826 Group	3826A Group	7560A Group	7560 Group
		3826AEF	3826AMFA, 38268MCA	37560MFA, 37560M8A	37560EF
		One Time PROM version	Mask ROM version	Mask ROM version	One Time PROM version
ROM/RAM [byte]		60K/2.5K	60K/2.5K, 48K/1.5K	60K/2.5K, 32K/1K	60K/2.5K
Oscillation circuit constant		The oscillation circuit constant for XIN-XOUT and XCIN-XCOUT depends on products.			
Hysteresis characteristics		Almost constant	When the power source voltage becomes lower, the range of hysteresis becomes narrow.		Almost constant
Sub-clock oscillation circuit		Regulator not included	Regulator included		Regulator not included
Handling of VPP power pin (P70)		A series resistor (5 kΩ) is required for the pin because input impedance is low.	A series resistor not required		A series resistor (5 kΩ) is required for the pin because input impedance is low.
D/A converter		CTCSS/DTMF function included		CTCSS/DTMF function not included	
Absolute maximum ratings	Power source voltage (Vcc), Input voltage (C1, C2), Output voltage (VL3), Output voltage (C1, C2)	-0.3 V to 7.0 V	-0.3 V to 6.5 V		-0.3 V to 7.0 V
		VL2 to 7.0 V	VL2 to 6.5 V		VL2 to 7.0 V
Power source voltage		Refer to section 6.			
RAM retention voltage		2.0 V (MIN.)	1.8 V (MIN.)		2.0 V (MIN.)
VL1 Power source voltage		1.3 V to 2.3 V	1.3 V to 2.1 V		1.3 V to 2.3 V
Timer X, Y input frequency (MAX.) f(CNTR0), f(CNTR1)		2.5 ≤ Vcc ≤ 4.0 V : (2×Vcc-4) MHz 4.0 ≤ Vcc ≤ 5.5 V : 4 MHz	1.8 ≤ Vcc ≤ 2.0 V: (5×Vcc-8) MHz 2.0 ≤ Vcc ≤ 4.0 V: (Vcc) MHz 4.0 ≤ Vcc ≤ 4.5 V: (2×Vcc-4) MHz 4.5 ≤ Vcc ≤ 5.5 V: 5 MHz		2.5 ≤ Vcc ≤ 4.0 V : (2×Vcc-4) MHz 4.0 ≤ Vcc ≤ 5.5 V : 4 MHz

*1 As for the A/D converter Specification, refer to “RENESAS Technical Update (NO. TN-380-A064A/E)”.

*2 The 3826A Group has the pin-compatibility with the 7560A Group.

The electrical characteristics of the 3826A Group are different from that of the 7560A Group.

3. Oscillation circuit constant

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 the oscillation circuits are different between the 3826A Group and 7560A Group, and 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.

The 3826A Group has 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, internal ROM and layout pattern may be different.
In the 3826A Group, noise radiation is decreased compared with the 7560A Group. Perform sufficient evaluations every individual product.

4. Note

• The 3826A Group is pin-compatible with the 7560A Group.
The 3826A Group has some registers related to the DTMF function and CTCSS function (refer to page 4 and page 5).
When these functions are not used in the 3826A Group, process the added registers (bits) as follows (1) or (2) :

(1) Do not write anything to the related registers (bits) (hold an initial value after reset).
(2) Write the initial value to the related registers (bits) after reset.

While handling (1) or (2) is progress, the program of the 7560A Group specifications can be operated in the 3826A Group specifications without modifying the program.

• Emulator MCU
The M38267RLFS does not have the 10-bit A/D conversion mode function.
Use M37560RLFS for the software development of 10-bit A/D.
The M37560RLFS has the DTMF function and CTCSS function.

5. SFR Comparison between 3826A Group and 7560A Group

	3826A Group	7560A Group
0000$_{16}$	Port P0 (P0)	Port P0(P0)
0001$_{16}$	Port P0 direction register (P0D)	Port P0 direction register (P0D)
0002$_{16}$	Port P1 (P1)	Port P1(P1)
0003$_{16}$	Port P1 direction register (P1D)	Port P1 direction register (P1D)
0004$_{16}$	Port P2 (P2)	Port P2(P2)
0005$_{16}$	Port P2 direction register (P2D)	Port P2 direction register (P2D)
0006$_{16}$	Port P3 (P3)	Port P3(P3)
0007$_{16}$	Port P3 direction register (P3D)	Port P3 direction register (P3D)
0008$_{16}$	Port P4 (P4)	Port P4(P4)
0009$_{16}$	Port P4 direction register (P4D)	Port P4 direction register (P4D)
000A$_{16}$	Port P5 (P5)	Port P5(P5)
000B$_{16}$	Port P5 direction register (P5D)	Port P5 direction register (P5D)
000C$_{16}$	Port P6 (P6)	Port P6(P6)
000D$_{16}$	Port P6 direction register (P6D)	Port P6 direction register (P6D)
000E$_{16}$	Port P7 (P7)	Port P7 (P7)
000F$_{16}$	Port P7 direction register (P7D)	Port P7 direction register (P7D)
0010$_{16}$		
0011$_{16}$		
0012$_{16}$		
0013$_{16}$		
0014$_{16}$	AD conversion low-order register (ADL)	A/D conversion register (low-order) (ADL)
0015$_{16}$	Key input control register (KIC)	Key input control register (KIC)
0016$_{16}$	PULL register A (PULLA)	PULL register A (PULLA)
0017$_{16}$	PULL register B (PULLB)	PULL register B (PULLB)
0018$_{16}$	Transmit/receive buffer register 1 (TBRB)	Transmit/receive buffer register (TBRB)
0019$_{16}$	Serial I/O1 status register (SIO1STS)	Serial I/O1 status register (SIO1STS)
001A$_{16}$	Serial I/O1 control register (SIO1CON)	Serial I/O1 control register (SIO1CON)
001B$_{16}$	UART control register (UARTCON)	UART control register (UARTCON)
001C$_{16}$	Baud rate generator (BRG)	Baud rate generator (BRG)
001D$_{16}$	Serial I/O2 control register (SIO2CON)	Serial I/O2 control register (SIO2CON)
001E$_{16}$	Reserved area (Access disabled)	Reserved area (Access disabled)
001F$_{16}$	Serial I/O2 register (SIO2)	Serial I/O2 register (SIO2)

NOTES:
Do not access memory in free space of S

	3826A Group	7560A Group
0020₁₆	Timer X low-order register (TXL)	Timer X low-order register (TXL)
0021₁₆	Timer X high-order register (TXH)	Timer X high-order register (TXH)
0022₁₆	Timer Y low-order register (TYL)	Timer Y low-order register (TYL)
0023₁₆	Timer Y high-order register (TYH)	Timer Y high-order register (TYH)
0024₁₆	Timer 1 register (T1)	Timer 1 register (T1)
0025₁₆	Timer 2 register (T2)	Timer 2 register (T2)
0026₁₆	Timer 3 register (T3)	Timer 3 register (T3)
0027₁₆	Timer X mode register (TXM)	Timer X mode register (TXM)
0028₁₆	Timer Y mode register (TYM)	Timer Y mode register (TYM)
0029₁₆	Timer 123 mode register (T123M)	Timer 123 mode register (T123M)
002A₁₆	TOUT/ϕ output control register (CKOUT)	TOUT/ϕ output control register (CKOUT)
002B₁₆	PWM control register (PWMCON)	PWM control register (PWMCON)
002C₁₆	PWM prescaler (PREPWM)	PWM prescaler (PREPWM)
002D₁₆	PWM register (PWM)	PWM register (PWM)
002E₁₆	CTSCSS timer (low) (CTCSSL)	Reserved area (Access disabled)
002F₁₆	CTSCSS timer (high) (CTCSSH)	Reserved area (Access disabled)
0030₁₆	DTMF high group timer (DTMFH)	Reserved area (Access disabled)
0031₁₆	DTMF low group timer (DTMFL)	Reserved area (Access disabled)
0032₁₆	DA1 conversion register (DA1)	DA1 conversion register (DA1)
0033₁₆	DA2 conversion register (DA2)	DA2 conversion register (DA2)
0034₁₆	AD control register (ADCON)	AD control register (ADCON)
0035₁₆	AD conversion high-order register (ADH)	AD conversion high-order register (ADH)
0036₁₆	DA control register (DACON)	DA control register (DACON)
0037₁₆	Watchdog timer control register (WDTCON)	Watchdog timer control register (WDTCON)
0038₁₆	Segment output enable register (SEG)	Segment output enable register (SEG)
0039₁₆	LCD mode register (LM)	LCD mode register (LM)
003A₁₆	Interrupt edge selection register (INTEDGE)	Interrupt edge selection register (INTEDGE)
003B₁₆	CPU mode register (CPUM)	CPU mode register (CPUM)
003C₁₆	Interrupt request register1 (IREQ1)	Interrupt request register1 (IREQ1)
003D₁₆	Interrupt request register2 (IREQ2)	Interrupt request register2 (IREQ2)
003E₁₆	Interrupt control register1 (ICON1)	Interrupt control register1 (ICON1)
003F₁₆	Interrupt control register2 (ICON2)	Interrupt control register2 (ICON2)

NOTES:
Do not access memory in free space of SFR.
: Difference

6. DA Converter

The 3826A Group and 7560A Group have two 8-bit D/A converter.
The 3826 Group has the following functions;

- DTMF (Dual Tone Multi Frequency) function to output the result which generated automatically the waveform of sine wave of two kinds of different frequency, and added two kinds of this sine wave as an analog value.
- CTCSS (Continuous Tone-Controlled Squelch system) function to generate the sine wave of single frequency automatically.

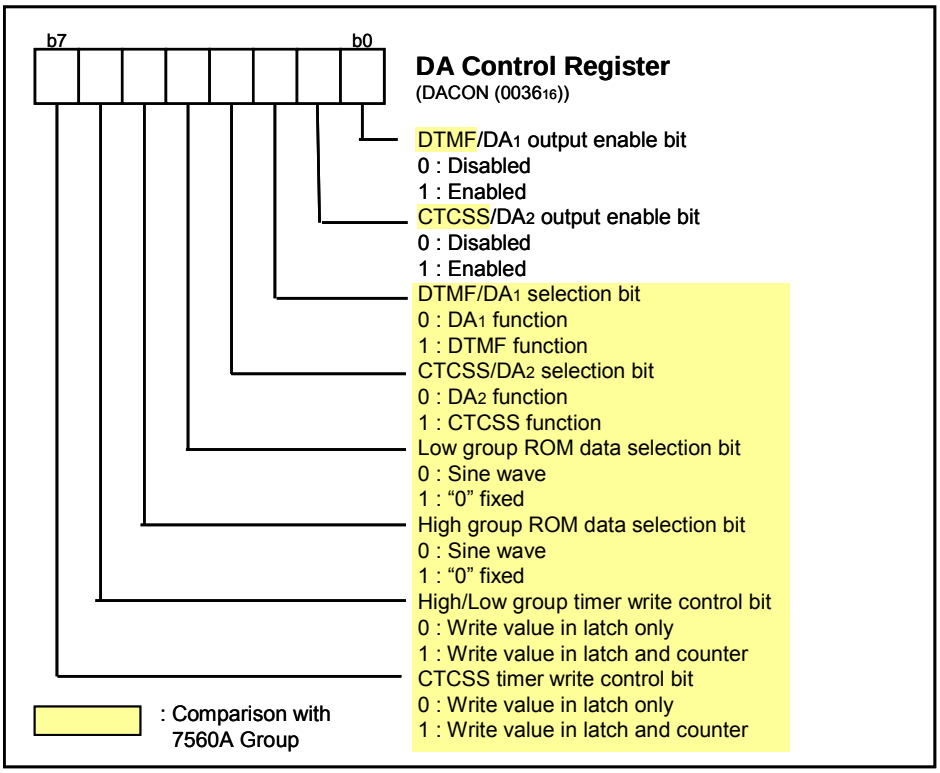

Figure 1. Structure of 3826A Group DA Control Register

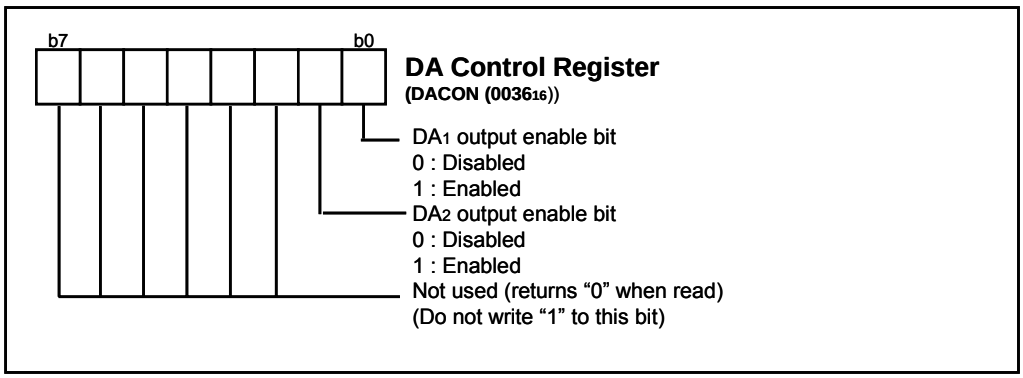

Figure 2. Structure of 7560A Group DA Control Register

• Note on applied voltage to VREF pin

When P56/DA1 pin and P57/DA2 pin are used as D/A conversion output pins, be sure to apply Vcc level to VREF pin. Likewise, when these pins are used as D/A conversion output pins, the Vcc level is recommended for the applied voltage to VREF pin.

When the voltage below Vcc level is applied, the D/A conversion accuracy may be worse.

7. Electrical Characteristics

Symbol	Parameter	Test conditions	3826AEF		38268MCA 3826AMFA		37560M8A 37560MFA		37560EF		Unit
			Typ.	Max.	Typ.	Max.	Typ.	Max.	Typ.	Max.	
Icc	Power source current	High-speed mode, Vcc = 5 V f(XIN) = 10 MHz f(XCIN) = 32.768 kHz Output transistors “off” A/D converter in operating	–	–	5.5	11.0	4.5	9.0	–	–	mA
		High-speed mode, Vcc = 5 V f(XIN) = 8 MHz f(XCIN) = 32.768 kHz Output transistors “off” A/D converter in operating	6.4	13	4.5	9.0	4.0	8.0	6.4	13	mA
		High-speed mode, Vcc = 5 V f(XIN) = 8 MHz (in WIT state) f(XCIN) = 32.768 kHz Output transistors “off” A/D converter stop	1.6	3.2	1.2	2.4	0.9	1.8	1.6	3.2	mA
		Low-speed mode, Vcc = 5 V, Ta ≦ 55°C f(XIN) = stopped f(XCIN) = 32.768 kHz Output transistors “off”	35	70	15	30	15	30	35	70	µA
		Low-speed mode, Vcc = 5 V, Ta = 25°C f(XIN) = stopped f(XCIN) = 32.768 kHz (in WIT state) Output transistors “off”	20	40	7	14	7	14	20	40	µA
		Low-speed mode, Vcc = 3 V, Ta ≦ 55°C f(XIN) = stopped f(XCIN) = 32.768 kHz Output transistors “off”	15	22	9	18	9	18	15	22	µA
		Low-speed mode, Vcc = 3 V, Ta = 25°C f(XIN) = stopped f(XCIN) = 32.768 kHz (in WIT state) Output transistors “off”	4.5	9.0	4.5	9.0	4.5	9.0	4.5	9.0	µA
		In STP state Ta = 25°C f(XIN) = stopped f(XCIN) = stopped Output transistors “off”	0.1	1.0	0.1	1.0	0.1	1.0	0.1	1.0	µA
		In STP state Ta = 55°C f(XIN) = stopped f(XCIN) = stopped Output transistors “off”	–	–	–	–	–	–	–	–	µA
		In STP state Ta = 85°C f(XIN) = stopped f(XCIN) = stopped Output transistors “off”	–	10	–	10	–	10	–	10	µA

8. Reference

Data Sheet

3826 Group (A version) Datasheet

3826 Group (One time PROM version) Datasheet

7560 Group (A version) Datasheet

7560 Group Datasheet

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REVISION HISTORY	Difference between 3826A Group and 7560A Group

Rev.	Date	Description	
		Page	Summary
1.00	2006.03.15	-	First Edition issued
1.01	2006.05.18	4	Color of A/D conversion register (low-order) (ADL) (address 001416) eliminated
		5	Color of A/D conversion register (high-order) (ADH) (address 003516) eliminated

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