Application Note

T32A_PPG

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1. Preface

This application note describes sample software for the programmable square wave (PPG) output function using the t32a driver.
This document helps the user check operation of a product under development and develop its program.

2. Technical Term

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

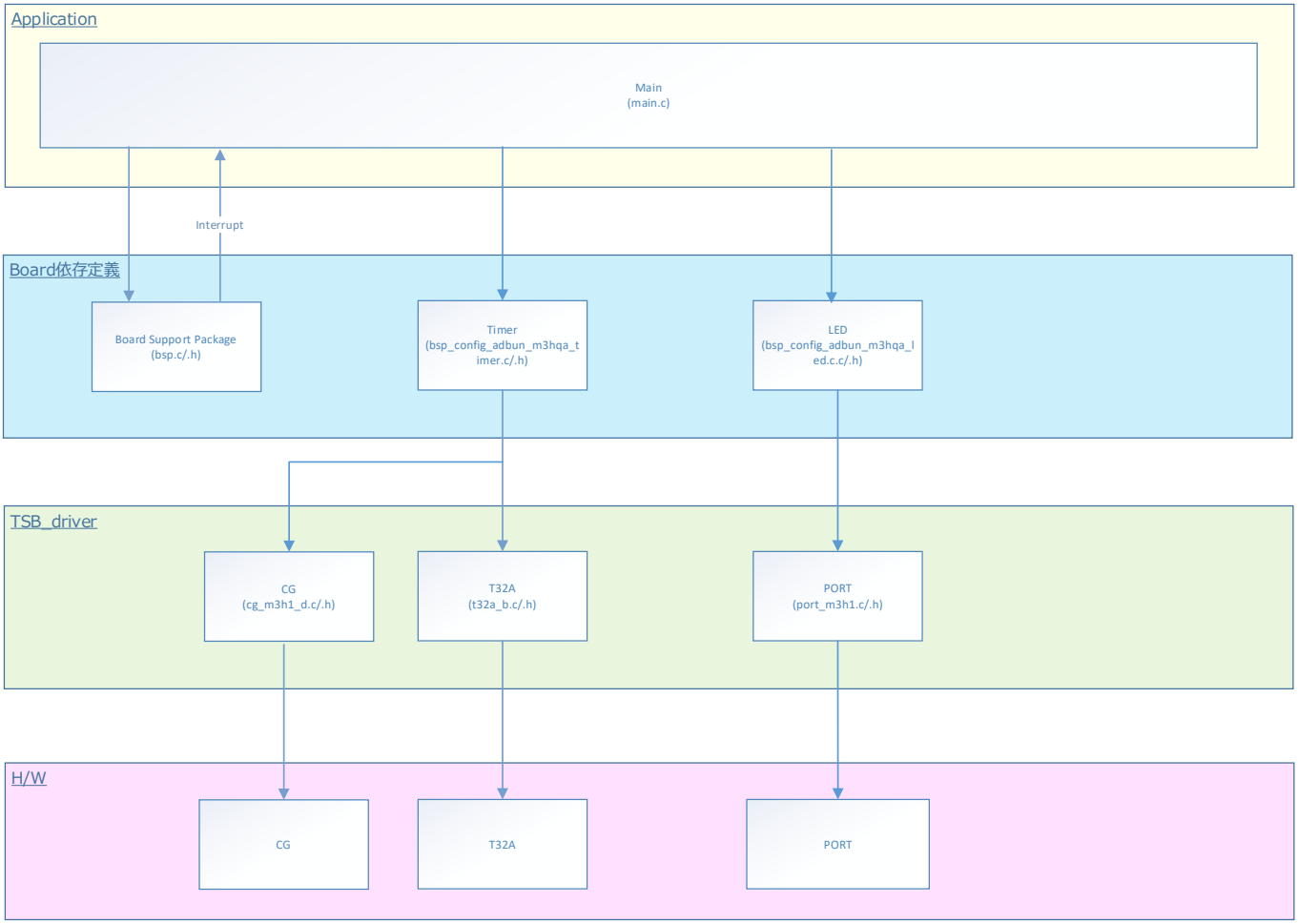
3. Reference Document

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 manual to be used.
Driver API list	Refer to the MCU Doc folder to be used.

4. Target Sample Program

Sample Program	Outline
T32A_PPG	Sample program of T32A_PPG function

5. Configuration Diagram



6. Sample Program：T32A_PPG

This is sample software that adjusts the duty ratio by pressing the switch and outputs a PPG square wave.

6.1. Outlines of Operation

At startup, PPG output is stopped.
Press BSP_PSW_1 to start PPG output. Press BSP_PSW_1 again to stop PPG output.
Pressing BSP_PSW_2 during PPG output changes Duty. Each time you press the button, the duty value changes in the order of 10, 25, 50, 75, 90, and then returns to 10.

6.2. Function to Use

The functions to use are as follows.
For the Port assignment of each channel, refer to the MCU user manual.

IP	Channel	Objective
T32A	BSP_T32A_PPG_1	For pulse output
	BSP_T32A_TIMER_1	Used as a 1ms interval timer
PORT (Push-Switch)	BSP_PSW_1	For event triggers
	BSP_PSW_2	For event triggers
UART	BSP_UART_1	For terminal emulator communication (Outputs log)

6.3. Interrupt to Use

Interrupt	Outlines
INTT32A03A	T32A ch3 Timer_A (For PPG output)
INTT32A00A	T32A ch0 Timer_A Timer counter increment every 1ms for SW processing
INTUART0RX	UART ch0 Receive interrupt for terminal emulator
INTUART0TX	UART ch0 Transmission interrupt for terminal emulator
INTUART0ERR	UART ch0 Error interrupt for terminal emulator

6.4. Configuration

“main.c” configuration setting.

Configuration	Current Value	Description
Timer_A	500ms	-

6.5. Example of Terminal Emulator Output

6.5.1. Normal Operation

```
PPG Output
Duty: 10%
PPG Stop
Change to Duty: 25%
Change to Duty: 50%
Change to Duty: 75%
Change to Duty: 90%
PPG Output
Duty: 90%
PPG Stop
Change to Duty: 10%
PPG Output
```

6.5.2. Case of Error Occurrence

Nothing.

7. T32A Driver

7.1. List of driver

The T32A is controlled by using the following interface.
For an example of use, refer to the source code.

Driver	Control Outlines
t32a_mode_init	T32A Object initialization mode
t32a_timer_init	T32A Object initialization
t32a_deinit	T32A Object release
t32a_timer_startIT	Initialization mode timer start
t32a_timer_stopIT	Initialization mode timer stop
t32a_SWcounter_start	Initialization mode timer start
t32a_SWcounter_stop	Initialization mode timer stop
t32a_reg_set	Timer register value setting
t32a_tmr_read	Read timer register value
t32a_get_status	Get status
t32a_timer_IRQHandler	IRQ handler for timer initialization
t32a_timer_cap0_IRQHandler	IRQ timer capture 0 handler for timer capture 0 initialization
t32a_timer_cap1_IRQHandler	IRQ timer capture 1 handler for timer capture 1 initialization
t32a_Calculator	Calculate the timer value to set the timer register

7.2. Details

See “3. Reference Documents” for more information.

8. Revision History

Revision	Date	Description
1.0	2022-04-08	First release

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