

## Application Note

### ADC NTC Monitor

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## 1. Preface

This application note describes sample software Adc\_NTC\_Monitor that uses the 12bit analog-to-digital converter (ADC).

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

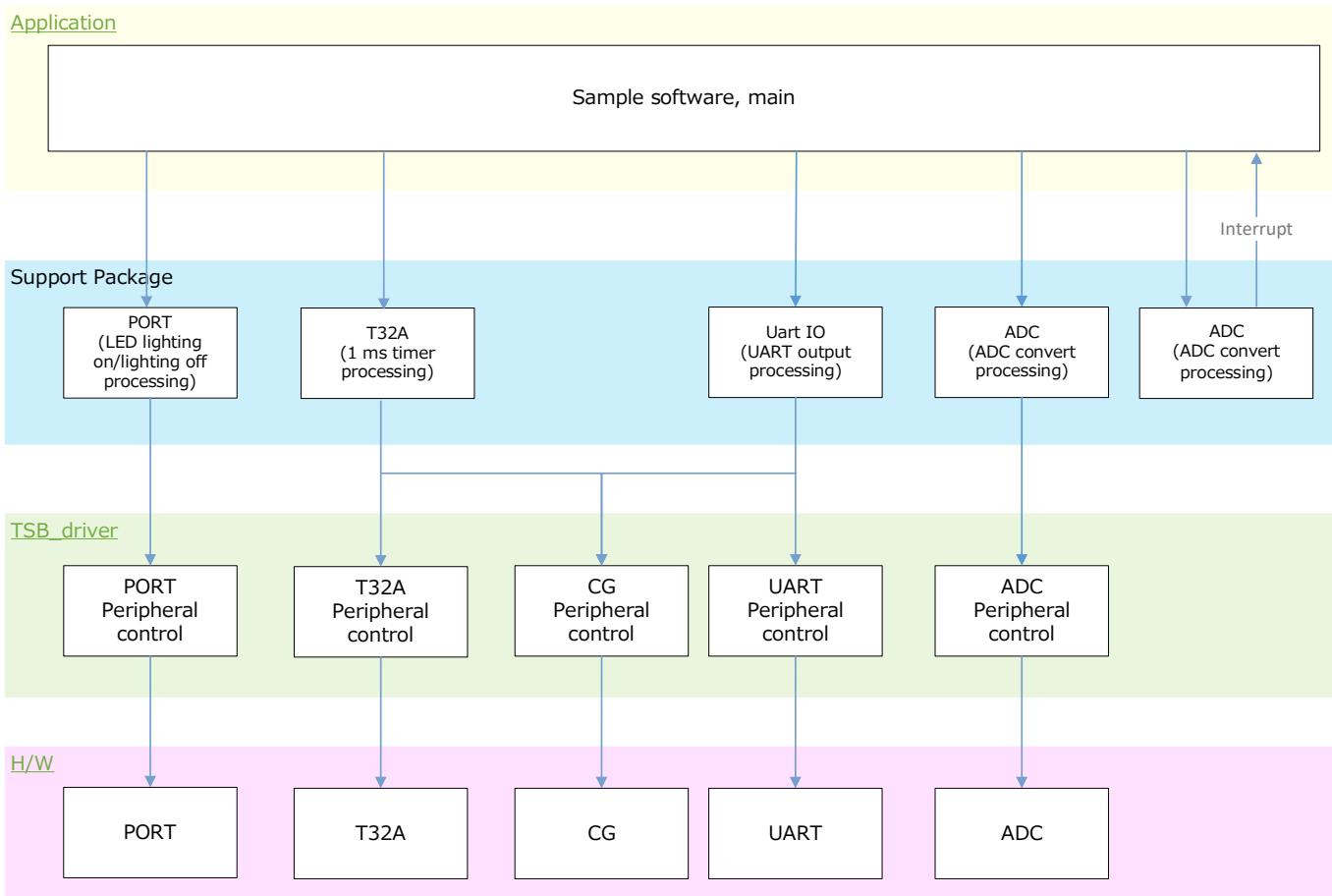
## 3. Reference Document

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_NTC_Monitor	Sample program measures the output voltage of a thermistor using ADC and monitoring function.

## 5. Configuration Diagram



## 6. Sample Program: ADC\_NTC\_Monitor

This is sample software that changes the LED display pattern according to temperature changes using the ADC monitoring function. The calculated temperature is also output to the terminal software.

### 6.1. Outlines of Operation

Measure the output voltage of BSP\_THERMISTOR\_1 with ADC. The calculated temperature is output to the terminal software.

When the acquired value is less than Temperature A, BSP\_LED\_1 and BSP\_LED\_2 light off.

If the obtained reading is larger than Temperature A and lower than Temperature B, BSP\_LED\_1 lights off and BSP\_LED\_2 lights on.

If the acquired value is greater than Temperature B, BSP\_LED\_1 and BSP\_LED\_2 light on.

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

BSP_THERMISTOR_1 Temperature-converted Value	BSP_LED_1	BSP_LED_2	Explanation
BSP_THERMISTOR_1 < Temperature A	light off	light off	-
Temperature A $\leq$ BSP_THERMISTOR_1 < Temperature B	light off	light on	-
Temperature B $\leq$ SP_THERMISTOR_1	light on	light on	-

### 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_THERMISTOR_1	For thermistor
PORT (LED)	BSP_LED_1	For operation check
	BSP_LED_2	For operation check
UART	BSP_UART_1	For terminal emulator communication, output operation log
T32A	BSP_T32A_TIMER_1	As a 1ms interval timer

### 6.3. Interrupt to Use

Interrupt	Outlines
(Note1)	UART Transmission interrupt for terminal emulator
(Note2)	UART Error Interrupt for terminal emulator
(Note3)	T32A Timer A Timer Counter increment every 1ms
INTADACP0	ADC monitor. For monitoring temperature information (Temperature A)
INTADACP1	ADC monitor. For monitoring temperature information (Temperature B)

Note1: For AdBun-M3HQA, "INTUART0TX".

Note2: For AdBun-M3HQA, "INTUART0ERR".

Note3: For AdBun-M3HQA, "INTT32A00AC".

### 6.4. Configuration

Configuration setting.

Configuration	Soft Definition Name	Current Value (Defaults)	Description
Timer A	CFG_OUTPUT_INTERVAL	5000	Output interval (Unit: ms)
Temperature A	CFG_ADC_CMP_VALUE_A	25	25 degrees Celsius
Temperature B	CFG_ADC_CMP_VALUE_B	36	36 degrees Celsius

## 6.5. Example of Terminal Emulator Output

### 6.5.1. Normal Operation

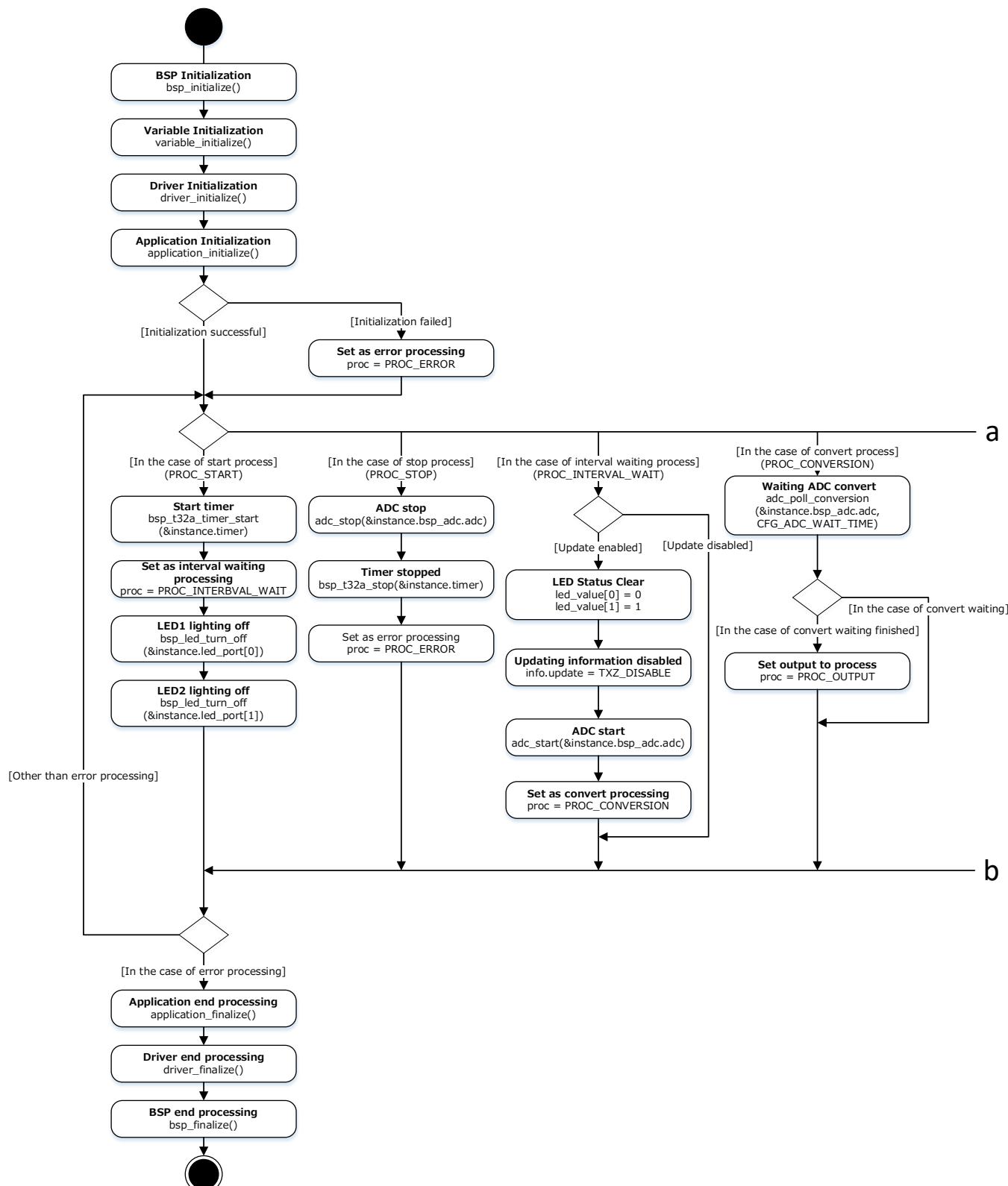
Convert Result Value[THERMISTOR]:0x128(26 degrees)

### 6.5.2. Case of Error Occurrence

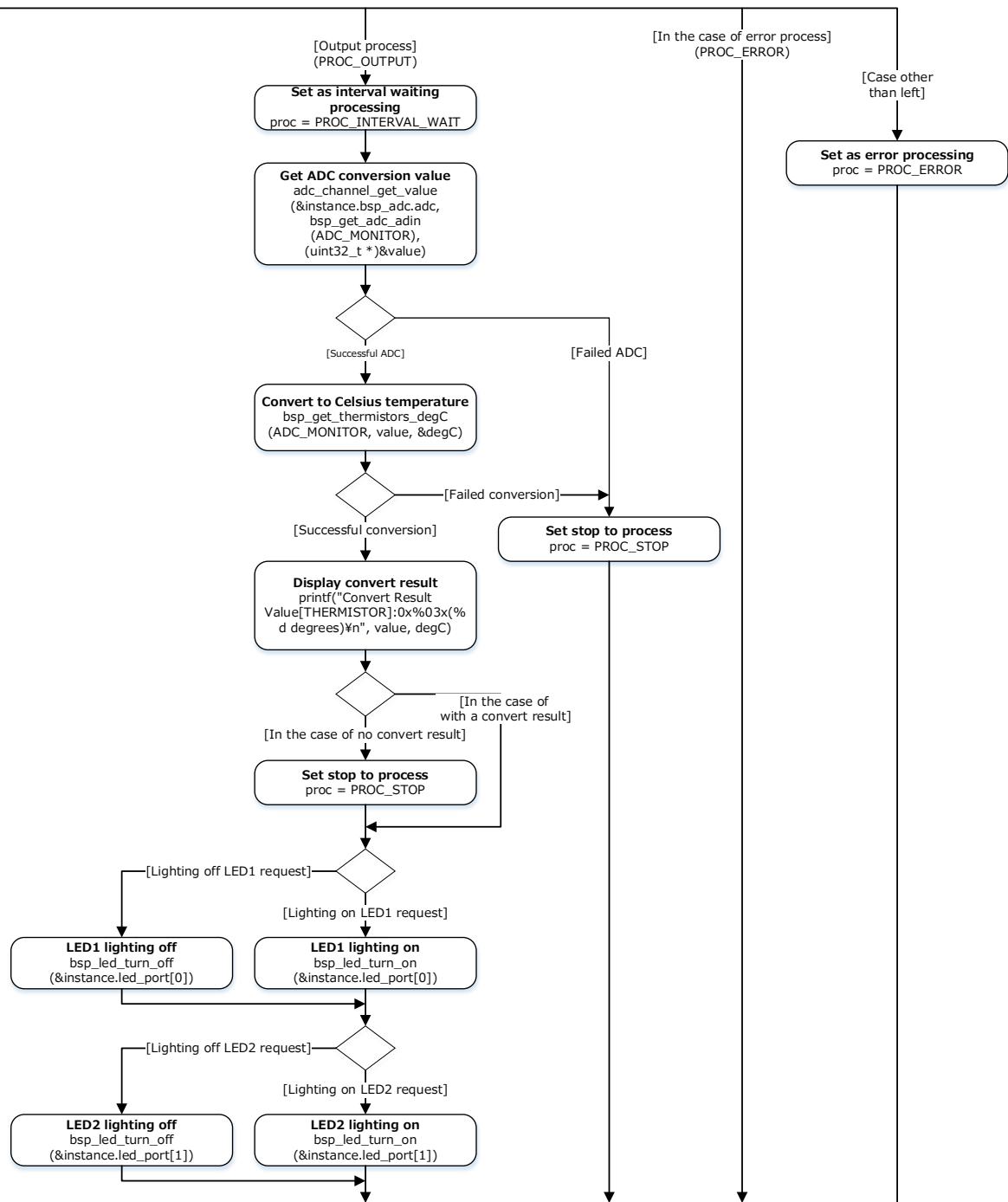
Nothing.

## 7. Activity diagram

### 7.1. main

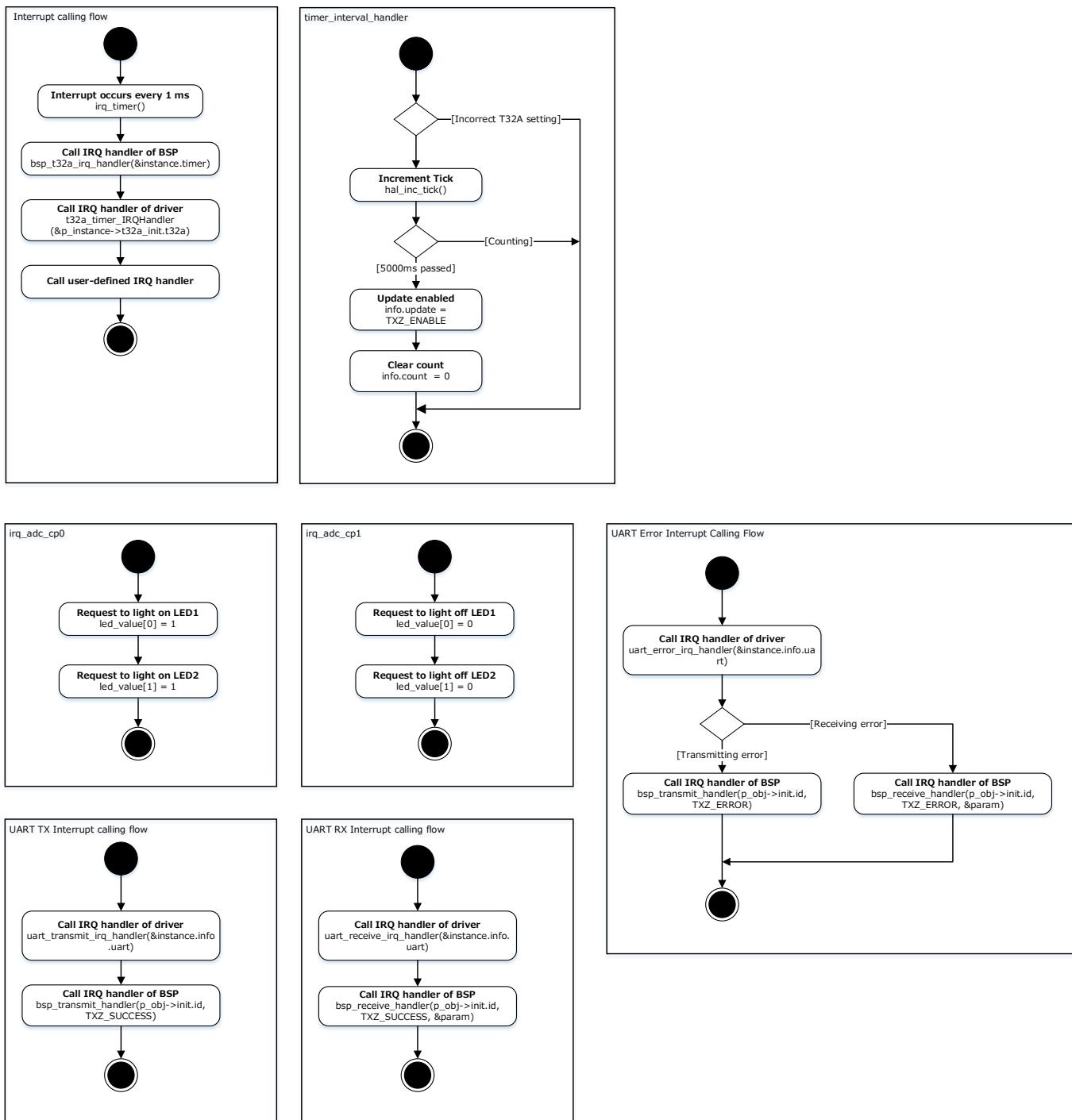


a



b

## 7.2. Interrupt



## 8. Revision History

Revision	Date	Description
1.0	2025-10-30	First release

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