

R32C/100 Series

A/D Converter Operation (Multi-port Repeat Sweep Mode 0)

REJ05B1411-0100

Rev.1.00

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1. Abstract

This document describes how to use the multi-port repeat sweep mode 0.

In multi-port repeat sweep mode 0, the analog voltage applied to the following 16 pins is A/D converted:

- Eight pins of port P10 (AN_0 to AN_7)
- One port (eight pins) from port P0 (AN0_0 to AN0_7), port P2 (AN2_0 to AN2_7), or port P15 (AN15_0 to AN15_7). ⁽¹⁾

Note:

1. Available in the 144-pin package

2. Introduction

The application example described in this document applies to the following microcomputers (MCUs):

MCUs: R32C/118 Group, R32C/117 Group, and R32C/116 Group

This program can be used with other R32C/100 Series MCUs which have the same special function registers (SFRs) as the above groups. Check the manuals for any modifications to functions. Careful evaluation is recommended before using the program described in this application note.

3. Application Example

The following settings show how to perform repeated A/D conversion on the input voltage of each pin from AN_0 to AN_7 and AN0_0 to AN0_7.

- Operation clock ϕ_{AD} ⁽¹⁾: f_{AD} divided by 2
- Resolution: 10-bit precision
- A/D conversion start condition: software trigger
- A/D conversion method: with sample and hold function
- DMAC operating mode: enabled
- DMAC addressing mode: non-incrementing addressing → incrementing addressing
- A/D sweep pin: AN_0 to AN_7, AN0_0 to AN0_7

Note:

1. The ϕ_{AD} frequency should be as follows:
When VCC = 4.2 to 5.5 V, 16 MHz or below,
When VCC = 3.0 to 5.5 V, 10 MHz or below
Without the sample and hold function; 250 kHz or above
With the sample and hold function; 1 MHz or above.

3.1 Explanation

In multi-port repeat sweep mode 0, the A/D conversion result of each analog input pin is stored to the AD00 register by setting the DSU bit in the AD0CON3 register to 1 (DMAC operating mode enabled).

The DMAC transfers the conversion result to a given memory space by selecting the A/D conversion interrupt request as the DMAC request source, fixed addressing as the source address, incrementing addressing as the destination address, setting the transfer size to 16 bits and setting repeat transfer. Figure 3.1 shows an Operation Example in Multi-port Repeat Sweep Mode 0. The updated A/D conversion result of each pin is overwritten and stored into a given RAM.

Note: The AD00 register should not be read.

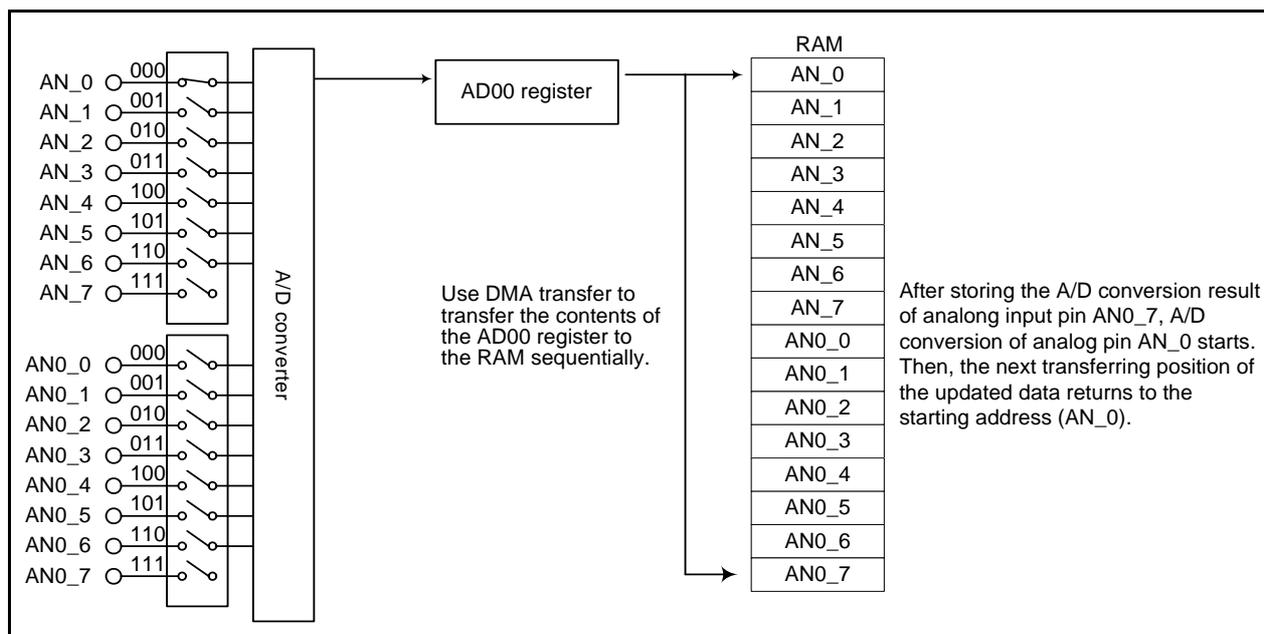


Figure 3.1 Operation Example in Multi-port Repeat Sweep Mode 0

3.2 Settings

This section shows the setting procedure and setting values to execute 3.1 “Explanation”. Refer to hardware user’s manuals for details of each register.

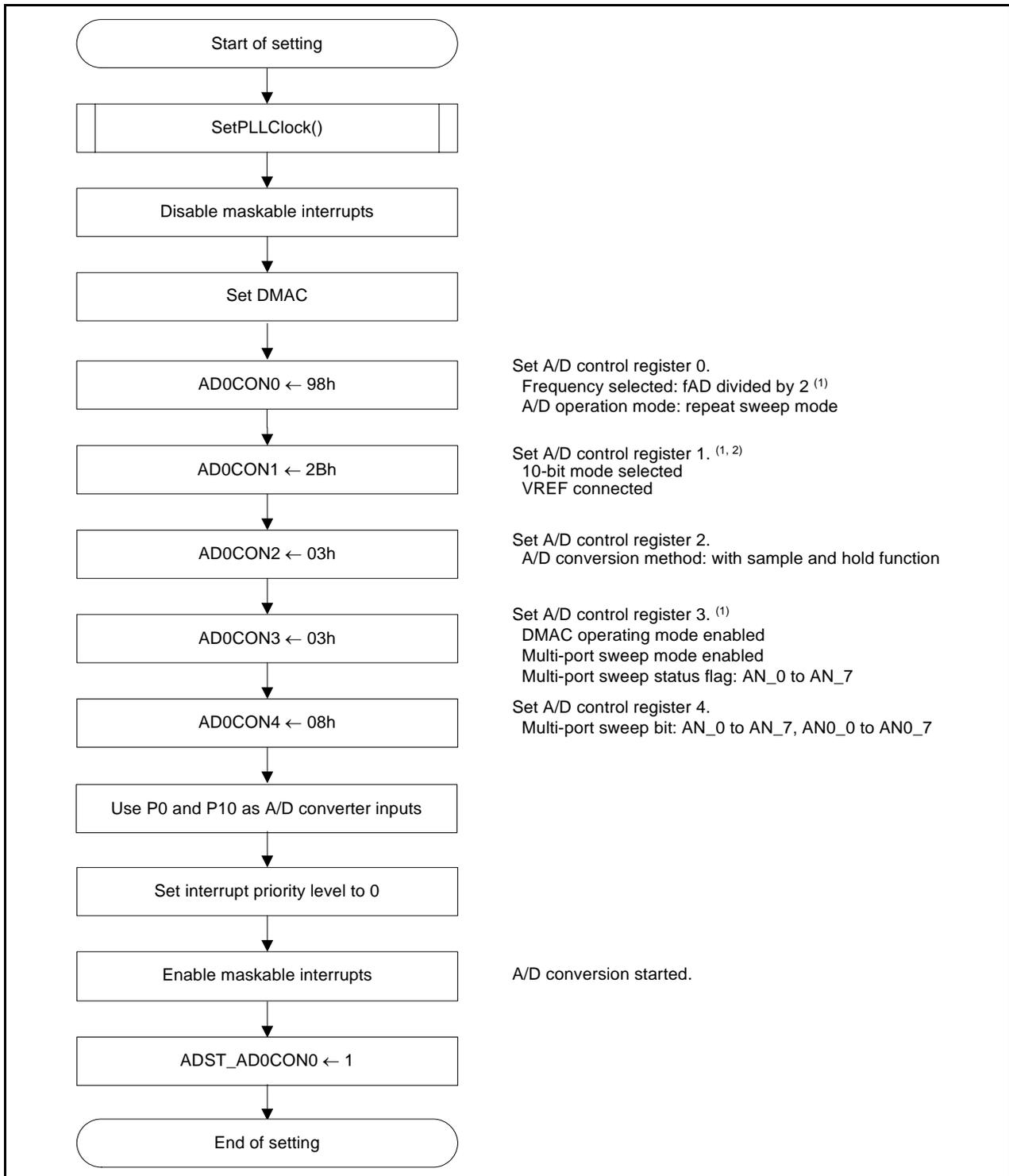


Figure 3.2 Setting Procedure of Multi-port Repeat Sweep Mode 0 (1/2)

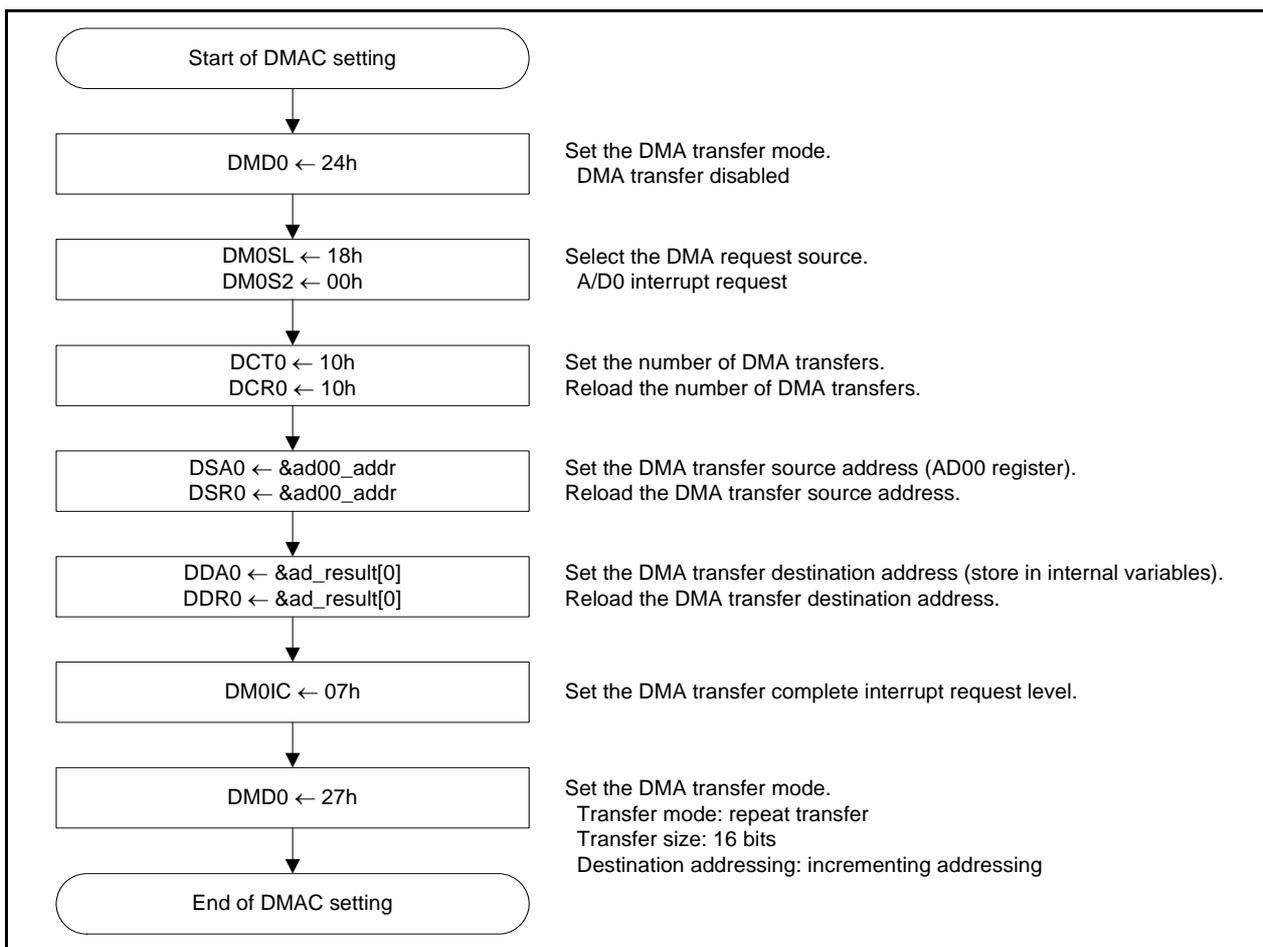


Figure 3.3 Setting Procedure of Multi-port Repeat Sweep Mode 0 (2/2)

4. Sample Program

A sample program can be downloaded from the Renesas Electronics website.

5. Reference Documents

User's Manuals

R32C/118 Group User's Manual: Hardware Rev.1.00

R32C/117 Group User's Manual: Hardware Rev.1.00

R32C/116 Group User's Manual: Hardware Rev.1.00

The latest versions can be downloaded from the Renesas Electronics website.

Technical Update/Technical News

The latest information can be downloaded from the Renesas Electronics website.

C Compiler Manual

R32C/100 Series C Compiler Package V.1.02 C Compiler User's Manual Rev.2.00

The latest version can be downloaded from the Renesas Electronics website.

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REVISION HISTORY	R32C/100 Series A/D Converter Operation (Multi-port Repeat Sweep Mode 0)
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		Page	Summary
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General Precautions in the Handling of MPU/MCU Products

The following usage notes are applicable to all MPU/MCU products from Renesas. For detailed usage notes on the products covered by this manual, refer to the relevant sections of the manual. If the descriptions under General Precautions in the Handling of MPU/MCU Products and in the body of the manual differ from each other, the description in the body of the manual takes precedence.

1. Handling of Unused Pins

Handle unused pins in accord with the directions given under Handling of Unused Pins in the manual.

- The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible. Unused pins should be handled as described under Handling of Unused Pins in the manual.

2. Processing at Power-on

The state of the product is undefined at the moment when power is supplied.

- The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the moment when power is supplied.

In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the moment when power is supplied until the reset process is completed.

In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the moment when power is supplied until the power reaches the level at which resetting has been specified.

3. Prohibition of Access to Reserved Addresses

Access to reserved addresses is prohibited.

- The reserved addresses are provided for the possible future expansion of functions. Do not access these addresses; the correct operation of LSI is not guaranteed if they are accessed.

4. Clock Signals

After applying a reset, only release the reset line after the operating clock signal has become stable. When switching the clock signal during program execution, wait until the target clock signal has stabilized.

- When the clock signal is generated with an external resonator (or from an external oscillator) during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Moreover, when switching to a clock signal produced with an external resonator (or by an external oscillator) while program execution is in progress, wait until the target clock signal is stable.

5. Differences between Products

Before changing from one product to another, i.e. to one with a different part number, confirm that the change will not lead to problems.

- The characteristics of MPU/MCU in the same group but having different part numbers may differ because of the differences in internal memory capacity and layout pattern. When changing to products of different part numbers, implement a system-evaluation test for each of the products.

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