

Application Note

ACCELEROMETER

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1. Preface

This application note describes the sample software of Accelerometer (Acceleration sensor) using Toshiba Serial Peripheral Interface (TSPi). This document helps the user check operation of a product under development and develop its program.

2. Technical Term

Term/Abbreviation	Definition
UART	Universal Asynchronous Receiver Transmitter
TSPi	Toshiba Serial Peripheral Interface
T32A	32-bit Timer Event Counter

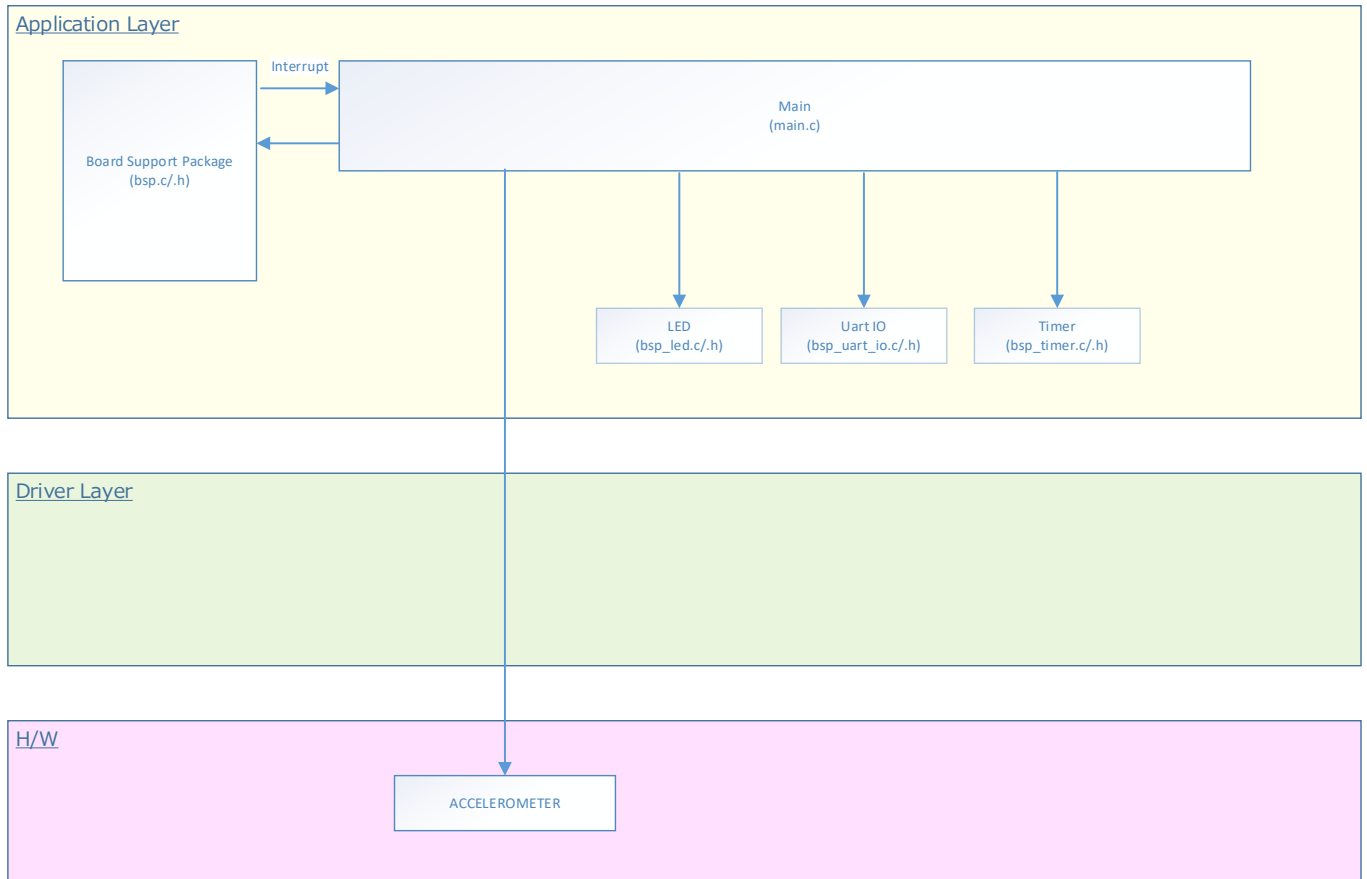
3. Reference Document

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 manual to be used.

4. Target Sample Program

Sample Program	Outlines
ACCELEROMETER	Sample of Accelerometer (Acceleration sensor)

5. Configuration Diagram



6. Sample Program: Accelerometer

This sample software communicates with the acceleration sensor using TSPI function. It outputs X-axis, Y-axis, and Z-axis data of the sensor on the terminal emulator.

6.1. Outlines of Operation

The X-axis, Y-axis, and Z-axis data of the acceleration sensor are displayed on the terminal emulator every second.

When the swing magnitude of the evaluation board is small, BSP_LED_0 lights. When the magnitude is bigger, BSP_LED_0 and BSP_LED_1 light. And when the magnitude is about maximum, all LED's (BSP_LED_0, BSP_LED_1, BSP_LED_2, and BSP_LED_3) light.

* When the evaluation board is turned upside down, "Detection angle over!!" is displayed on the terminal emulator.

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
UART	BSP_UART_0	Communication with the terminal emulator
TSPI	BSP_TSPI_2	Communication with Accelerometer
PORT	BSP_LED_0	LED control
	BSP_LED_1	LED control
	BSP_LED_2	LED control
	BSP_LED_3	LED control
T32A	BSP_TIMER_1MS	Interval Timer

6.3. Interrupt to Use

Interrupt	Outlines
TSPI Interrupt	TSPI transmission end interrupt
	TSPI reception end interrupt
UART Interrupt	UART reception interrupt
	UART transmission interrupt
	UART ERROR interrupt
Timer Interrupt	Interval timer interrupt

6.4. Configuration

Nothing.

6.5. Example of Terminal Emulator Output

6.5.1. Normal Operation

```
X: xx Y: yy Z: zz  
X: xx Y: yy Z: zz  
X: xx Y: yy Z: zz  
X: xx Y: yy Z: zz  
X: xx Y: yy Z: zz  
:  
:
```

※X: X-axis data

Y: Y-axis data

Z: Z-axis data

6.5.2. Case of Error Occurrence

Nothing.

7. TSPI Driver

7.1. List of Drivers

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

Interface Name	Control Outlines
tspi_deinit	TSPI object is released.
tspi_discard_receive	Reception is discarded.
tspi_discard_transmit	Transmission is discarded.
tspi_dma_deinit	TSPI DMA object is released.
tspi_dma_discard_receive	Reception is discarded.
tspi_dma_discard_transmit	Transmission is discarded.
tspi_dma_init	TSPI DMA object is initialized.
tspi_dma_transmitlt	Data is transmitted. Non-blocking communication.
tspi_dma_receivevt	Data is received. Non-blocking communication.
tspi_error_clear	Error information is cleared.
tspi_format	Data format setting
tspi_get_error	Error information is acquired.
tspi_get_status	Status is acquired.
tspi_init	TSPI object is initialized.
tspi_master_dma_receive	DMA data is received. Non-blocking communication.
tspi_master_dma_transfer	DMA data is transferred. Non-blocking communication.
tspi_master_read	Data is received. Blocking communication.
tspi_master_receive	Data is received. Non-blocking communication.
tspi_master_transfer	Data is transferred. Non-blocking communication.
tspi_master_write	Data is transferred. Blocking communication.

8. Revision History

Revision	Date	Description
1.0	2021-10-08	First release

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