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April 1st, 2010
Renesas Electronics Corporation

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M16C/80 Group

Operation of D-A Converter

1.0 Abstract

Operations of the D-A converter are described bellow.

2.0 Introduction

Operation (1) Writing a value to D-A register i.

(2) Setting the D-Ai output enable bit to "1" outputs an analog signal on the DAi pin.

(3) Setting "0" to the D-Ai output enable bit, the status of DAi pin becomes high-inpedance.

Note • To use the D-A converter, set the corresponding function select register A to I/O port and direction register to input.

3.0 Set-up procedure

Setting Port direction register

Port P9 direction register [Address 03C7₁₆] PD9 (Note1)

Port P93 direction register
0 : Input mode

Port P94 direction register
0 : Input mode

Note 1 : Set bit 2 of the protect register (address 000A₁₆) to "1" before rewriting to this register.



Setting function select register

Function select register B3 [Address 03B7₁₆] PSL3

Port P93 peripheral function
1 : Input peripheral function disabled (DA0 output)

Port P94 peripheral function
1 : Input peripheral function disabled (DA1 output)

Function select register A3 [Address 03B5₁₆] PS3 (Note1)

Port P93 function select bit
0 : I/O port

Port P94 function select bit
0 : I/O port

Note 1 : Set bit 2 of the protect register (address 000A₁₆) to "1" before rewriting to this register.



Setting D-A register

D-A register 0 [Address 0398₁₆] DA0
D-A register 1 [Address 039A₁₆] DA1

Output value of D-A conversion



Setting D-A control register

D-A Control register [Address 039C₁₆] DACON

D-A0 output enable bit
1 : Output enabled

D-A1 output enable bit
1 : Output enabled

4.0 Programming Code

```

;*****
;
; M16C/80 Program Collection
;
; FILE NAME : rjj05b0483_src.a30
; CPU       : M16C/80 Group
; FUNCTION  : Operation of D-A Converter
; HISTORY   : 2004.02.15 Ver 1.00
;
; Copyright(C)2003, Renesas Technology Corp.
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;
;*****
;*****
; Include
;*****
; .LIST      OFF          ;Stops outputting lines to the assembler list file
; .INCLUDE   sfr80100.inc ;Reads the file that defined SFR
; .LIST      ON           ;Starts outputting lines to the assembler list file
;
;*****
; Symbol definition
;*****
RAM_TOP      .EQU    000400H ;Start address of RAM
RAM_END      .EQU    002BFFH ;End address of RAM
ROM_TOP      .EQU    0FFC000H ;Start address of ROM
FIXED_VECT_TOP .EQU  0FFFFDCH ;Start address of fixed vector
;
;*****
; Program area
;*****
;=====
; Start up
;=====
; .SECTION   PROGRAM, CODE ;Declares section name and section type
; .ORG      ROM_TOP        ;Declares start address
RESET:
LDC    #RAM_END+1, ISP ;Sets initial value in stack pointer
; Sets Processor mode, System clock and Main clock division
MOV.B  #03H, prcr      ;Removes protect
MOV.B  #10000000B, pm0 ; Single-chip mode
MOV.B  #11000000B, pm1 ; Flash memory version
MOV.B  #00001000B, cm0 ; Xcin-Xcout High
MOV.B  #00100000B, cm1 ; Xin-Xout High
MOV.B  #00010010B, mcd ; No division mode
MOV.B  #00H, prcr      ;Protects all registers
;

```

```

=====
;
;   D-A Converter
=====
;
;   To use the D-A converter,
;   set the corresponding function select register A to I/O port and
;   direction register to input.
;
;   Setting Port direction register
MOV.B  #00000100B, prcr ;Clearing the protect (set to write-enabled state)
BCLR   pd9_3          ;Input mode
;   Setting function select register
BSET   psl3_3         ;Input peripheral function disabled (DA0 output)
MOV.B  #00000100B, prcr
BCLR   ps3_3          ;DA0(P93) is I/O port
;   Setting D-A register
MOV.B  #0AAH, da0     ;(Output value of D-A conversion)
;   Setting D-A control register
MOV.B  #00000001B, dacon
;
;           |+-----;D-A0 output enable bit (1:Output enabled)
;           +-----;D-A1 output enable bit (0:Output disabled)
;
MAIN:
      JMP      MAIN
;
=====
;   Dummy interrupt processing program
=====
dummy:
      REIT
;
;*****
;   Setting of fixed vector
;*****
      .SECTION   F_VECT, ROMDATA
      .ORG      FIXED_VECT_TOP
;
      .LWORD    dummy ;Undefined instruction
      .LWORD    dummy ;Overflow
      .LWORD    dummy ;BRK instruction execution
      .LWORD    dummy ;Address match
      .LWORD    dummy ;
      .LWORD    dummy ;Watchdog timer
      .LWORD    dummy ;
      .LWORD    dummy ;NMI
      .LWORD    RESET ;Reset
;
      .END

```

5.0 Reference

Renesas Technology Corporation Semiconductor Home page

<http://www.renesas.com/>

Technical Support

E-mail: support_apl@renesas.com

Data Sheet

M16C/80 group Rev. E3

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