Application Note

CG_EXINT

Table of Contents

1. Preface

This application note describes sample software CG_EXINT that uses the Clock Control and Operation Mode (CG).
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
EXCEPT	Except
FLASH	Flash Memory
SIWDT	Clock Selective Watchdog Timer
Timer	T32A:32-bit Timer Event Counter

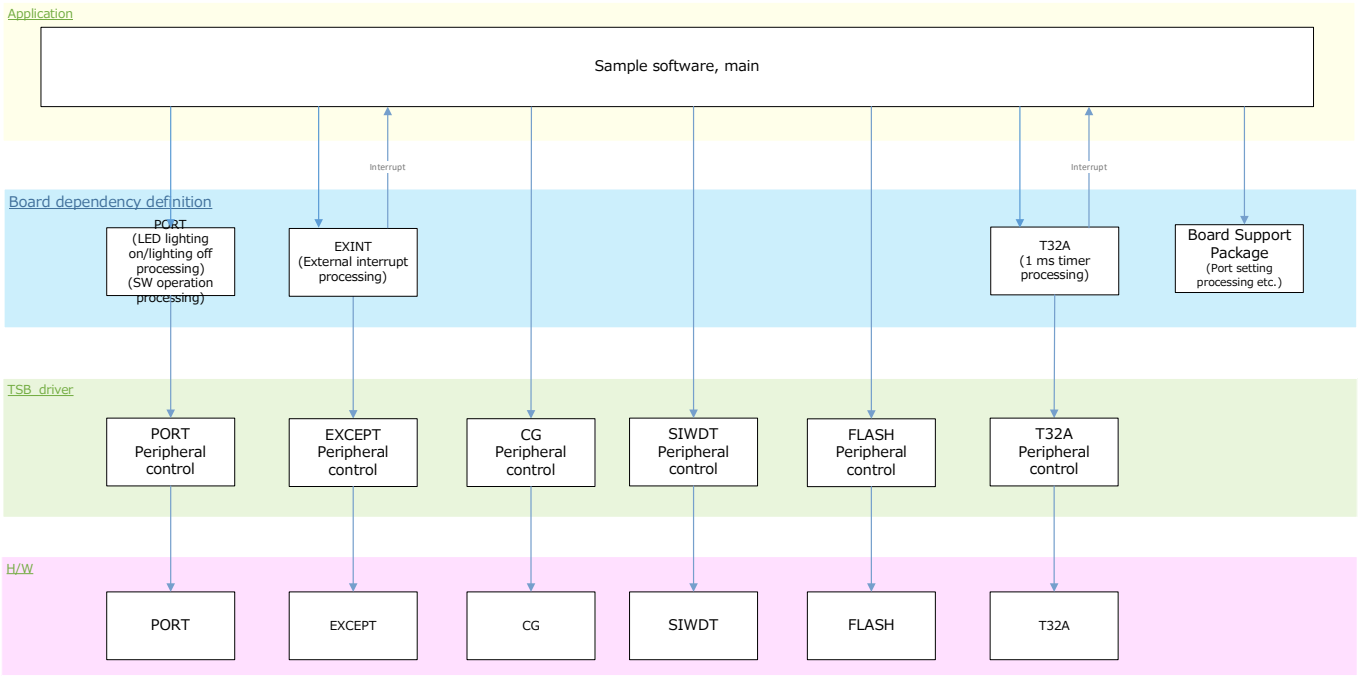
3. Reference Document

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
CG_EXINT	Sample program of clock control and operation mode switching

5. Configuration Diagram



6. Sample Program:CG_EXINT

This is the sample software that uses CG operation mode transition function to shift to the low-power consumption mode and return to NORMAL mode according to the pressed switches.
Visualizes the operation mode by LED.

6.1. Outlines of Operation

Switches (NORMAL/IDLE/STOP1/STOP2) when pressed.

When BSP_PSW_1 is pressed, IDLE mode is entered.
However, it is invalid when pressed during low power consumption mode.

When BSP_PSW_2 is pressed, STOP1 mode is entered.
However, it is invalid when pressed during low power consumption mode.

When BSP_PSW_3 is pressed, STOP2 mode is entered.
However, it is invalid when pressed during low power consumption mode.

When BSP_PSW_5 is pressed, NORMAL mode is entered.
However, if it is pressed during NORMAL, it is disabled.

LED is turned on and off according to the selected mode.
NORMAL mode : BSP_LED_1 blink at a constant Duty for a fixed period. All other LED are turned off.
IDLE mode : BSP_LED_2 is turned on. All other LED are turned off.
STOP1 mode : BSP_LED_3 is turned on. All other LED are turned off.
STOP2 mode : BSP_LED_4 is turned on. All other LED are turned off.

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
PORT (Push Switch)	BSP_PSW_1	Event trigger
	BSP_PSW_2	Event trigger
	(Note1): BSP_PSW_3	(Note1): Event trigger
	(Note2): BSP_PSW_5	(Note2): Event trigger
PORT (LED)	BSP_LED_1	For operation check
	BSP_LED_2	For operation check
	BSP_LED_3	For operation check
	BSP_LED_4	For operation check
T32A	BSP_T32A_TIMER_1	Interval timer

Note1: SBK-M471 does not support STOP2 mode and does not have BSP_PSW_3.
Note2: For SBK-M471, use BSP_SSW_1 instead.

6.3. Interrupt to Use

Interrupt	Outlines
(Note1)	External interrupt when BSP_PSW_5 is pressed
(Note2)	T32A Timer A Timer counter increments every 1ms for Switch / LED processing

Note1: For SBK-M471, "INT3".
For AdBun-M3HQA, “INT02”.
Note2: For SBK-M471 and AdBun-M3HQA, "INTT32A00AC".

6.4. Configuration

Configuration setting.

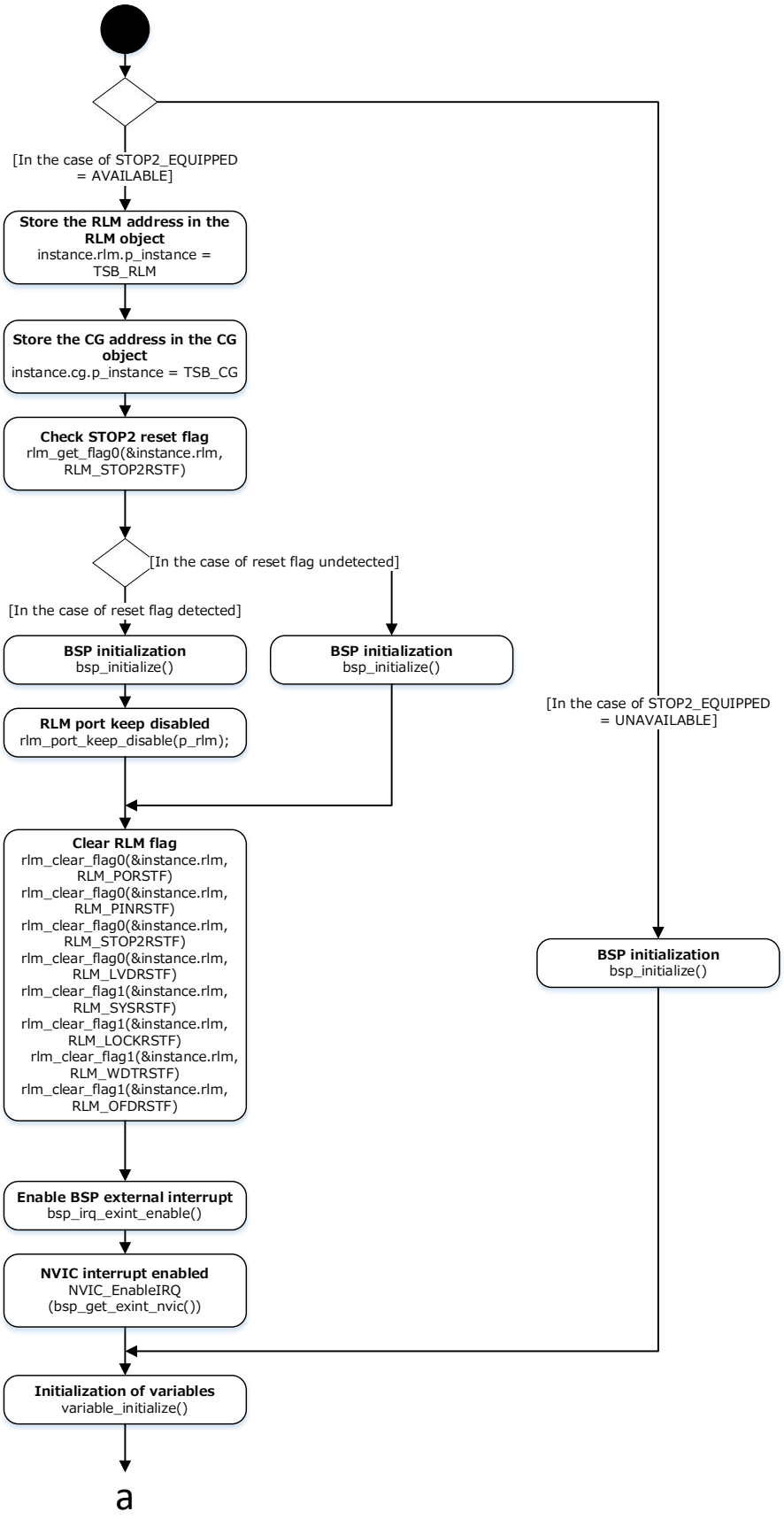
Configuration	Soft Definition Name	Current Value (Defaults)	Description
Cycle A	CFG_LED_BLINK_FRQ	2	LED blink Cycle (Unit:Hz)
DutyA	CFG_LED_BLINK_DUTY	0.5	LED blink Duty (50%)

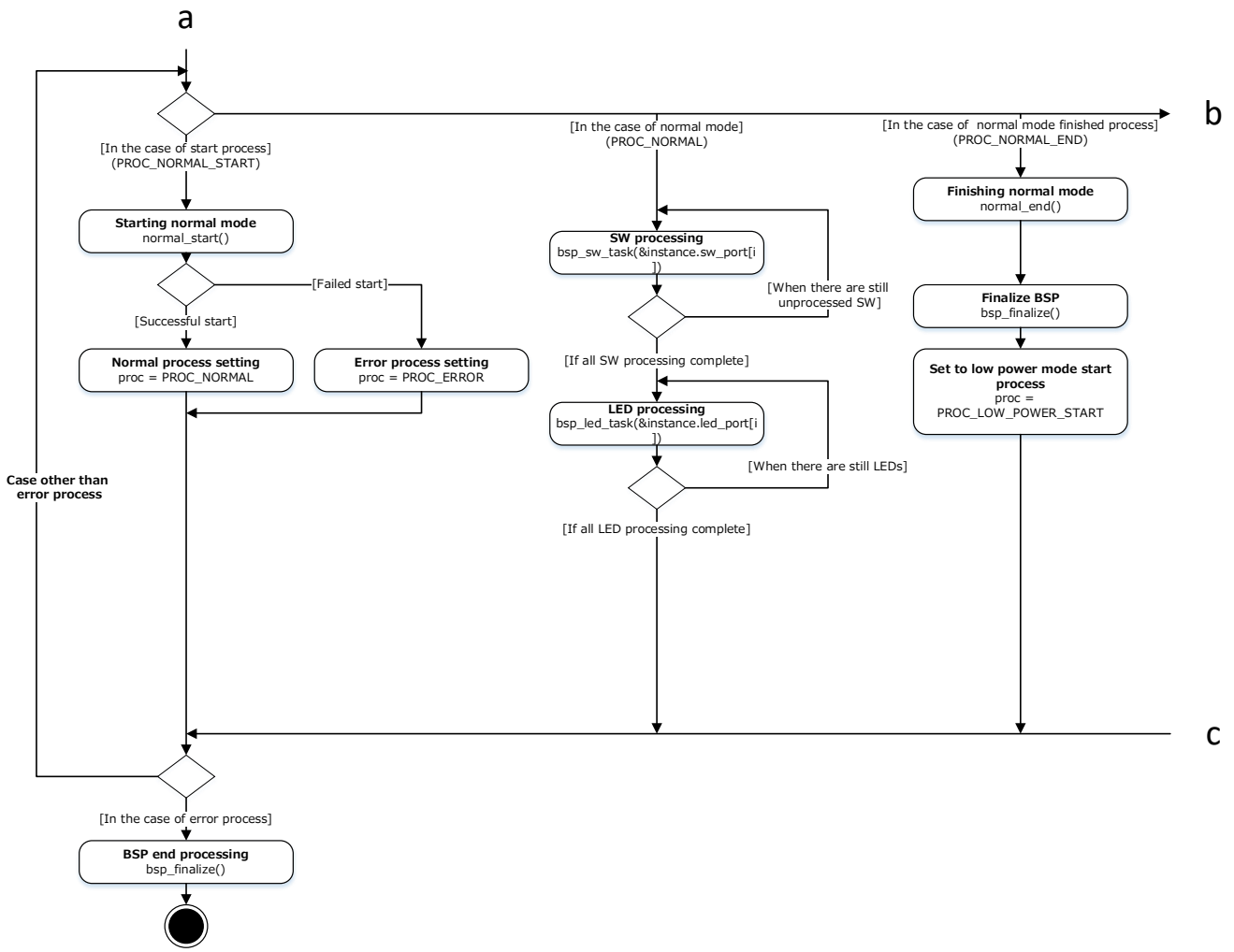
6.5. Example of Terminal Emulator Output

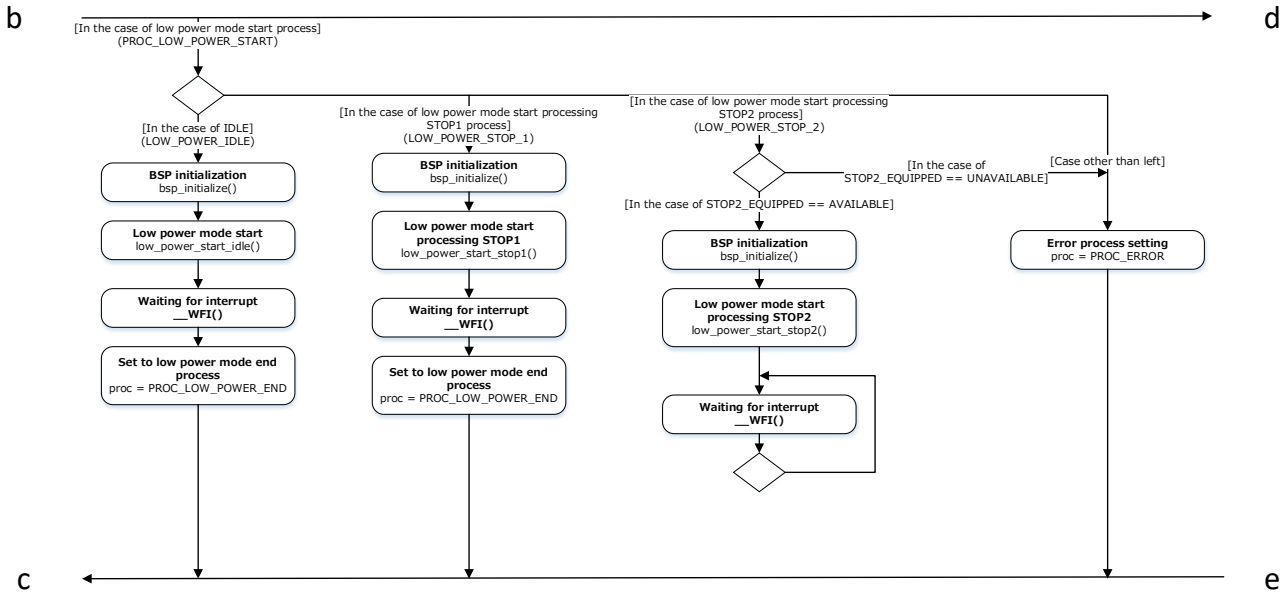
Nothing.

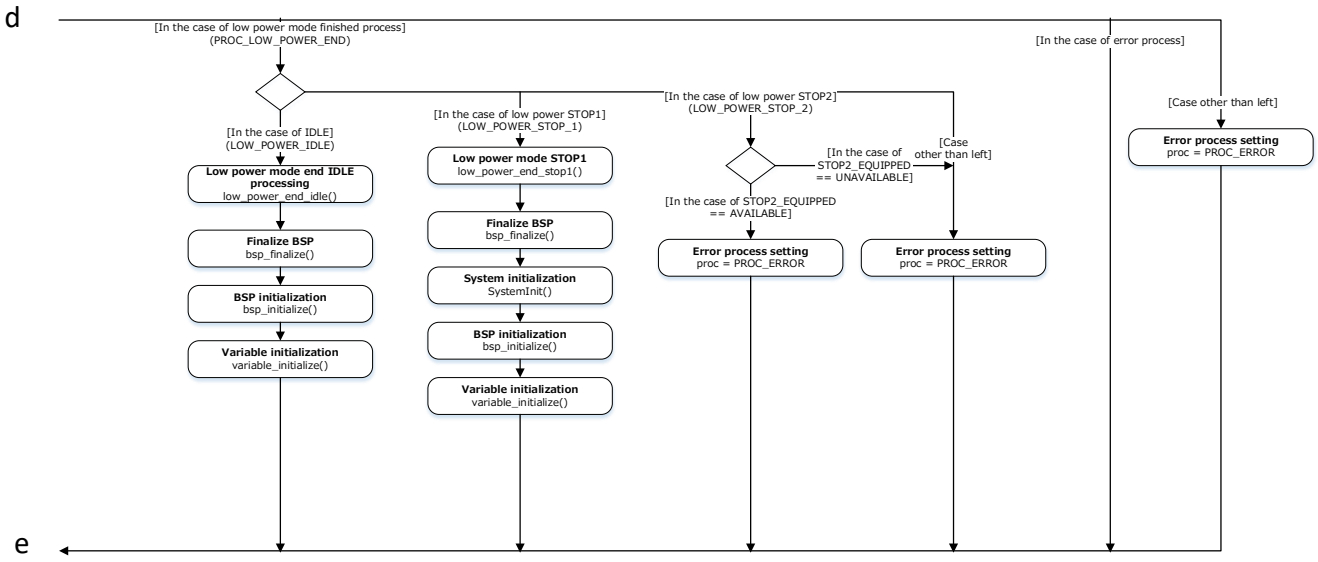
7. Activity diagram

7.1. main

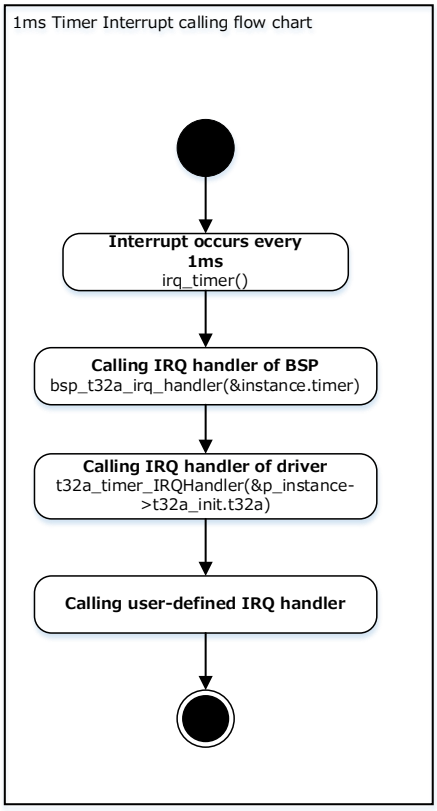


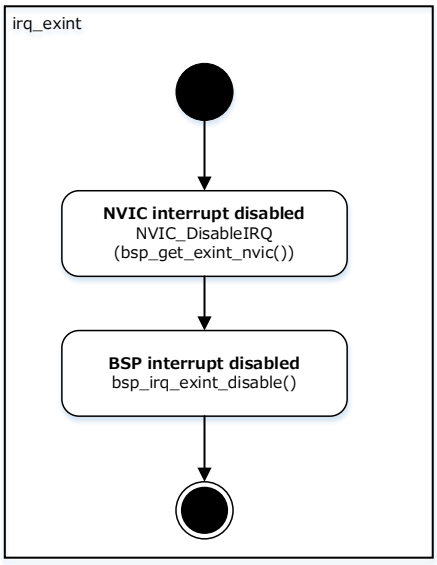

a
b
c
[In the case of start process]
(PROC_NORMAL_START)
Starting normal mode
normal_start()
[Failed start]
[Successful start]
Normal process setting
proc = PROC_NORMAL
Error process setting
proc = PROC_ERROR
[In the case of normal mode]
(PROC_NORMAL)
SW processing
bsp_sw_task(&instance.sw_port[i
])
[When there are still
unprocessed SW]
[If all SW processing complete]
LED processing
bsp_led_task(&instance.led_port[i
])
[When there are still LEDs]
[If all LED processing complete]
[In the case of normal mode finished process]
(PROC_NORMAL_END)
Finishing normal mode
normal_end()
Finalize BSP
bsp_finalize()
Set to low power mode start
process
proc =
PROC_LOW_POWER_START
Case other than
error process
[In the case of error process]
BSP end processing
bsp_finalize()

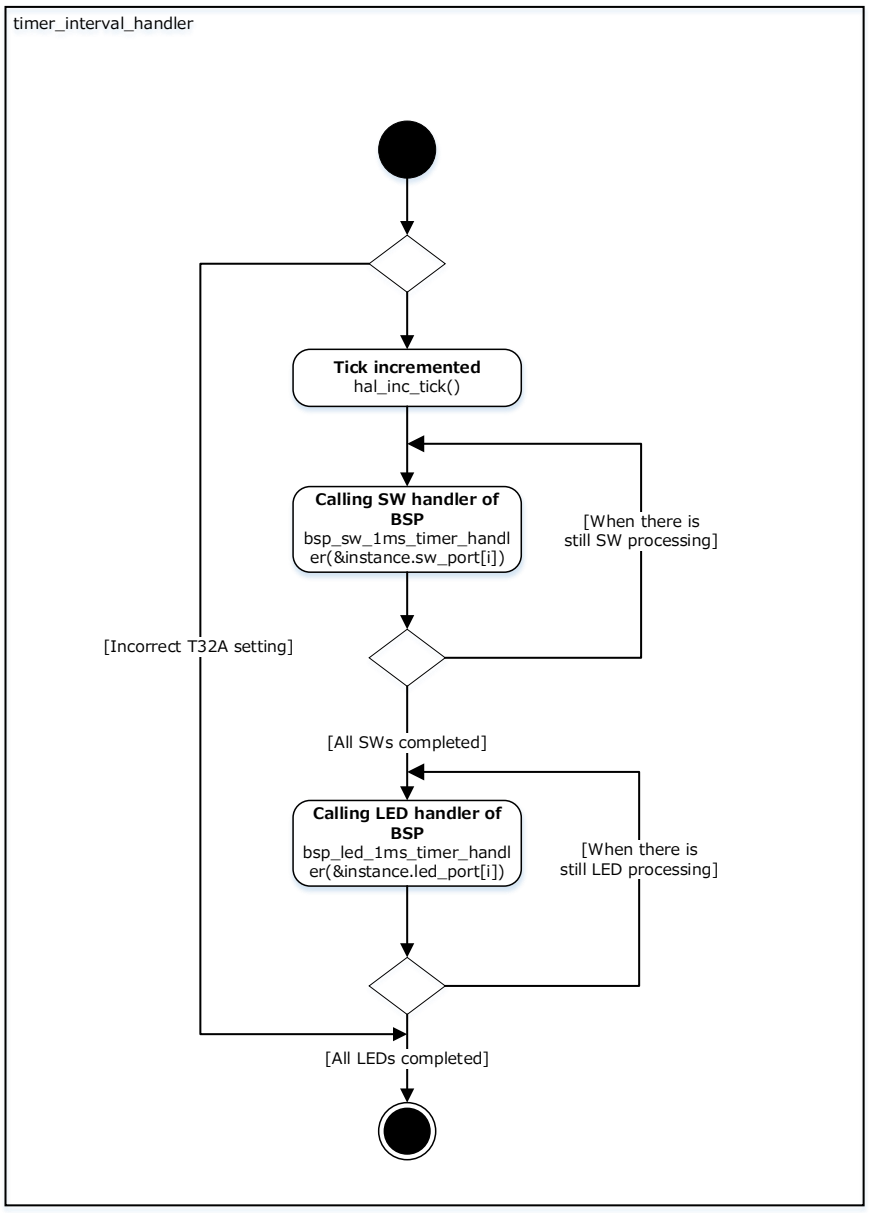

b
d
c
e
[In the case of low power mode start process]
(PROC_LOW_POWER_START)
[In the case of IDLE]
(LOW_POWER_IDLE)
BSP initialization
bsp_initialize()
Low power mode start
low_power_start_idle()
Waiting for interrupt
__WFI()
Set to low power mode end
process
proc = PROC_LOW_POWER_END
[In the case of low power mode start processing
STOP1 process]
(LOW_POWER_STOP_1)
BSP initialization
bsp_initialize()
Low power mode start
processing STOP1
low_power_start_stop1()
Waiting for interrupt
__WFI()
Set to low power mode end
process
proc = PROC_LOW_POWER_END
[In the case of low power mode start processing
STOP2 process]
(LOW_POWER_STOP_2)
[In the case of
STOP2_EQUIPPED == UNAVAILABLE]
[Case other than left]
[In the case of STOP2_EQUIPPED == AVAILABLE]
BSP initialization
bsp_initialize()
Low power mode start
processing STOP2
low_power_start_stop2()
Waiting for interrupt
__WFI()
Error process setting
proc = PROC_ERROR

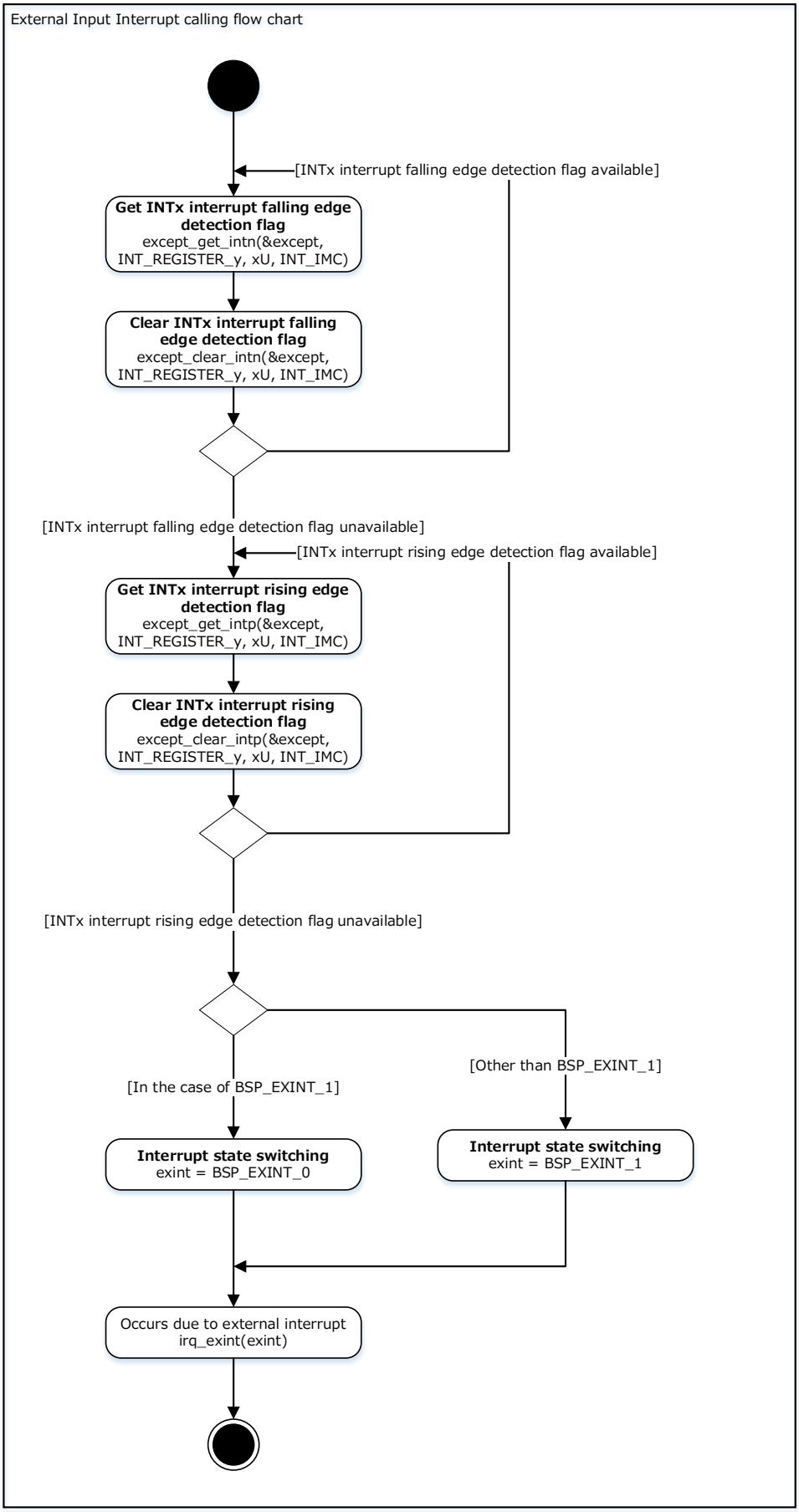

d
[In the case of low power mode finished process]
(PROC_LOW_POWER_END)
[In the case of error process]
[In the case of IDLE]
(LOW_POWER_IDLE)
[In the case of low power STOP1]
(LOW_POWER_STOP_1)
[In the case of low power STOP2]
(LOW_POWER_STOP_2)
[Case other than left]
Low power mode end IDLE processing
low_power_end_idle()
Low power mode STOP1
low_power_end_stop1()
[In the case of STOP2_EQUIPPED == UNAVAILABLE]
[Case other than left]
Error process setting
proc = PROC_ERROR
Finalize BSP
bsp_finalize()
Finalize BSP
bsp_finalize()
[In the case of STOP2_EQUIPPED == AVAILABLE]
BSP initialization
bsp_initialize()
System initialization
SystemInit()
Error process setting
proc = PROC_ERROR
Error process setting
proc = PROC_ERROR
Variable initialization
variable_initialize()
BSP initialization
bsp_initialize()
Variable initialization
variable_initialize()
e

7.2. Interrupt









M471:y = B	M471:x = 3
M4L4:y = A	M4L4:x = 6
M3HQ:y = A	M3HQ:x = 2

8. Revision History

Revision	Date	Description
1.0	2025-1-20	First release
1.1	2025-10-30	6.3Interrupt to Use Added M3H Interrupt Name.

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