R32C/100 Series

A/D Converter Operation (Repeat Sweep Mode 0)

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1. Abstract

This document describes how to use repeat sweep mode 0. In repeat sweep mode 0, repeated A/D conversion is performed on the input voltage of pins selected from the following: AN_0 to AN_7, AN0_0 to AN0_7, AN2_0 to AN2_7 and AN15_0 to AN15_7.

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

This application example describes how to perform repeated A/D conversion in repeat sweep mode 0 on the input voltage of pins AN_0 to AN_7.

- Operation clock ϕAD: fAD 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: disabled

3.1 Explanation

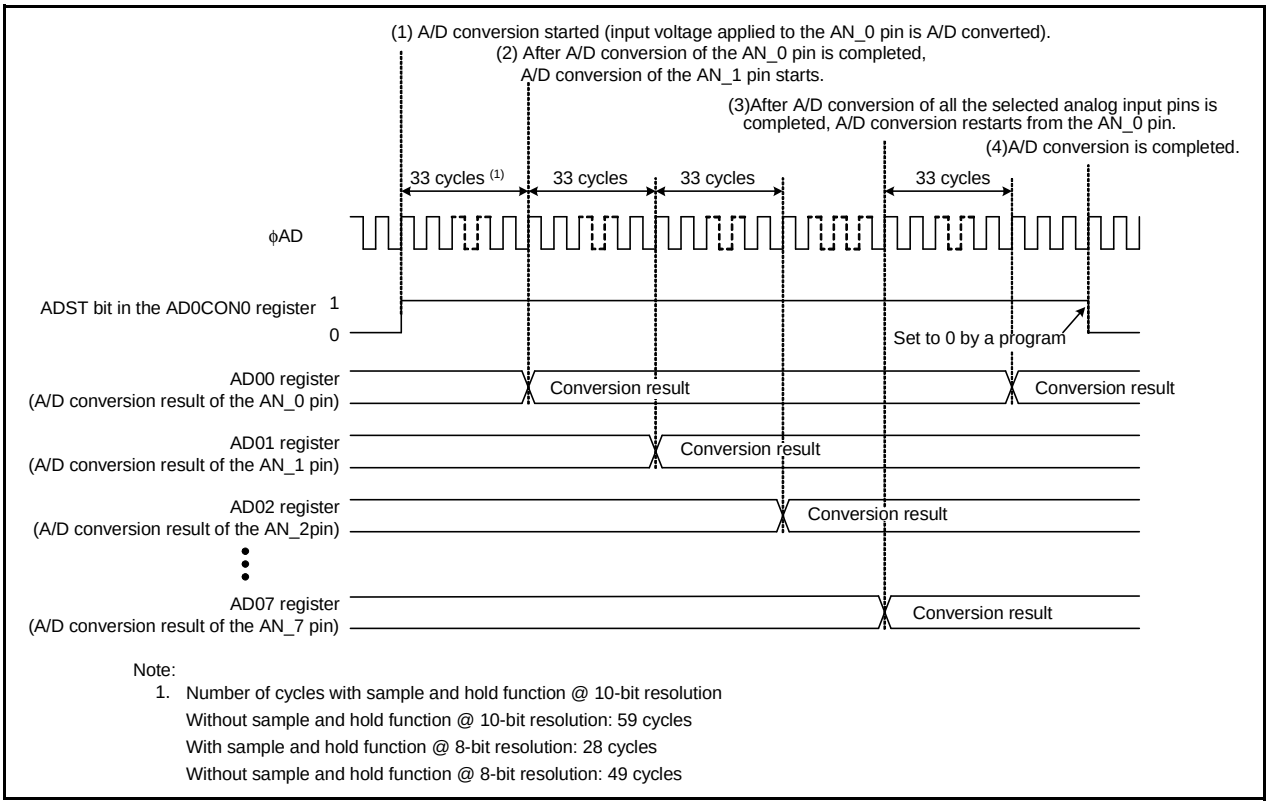
(1) When setting the ADST bit in the AD0CON0 register to 1 (A/D conversion started), the input voltage applied to the AN_0 pin is A/D converted.

(2) After the A/D conversion is completed on the AN_0 pin, the conversion result (the contents of the successive conversion register) is transferred to the AD00 register. Then, the input voltage applied to the selected analog input pins (AN_1 to AN_7) is successively A/D converted. The conversion result is transferred to the corresponding AD0i register each time A/D conversion is completed on the selected pin (i = 0 to 7).

(3) After A/D conversion is completed on all selected analog input pins, the A/D converter successively restarts from the AN_0 pin. The IR bit in the AD0IC register does not become 1 (interrupt requested).

(4) The A/D converter does not stop operating until the ADST bit is set to 0 (A/D convention stopped) by a program.

Figure 3.1 shows an Operation Example in Repeat Sweep Mode 0.

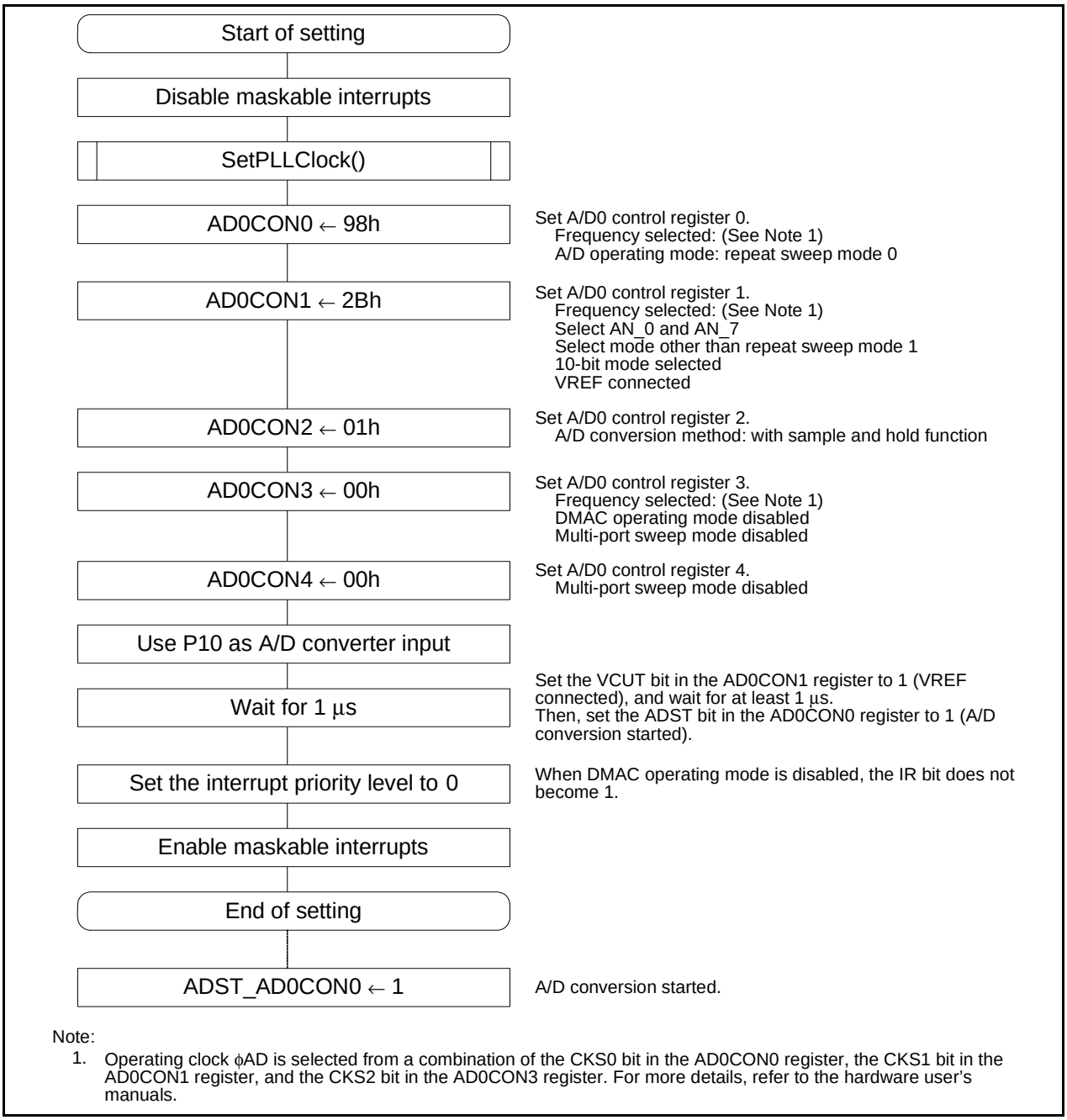


Note:
1. Number of cycles with sample and hold function @ 10-bit resolution
Without sample and hold function @ 10-bit resolution: 59 cycles
With sample and hold function @ 8-bit resolution: 28 cycles
Without sample and hold function @ 8-bit resolution: 49 cycles

Figure 3.1 Operation Example in Repeat Sweep Mode 0

3.2 Settings

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



Note:
1. Operating clock ϕAD is selected from a combination of the CKS0 bit in the AD0CON0 register, the CKS1 bit in the AD0CON1 register, and the CKS2 bit in the AD0CON3 register. For more details, refer to the hardware user’s manuals.

Figure 3.2 Setting Procedure of Repeat Sweep Mode 0

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 (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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