Application Note

ADC_Monitor
(ADC-I)

Table of Contents

1. Preface

This application note describes sample software for the analog-to-digital converter (ADC) monitoring function.
This document helps the user check operation of a product under development and develop its program.

2. Technical Term

Term/Abbreviation	Definition
ADC	Analog-to-Digital Converter
BSP	Board Support Package
CG	Clock Control and Operation Mode
Timer	T32A:32-bit Timer Event Counter
UART	Universal Asynchronous Receiver Transmitter

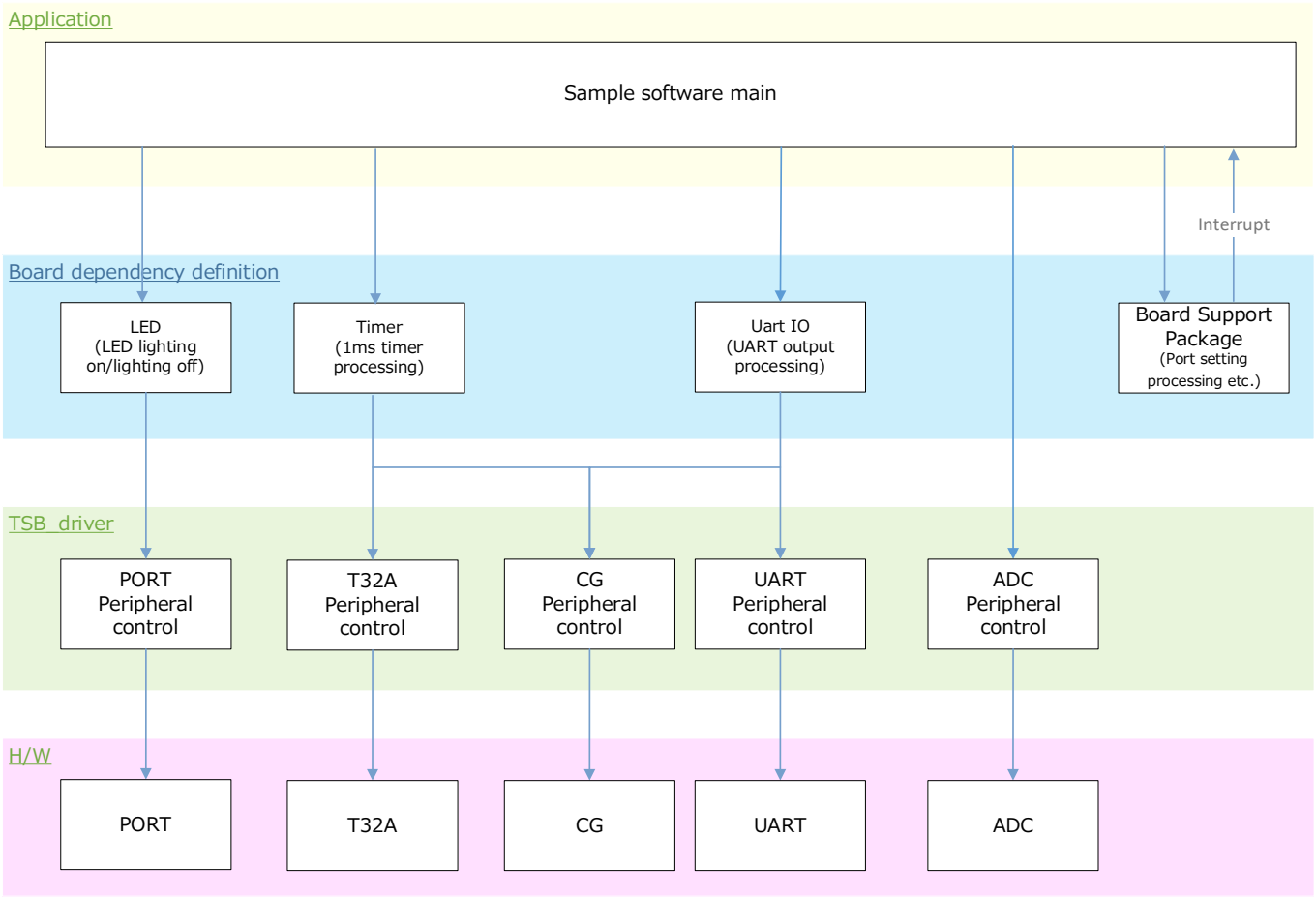
3. Reference Document

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
ADC_Monitor	Sample program of ADC monitoring function

5. Configuration Diagram



6. Sample Program:ADC_Monitor

This is sample software that changes the LED display pattern according to variable resistance value changes using the ADC monitoring function.

6.1. Outlines of Operation

Measure the output voltage of BSP_VR_1 with ADC.
When the acquired value is less than or equal to CMPValueA, BSP_LED_1 and BSP_LED_2 are turned off.
If the obtained reading is CMPValueA large and lower than CMPValueB, BSP_LED_1 turns off and BSP_LED_2 turns on.
If the acquired value is equal to or greater than CMPValueB, BSP_LED_1 and BSP_LED_2 are turns on.

BSP_VR_1 value	BSP_LED_1	BSP_LED_2	Description
BSP_VR_1 ≦ CMPValueA	OFF	OFF	-
CMPValueA < BSP_VR_1 < CMPValueB	OFF	ON	-
CMPValueB ≦ BSP_VR_1	ON	ON	-

For the values of CMPValue A and B, refer to 6.4. Configuration.

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
ADC	BSP_VR_1	Variable resistance value
PORT	BSP_LED_1	For operation check
	BSP_LED_2	For operation check
UART	BSP_UART_1	For terminal emulator communication (Outputs log)
T32A	BSP_T32A_TIMER_1	interval timer

6.3. Interrupt to Use

Interrupt	Outlines
INTUART0RX	UART ch0 Receive interrupt for terminal emulator
INTUART0TX	UART ch0 Transmission interrupt for terminal emulator
INTUART0ERR	UART ch0 Error interrupt for terminal emulator
INTT32A00A	T32A Timer A Timer counter increment every 1ms for display update
INTADACP0	ADC monitor for variable resistance value (CMPValueA) For information monitoring
INTADACP1	ADC monitor for variable resistance value (CMPValueB) For information monitoring

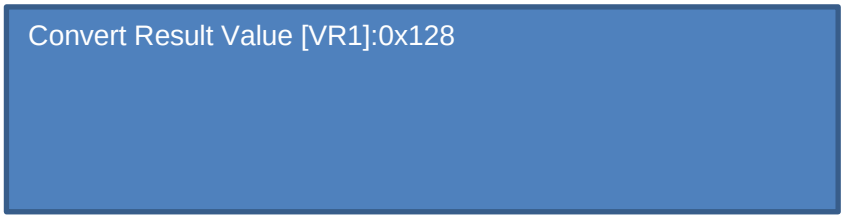
6.4. Configuration

“main.c” configuration setting.

Configuration	Current Value	Description
Timer A	5s	-
CMPValueA	0x555	-
CMPValueB	0xAAA	-

6.5. Example of Terminal Emulator Output

6.5.1. Normal Operation

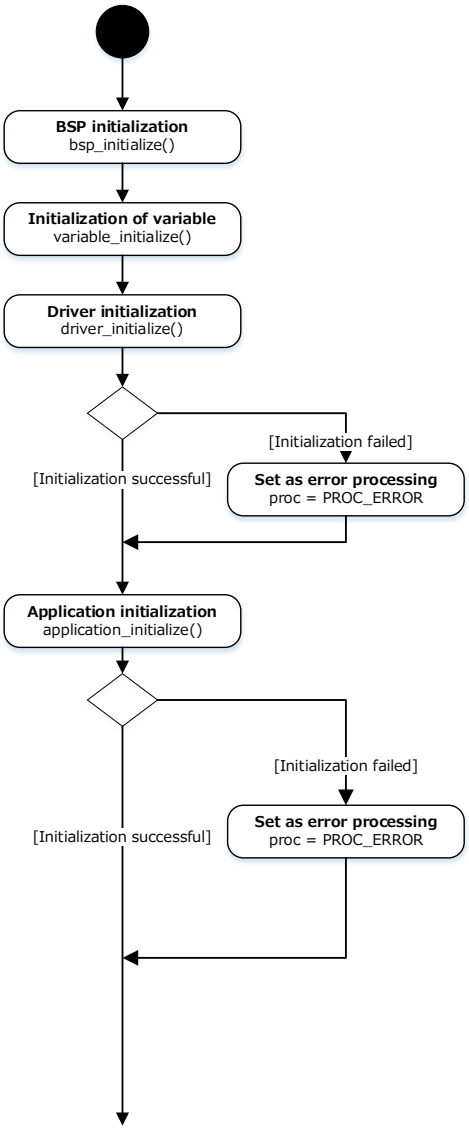


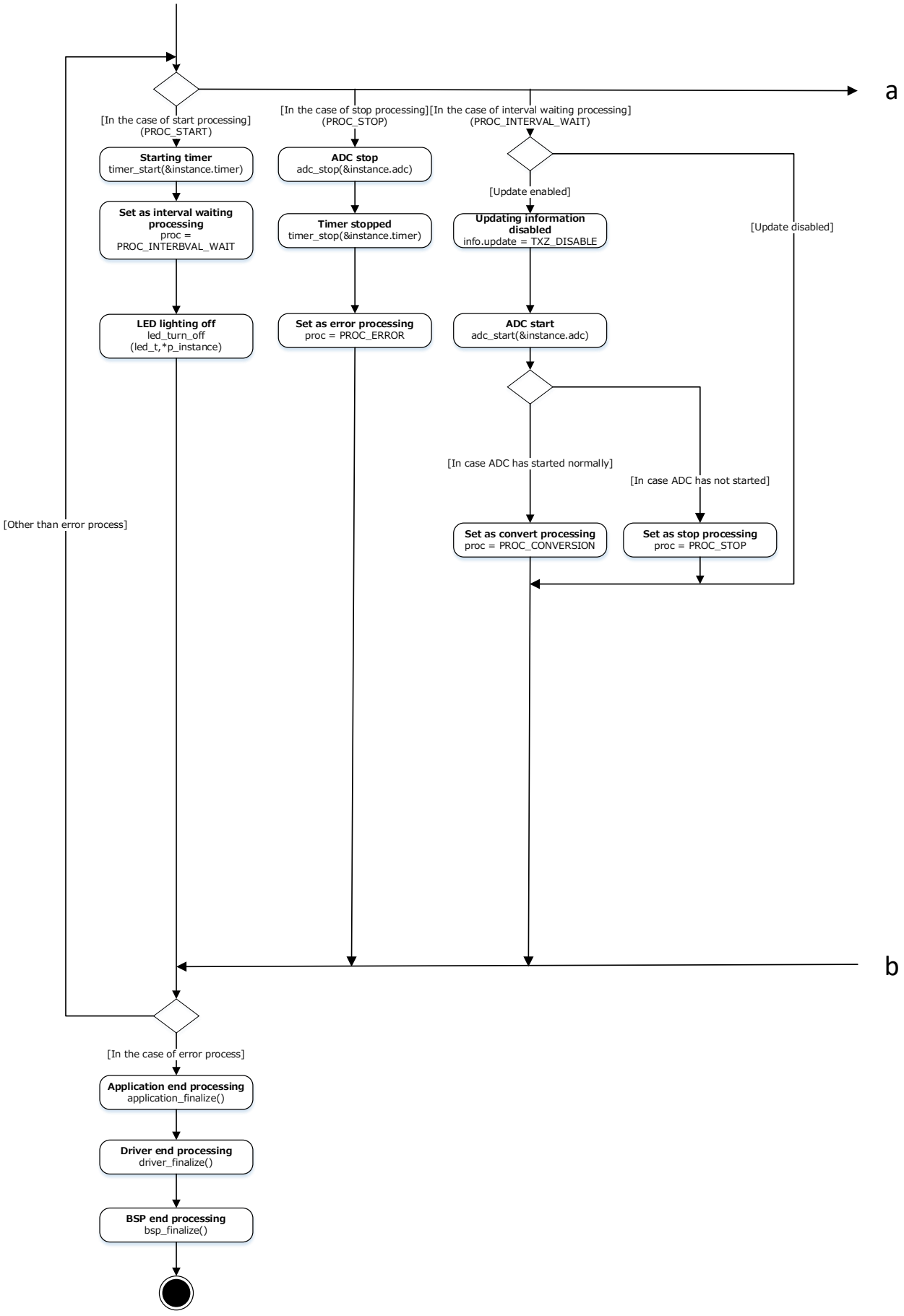
6.5.2. Case of Error Occurrence

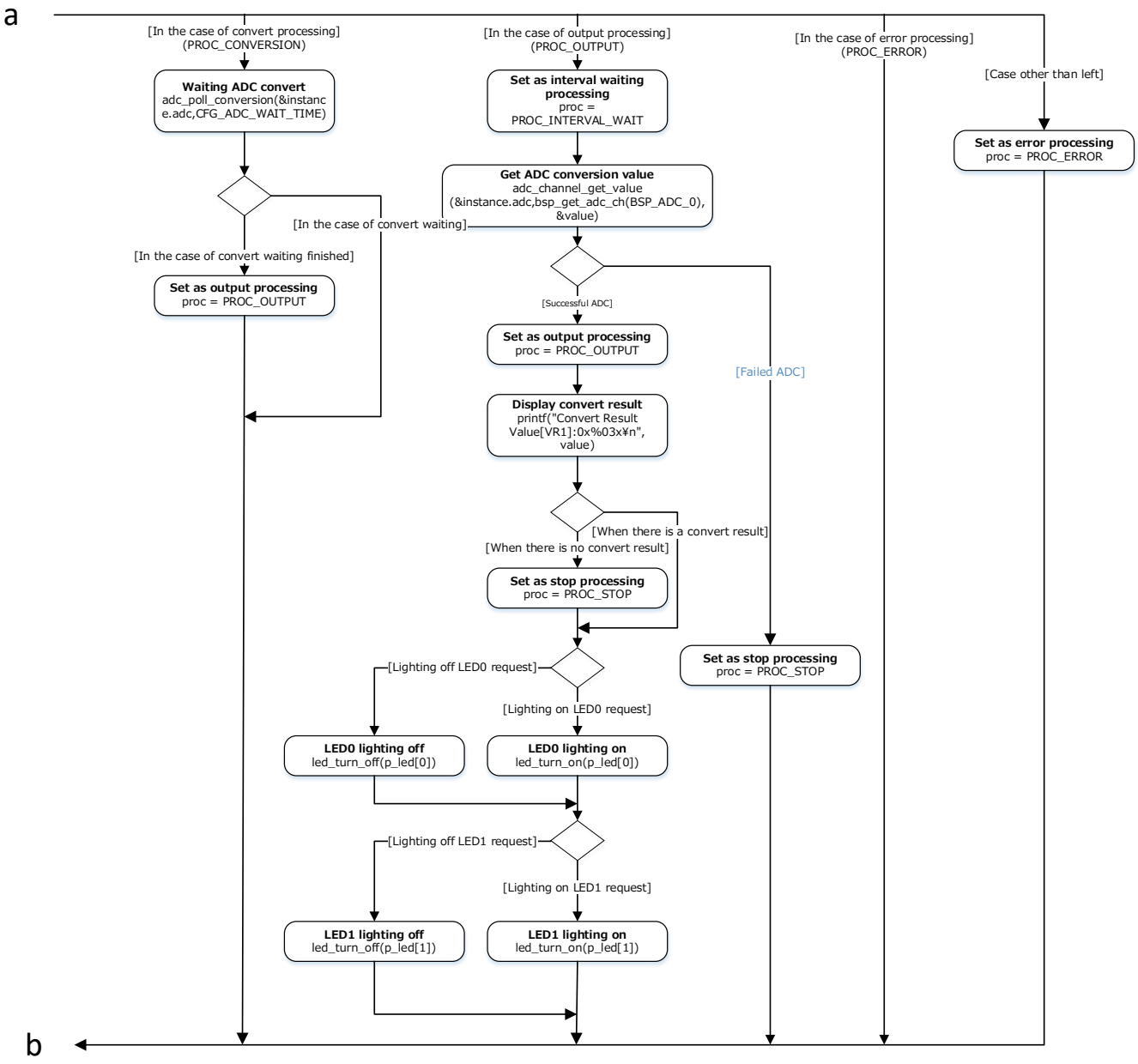
Nothing.

7. Activity diagram

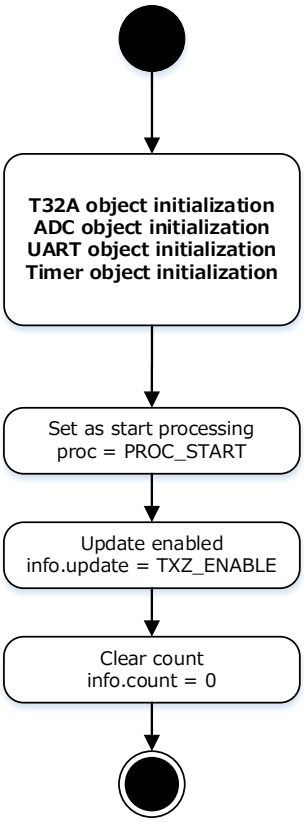
7.1. main



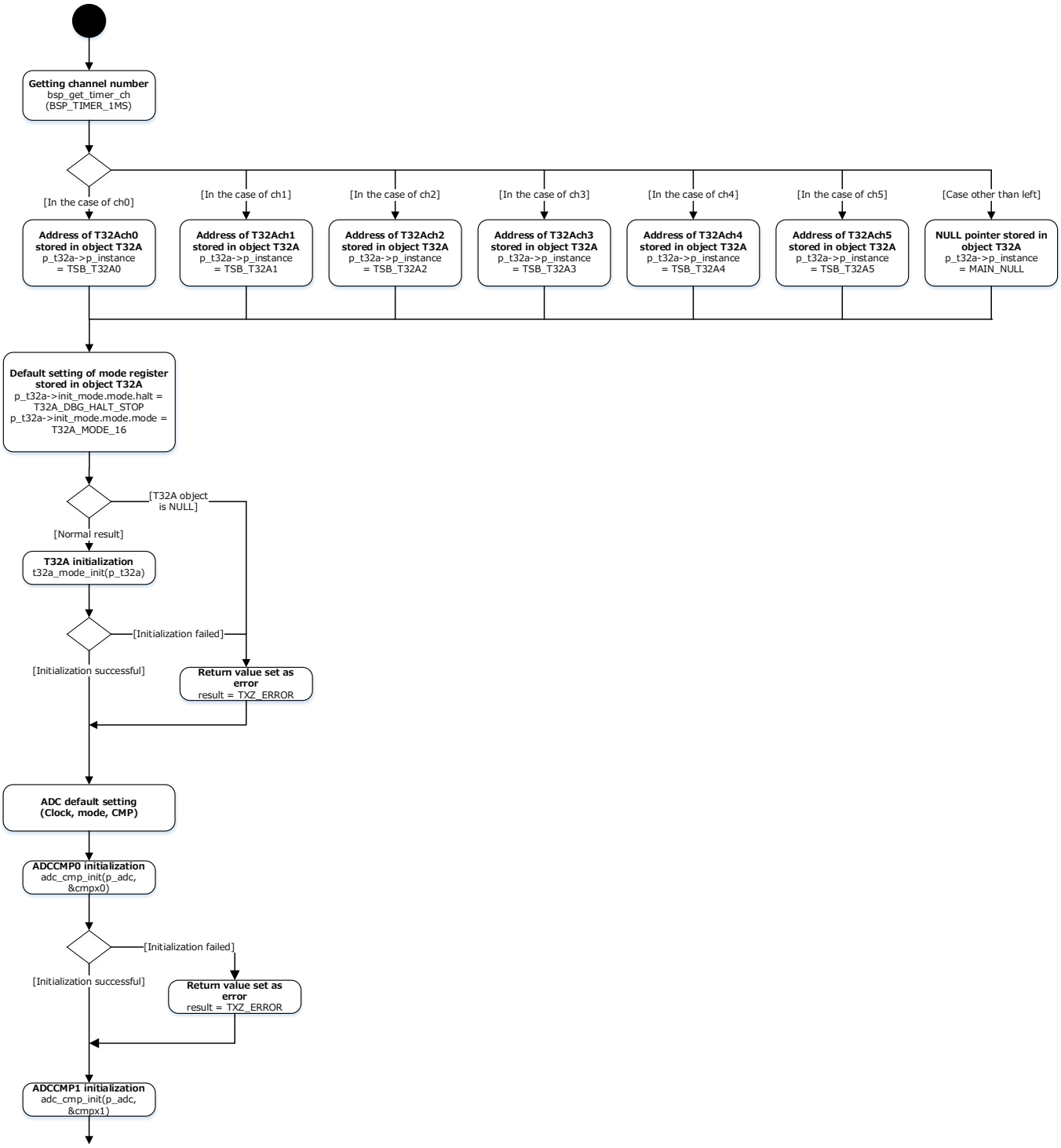

a
[In the case of start processing]
(PROC_START)
[In the case of stop processing]
(PROC_STOP)
[In the case of interval waiting processing]
(PROC_INTERVAL_WAIT)
Starting timer
timer_start(&instance.timer)
ADC stop
adc_stop(&instance.adc)
[Update enabled]
Set as interval waiting processing
proc = PROC_INTERBVAL_WAIT
Timer stopped
timer_stop(&instance.timer)
Updating information disabled
info.update = TXZ_DISABLE
[Update disabled]
LED lighting off
led_turn_off (led_t,*p_instance)
Set as error processing
proc = PROC_ERROR
ADC start
adc_start(&instance.adc)
[In case ADC has started normally]
[In case ADC has not started]
[Other than error process]
Set as convert processing
proc = PROC_CONVERSION
Set as stop processing
proc = PROC_STOP
b
[In the case of error process]
Application end processing
application_finalize()
Driver end processing
driver_finalize()
BSP end processing
bsp_finalize()

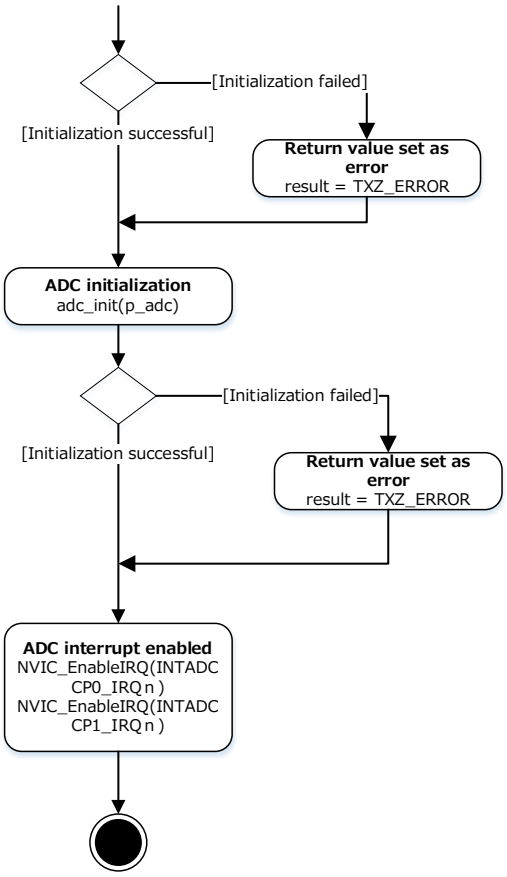

a
[In the case of convert processing]
(PROC_CONVERSION)
Waiting ADC convert
adc_poll_conversion(&instance.adc,CFG_ADC_WAIT_TIME)
[In the case of convert waiting]
[In the case of convert waiting finished]
Set as output processing
proc = PROC_OUTPUT
[In the case of output processing]
(PROC_OUTPUT)
Set as interval waiting processing
proc = PROC_INTERVAL_WAIT
Get ADC conversion value
adc_channel_get_value (&instance.adc,bsp_get_adc_ch(BSP_ADC_0), &value)
[Successful ADC]
[Failed ADC]
Set as output processing
proc = PROC_OUTPUT
Display convert result
printf("Convert Result Value[VR1]:0x%03x¥n", value)
[When there is a convert result]
[When there is no convert result]
Set as stop processing
proc = PROC_STOP
[Lighting off LED0 request]
[Lighting on LED0 request]
LED0 lighting off
led_turn_off(p_led[0])
LED0 lighting on
led_turn_on(p_led[0])
[Lighting off LED1 request]
[Lighting on LED1 request]
LED1 lighting off
led_turn_off(p_led[1])
LED1 lighting on
led_turn_on(p_led[1])
Set as stop processing
proc = PROC_STOP
[In the case of error processing]
(PROC_ERROR)
[Case other than left]
Set as error processing
proc = PROC_ERROR
b

7.2. variable_initalize

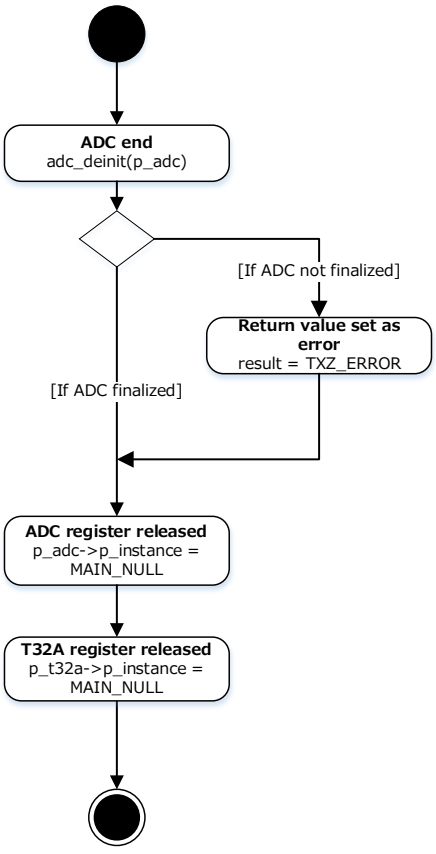


7.3. driver_initialize

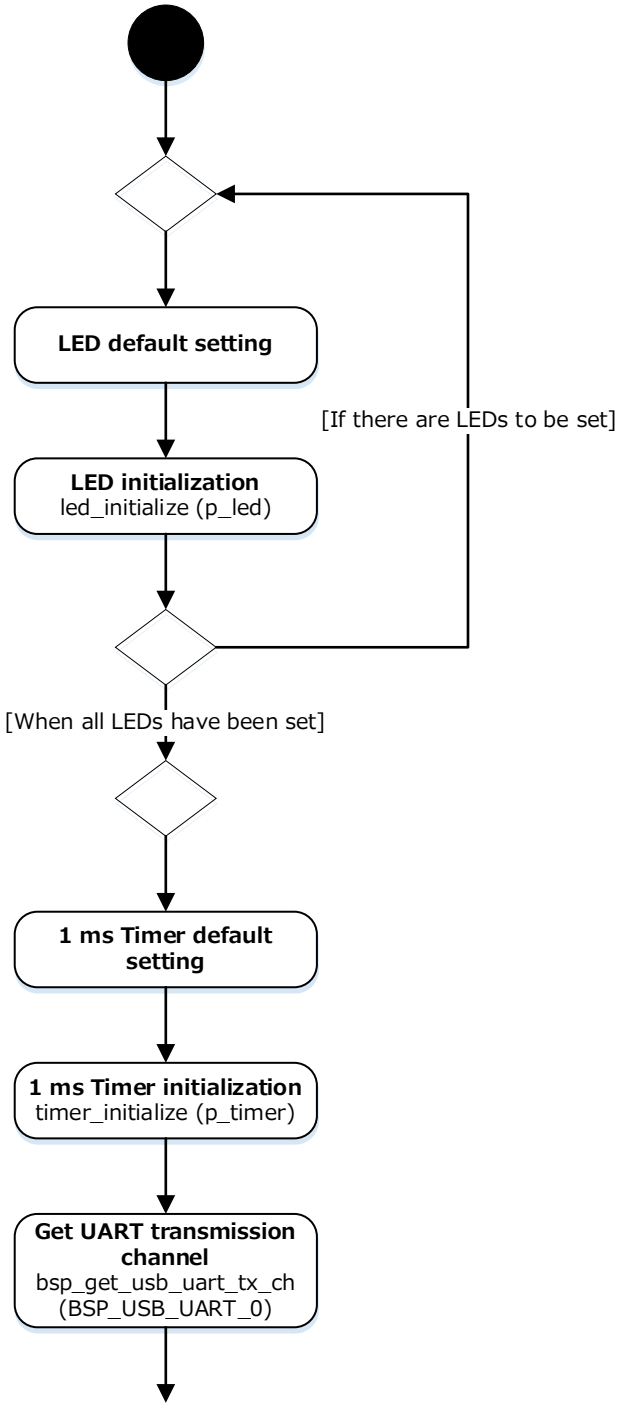


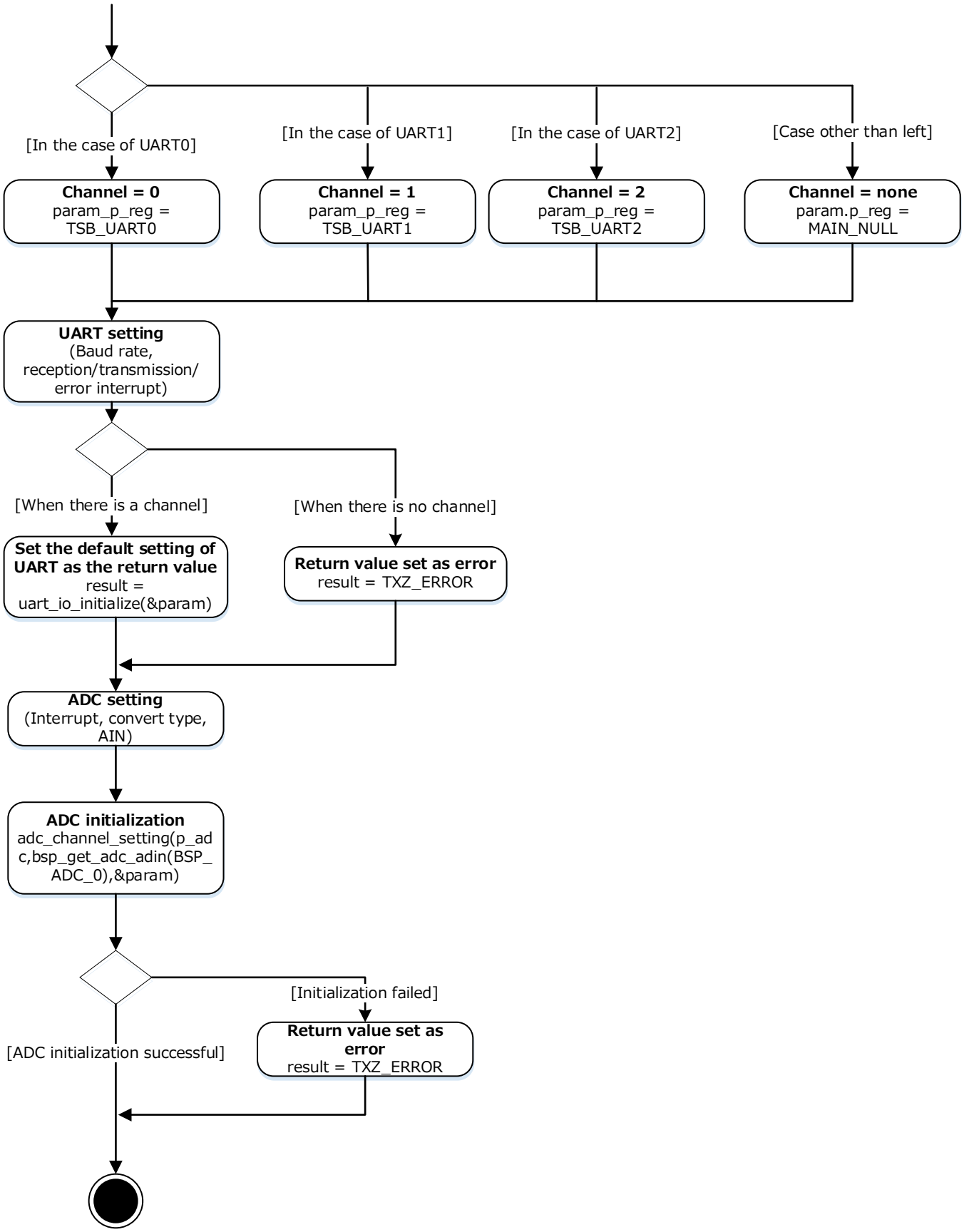


7.4. driver_finalize

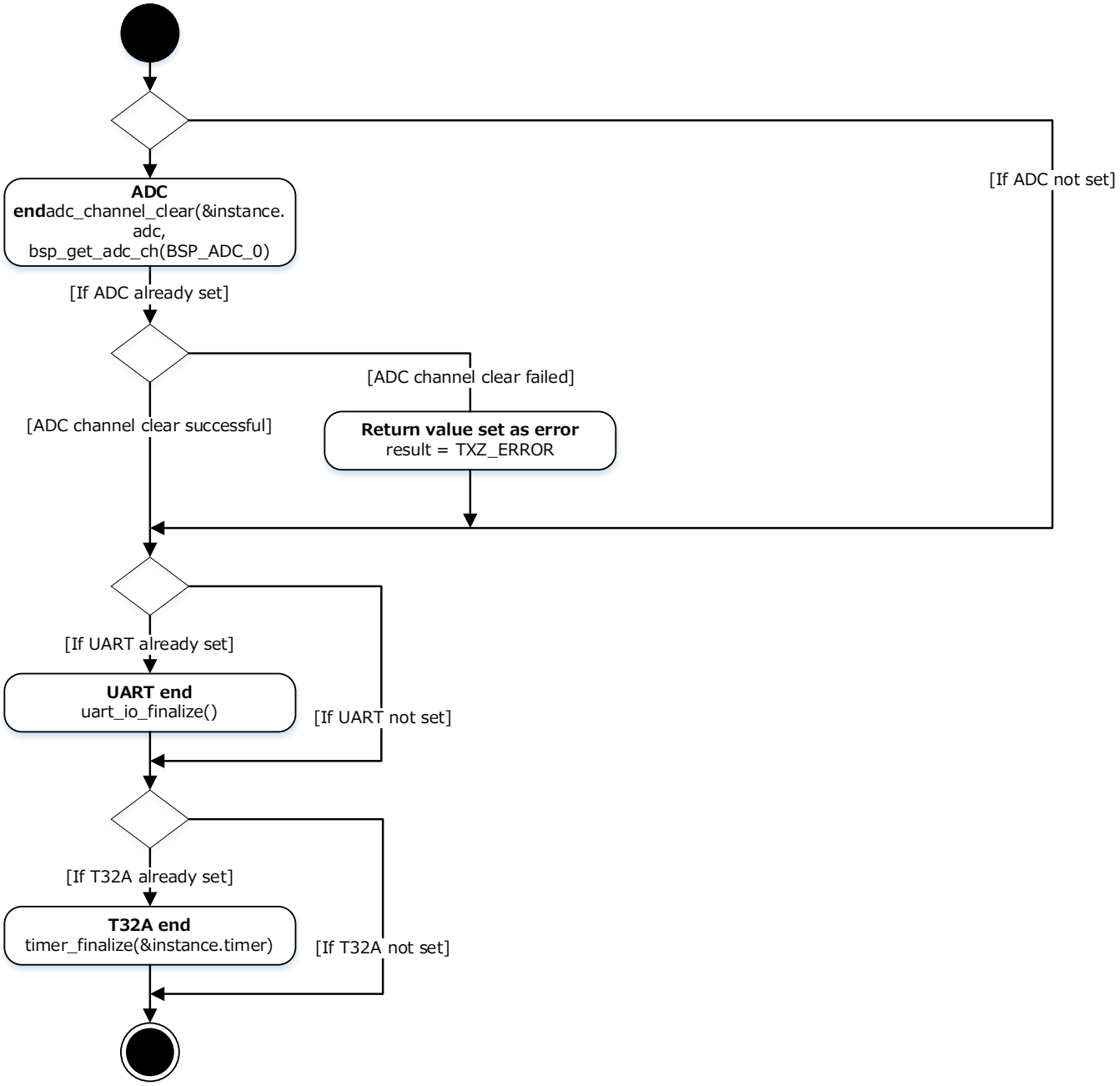


7.5. application_initialize

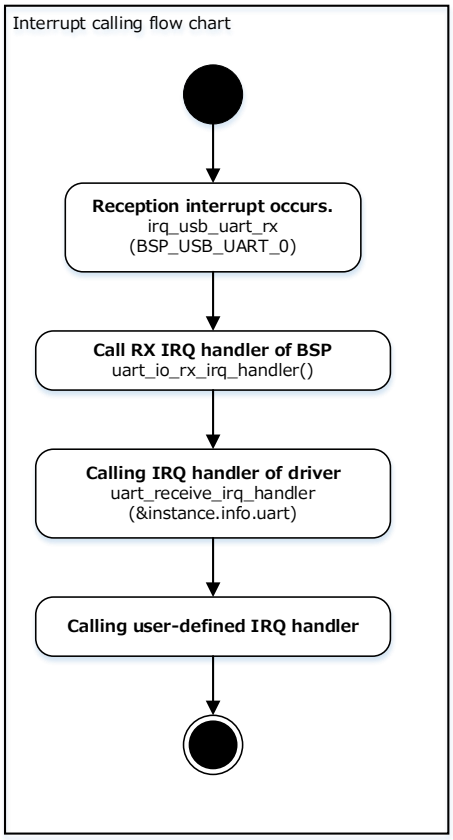


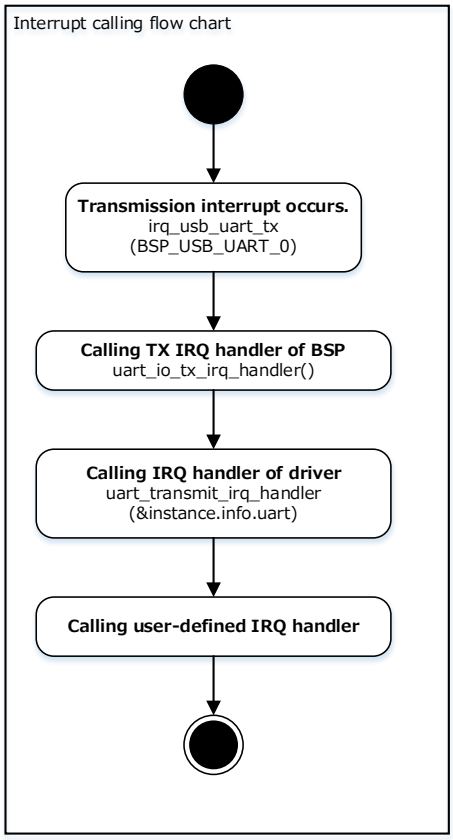


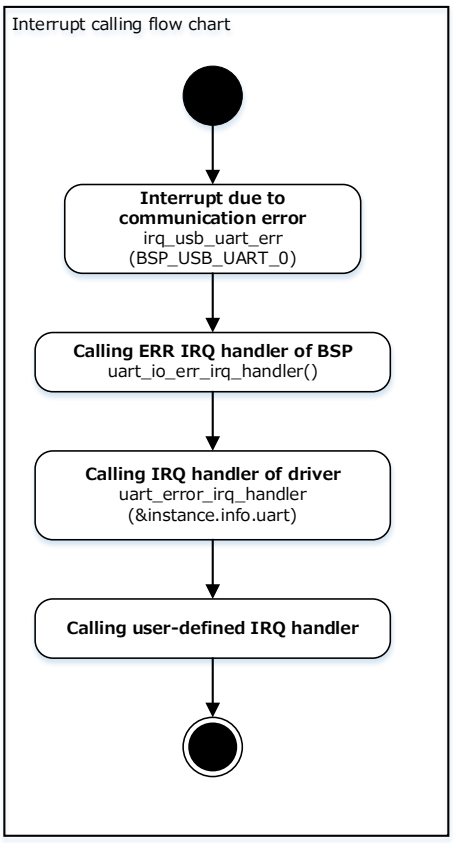
7.6. application_finalize

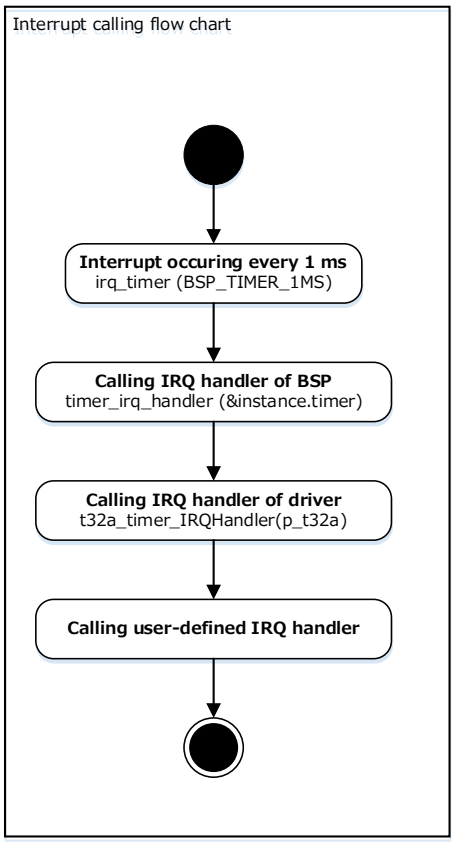


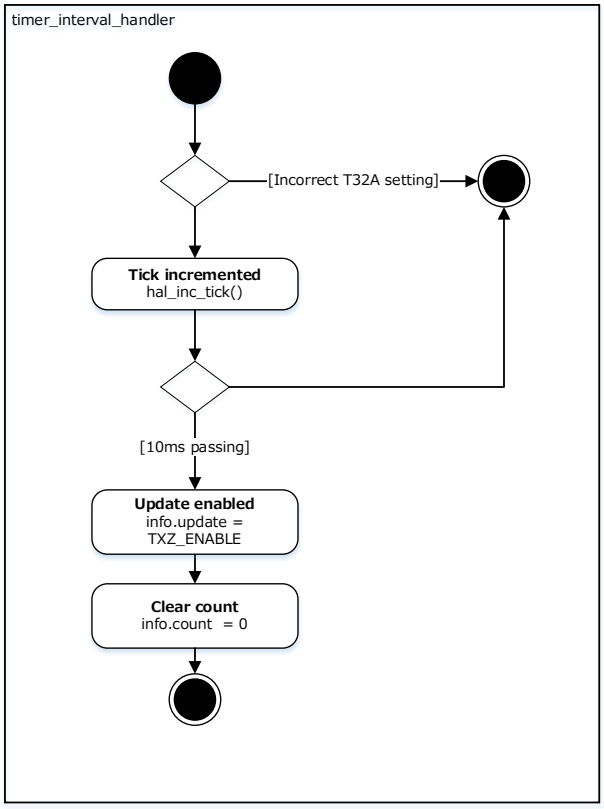
7.7. Interrupt

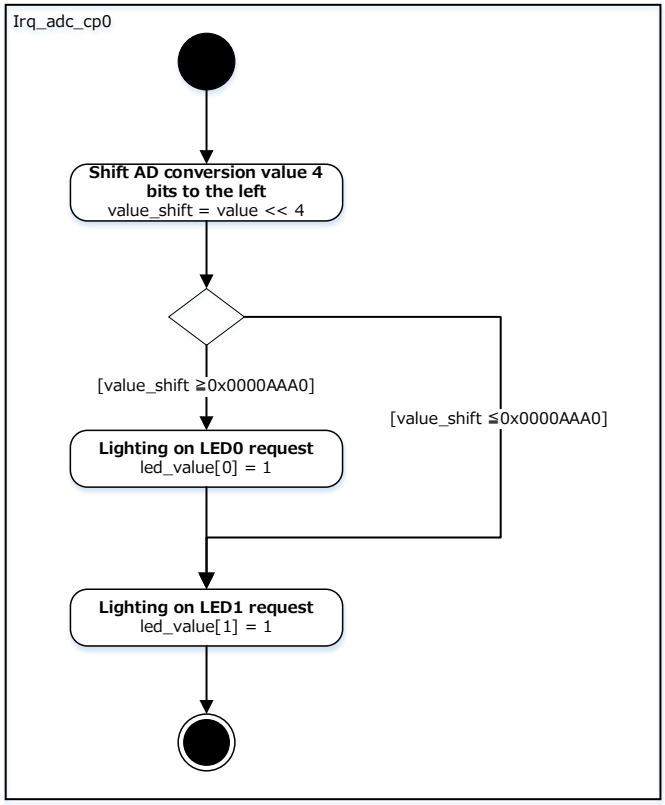


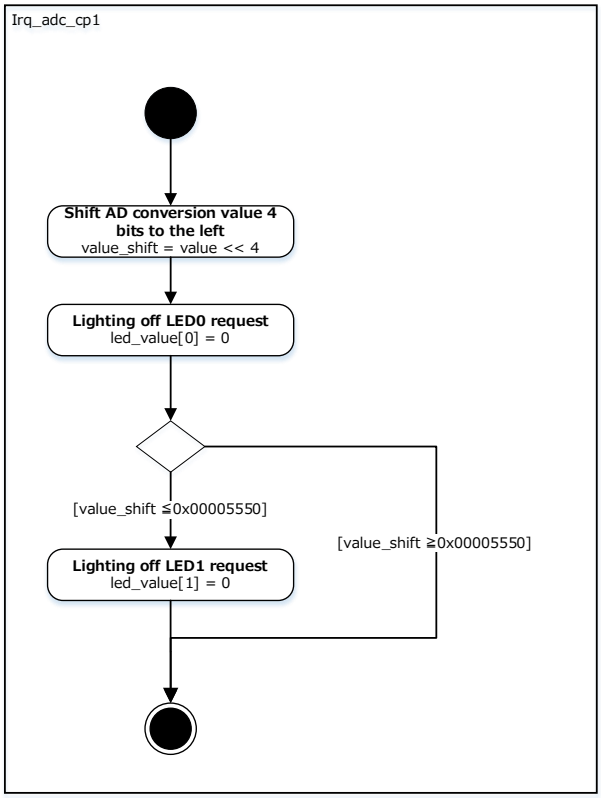












8. Revision History

Revision	Date	Description
1.0	2023-10-16	First release

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