

# Application Note

## CG\_EXINT

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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 : CG_EXINT .....	5
6.1. Outlines of Operation .....	5
6.1.1. NORMAL Mode .....	5
6.1.2. Low power consumption Mode .....	5
6.2. Function to Use.....	5
6.3. Interrupt to Use .....	5
6.4. Configuration.....	6
6.5. Example of Terminal Emulator Output .....	6
7. CG Driver .....	7
8. Revision History .....	8
<b>RESTRICTIONS ON PRODUCT USE .....</b>	<b>9</b>

### 1. Preface

This application note describes sample software for the switches between NORMAL mode and low power consumption mode using clock control and operation mode functions.  
This document helps the user check operation of a product under development and develop its program.

### 2. Technical Term

Term/Abbreviation	Definition
CG	Clock control and Operation Mode
BSP	Board Support Package
Timer	T32A : 32-bit Timer Event Counter

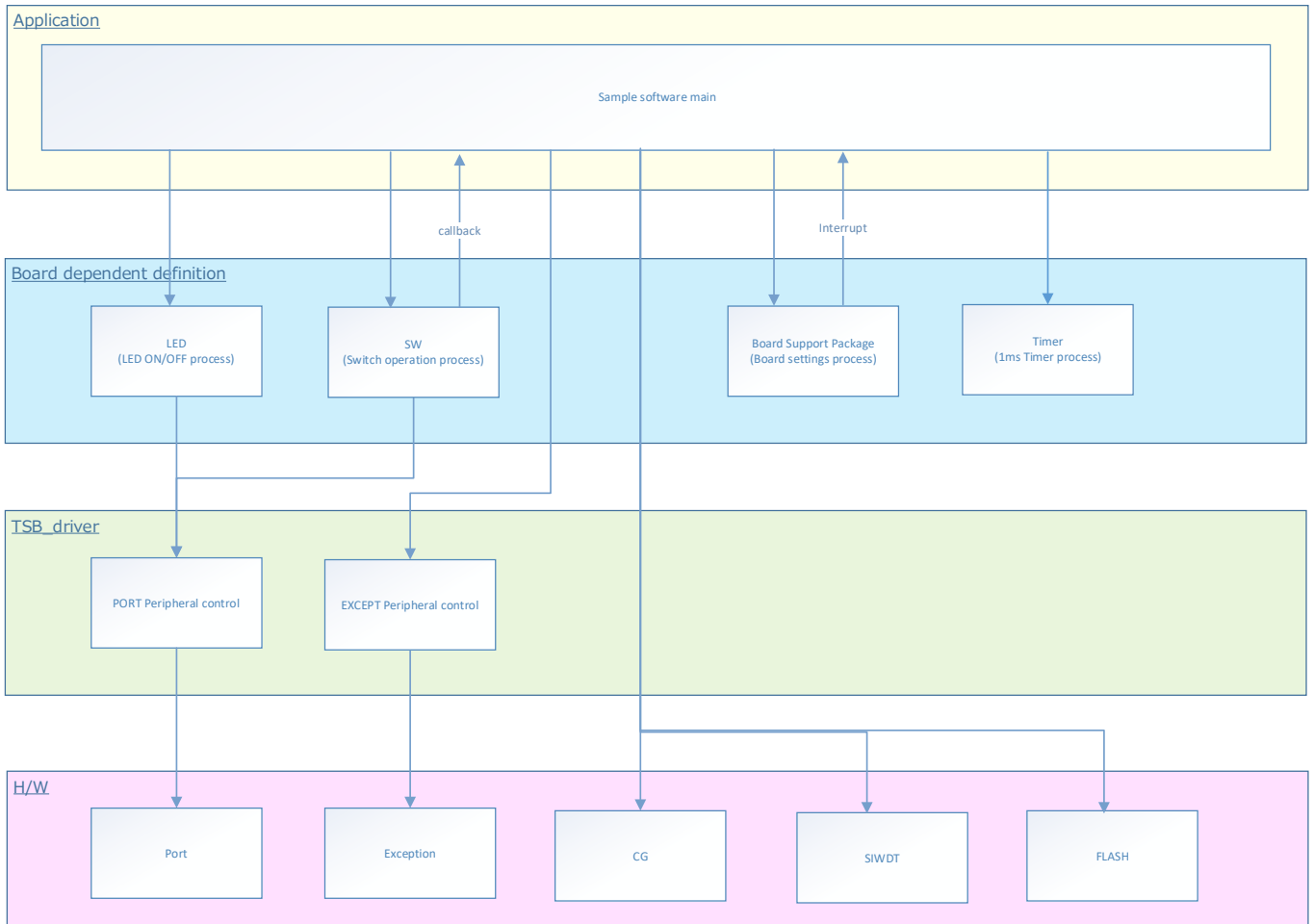
### 3. Reference Document

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 sample software that switches the mode of the microcomputer by Push-Switch input.

### 6.1. Outlines of Operation

Switch to low power consumption mode (IDLE / STOP1 / STOP2) triggered by port input by Push-Switch. When shifting to the low power consumption mode, the LED lights up and you can check the operation switching.

After switching to the low power consumption mode, it returns to the NORMAL mode by detecting an external interrupt.

#### 6.1.1. NORMAL Mode

In NORMAL mode, the following operations are performed.

- BSP\_LED\_1 blinks in Cycle\_A and Duty\_A (other LEDs are off).
- Port input monitoring (monitoring at intervals).
- Press BSP\_PSW\_1 to switch to IDLE mode.
- Press BSP\_PSW\_2 to switch to STOP1 mode.
- Press BSP\_PSW\_3 to switch to STOP2 mode.

#### 6.1.2. Low power consumption Mode

In the low power consumption mode, the following operations are performed.

##### IDLE

- BSP\_LED\_2 is on (other LEDs are off).
- Press BSP\_PSW\_5 to switch to NORMAL mode.

##### STOP1

- BSP\_LED\_3 is on (other LEDs are off).
- Press BSP\_PSW\_5 to switch to NORMAL mode.

##### STOP2

- BSP\_LED\_4 is on (other LEDs are off).
- Press BSP\_PSW\_5 to switch to NORMAL mode.

## 6.2. Function to Use

The functions to use are as follows.

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

IP	Channel	Objective
PORT	BSP_PSW_1	For event triggers
	BSP_PSW_2	For event triggers
	BSP_PSW_3	For event triggers
	BSP_PSW_5	For event triggers
	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	Used as a 1ms interval timer

## 6.3. Interrupt to Use

Interrupt	Outlines
INT02	External interrupt 02. For returning from IDLE / STOP1 / STOP2
INTT32A00A	T32A Timer A Timer counter increments every 1ms for Switch / LED processing

## 6.4. Configuration

“main.c” configuration setting.

Configuration	Current Value	Description
Cycle_A	2Hz	-
Duty_A	50%	-

## 6.5. Example of Terminal Emulator Output

Nothing.

### 7. CG Driver

The CG is controlled by using the following driver.  
For an example of use, refer to the source code.

Driver	Control Outlines
cg_set_gear	Set the gear according to the register value
cg_set_phyt0	Set the pre-scaler clock according to the register value
cg_set_warm_up_time	Set warm-up time
cg_start_warmup	Start operation of warm-up timer for oscillator
cg_get_warm_up_state	Check if the warm-up is complete
cg_wait_warmup	Wait for the warm-up end of high-speed oscillation
cg_set_ehoscen	Select an external high speed oscillator
cg_set_oscsel	Set FOSC base clock
cg_get_oscsel	Check if it is in oscsel state
cg_get_gear	Update gear according to register value
cg_get_phyt0	Update prescaler clock according to register value
cg_ihosc1_enable	Enable internal high speed oscillator 1
cg_ihosc1_disable	Disable internal high speed oscillator 1
cg_set_PLL	Set the PLL according to the register value
cg_PLL_enable	Enable PLL
cg_PLL_disable	Disable PLL
cg_set_stby_mode	Set STBYmode according to register value
cg_set_PLL_clock	Set PLL base clock
cg_get_PLL_status	Check if it is in PLL0SEL state
cg_protect_enable	Enable CG protection
cg_protect_disable	Disable CG protection
cg_get_ihosc1_state	Check if it is in ihosc1 state
cg_get_ihosc2_state	Check if it is in ihosc2 state
cg_ihosc2_enable	Enable internal high speed oscillator 2
cg_ihosc2_disable	Disable internal high speed oscillator 2
cg_scout_enable	Enable SCOUT
cg_scout_disable	Disable SCOUT
cg_set_scout_clock	Set SCOUT base clock
cg_set_scout_time	Set SCOUT time
cg_get_stby_mode	Get TRBY mode register value
cg_set_low_warm_up_time	Set low oscillator warm-up time
cg_start_low_warmup	Start operation of warm-up timer for low oscillator
cg_get_low_warm_up_state	Check if low oscillator warm-up is complete
cg_get_system_core_clock	Get CG system core clock
rlm_port_keep_enable	Enable RLM port
rlm_port_keep_disable	Disable RLM port
rlm_protect_enable	Enable RLM protection
rlm_protect_disable	Disable RLM protection
rlm_fs_enable	Enable fs
rlm_fs_disable	Disable fs

## 8. Revision History

Revision	Date	Description
1.0	2023-06-28	First release



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