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April 1st, 2010
Renesas Electronics Corporation

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M32C/84, 85, 86, 87, 88 Group

DMA Setup Procedure When Using ASM Function

1. Abstract

The document describes how to set up DMA (DMA0 to DMA3) using the ASM function.

2. Introduction

The application example described in this document is applied to the following MCUs and parameter(s):

MCUs: M32C/84 Group
M32C/85 Group
M32C/86 Group
M32C/87 Group
M32C/88 Group

This program can be used with other M16C Family MCUs which have the same special function registers (SFRs) as the above MCUs. Check the manual for any additions and modifications to functions. Careful evaluation is recommended before using this application note.

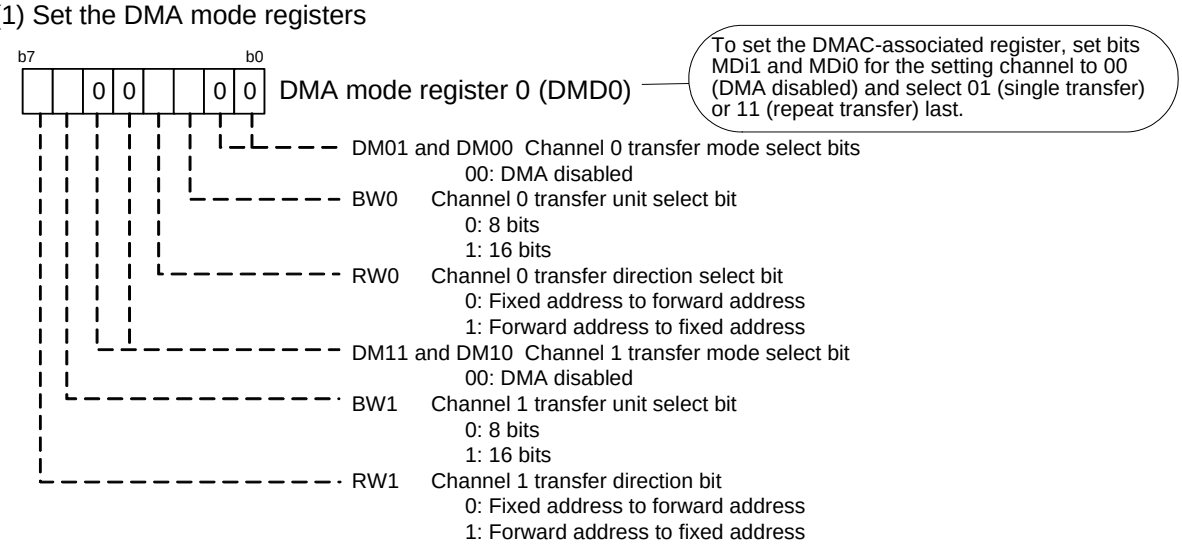
3. Application Example

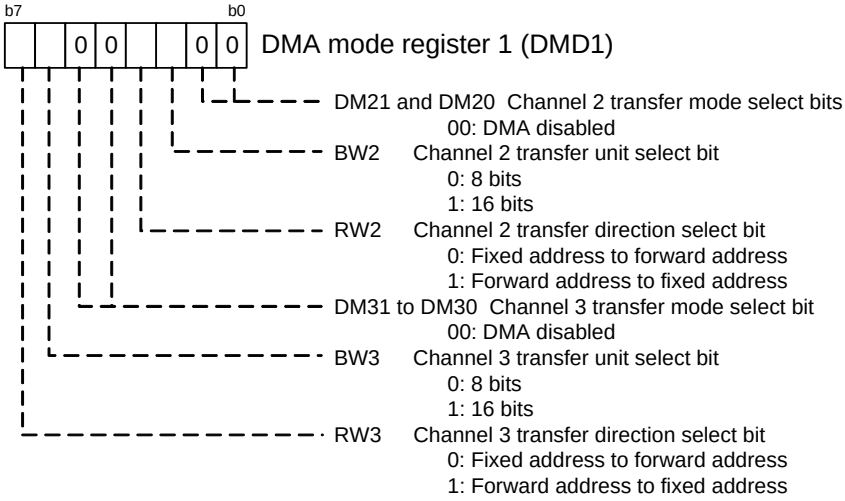
In the M32C/84, 85, 86, 87, 88 Group, some of the DMAC-associated registers are allocated to the internal CPU registers. Set up DMAC using the ASM function (inline assemble description) by the C compiler (M3T-NC308WA) for the M32C/90, 80, and M16C/80 Series.

3.1 Setup

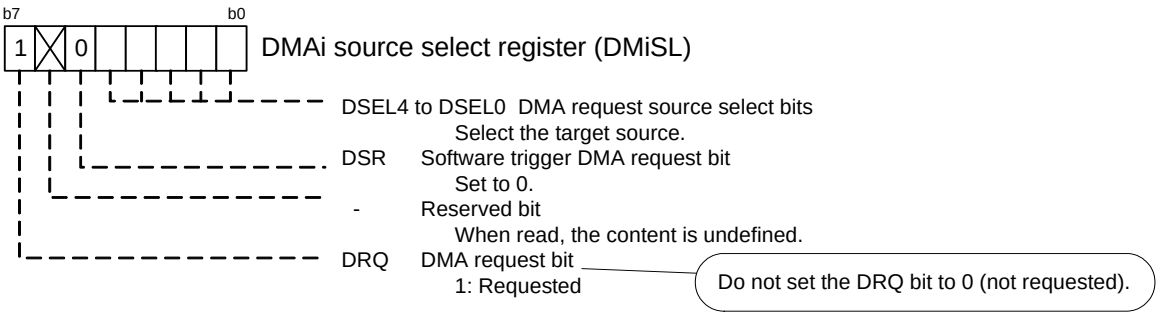
This section shows how to set up DMA as the following sequence in **3. Application Example**.
Refer to the MCUs Hardware Manual for details of individual registers.

(1) Set the DMA mode registers

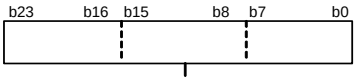




(2) Set the DMAi source select register



(3) Set the DMAi memory address register

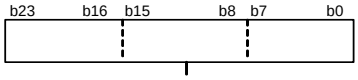


DMAi memory address register (DMAi)

Set a source or destination forward address

To set the DMA2 register, set the B flag in the FLG register to 1 (register bank 1) and then set the A0 register.
To set the DMA3 register, set the B flag to 1 and then set the A1 register likewise.
Use the MOV instruction to set registers A0 and A1.

(4) Set the DMAiSFR address register

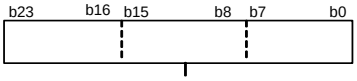


DMAiSFR address register (DSAi)

Set a source or destination fixed address

To set the DSA2 register, set the B flag in the FLG register to 1 (register bank 1) and then set the A0 register.
To set the DSA3 register, set the B flag to 1 and then set the FB register likewise.
Use the MOV instruction to set registers SB and FB.

(5) Set the DMAi memory reload register

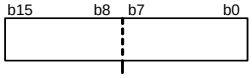


DMAi memory reload register (DRAi)

Set a source or destination forward address

To set the DRA2 register, set the SVP register.
To set the DRA3 register, set the VCT register.
Use the LDC instruction to set registers SVP and VCT.

(6) Set the DMAi transfer count register

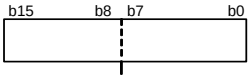


DMAi transfer count register (DCTi)

Set the number of transfers

To set the DCT2 register, set the B flag in the FLG register to 1 and then set the R0 register.
To set the DCT3 register, set the B flag to 1 and then set the R1 register likewise.
Use the MOV instruction to set registers R0 and R1.

(7) Set the DMAi transfer count reload register



DMAi transfer count reload register (DRCi)

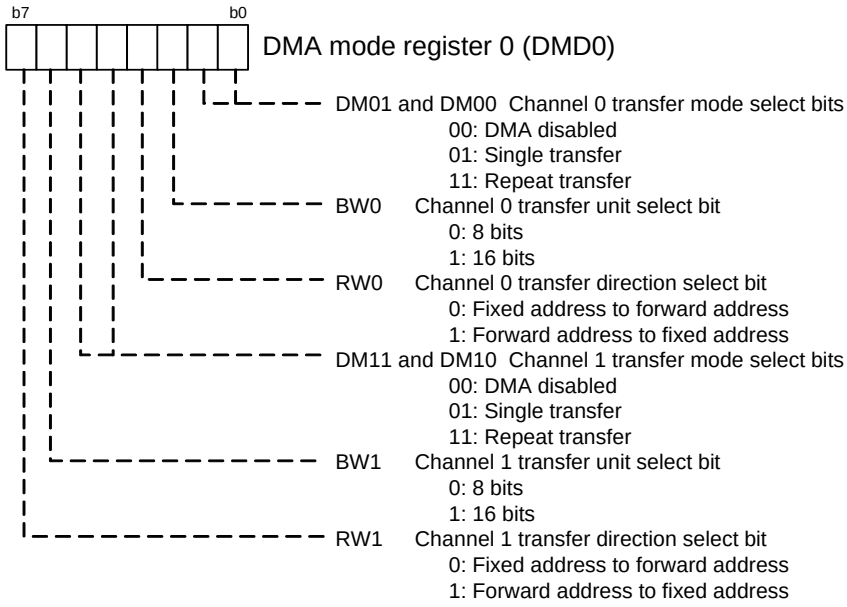
Set a reload value for the number of transfers

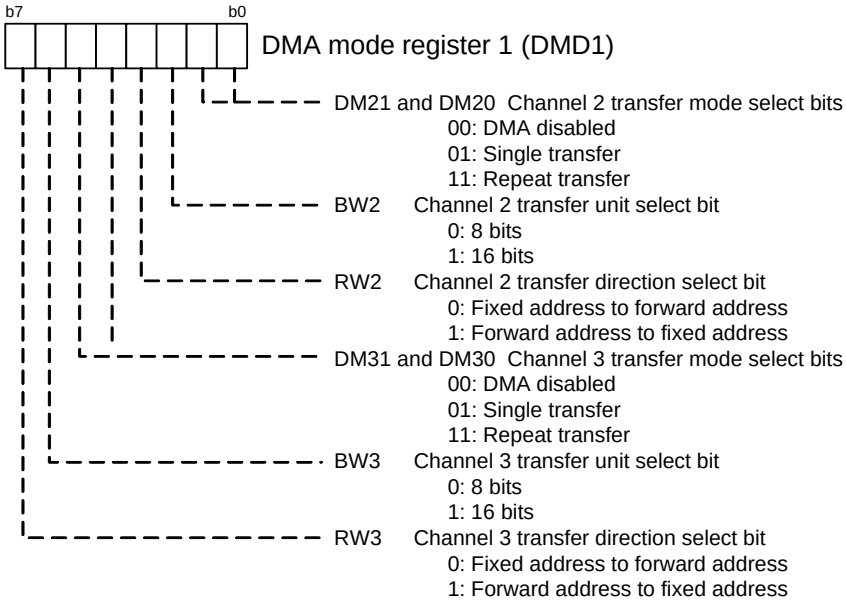
To set the DRC2 register, set the B flag in the FLG register to 1 and then set the R2 register.
To set the DRC3 register, set the B flag to 1 and then set the R3 register likewise.
Use the MOV instruction to set registers R2 and R3.

(8) Insert a dummy cycle.

Enable DMA after setting the DMiSL register (i = 0 to 3) and waiting six or more BCLK cycles by a program.

(9) Set the DMA mode registers





(10) Start the peripheral function to set the DMA0 request source.

NOTES:

When using DMA2 and DMA3,
- Register bank 1 cannot be used.
- High-speed interrupts cannot be used.

4. Sample Programming Code

A sample program can be downloaded from the Renesas Technology website.
For download, click “Application Notes” in the left-hand side menu of the M16C Family page.

5. Reference Documents

Hardware Manuals
M32C/84 Group Hardware Manual
M32C/85 Group Hardware Manual
M32C/86 Group Hardware Manual
M32C/87 Group Hardware Manual
M32C/88 Group Hardware Manual
The latest version can be downloaded from the Renesas Technology website.

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