

To our customers,

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Renesas Electronics Corporation

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# **78K0R/Kx3 Microcontroller**

## **Sample Program**

### **Operation Manual**

#### **(Consecutive Capturing of A/D Conversion Results (DMA Controller), C Source)**

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This software is for reference only and NEC Electronics does not guarantee its operation.  
Thoroughly evaluate this software on your set prior to use.

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1st Product Solution Group, Multipurpose Microcomputer Systems Division,  
Microcomputer Operations Unit  
NEC Electronics Corporation

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## 1. OVERVIEW

This manual explains the sample program functions of the DMA controller (consecutive capturing of the A/D conversion results) for the 78K0R/Kx3.

In this sample program, a DMA controller (consecutive capturing of the A/D conversion results) operation is performed.

The outline of the processing is as follows.

- Consecutive capturing of the A/D conversion results
- DMA channel 1 is used for DMA transfer.
- DMA start source: INTAD
- Interrupt of A/D is assigned to IFC13 to IFC10 (bits 3 to 0 of the DMC1 register) = 1100B
- Transfers FFF1EH and FFF1FH (2 bytes) of the 10-bit A/D conversion result register (ADCR) to 2,048 bytes of FF380H to FFB7FH of RAM.

In this sample program, A/D converter processing is used, but a description of this processing is omitted. For details, refer to the description of A/D Converter Processing.

## 2. RESOURCES USED

Resource	Description	Remark
Main clock specification	Internal high-speed oscillator used (8 MHz (TYP.))	Always oscillated
	High-speed system clock used (20 MHz)	Oscillated by initial processing. Supplied to CPU and peripheral hardware
Subclock	XT1 (32.768 kHz)	Oscillated by initial processing
Related hardware	DMA SFR address register 1 (DSA1)	DMA SFR address (= FFF1EH)
	DMA RAM address register 1 (DRA1)	DMA RAM address (= FF380H)
	DMA byte count register 1 (DBC1)	Number of times of DMA channel transfer
	DMA mode control register 1 (DMC1)	
	Port mode register 15 (PM15)	
	Port register 15 (P15)	
I/O	Analog input: ANI15 (P157)	
Interrupt	End of DMA1 transfer interrupt (INTDMA1)	
Others	Refer to A/D Converter Processing.	

### 3. SOFTWARE CONFIGURATION

#### Files

File Name	Processing Outline	Remark
K0R_def.h <sup>Note</sup>	Definition file	
K0R_init.c <sup>Note</sup>	Initialization processing	
K0R_ext.h	External declaration	
K0R_main.c	Main processing	
K0R_sfr_set.c	DMA controller processing (consecutive capturing of A/D conversion results)	
K0R_adc.c	A/D converter processing	Explained in detail in A/D Converter Processing

**Note** These files are commonly used by the sample programs.



## 4. FUNCTION EXPLANATIONS

[File name]

K0R\_main.c

Function

Function Name	Processing Outline	Argument	Return Value
main	Main routine	None	None

Function explanations

Function name	main
Processing	Main routine
Argument	–
Return value	–
Description	Executes initialization processing and then starts DMA transfer of A/D conversion. A/D conversion value of 2048 bytes is transferred to a specified RAM area.
Remark	–

[File name]

K0R\_sfr\_set.c

Functions

Function Name	Processing Outline	Argument	Return Value
DMA_ADIN	Initializes DMA controller (consecutive capturing of A/D conversion results).	None	None
DMA_ADBK	Ends DMA controller (consecutive capturing of A/D conversion results).	None	None
DMA_ADIT	Transfer end interrupt of DMA controller (consecutive capturing of A/D conversion results)	None	None

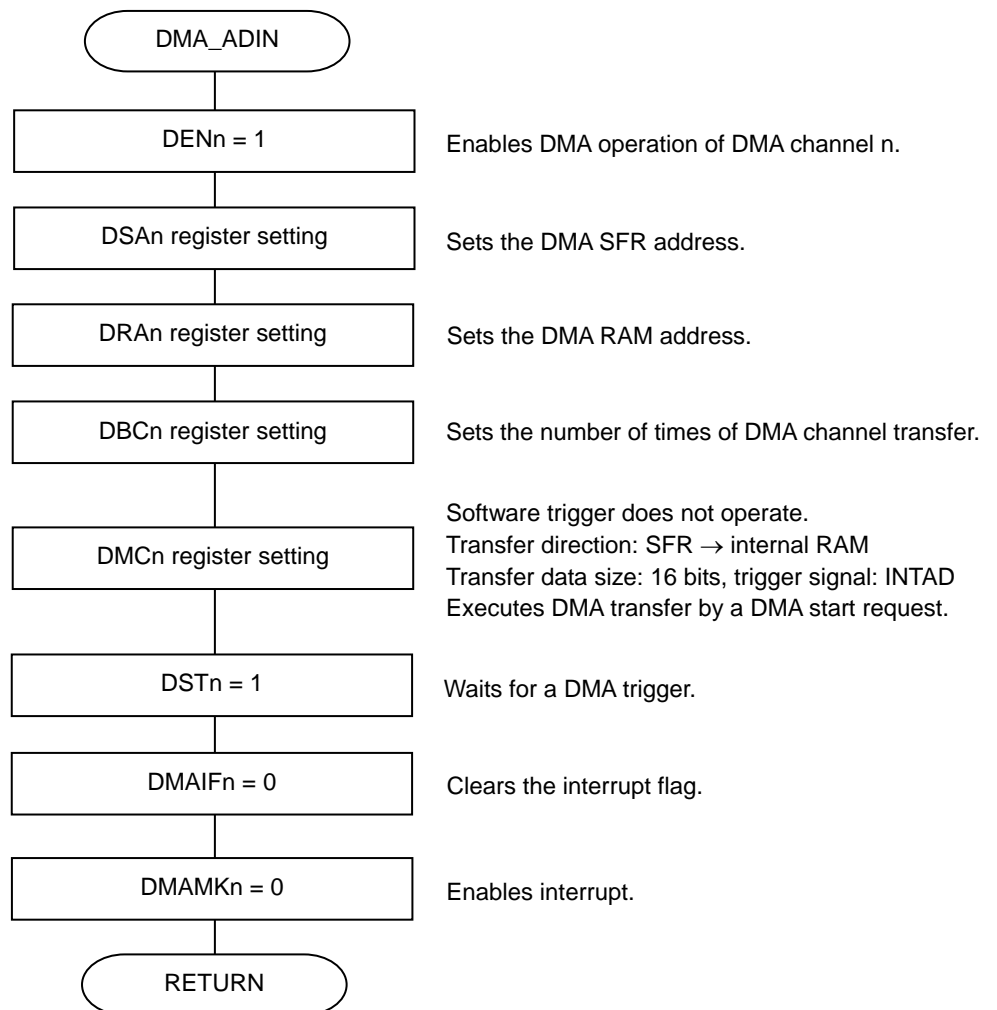
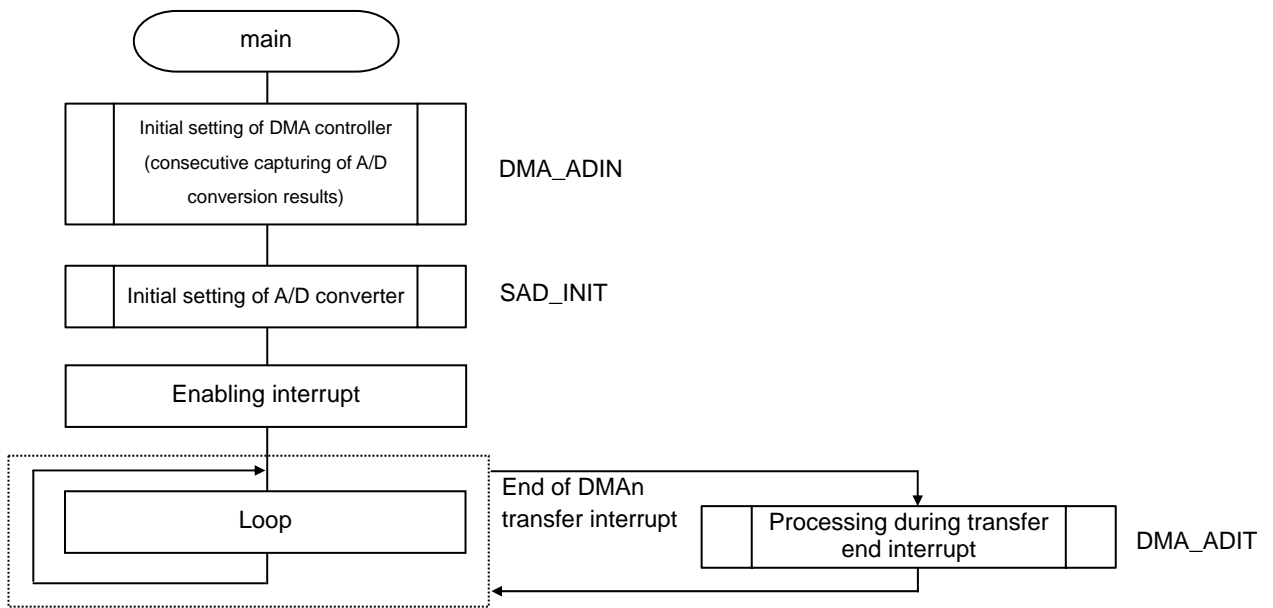
Function explanations

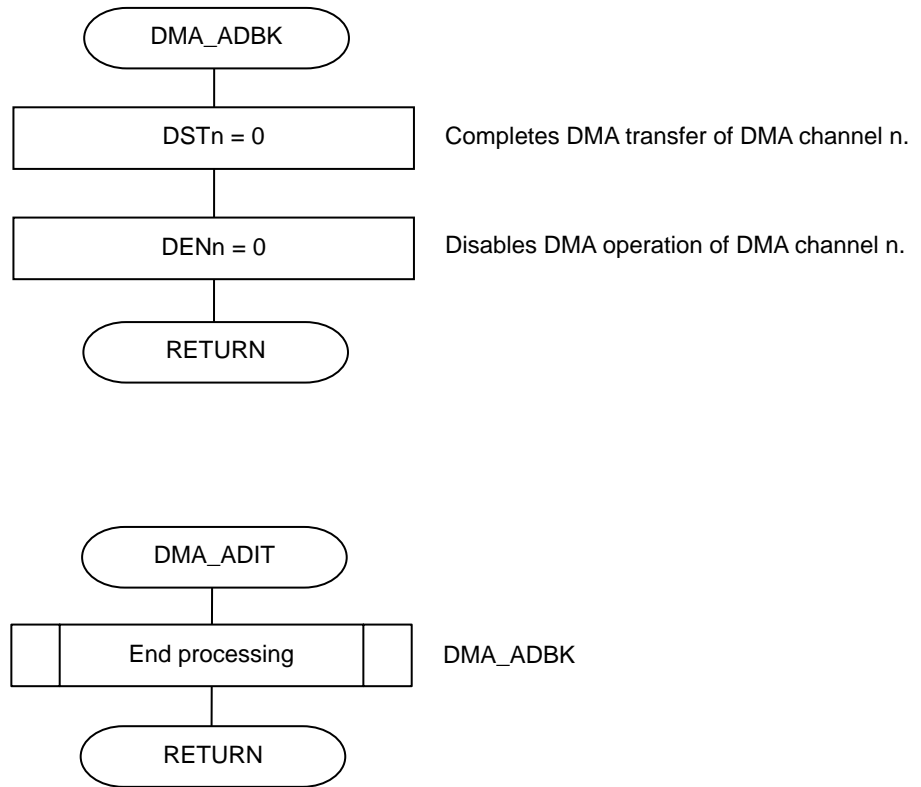
Function name	DMA_ADIN
Processing	Initializes DMA controller (consecutive capturing of A/D conversion results).
Argument	–
Return value	–
Description	Executes initialization.
Remark	–

Function name	DMA_ADBK
Processing	Ends DMA controller (consecutive capturing of A/D conversion results).
Argument	–
Return value	–
Description	Ends DMA transfer.
Remark	–

Function name	DMA_ADIT
Processing	Transfer end interrupt of DMA controller (consecutive capturing of A/D conversion results)
Argument	–
Return value	–
Description	Performs processing during transfer end interrupt. In this sample program, an end operation is called.
Remark	–

5. FLOWCHARTS





**Remark** n: DMA channel number (n = 0, 1)  
n = 1 for this sample program.