Application Note

UART_RECEIVE

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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 µVision 8
6.6.3. SEGGER Embedded Studio 10
6.7. DMAC Communication Setting 12
7. Activity diagram 13
7.1. main 13
7.2. Interrupt 15
8. Revision History 16
RESTRICTIONS ON PRODUCT USE 17

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1. Preface

This application note describes the sample software 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 Controller
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.

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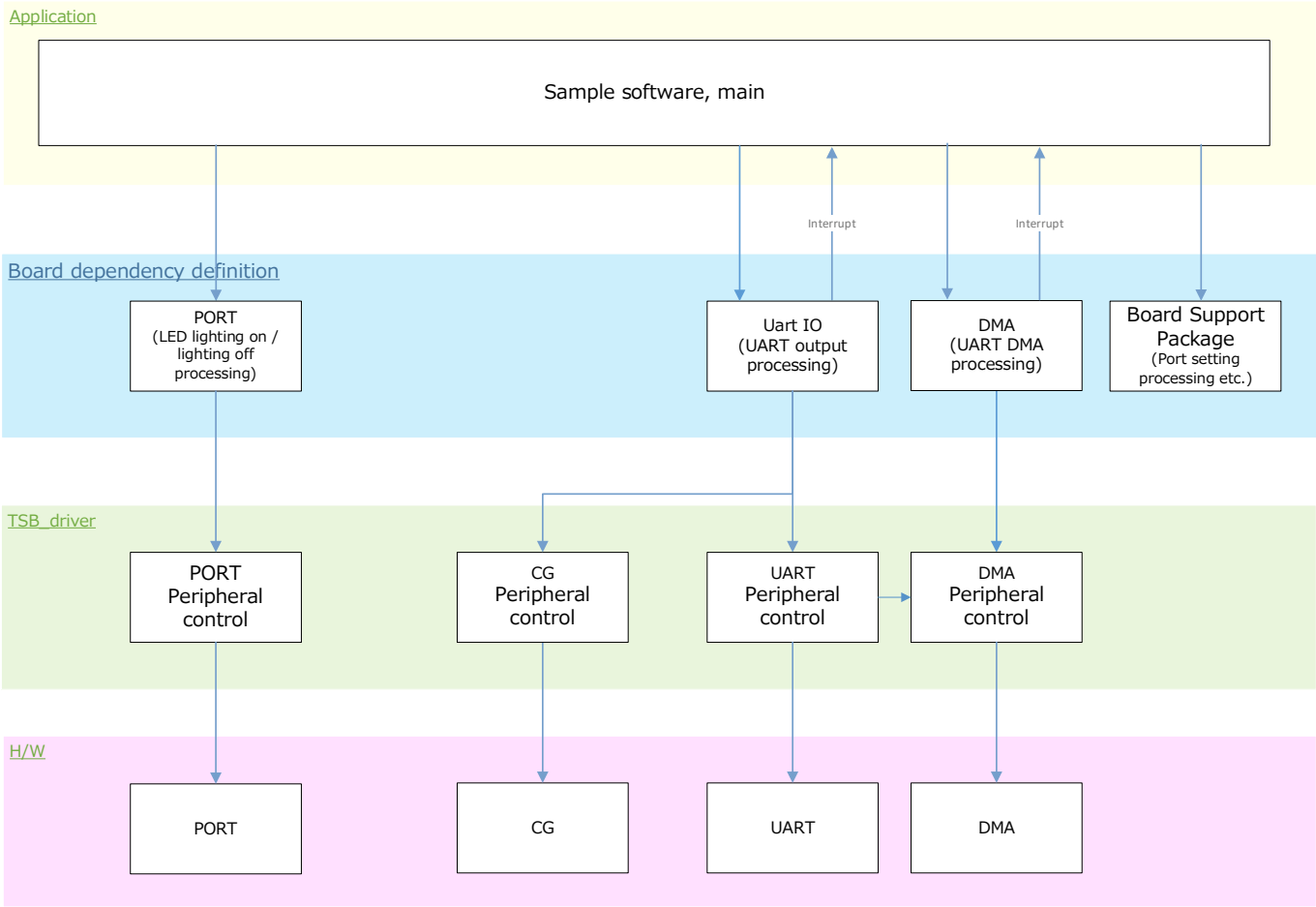
4. Target Sample Program

Sample Program	Outline
UART_RECEIVE	Sample program using UART communication function

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

For details, please refer to the “Interrupt List by Sample” in the MCU User’s Manual.

6.4. Configuration

Configuration setting.

Configuration	Soft Definition Name	Current Value (Defaults)	Description
String 1	BSP_MCU_NAME	(Note1)	Comparison target for the string entered from the terminal Emulator
Communication Control Selection	NODMAC PJ option	(Note2): NODMAC	NODMAC (Does not use DMAC), DMA (Use DMAC) Can be switched

Note1: Please refer to the "Log Control and Others" section in the MCU User's Manual.
Note2: For information on how to switch when using DMAC, see Chapter 6.6.

6.5. Example of Terminal Emulator Output

Nothing.

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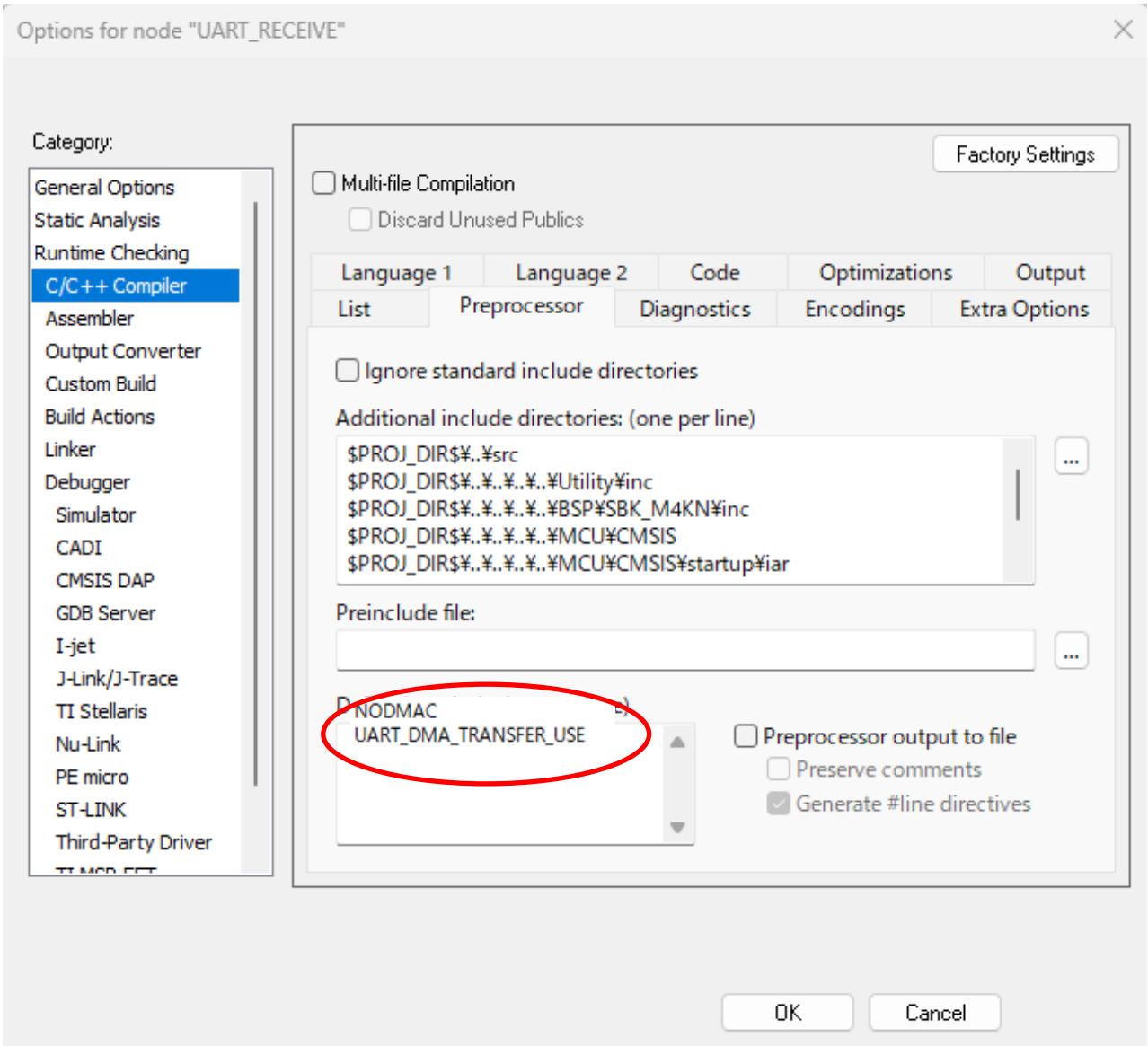
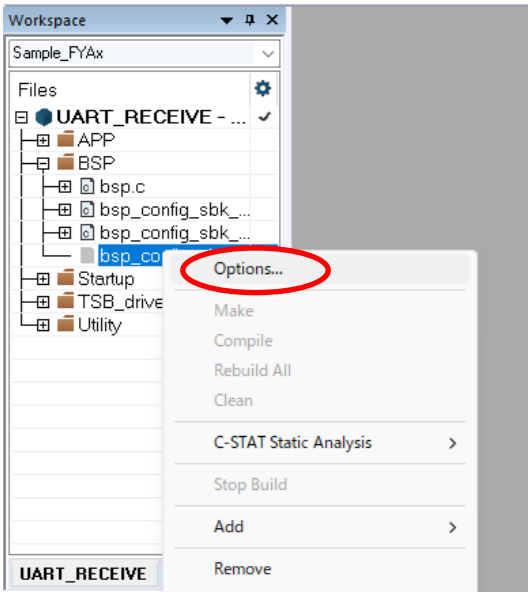
6.6. How to switch DMAC function

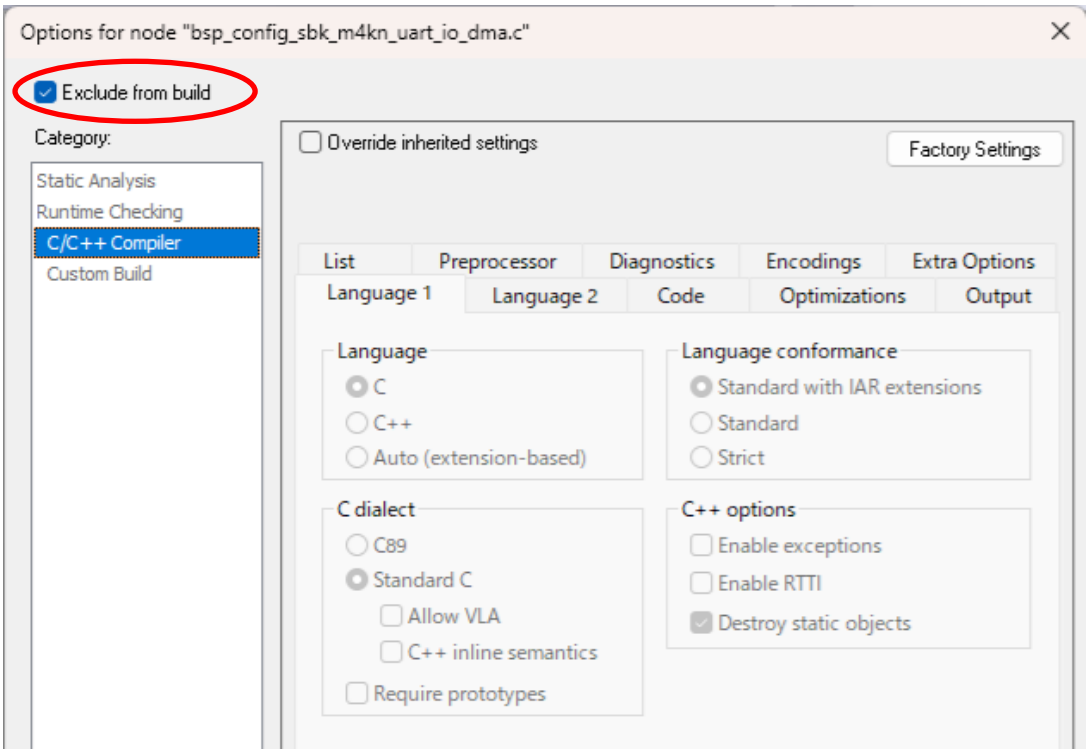
Follow the steps below to enable/disable the DMAC function.

6.6.1. IAR Embedded Workbench



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:

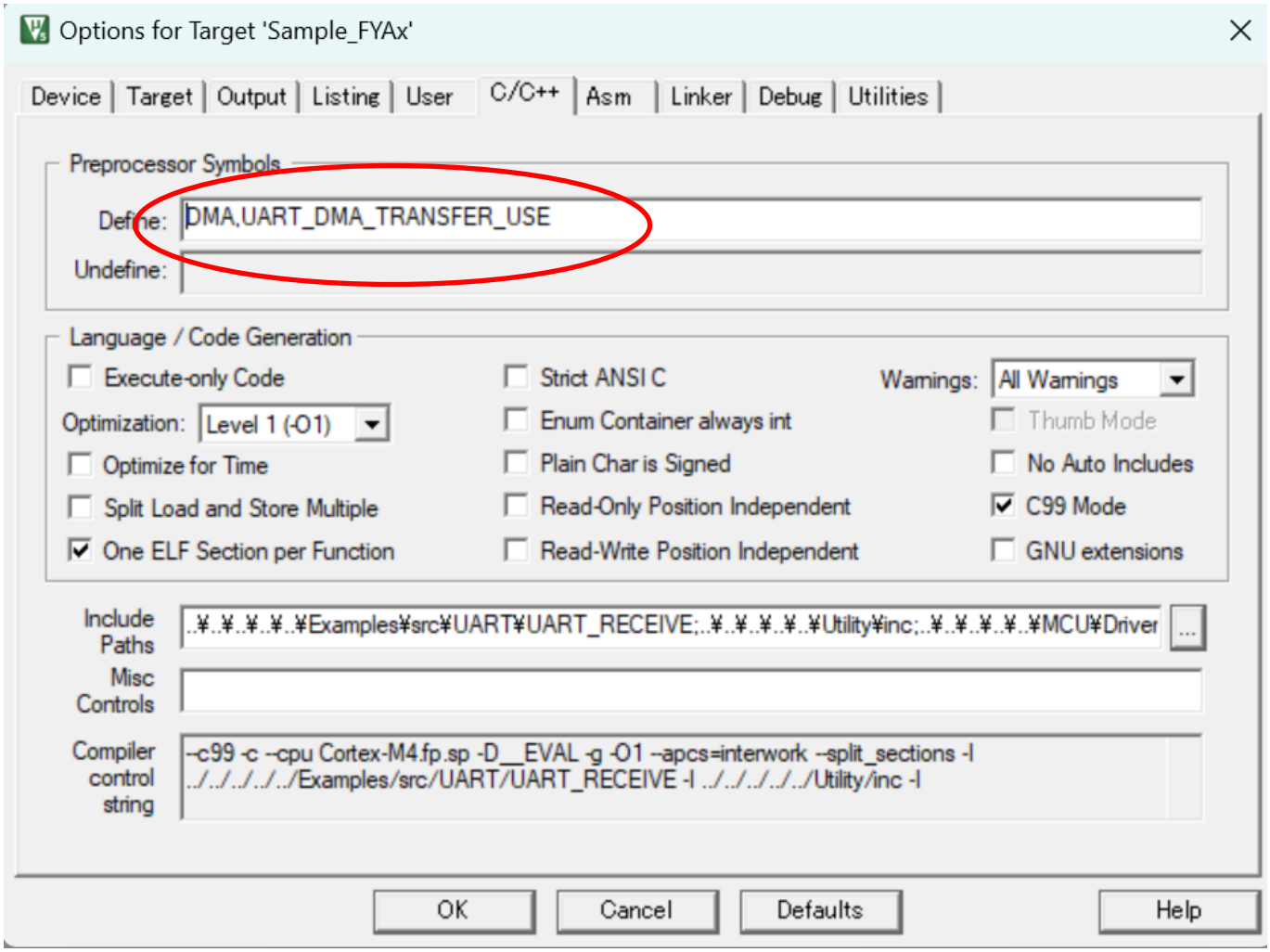
bsp_config_sbk_m4xx_dmac.c	Don't use files
bsp_config_sbk_m4xx_uart_io.c	Use files
bsp_config_sbk_m4xx_uart_io_dma.c	Don't use files

DMAC enabled:

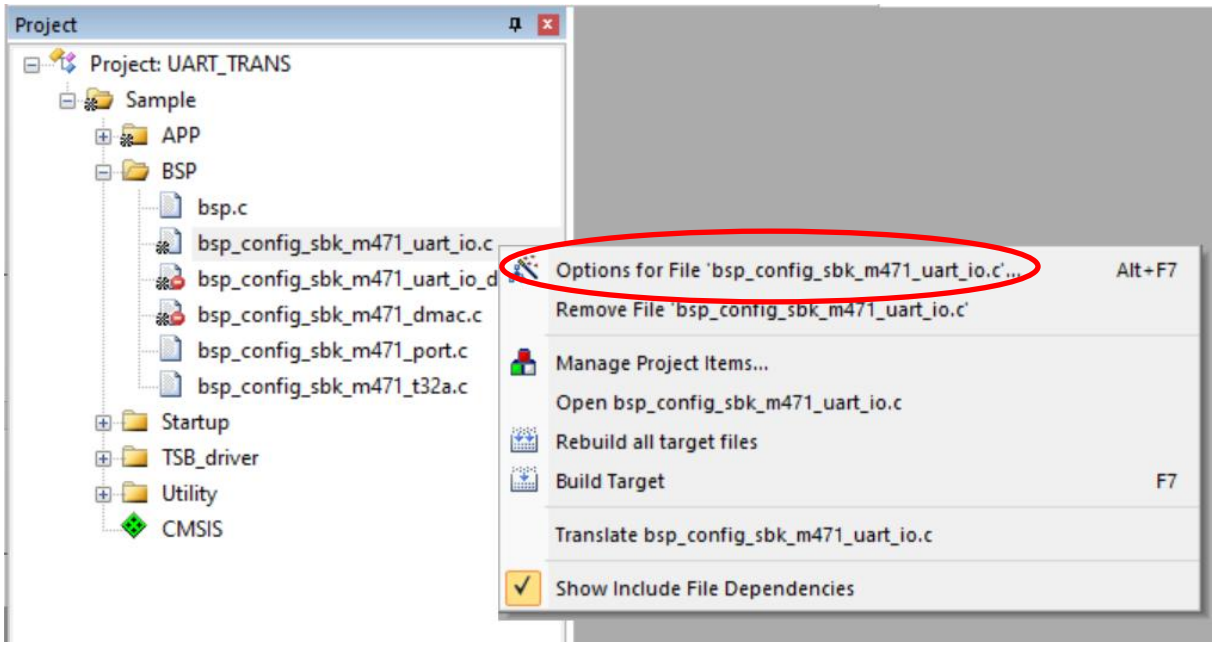
bsp_config_sbk_m4xx_dmac.c	Use files
bsp_config_sbk_m4xx_uart_io.c	Don't use files
bsp_config_sbk_m4xx_uart_io_dma.c	Use files

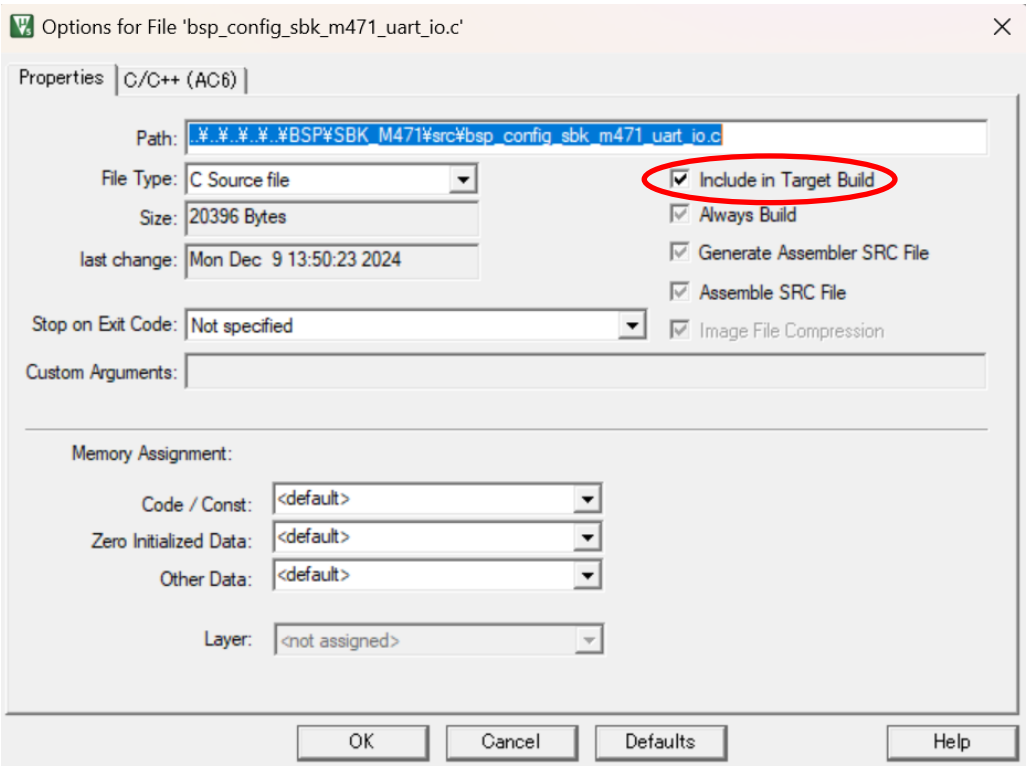
Please build after changing the settings.

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:

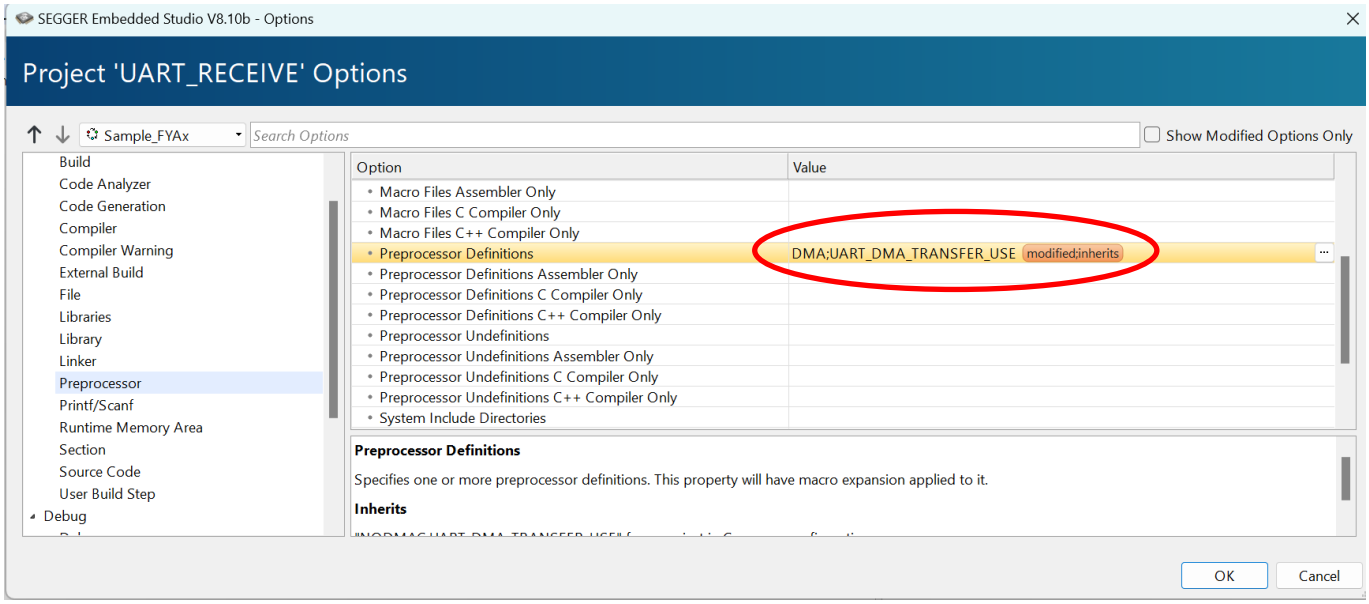
bsp_config_sbk_m4xx_dmac.c	Don't use files
bsp_config_sbk_m4xx_uart_io.c	Use files
bsp_config_sbk_m4xx_uart_io_dma.c	Don't use files

DMAC enabled:

bsp_config_sbk_m4xx_dmac.c	Use files
bsp_config_sbk_m4xx_uart_io.c	Don't use files
bsp_config_sbk_m4xx_uart_io_dma.c	Use files

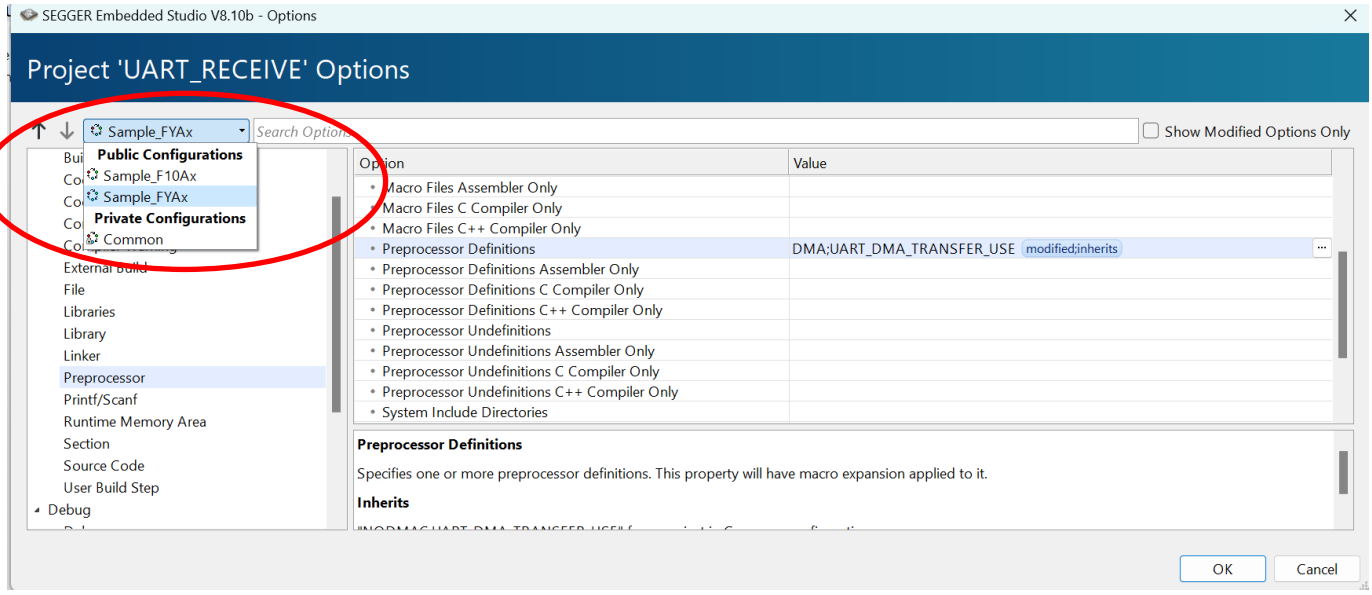
Please build after changing the settings.

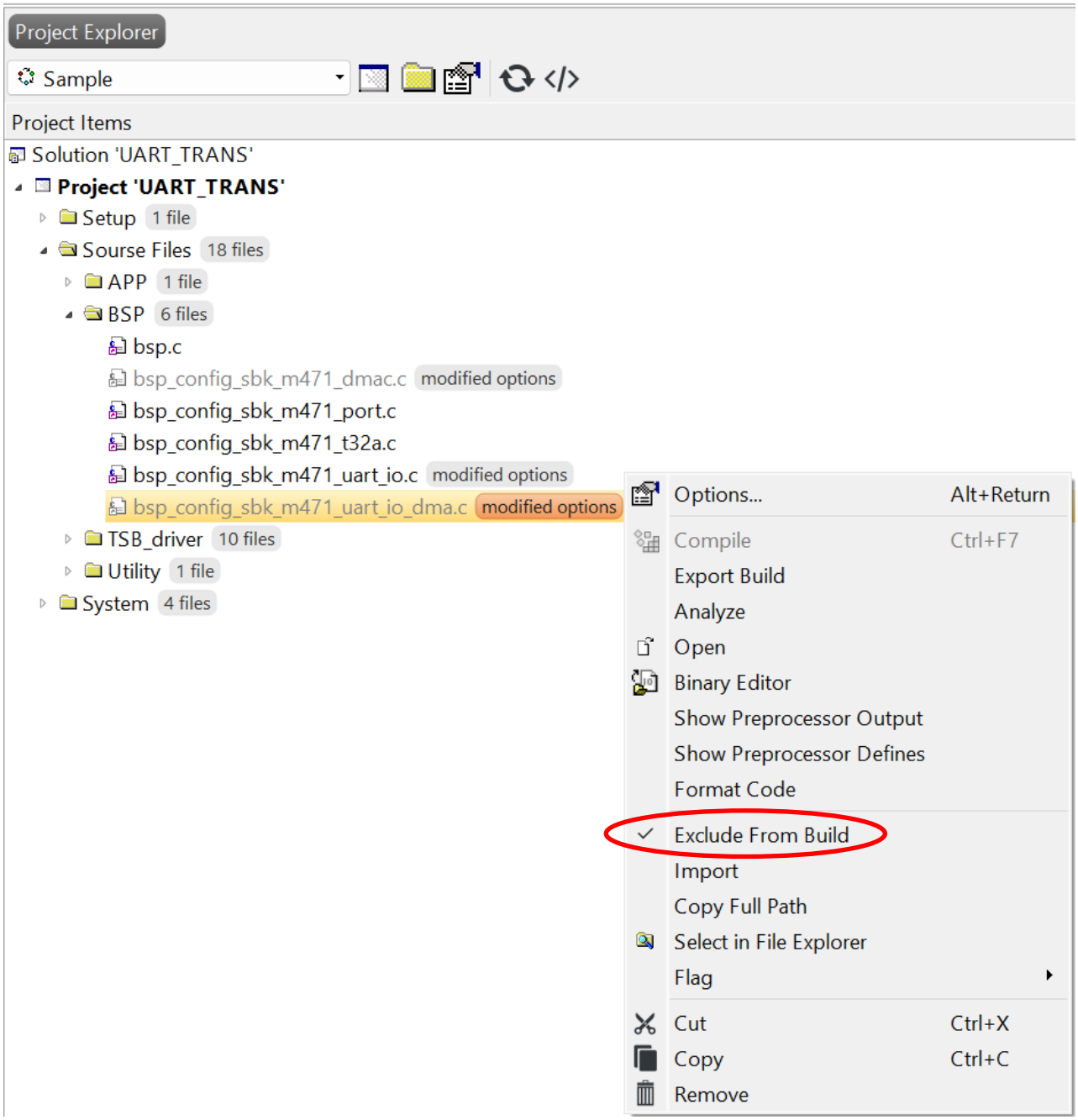
6.6.3. SEGGER Embedded Studio



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

Note: 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_m4xx_dmac.c	Don't use files
bsp_config_sbk_m4xx_uart_io.c	Use files
bsp_config_sbk_m4xx_uart_io_dma.c	Don't use files

DMAC enabled:

bsp_config_sbk_m4xx_dmac.c	Use files
bsp_config_sbk_m4xx_uart_io.c	Don't use files
bsp_config_sbk_m4xx_uart_io_dma.c	Use files

Please build after changing the settings.

6.7. DMAC Communication Setting

Startup Factors and Transfer Mode

Configuration	Description
Startup Factors	DMA Request from TSPI Driver (Request Based on FIFO level)
Transfer Mode	Singel Transfer/Unit Normal Transfer

Channel Control Data: Transfer Mode Setting [DMAChnlCfg]

Configuration	Description
Destination Address Increment	00: [1byte]
Destination Data Size	00: [1byte]
Source Address Increment	11: [No increment]
Source Data Size	00: [1byte]
Arbitration	0000: [After 1 Rotation Transfer]
Transfer Count	0x000: [1time]
Singel Transfer Setting	0: [Not used because it is not a chain transfer]
Transfer Mode	001: [Unit Normal Transfer]

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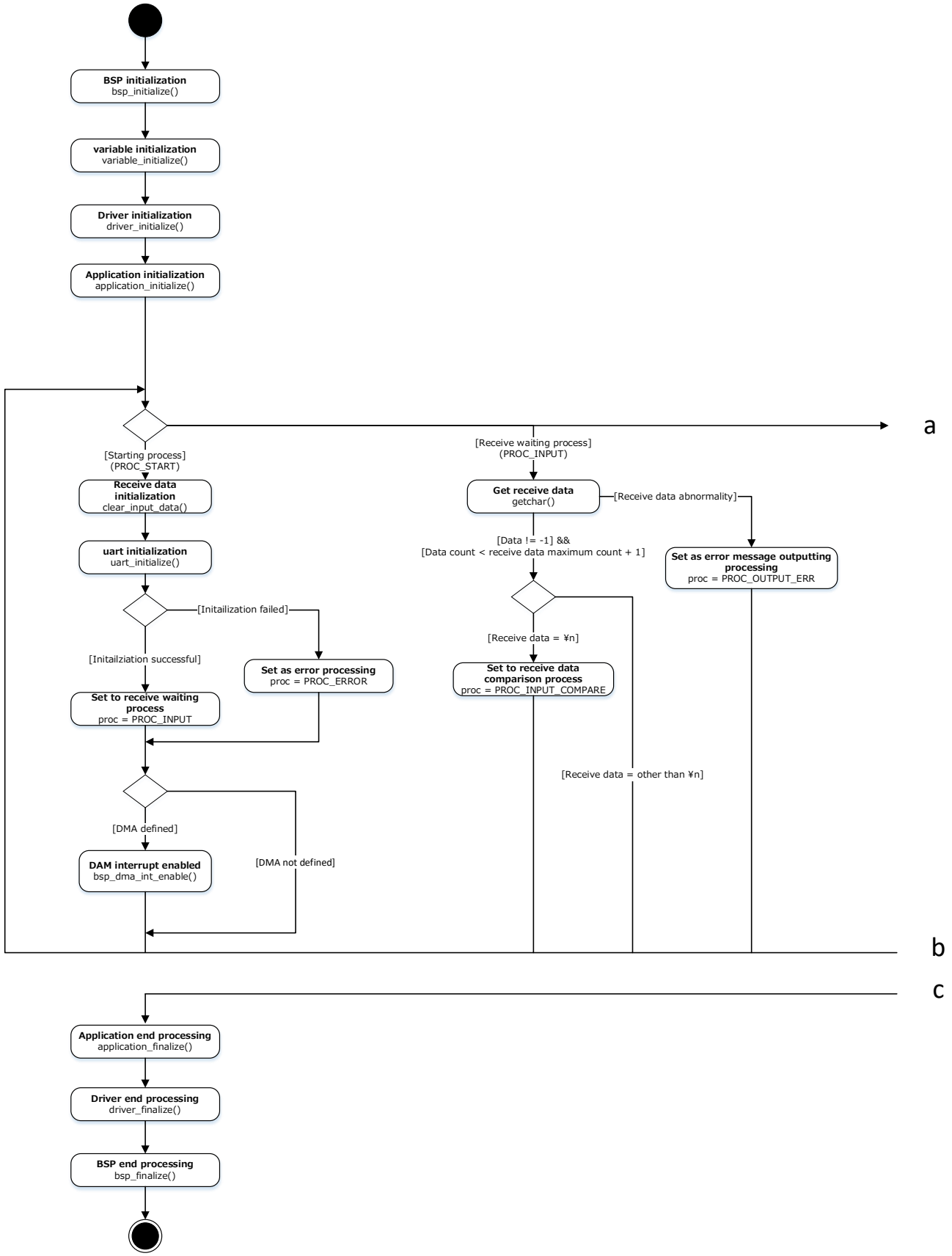
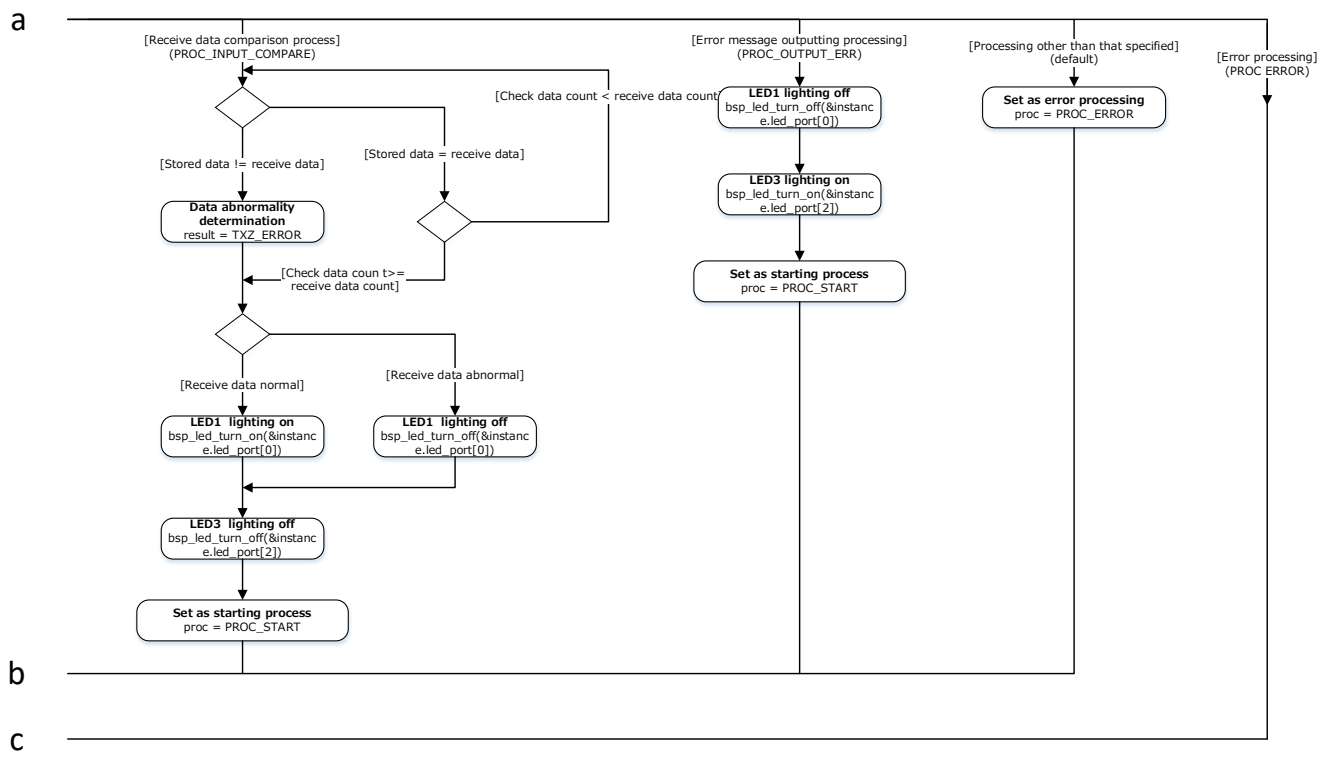
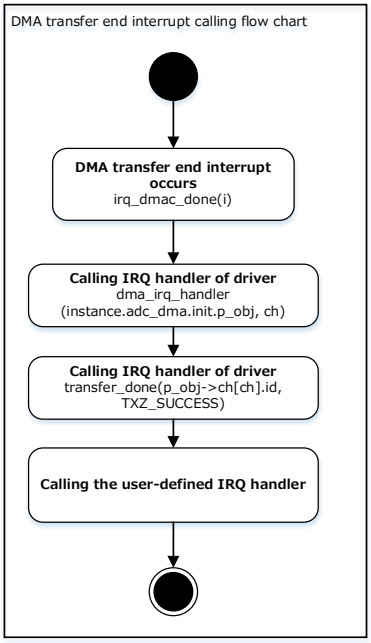
7. Activity diagram

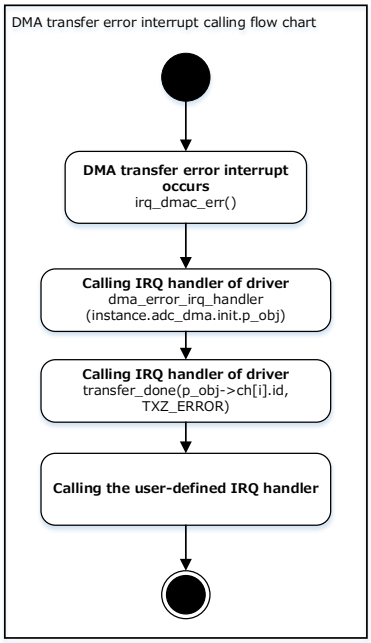
7.1. main

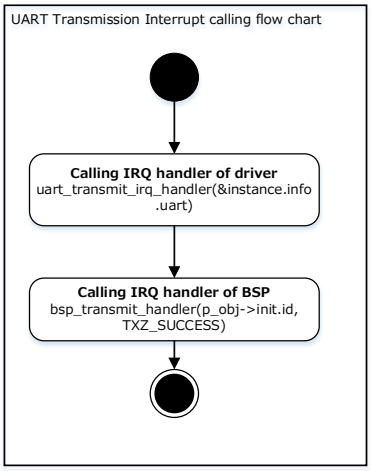


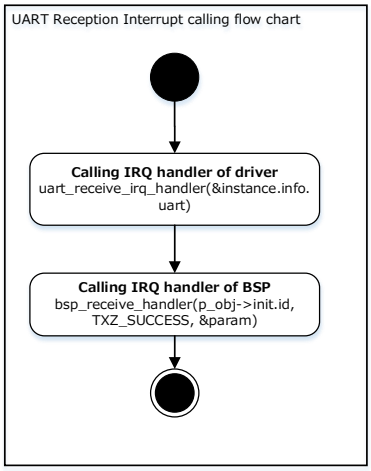

a
[Receive data comparison process]
(PROC_INPUT_COMPARE)
[Stored data != receive data]
[Stored data = receive data]
[Check data count < receive data count]
Data abnormality determination
result = TXZ_ERROR
[Check data coun t>= receive data count]
[Receive data normal]
[Receive data abnormal]
LED1 lighting on
bsp_led_turn_on(&instance.led_port[0])
LED1 lighting off
bsp_led_turn_off(&instance.led_port[0])
LED3 lighting off
bsp_led_turn_off(&instance.led_port[2])
Set as starting process
proc = PROC_START
[Error message outputting processing]
(PROC_OUTPUT_ERR)
LED1 lighting off
bsp_led_turn_off(&instance.led_port[0])
LED3 lighting on
bsp_led_turn_on(&instance.led_port[2])
Set as starting process
proc = PROC_START
[Processing other than that specified]
(default)
Set as error processing
proc = PROC_ERROR
[Error processing]
(PROC ERROR)
b
c

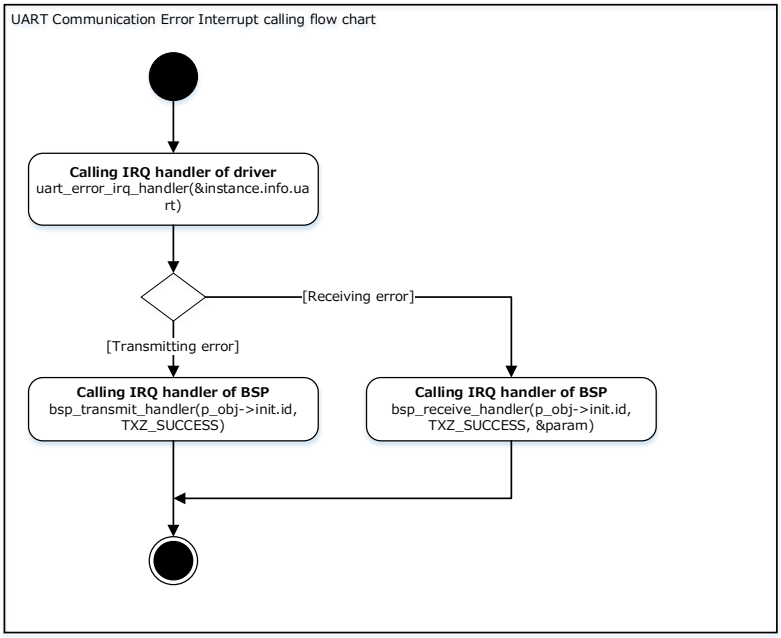
7.2. Interrupt











8. Revision History

Revision	Date	Description
1.0	2025-01-20	First release
1.1	2025-10-30	6.3 Interrupt to Use Added M3H Interrupt Name.
1.2	2026-07-30	6.3 Interrupt to Use Detailed information is transcribed into the User's Manual

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