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Renesas Electronics Corporation

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# **78K0R/Kx3 Microcontroller Sample Program Operation Manual (CSI Consecutive Transmission (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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Microcomputer Operations Unit  
NEC Electronics Corporation

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## 1. OVERVIEW

This manual explains the sample program functions of the DMA controller (CSI consecutive transmission) for the 78K0R/Kx3.

In this sample program, a DMA controller (CSI consecutive transmission) operation is performed.

The outline of the processing is as follows.

- Consecutive transmission of CSI00
- DMA channel 0 is used for DMA transfer.
- DMA start source: INTCSI00 (software trigger (STG0) only for the first start source)
- Interrupt of CSI00 is assigned to IFC03 to IFC00 (bits 3 to 0 of the DMC0 register) = 0110B
- Transfers FF100H to FF1FFH (256 bytes) of the RAM to the transmit buffer (SIO00) of CSI.

3-wire serial I/O processing (master transmission (single-transmission mode))

In this sample program, 3-wire serial I/O processing (master transmission (single-transmission mode)) is used, but a detailed explanation is omitted. For details, refer to the description of 3-Wire Serial I/O Processing (Master Transmission (Single-Transmission Mode)).

## 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 0 (DSA0)	
	DMA RAM address register 0 (DRA0)	
	DMA byte count register 0 (DBC0)	
	DMA mode control register 0 (DMC0)	
	Port mode register 1 (PM1)	
	Port register 1 (P1)	
I/O	Output: SO00 (P12), $\overline{\text{SCK00}}$ (P10)	
Interrupt	End of DMA0 transfer interrupt (INTDMA0)	
Others	Refer to 3-Wire Serial I/O Processing (Master Transmission (Single-Transmission Mode)).	

### 3. SOFTWARE CONFIGURATION

#### Files

File Name	Processing Outline	Remark
K0R_def.h <sup>Note 1</sup>	Definition file	
K0R_init.c <sup>Note 1</sup>	Initialization processing	
K0R_ext.h	External declaration	
K0R_main.c	Main processing	
K0R_sfr_set.c	DMA controller processing (CSI consecutive transmission)	
K0R_csi_tr.c	3-wire serial I/O processing (master transmission (single-transmission mode))	Explained in detail in 3-Wire Serial I/O Processing (Master Transmission (Single-Transmission Mode)).
K0R_link.dr <sup>Note 2</sup>	Defines variables in a specific memory space.	

**Notes** 1. These files are commonly used by the sample programs.

2. For details of the link directive, refer to "RA78K0R Assembler Package Operation".



#### 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 a CSI transmission operation by DMA transfer.
Remark	—

[File name]

K0R\_sfr\_set.c

Functions

Function Name	Processing Outline	Argument	Return Value
DMA_CSIN	Initializes DMA controller (CSI consecutive transmission).	None	None
DMA_CSST	Starts DMA controller (CSI consecutive transmission).	None	None
DMA_CSBK	End processing (forcible abortion) of DMA controller (CSI consecutive transmission)	None	None
DMA_CSIT	Transfer end interrupt of DMA controller (CSI consecutive transmission)	None	None

## Function explanations

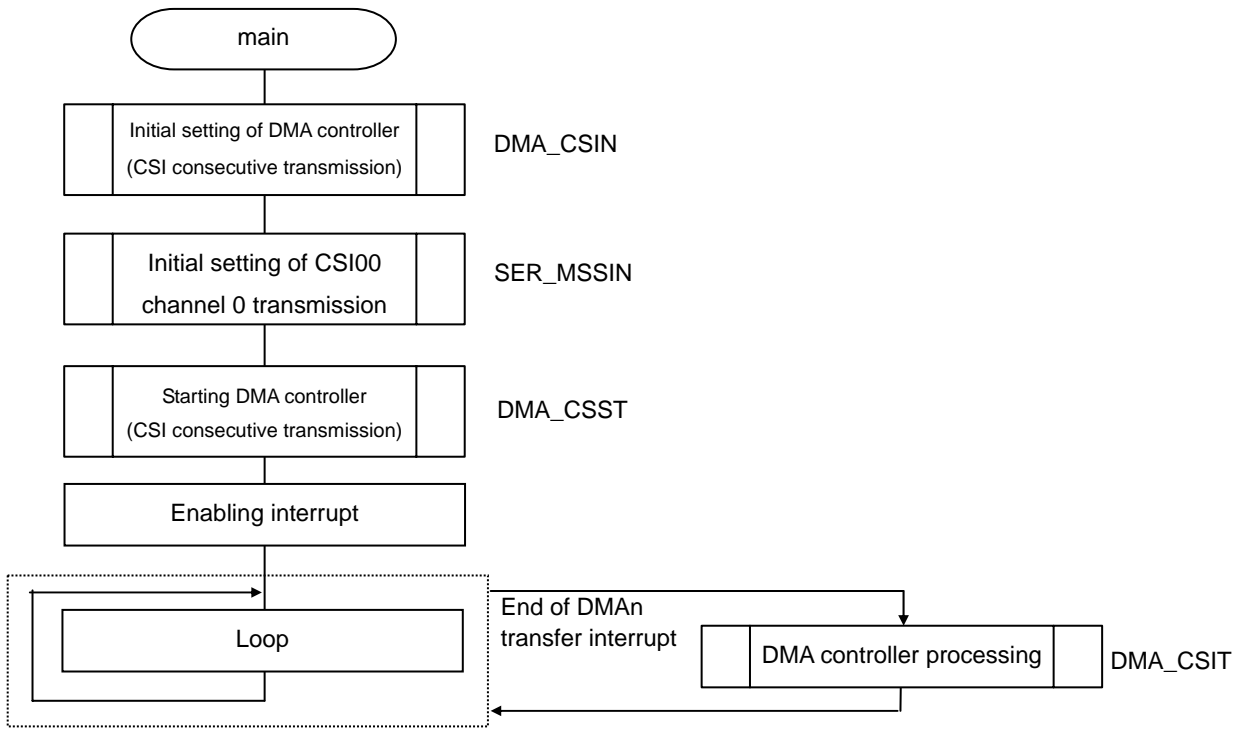
Function name	DMA_CSIN
Processing	Initializes DMA controller (CSI consecutive transmission).
Argument	–
Return value	–
Description	Executes initialization.
Remark	–

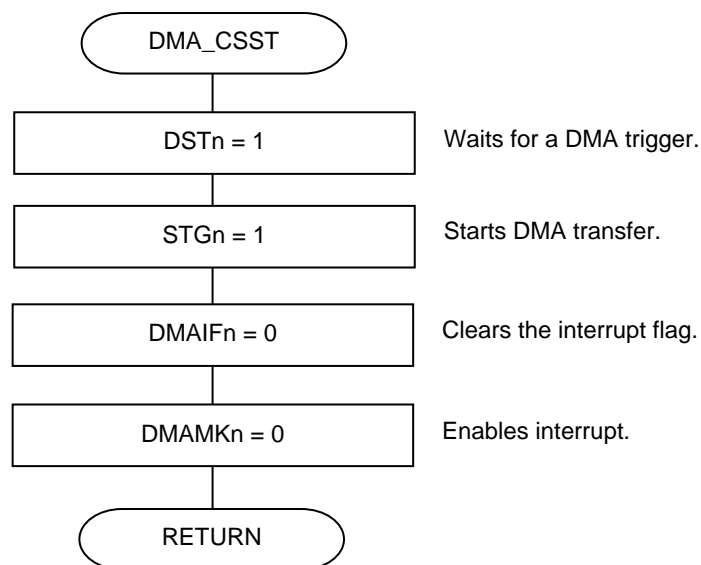
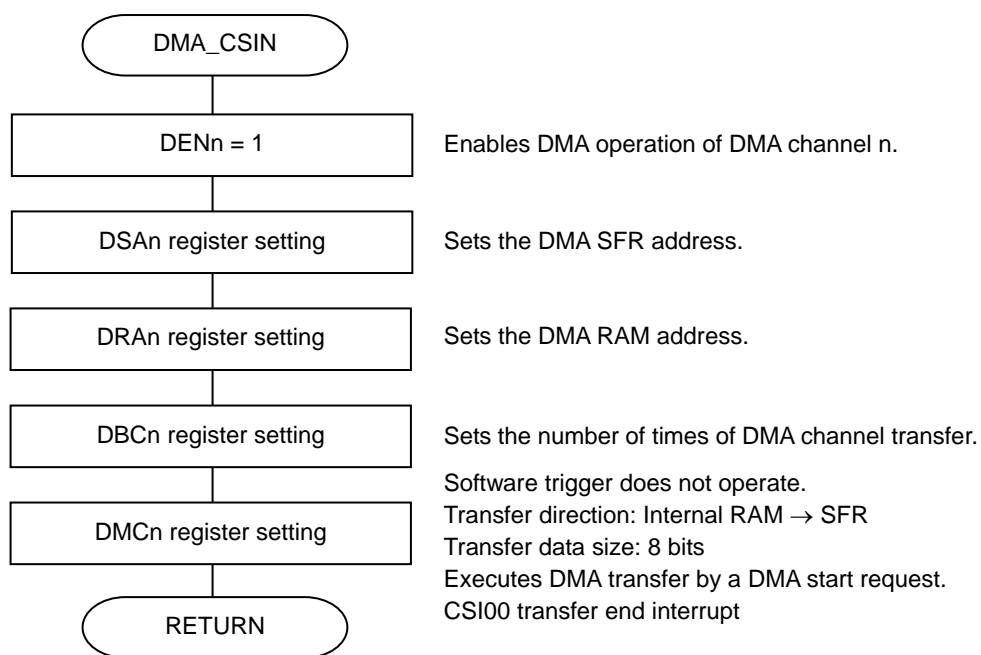
Function name	DMA_CSST
Processing	Starts DMA controller (CSI consecutive transmission).
Argument	–
Return value	–
Description	Starts DMA transfer operation.
Remark	–

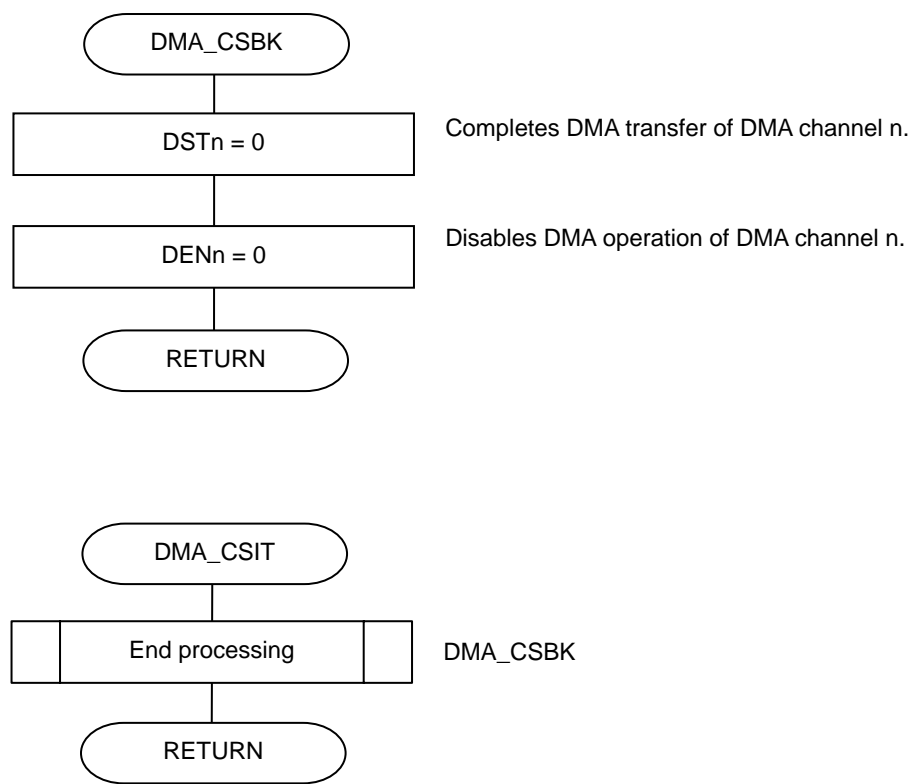
Function name	DMA_CSBK
Processing	End processing (forcible abortion) of DMA controller (CSI consecutive transmission)
Argument	–
Return value	–
Description	Ends (forcibly aborts) DMA transfer operation.
Remark	–

Function name	DMA_CSIT
Processing	Transfer end interrupt servicing of DMA controller (CSI consecutive transmission)
Argument	–
Return value	–
Description	Performs DMA controller end processing during transfer end interrupt.
Remark	–

5. FLOWCHARTS







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