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Renesas Electronics Corporation

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## R8C/2D Group

### A/D Converter in Single Sweep Mode

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#### 1. Abstract

This document describes a program for the A/D converter in single sweep mode.

#### 2. Introduction

The application example described in this document applies to the following MCU and parameter(s):

- MCU : R8C/2D Group

This program can be used with other R8C/Tiny Series MCUs which have the same special function registers (SFRs) as the R8C/2D Group. Check the manual for any additions and modifications to functions. Careful evaluation is recommended before using this application note.

### 3. Application Example Description

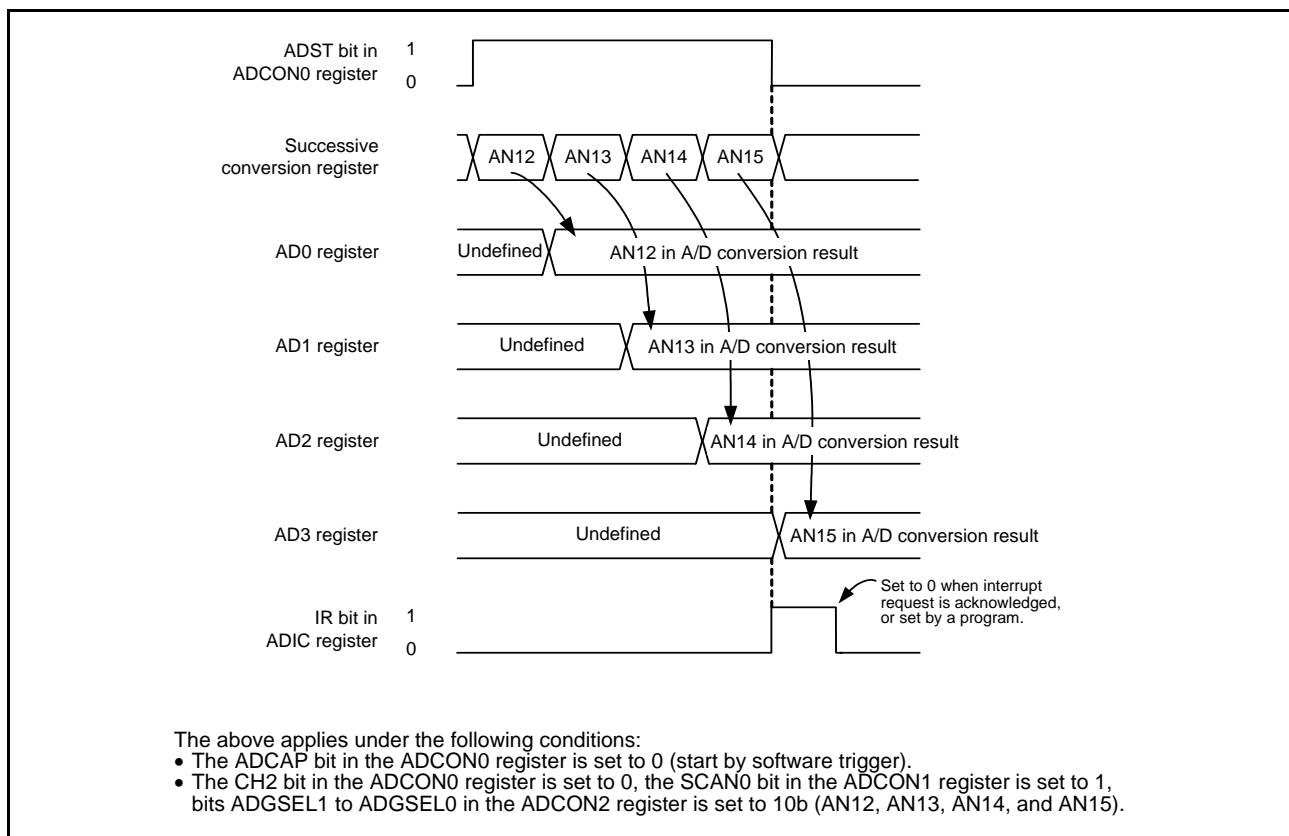
In A/D converter single sweep mode, the input voltage of two or four pins selected from among AN12 to AN19 are A/D converted each time.

This section describes how to A/D convert the input voltage of pins AN12 and AN13 in A/D converter single sweep mode. Other setting conditions are as follows:

- Operating clock : f2
- Resolution : 10 bits
- A/D conversion start condition : Software trigger
- Sample & hold function : Enabled

- (1) Setting the ADST bit in the ADCON0 register to 1 (A/D conversion started) allows the A/D converter to start operating and the input voltage of the AN12 pin is A/D converted.
- (2) After A/D conversion of the AN12 pin is completed, the content of the successive approximation register (conversion result) is transferred to the AD0 register. The conversion result is transferred to the corresponding A/D register i (i = 0 to 3) each time A/D conversion of the selected pin is completed.
- (3) After A/D conversion of the selected analog input pin is completed, the IR bit in the ADIC register is set to 1 (interrupt requested). At the same time, the ADST bit is set to 0 (A/D conversion stopped) and the A/D converter stops operating.

Figure 3.1 shows the Single Sweep Mode Operation.



**Figure 3.1 Single Sweep Mode Operation**

This sample program may include operations of unused bit functions for the SFR bit layout. Set these values according to the operating conditions of the user system.

### 3.1 Pin Usage

Table 3.1 Pin Usage and Functions

Pin	I/O	Function
P7_0/AN12	Input	A/D input 12
P7_1/AN13	Input	A/D input 13

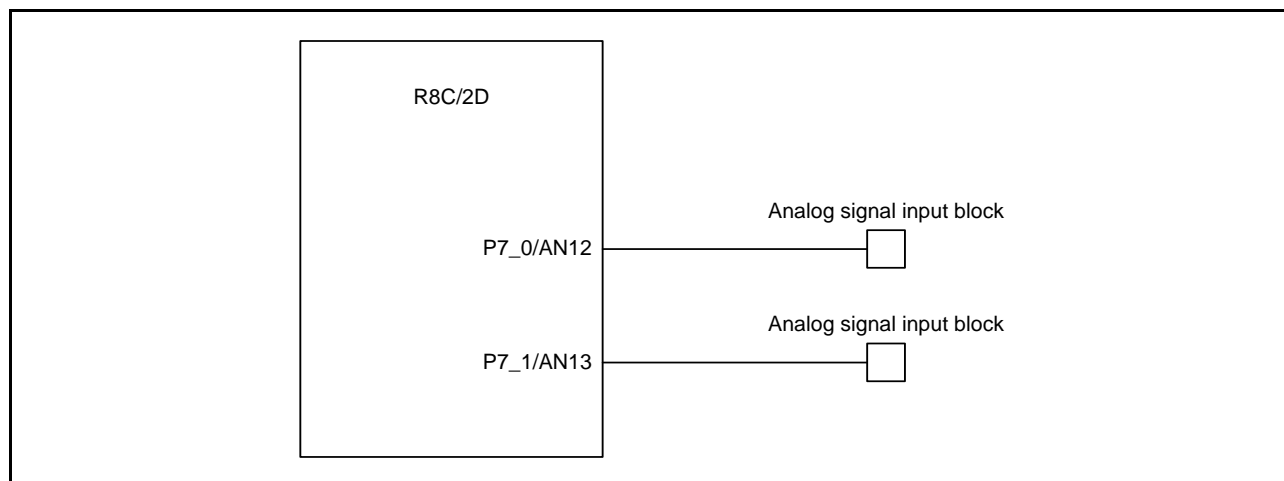


Figure 3.2 Analog Signal Input

### 3.2 Memory Usage

Table 3.2 Memory Usage

Memory Usage	Size	Remark
ROM	70 bytes	In main.c module
RAM	4 bytes	In main.c module
Maximum user stack usage	6 bytes	main function: 6 bytes
Maximum interrupt stack usage	0 bytes	Unused

Memory usage varies depending on the C compiler version and the compile option.

The above applies under the following conditions:

- C compiler: M16C/60, 30, 20, 10, Tiny, R8C/Tiny Series Compiler V.5.40 Release 00
- Compile option: -c -finfo; NOTE: -dir “\$(CONFIGDIR)” -R8C

NOTE: Unavailable in the R8C/Tiny-exclusive free version.

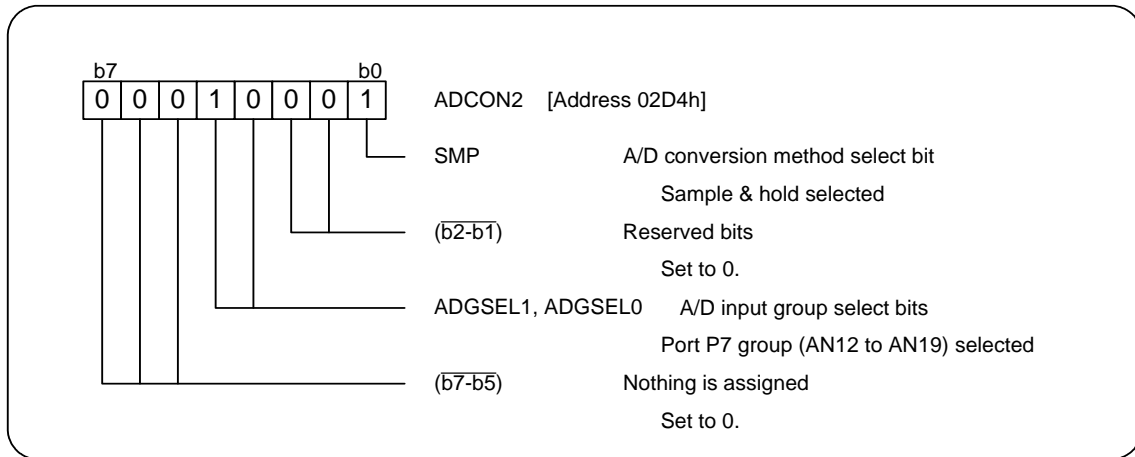
Table 3.3 RAM Usage and Definition

Symbol	Type	Size	Content
ad_data[2]	unsigned short	4 bytes	A/D conversion data

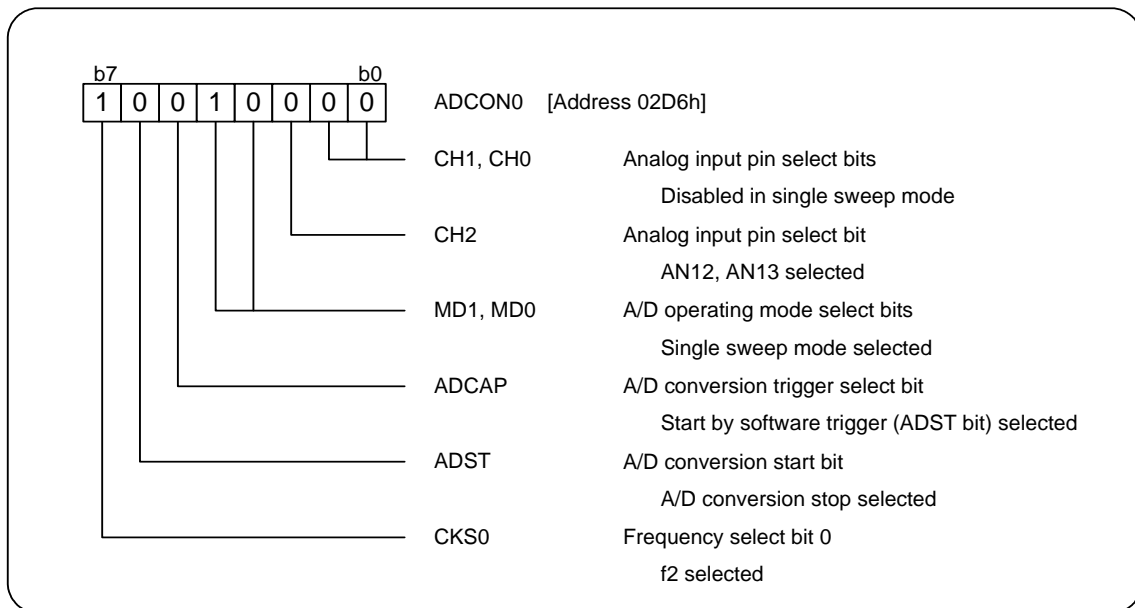
#### 4. Setup

This section shows the initial setting procedures and values to perform the example described in **3. Application Example Description**. Refer to the **R8C/2D Group Hardware Manual** for details on individual registers.

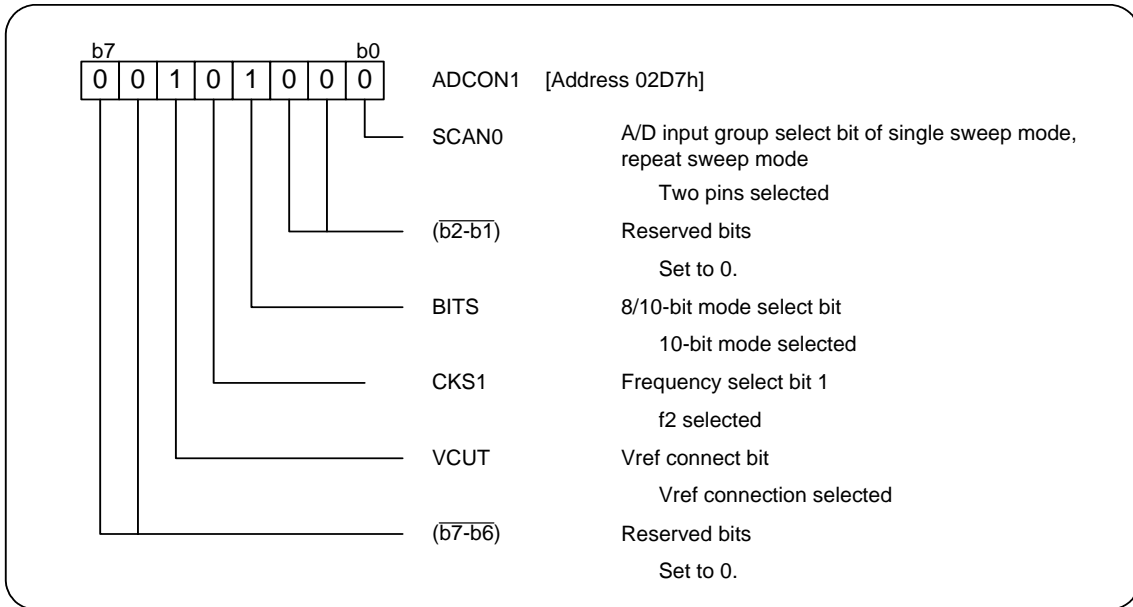
(1) Set A/D control register 2



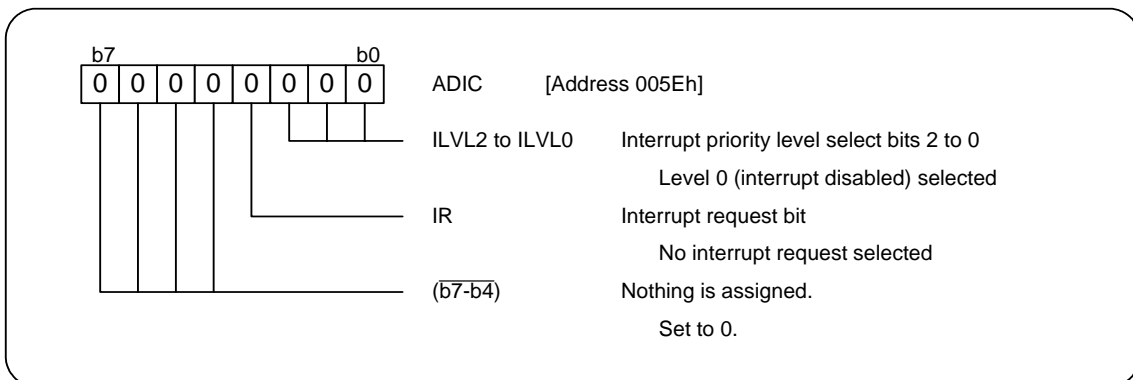
(2) Set A/D control register 0



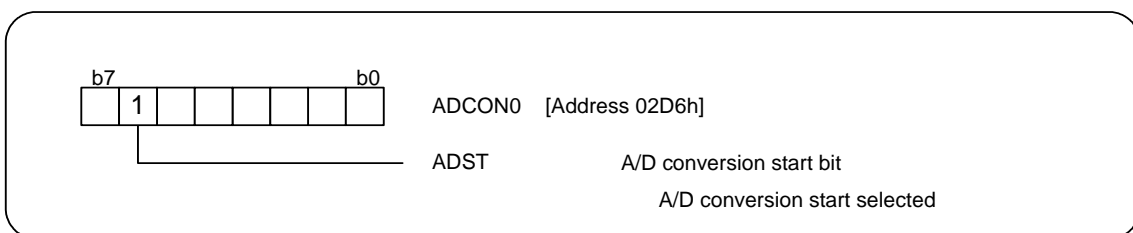
(3) Set A/D control register 1



(4) Set the A/D conversion interrupt control register

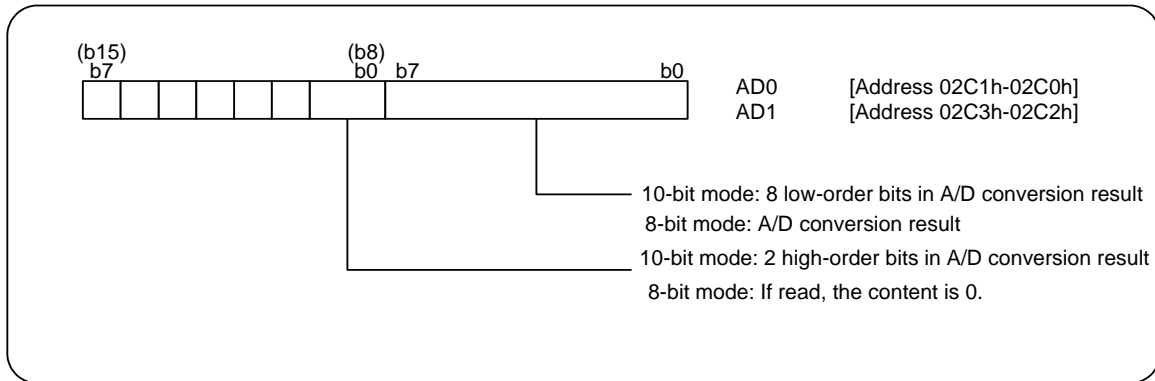


(5) Start A/D conversion (set A/D control register 0)



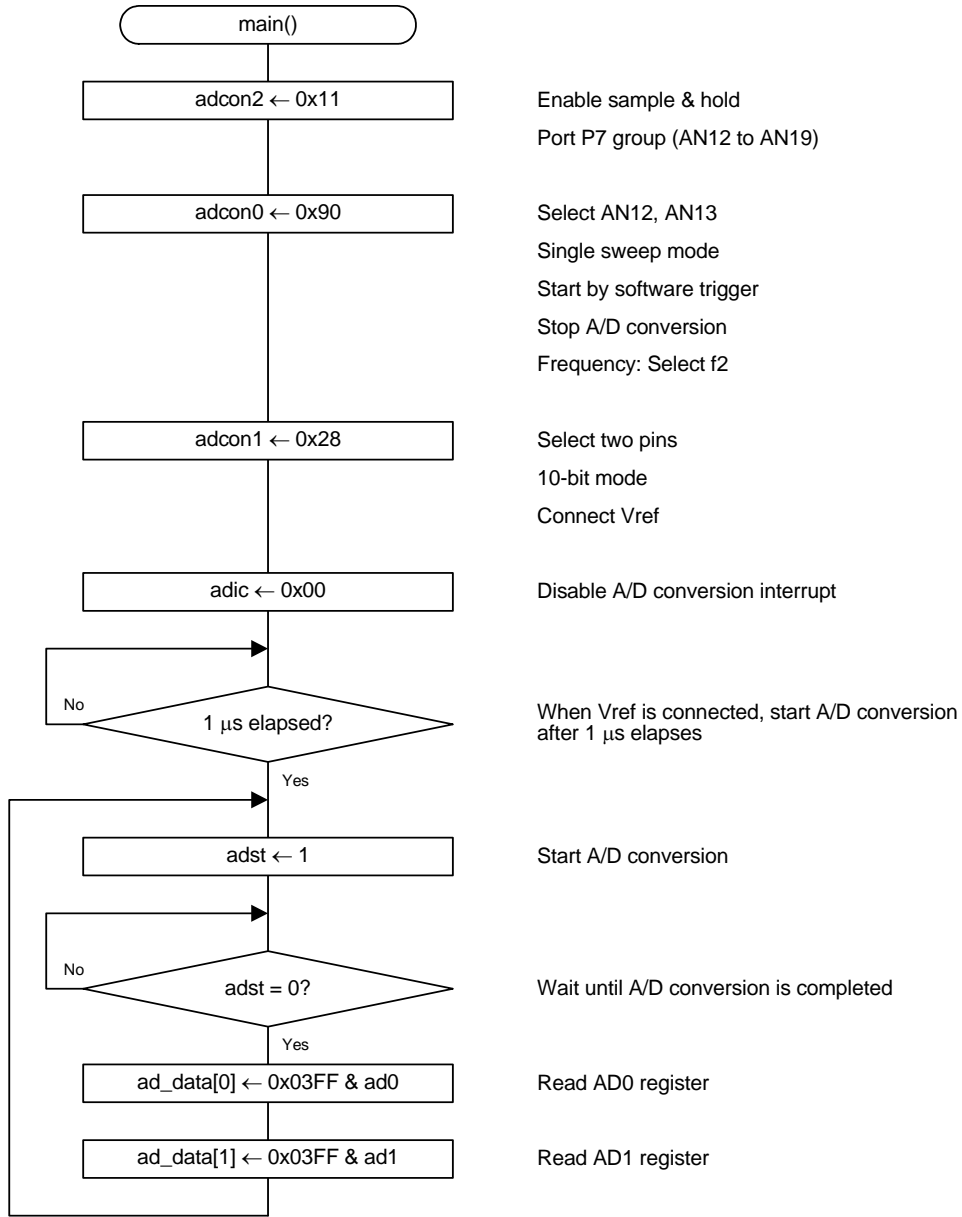
(6) Wait until A/D conversion is completed

(7) Read the A/D conversion results (read registers AD0 and AD1)





5. Flowchart



## 6. Sample Programming Code

A sample program can be downloaded from the Renesas Technology website.  
To download, click “Application Notes” in the left-hand side menu of the R8C/Tiny Series page.

## 7. Reference Documents

Hardware Manual  
R8C/2D Group Hardware Manual  
The latest version can be downloaded from the Renesas Technology website.

Technical Update/Technical News  
The latest information can be downloaded from the Renesas Technology website.

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REVISION HISTORY	R8C/2D Group A/D Converter in Single Sweep Mode
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		Page	Summary
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