

## Application Note

# UART RECEIVE (UART-C)

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## Table of Contents

Table of Contents.....	2
1. Preface .....	3
2. Technical Term .....	3
3. Reference Document .....	3
4. Target Sample Program .....	4
5. Configuration Diagram .....	4
6. Sample Program:UART_RECEIVE .....	5
6.1. Outlines of Operation.....	5
6.2. Function to Use.....	5
6.3. Interrupt to Use .....	5
6.4. Configuration.....	5
6.5. Example of Terminal Emulator Output .....	5
6.6. How to switch DMAC function .....	6
6.6.1. IAR Embedded Workbench.....	6
6.6.2. Keil $\mu$ Vision.....	8
6.6.3. SEGGER Embedded Studio .....	10
7. Activity diagram.....	12
7.1. main .....	12
7.2. variable_initialize .....	14
7.3. driver_initialize .....	14
7.4. driver_finalize.....	15
7.5. driver_dma_initialize .....	15
7.6. driver_dma_finalize.....	16
7.7. application_initialize.....	16
7.8. application_finalize.....	17
7.9. clear_input_data .....	18
7.10. uart_initialize .....	19
7.11. Interrupt.....	20
8. Revision History .....	21
<b>RESTRICTIONS ON PRODUCT USE .....</b>	<b>22</b>

### 1. Preface

This application note describes the sample software for UART\_RECEIVE using Universal Asynchronous Receiver Transmitter (UART).

This document helps the user check operation of a product under development and develop its program.

### 2. Technical Term

Term/Abbreviation	Definition
BSP	Board Support Package
CG	Clock Control and Operation Mode
DMA	Direct Memory Access
UART	Universal Asynchronous Receiver Transmitter

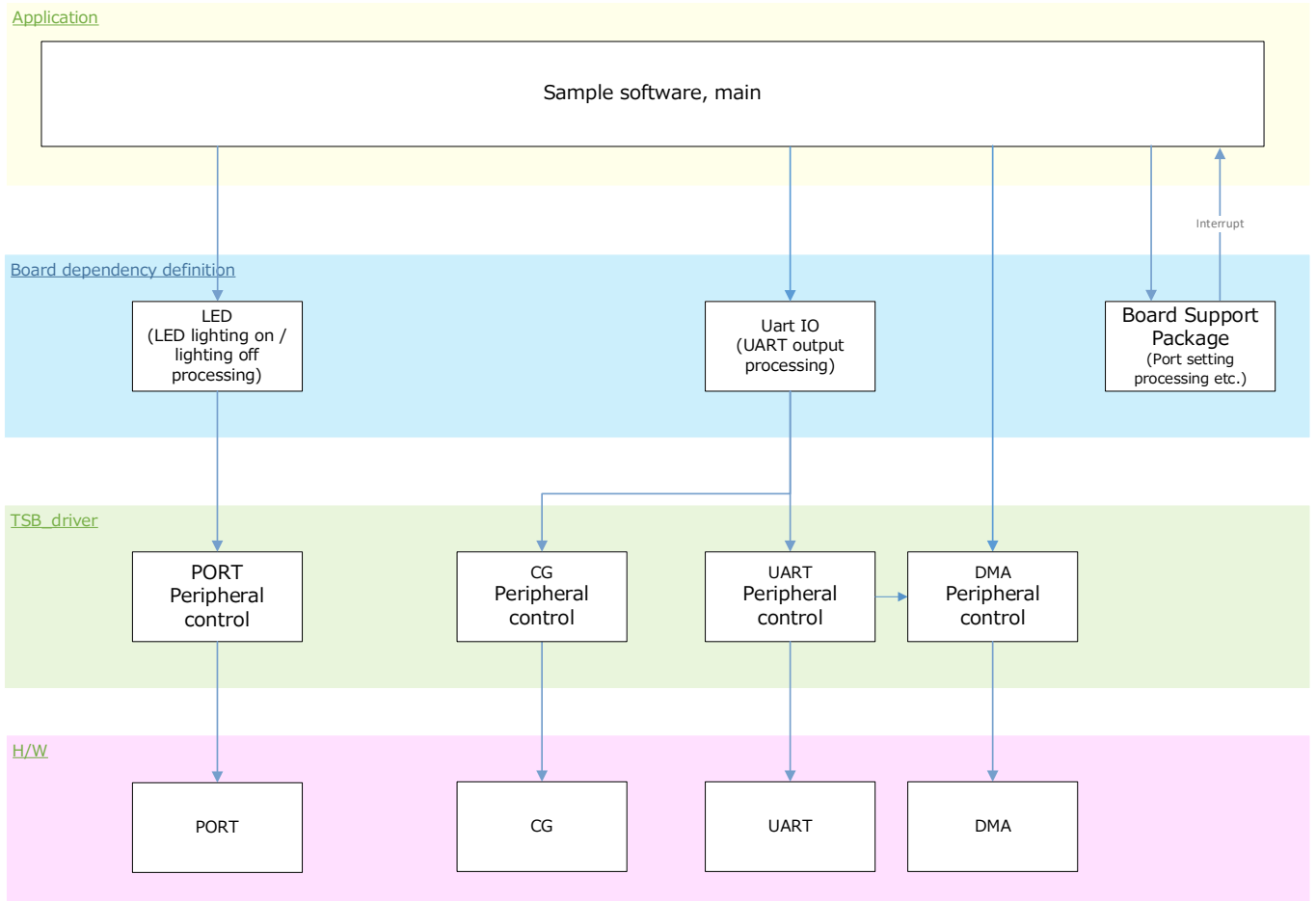
### 3. Reference Document

Document	Notes
Data sheet	Refer to the data sheet of MCU to be used.
Reference manual	Refer to the reference manual of each IP to be used.
Application note MCU User Guide	Refer to the MCU user guide to be used.

## 4. Target Sample Program

Sample Program	Outline
UART_RECEIVE	Sample program of UART function (UART Receive)

## 5. Configuration Diagram



## 6. Sample Program:UART\_RECEIVE

This sample software that receives the character string input from the terminal emulator using the receive function of the UART communication function and turn on LED every time it matches the character string 1.

### 6.1. Outlines of Operation

Wait for the input of the character string of the terminal emulator.

If BSP\_LED\_3 is turn on, it will turn off.

When a character string is input, the character string 1 is compared with the received character string, and when the character strings match, BSP\_LED\_1 is turn on.

If there is a mismatch, turn off BSP\_LED\_1.

When error occurs, turn on BSP\_LED\_3 and turn off BSP\_LED\_1.

### 6.2. Function to Use

The functions to use are as follows:

For the Port assignment of each BSP channel, refer to the MCU user guide.

IP	Channel	Objective
UART	BSP_UART_1	For terminal emulator communication
PORT(LED)	BSP_LED_1	For operation check
	BSP_LED_3	For operation check

### 6.3. Interrupt to Use

Interrupt	Outlines
*1	UART receive interrupt
*2	UART error interrupt

\*1 For SBK-M4KN/SBK-M4KN10, "INTSC0RX", for AdBun-M3HQF10/AdBun-M3HQA, "INTUART0RX"

\*2 For SBK-M4KN/SBK-M4KN10, "INTSC0ERR", for AdBun-M3HQF10/AdBun-M3HQA, "INTUART0ERR"

### 6.4. Configuration

"main.c" configuration setting.

Configuration	Current Value	Description
Character string 1	*1	Comparison target of character strings input from terminal emulator
Communication control selection	*2 NODMAC	Switchable between NODMAC (does not use DMAC) and DMA (uses DMAC)

\*1 For SBK-M4KN/SBK-M4KN10, "TMPM4KNFYA¥n"  
 For AdBun-M3HQF10, "TMPM3HQF10"  
 For AdBun-M3HQA, "TMPM3HQFDA"

\*2 For details on how to switch when using DMAC, see Chapter 6.6.

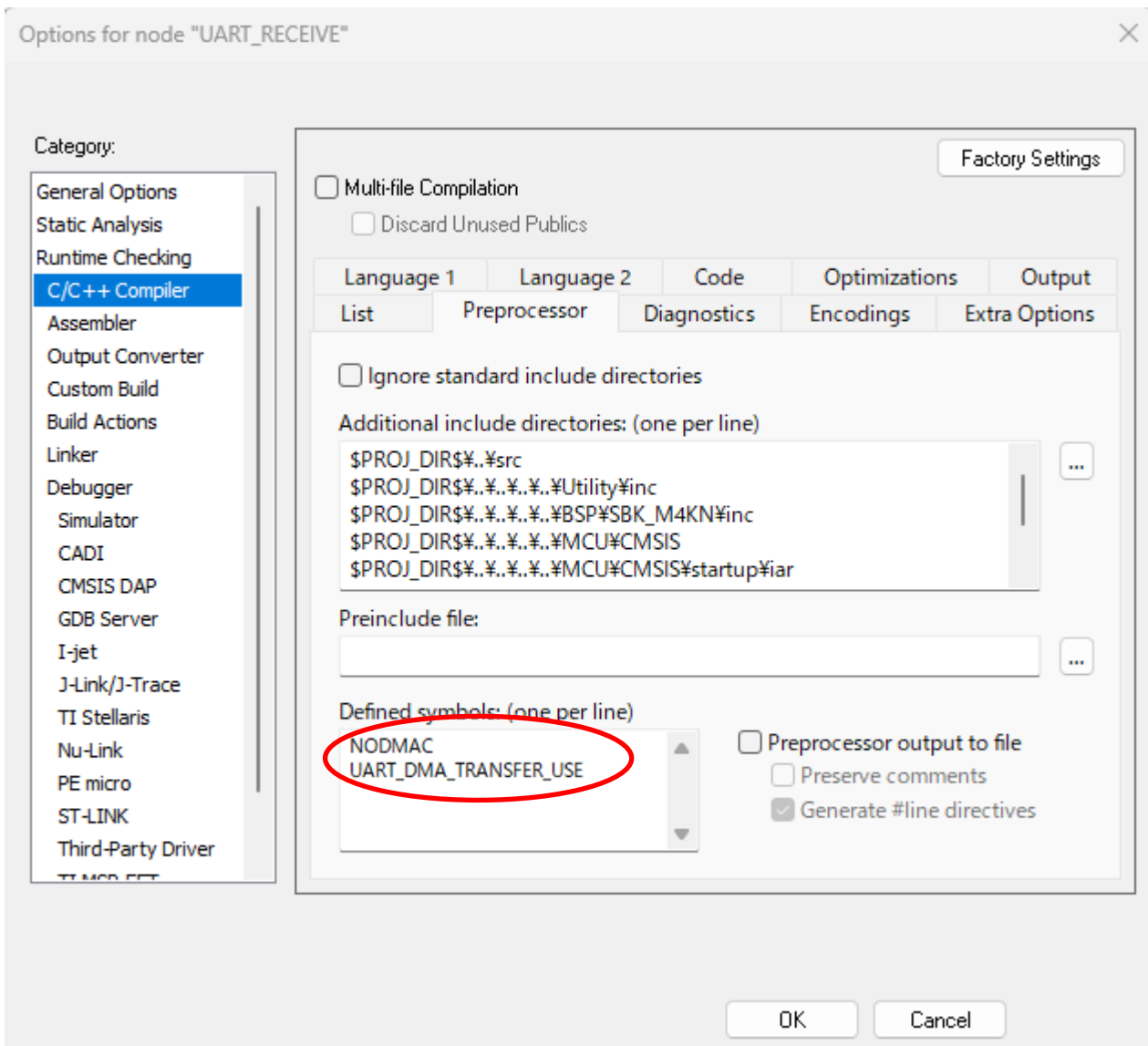
### 6.5. Example of Terminal Emulator Output

Nothing.

## 6.6. How to switch DMAC function

Follow the steps below to enable/disable the DMAC function.

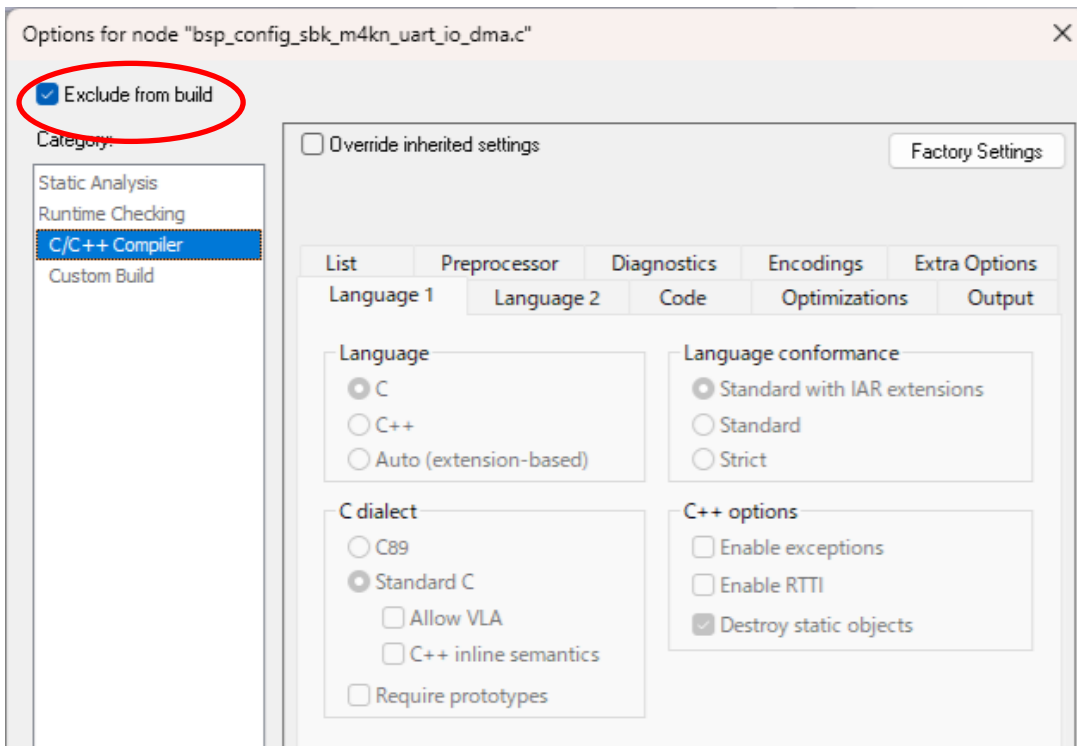
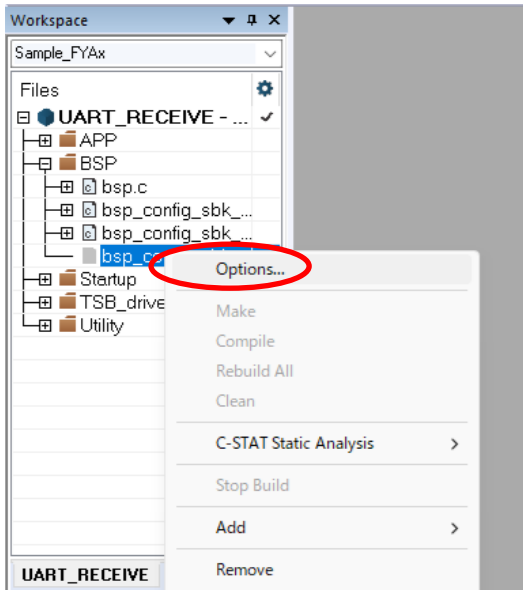
### 6.6.1. IAR Embedded Workbench



Open "Project" → "Options" → "C/C++ Compiler" → "Preprocessor".

Change "Defined symbol" as follows:

- If you do not use DMAC: "NODMAC"
- When using DMAC: "DMA", "UART\_DMA\_TRANSFER\_USE"



Right-click the file you want to configure, open options, and change "Exclude from build".  
 If you want to use the file, uncheck "Exclude from build", otherwise uncheck "Exclude from build".

DMAC disabled:

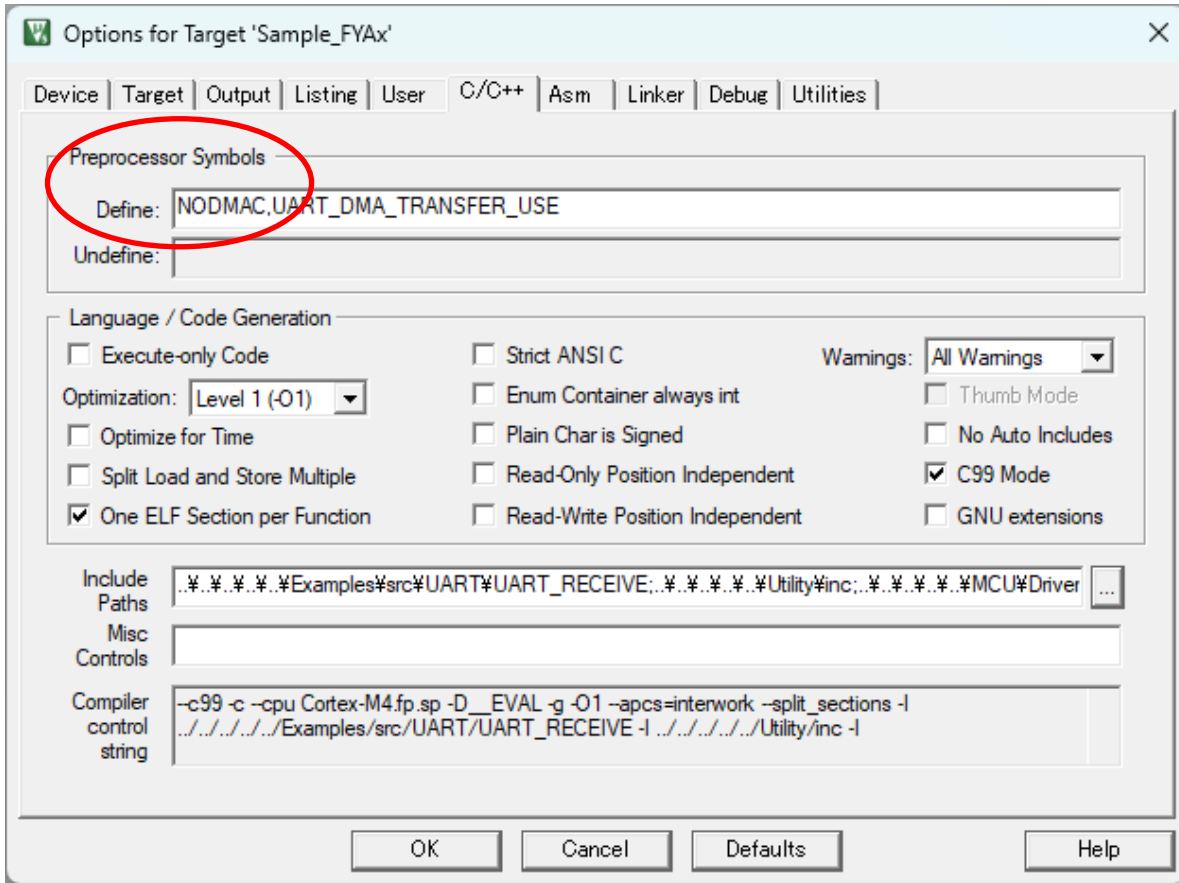
bsp_config_sbkm4xn_uart_io.c	Use files
bsp_config_sbkm4xn_uart_io_dma.c	Don't use files

DMAC enabled:

bsp_config_sbkm4xn_uart_io.c	Don't use files
bsp_config_sbkm4xn_uart_io_dma.c	Use files

Please build after changing the settings.

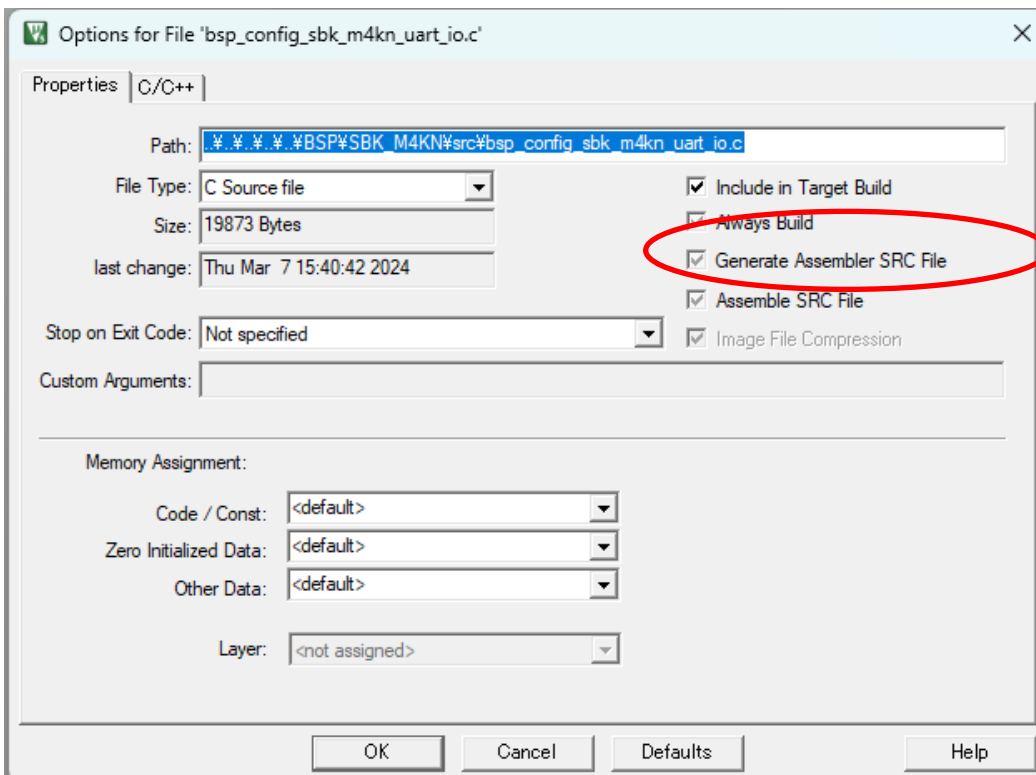
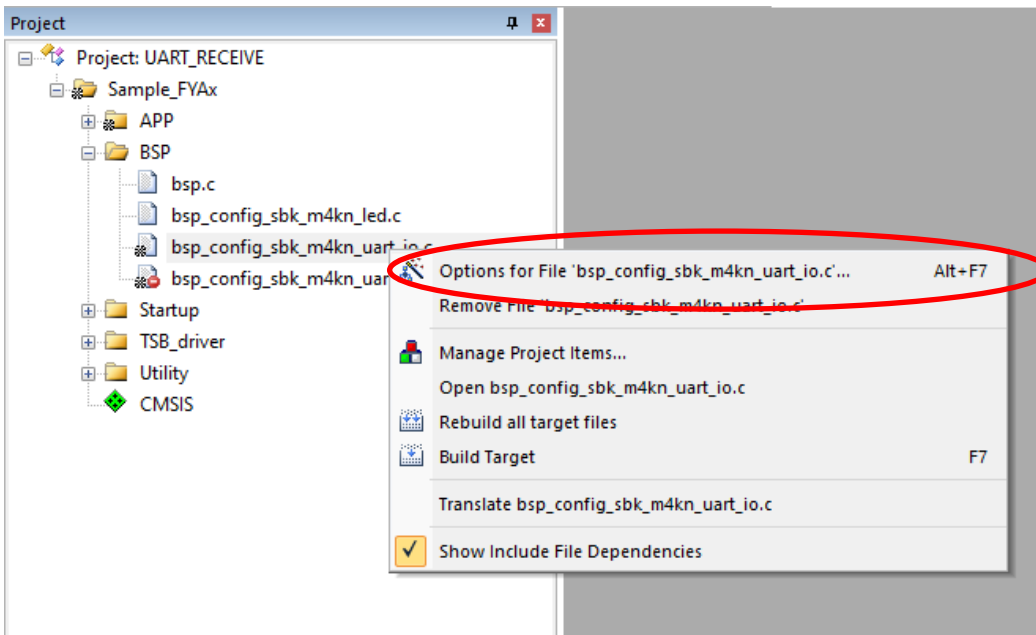
## 6.6.2. Keil µVision



Open “Project” → “Options for Target ‘Sample’ ” → “C/C++” .  
 Change "Define:" of "Preprocessor Symbols" as shown below.

- If you do not use DMAC, select "NODMAC"
- "DMA" and "UART\_DMA\_TRANSFER\_USE" when using DMAC





Right-click the file you want to configure, open Options for File 'xxxx.c' and change "Include in Target Build". If you want to use the file, check "Include in Target Build", otherwise uncheck "Include in Target Build".

DMAC disabled:

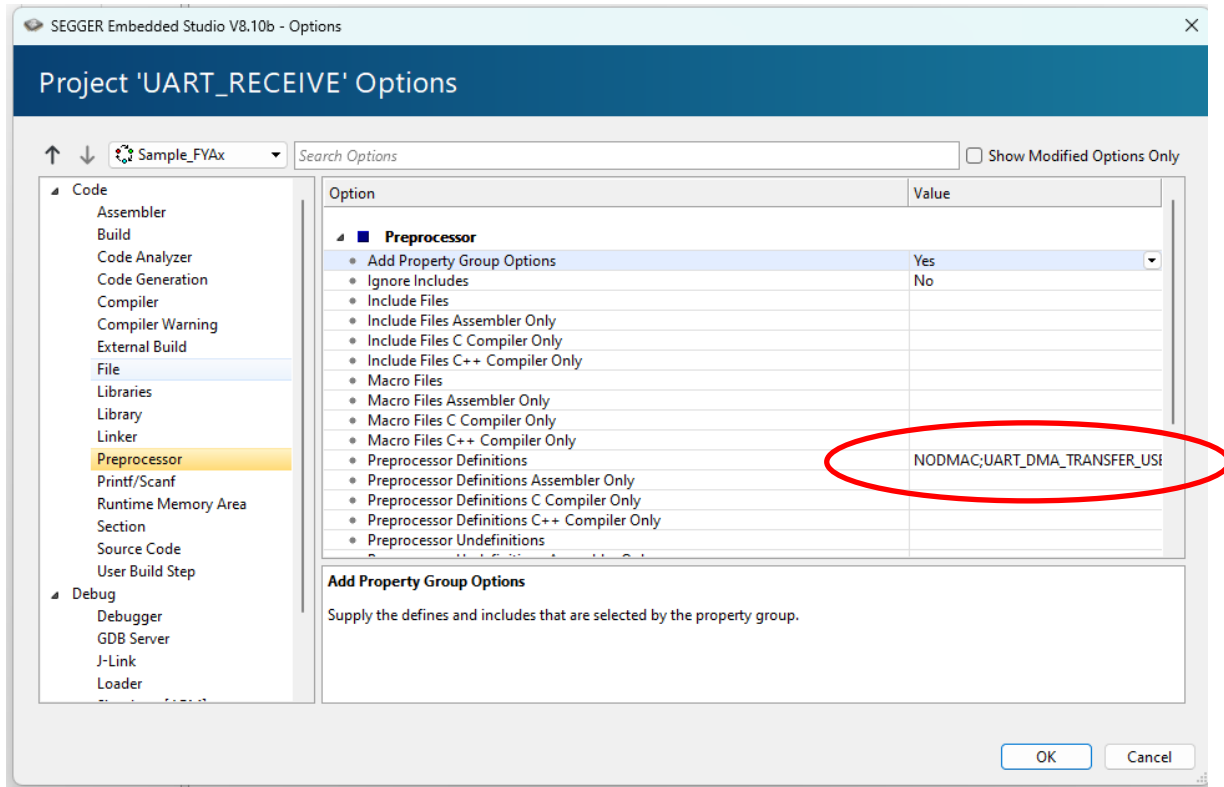
bsp_config_sbk_m4xn_uart_io.c	Use files
bsp_config_sbk_m4xn_uart_io_dma.c	Don't use files

DMAC enabled:

bsp_config_sbk_m4xn_uart_io.c	Don't use files
bsp_config_sbk_m4xn_uart_io_dma.c	Use files

Please build after changing the settings.

### 6.6.3. SEGGER Embedded Studio

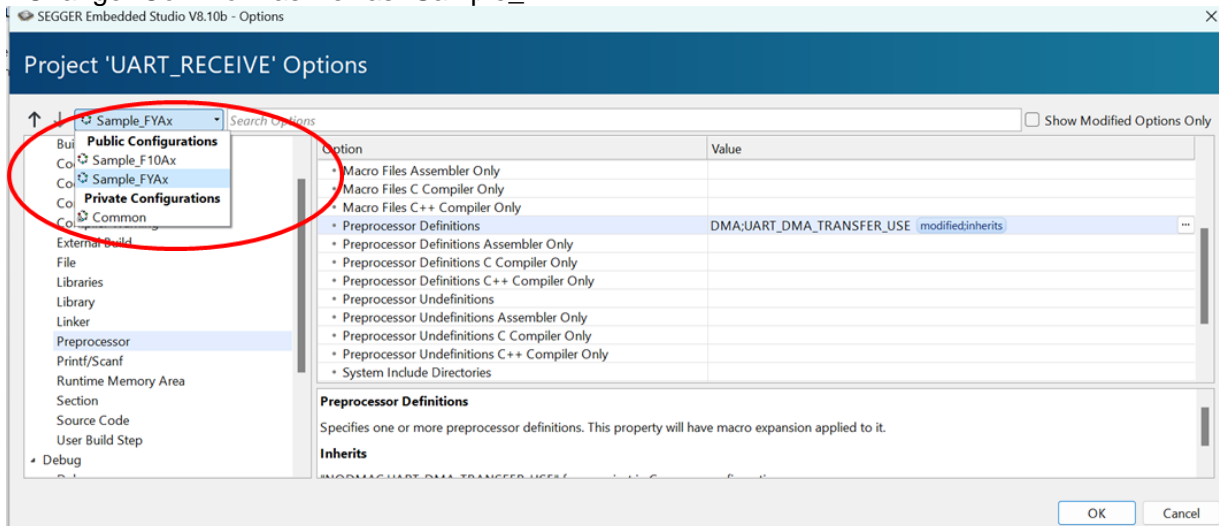


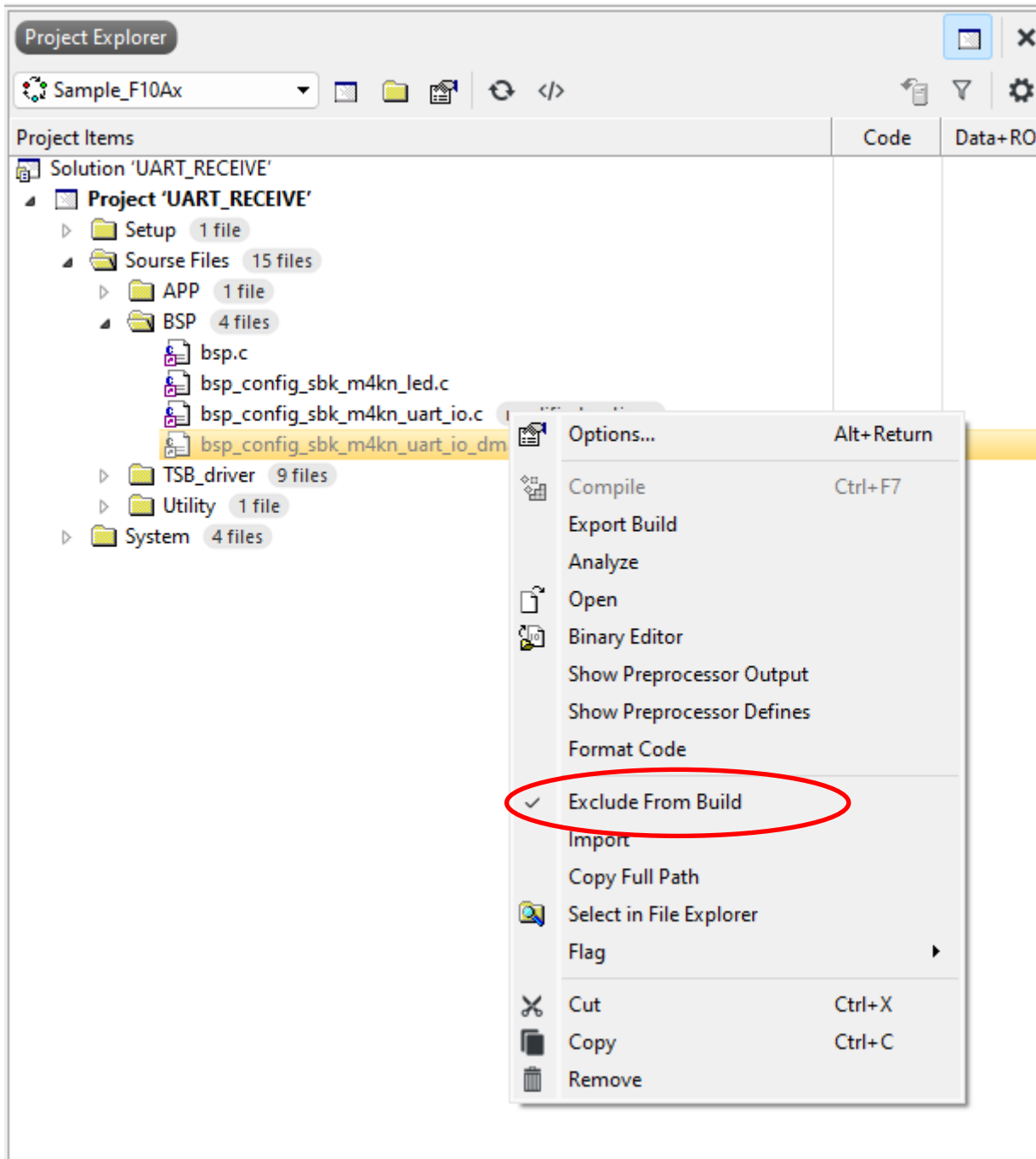
Open "Project" → "Options" → "Preprocessor".

Change "Preprocessor Definitions" as shown below.

- If you do not use DMAC, select "NODMAC"
- "DMA" and "UART\_DMA\_TRANSFER\_USE" when using DMAC

\* Change "Common" as well as "Sample\_xxx".





Right-click the file you want to configure and change "Exclude From Build".  
If you want to use a file, uncheck "Exclude From Build", otherwise check "Exclude From Build".

DMAC disabled:

bsp_config_sbk_m4xn_uart_io.c	Use files
bsp_config_sbk_m4xn_uart_io_dma.c	Don't use files

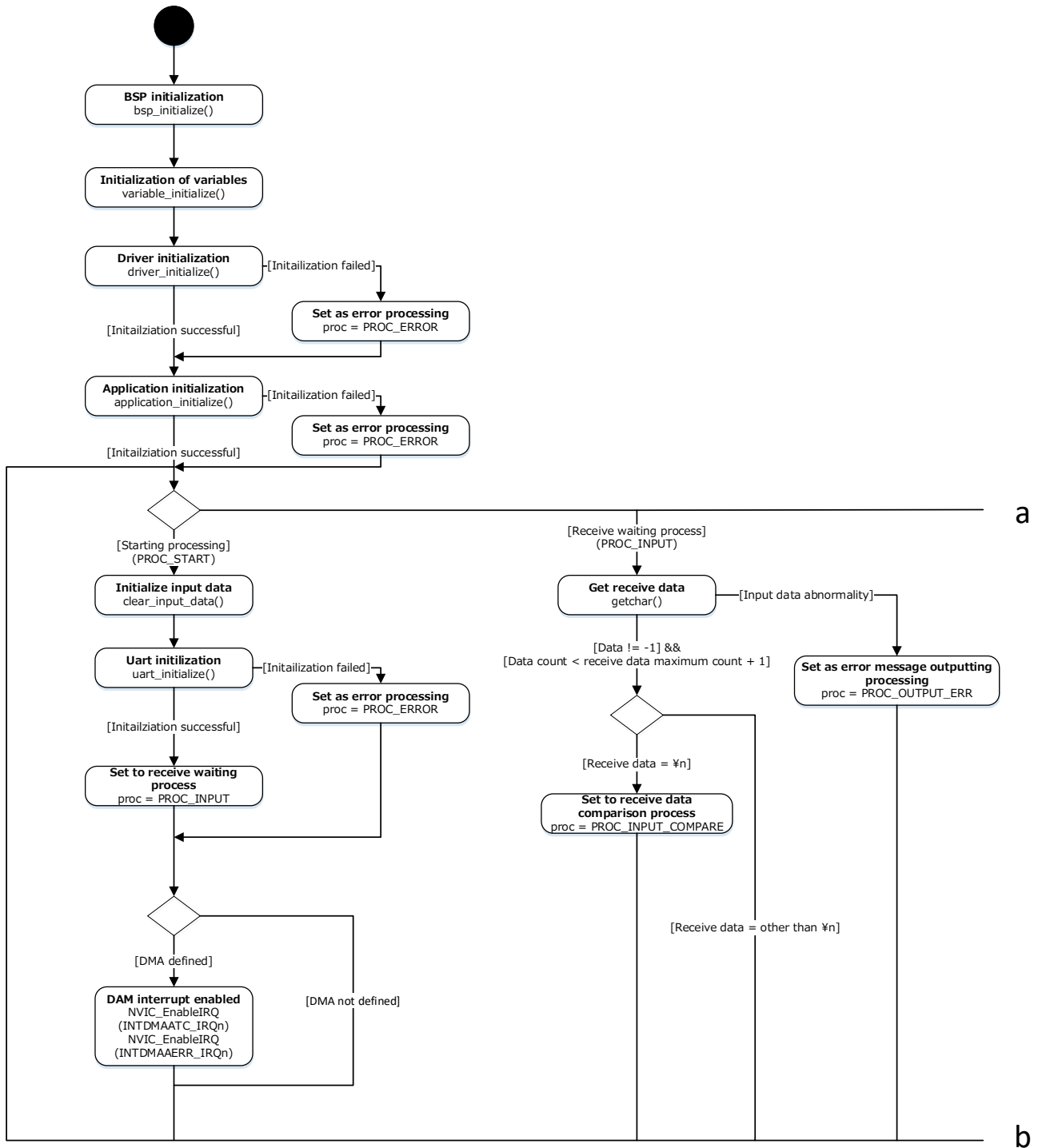
DMAC enabled:

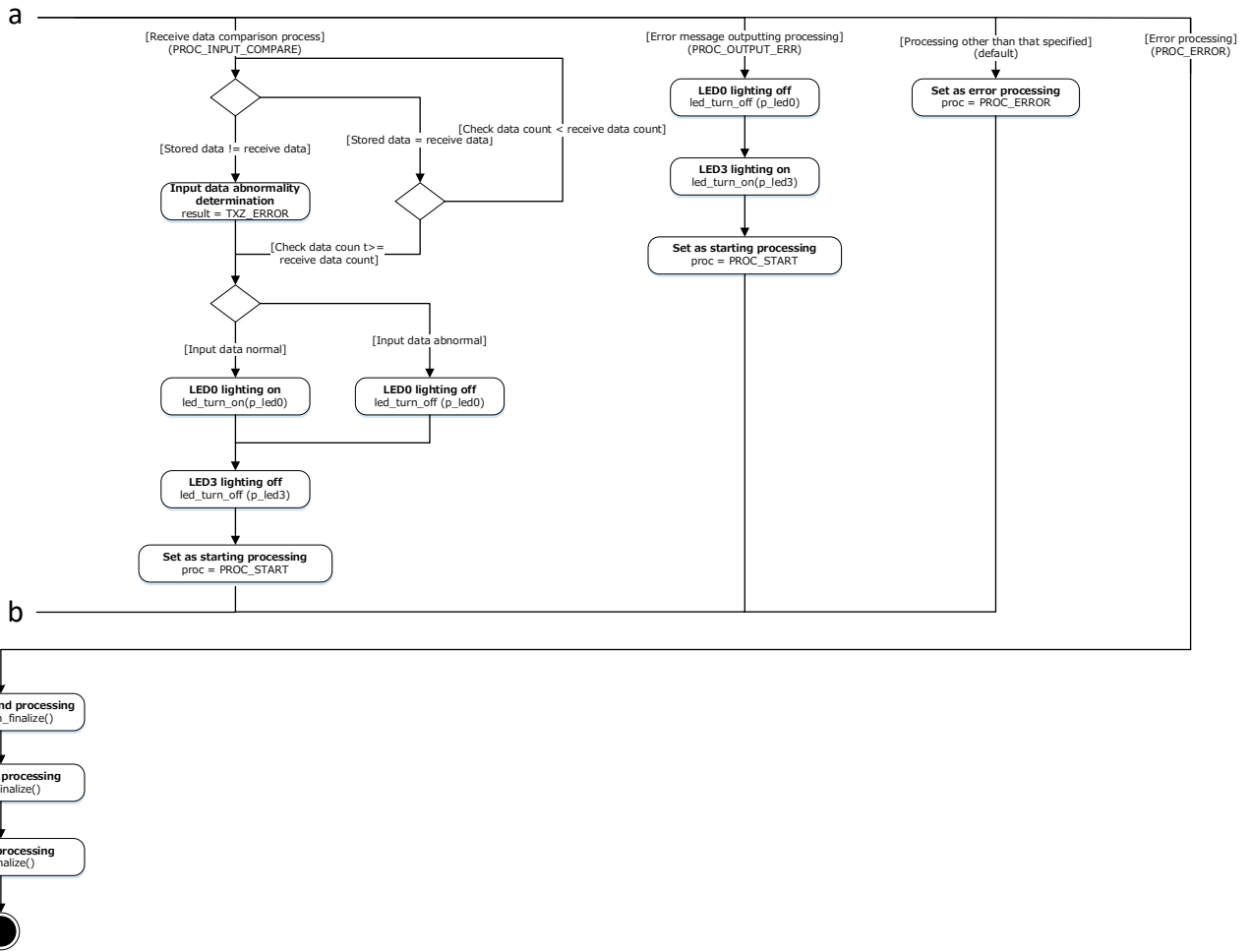
bsp_config_sbk_m4xn_uart_io.c	Don't use files
bsp_config_sbk_m4xn_uart_io_dma.c	Use files

Please build after changing the settings.

### 7. Activity diagram

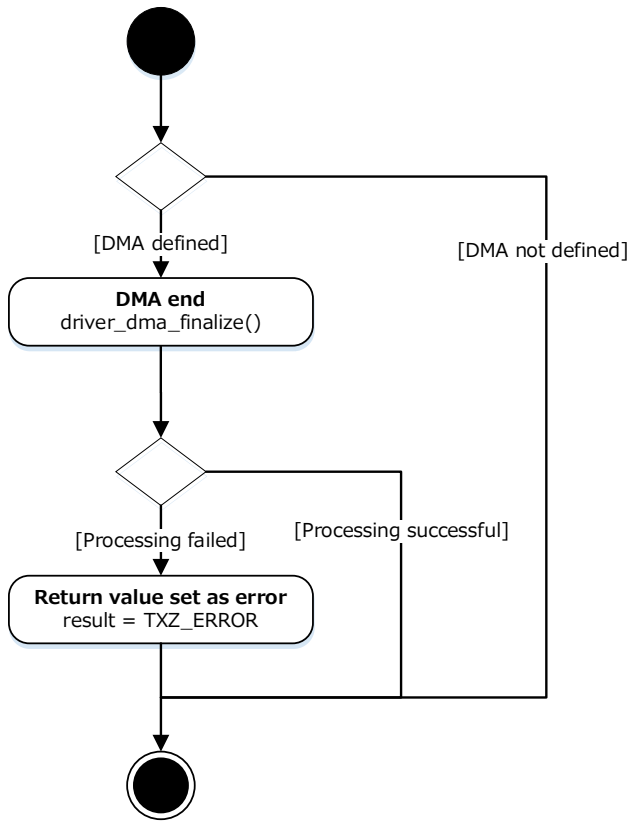
#### 7.1. main



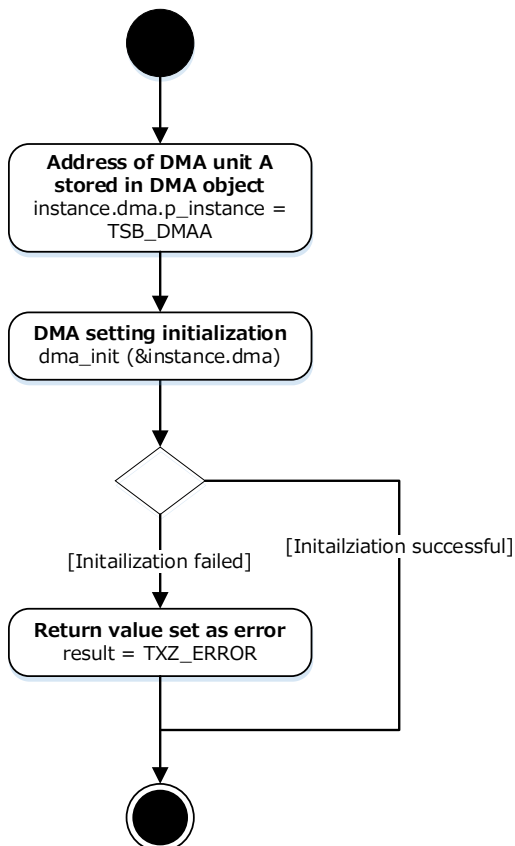




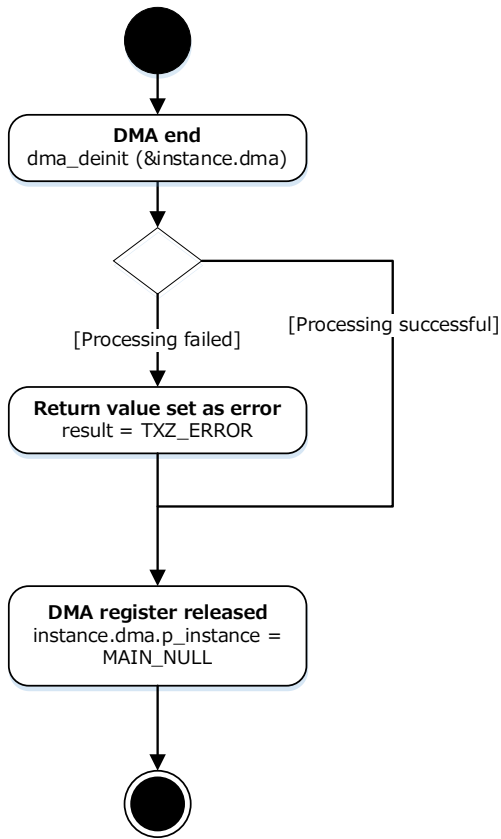
## 7.4. driver\_finalize



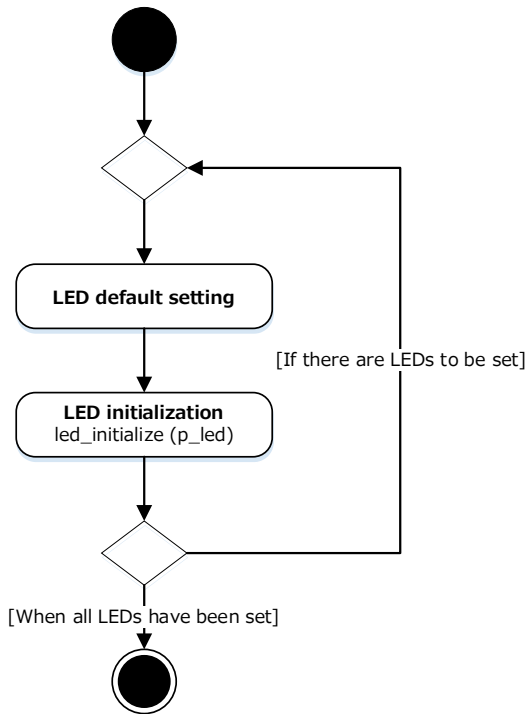
## 7.5. driver\_dma\_initialize



### 7.6. driver\_dma\_finalize

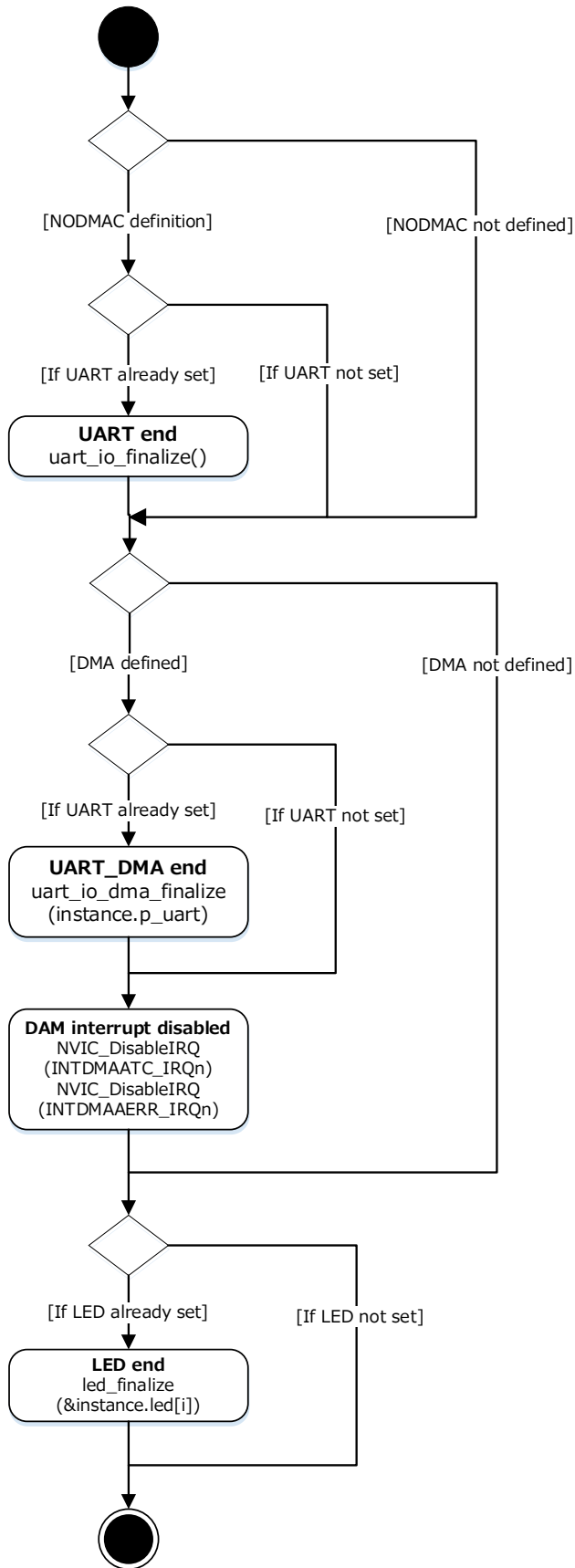


### 7.7. application\_initialize

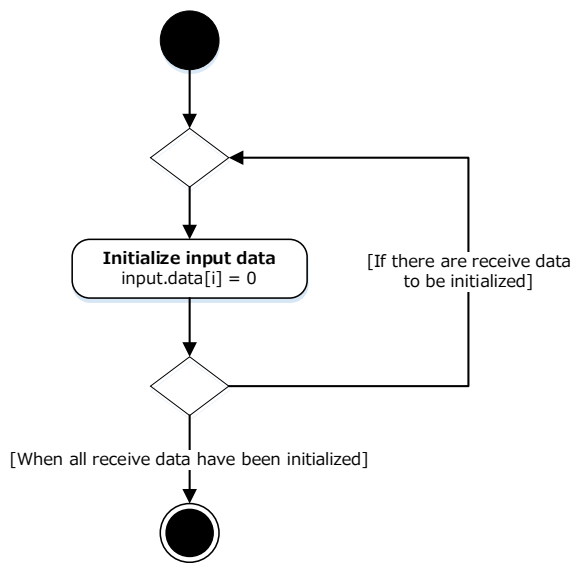




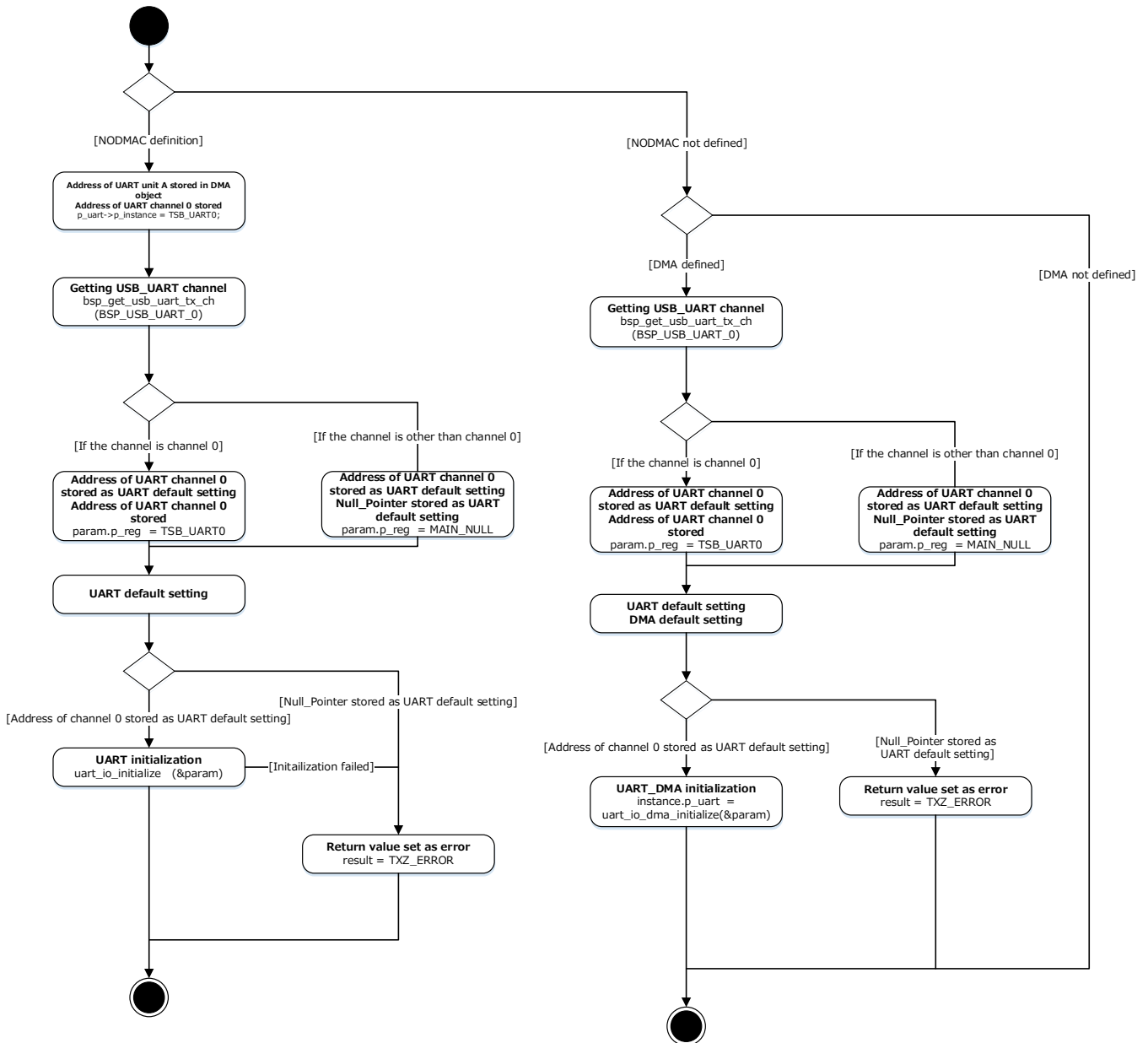
## 7.8. application\_finalize



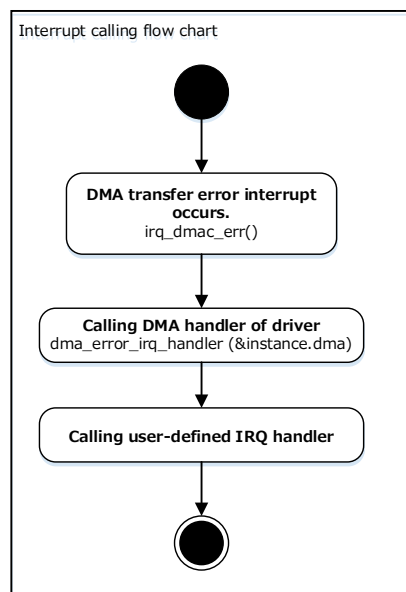
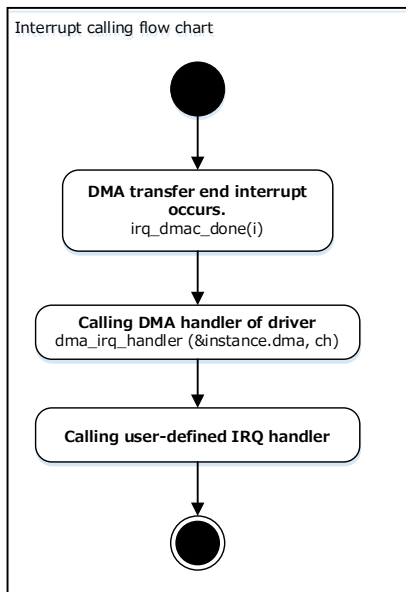
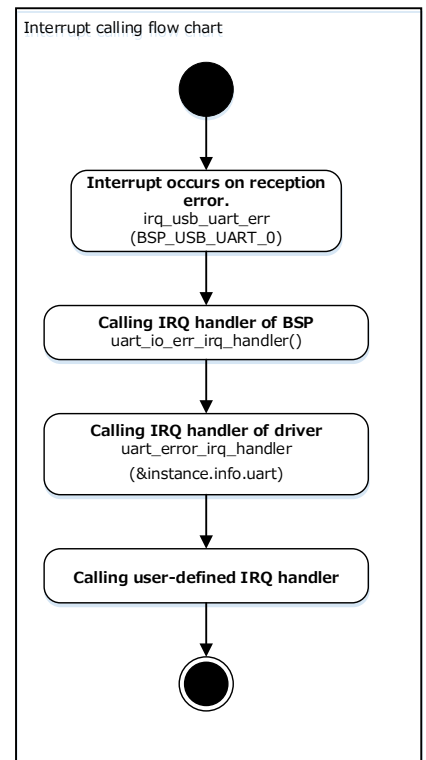
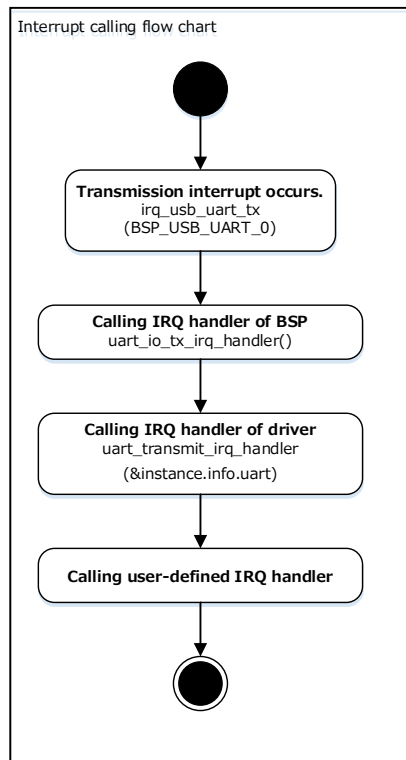
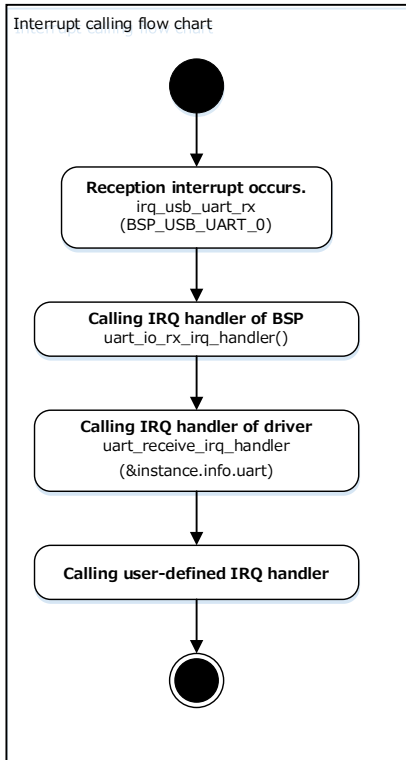
### 7.9. clear\_input\_data



### 7.10. uart\_initialize



### 7.11. Interrupt



## 8. Revision History

Revision	Date	Description
1.0	2023-10-16	First release
1.1	2024-03-25	Added method to switch DMAC function
1.2	2024-07-16	Added detailed description of DMAC function switching

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