

Application Note

TSPI_ ACCELEROMETER

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1. Preface

This application note describes the sample software TSPI_ACCELEROMETER using 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
BSP	Board Support Package
CG	Clock Control and Operation Mode
Timer	T32A:32-bit Timer Event Counter
TSPI	Serial Peripheral Interface
UART	Universal Asynchronous Receiver Transmitter

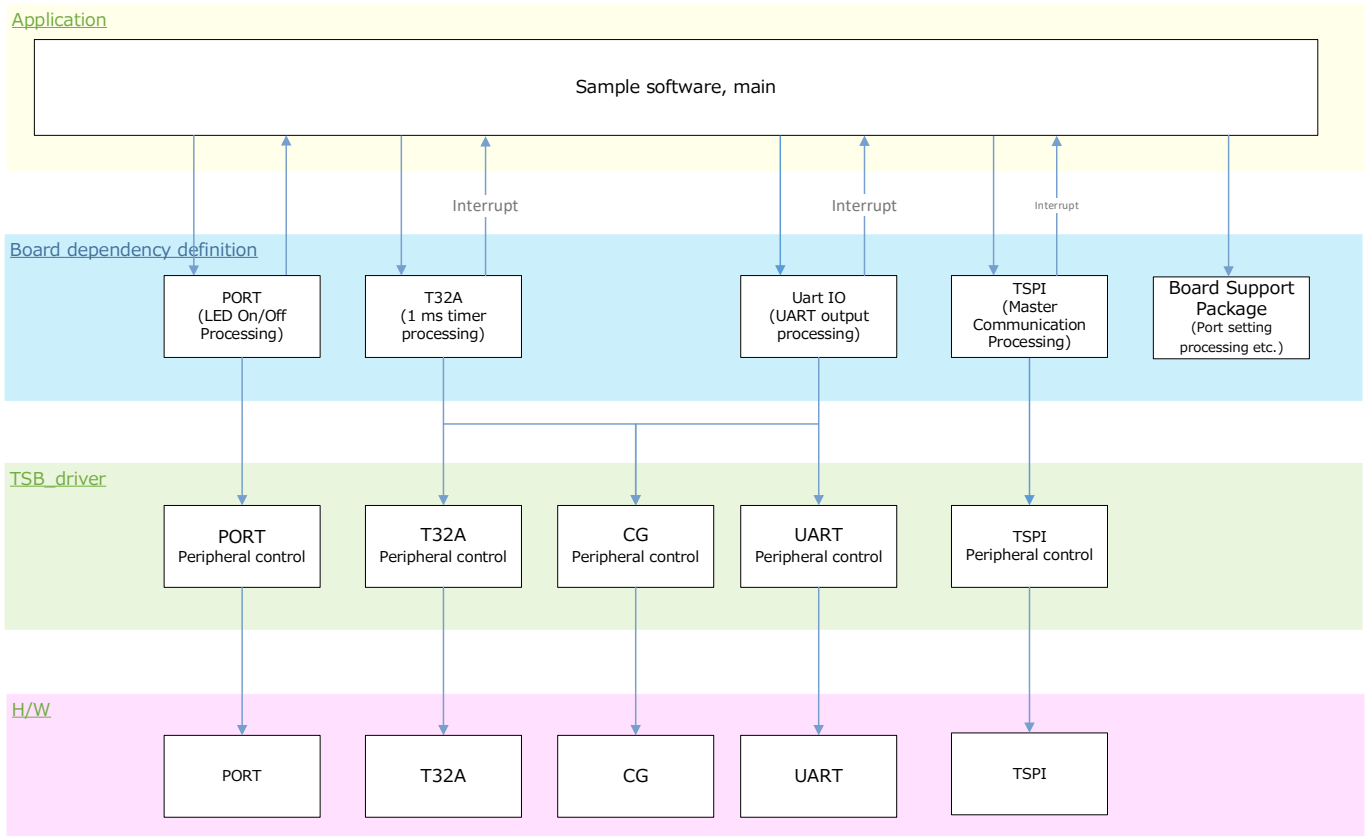
3. Reference Document

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
TSPI_ACCELEROMETER	Sample program of SPI communication function (Collecting acceleration sensor data)

5. Configuration Diagram



6. Sample Program: TSPI_ACCELEROMETER

This is a sample software that uses the SPI mode transmission/reception functionality to receive data from an acceleration sensor and obtain sensor information for the XYZ axes

6.1. Outlines of Operation

When the software starts, it initiates SPI communication with the acceleration sensor and detects the strength of the evaluation board's vibration at each Timer A interval. The SPI communication operates in master mode and performs single transfers. The detection results are output to the LED and the terminal software.

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
TSPI	BSP_TSPI_IC	Acceleration sensor interface
T32A	BSP_T32A_TIMER_1	Interval timer
PORT (LED)	BSP_LED_1	For operation check (Lights up when above threshold A)
	BSP_LED_2	For operation check (Lights up when above threshold B)
	BSP_LED_3	For operation check (Lights up when above threshold C)
	BSP_LED_4	For operation check (Lights up when above threshold D)
UART	BSP_UART_1	Terminal soft communication

6.3. Interrupt to Use

Interrupt	Outlines
INTUART0TX	UART send interrupt
INTUART0ERR	UART error interrupt
INTT32A00A	T32A TimerA Timer counter increment every 1ms
INTT1RX	SPI receive interrupt
INTT1TX	SPI send interrupt

6.4. Configuration

Configuration setting.

Configuration	Soft Definition Name	Current Value (Defaults)	Description
Timer A	CFG_OUTPUT_INTERVAL	1000	Data detection interval (Unit: ms)
Threshold A	LED_ON_RANGE_A	36	X+Y+Z axis information
Threshold B	LED_ON_RANGE_B	72	X+Y+Z axis information
Threshold C	LED_ON_RANGE_C	108	X+Y+Z axis information
Threshold D	LED_ON_RANGE_D	144	X+Y+Z axis information
Threshold E	LED_ON_RANGE_E	180	X+Y+Z axis information

6.5. Example of Terminal Emulator Output

6.5.1. Normal

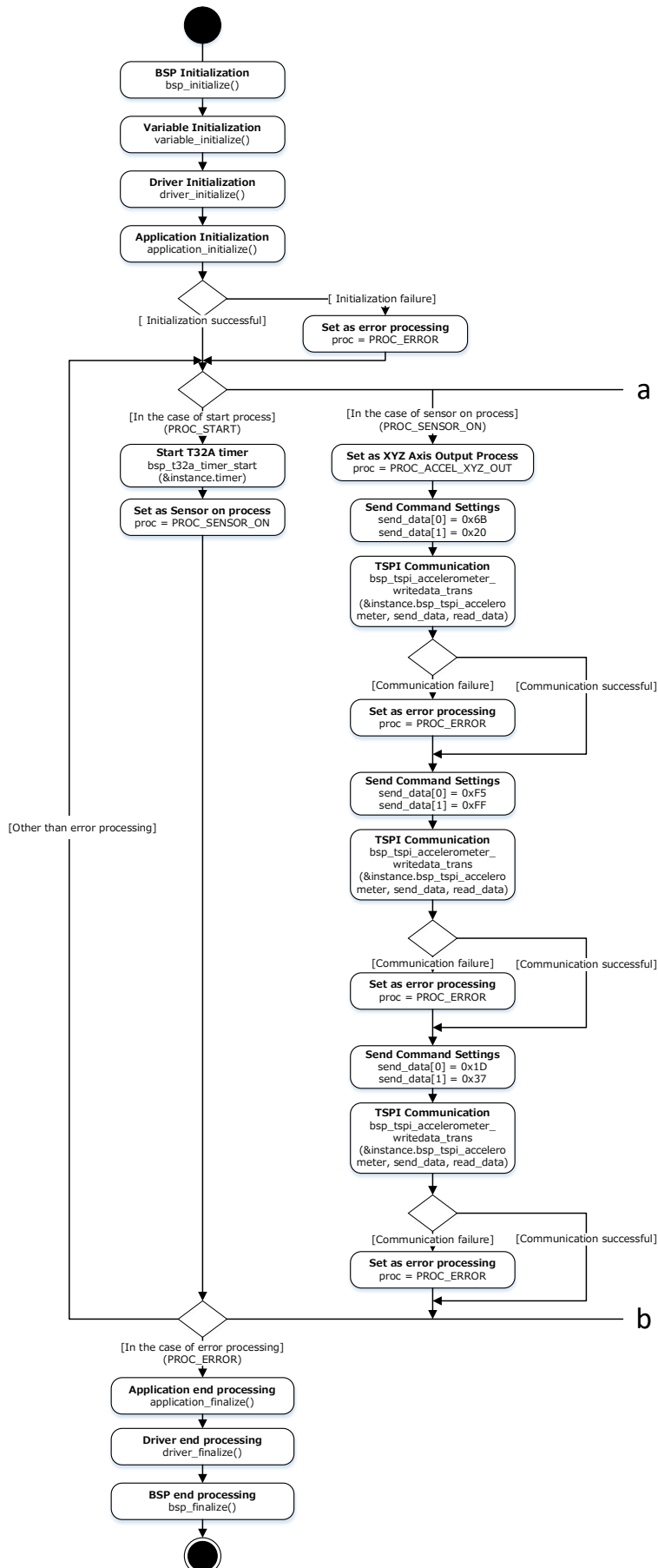
```
X:0 Y:0 Z:0
X:-5 Y:0 Z:5
X:2 Y:-3 Z:4
X:1 Y:0 Z:1
X:4 Y:5 Z:7
X:4 Y:5 Z:7
X:4 Y:5 Z:7
X:4 Y:5 Z:7
X:4 Y:5 Z:7
X:4 Y:5 Z:7
X:4 Y:5 Z:7
X:4 Y:5 Z:7
X:4 Y:5 Z:7
```

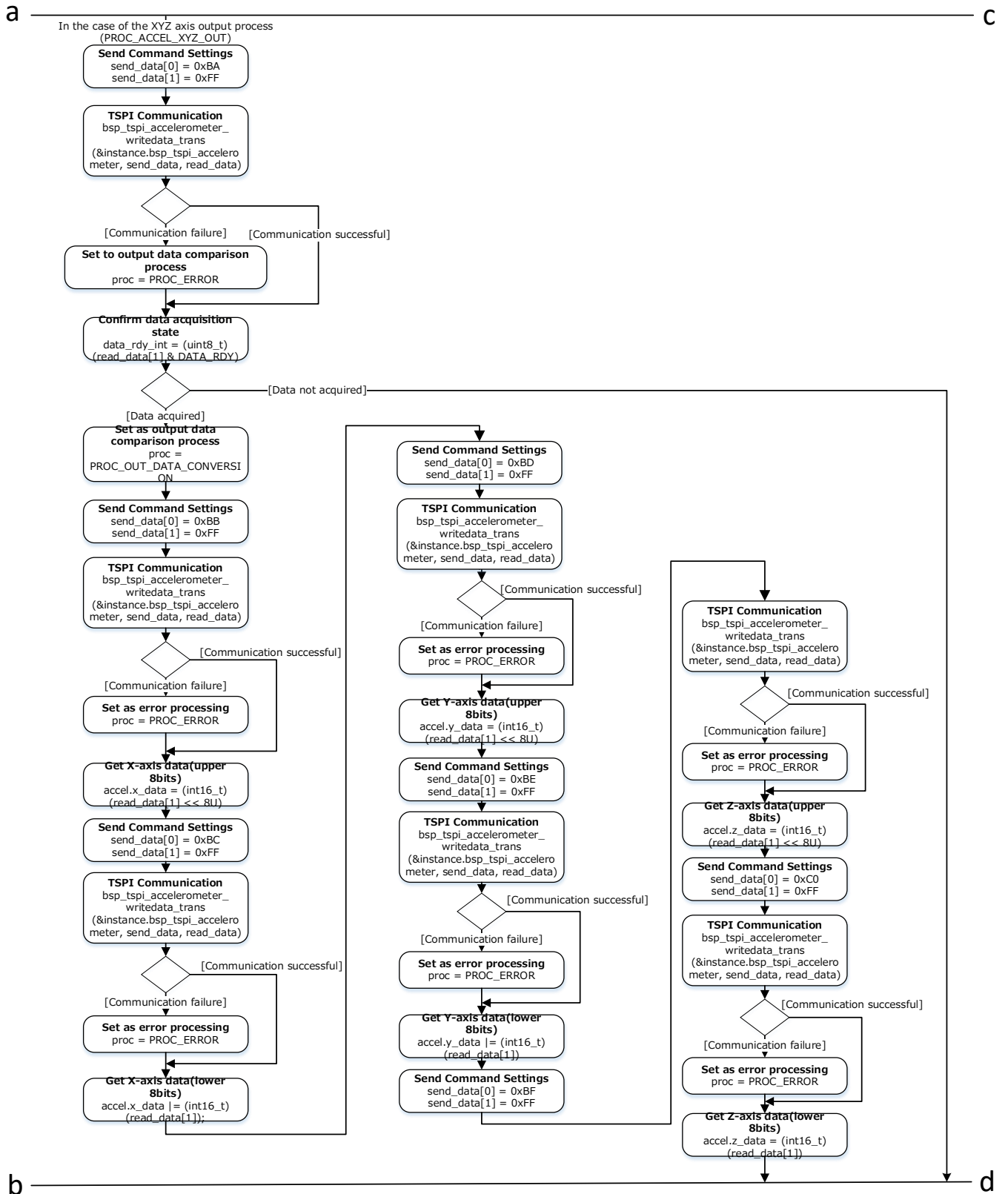
6.5.2. Error

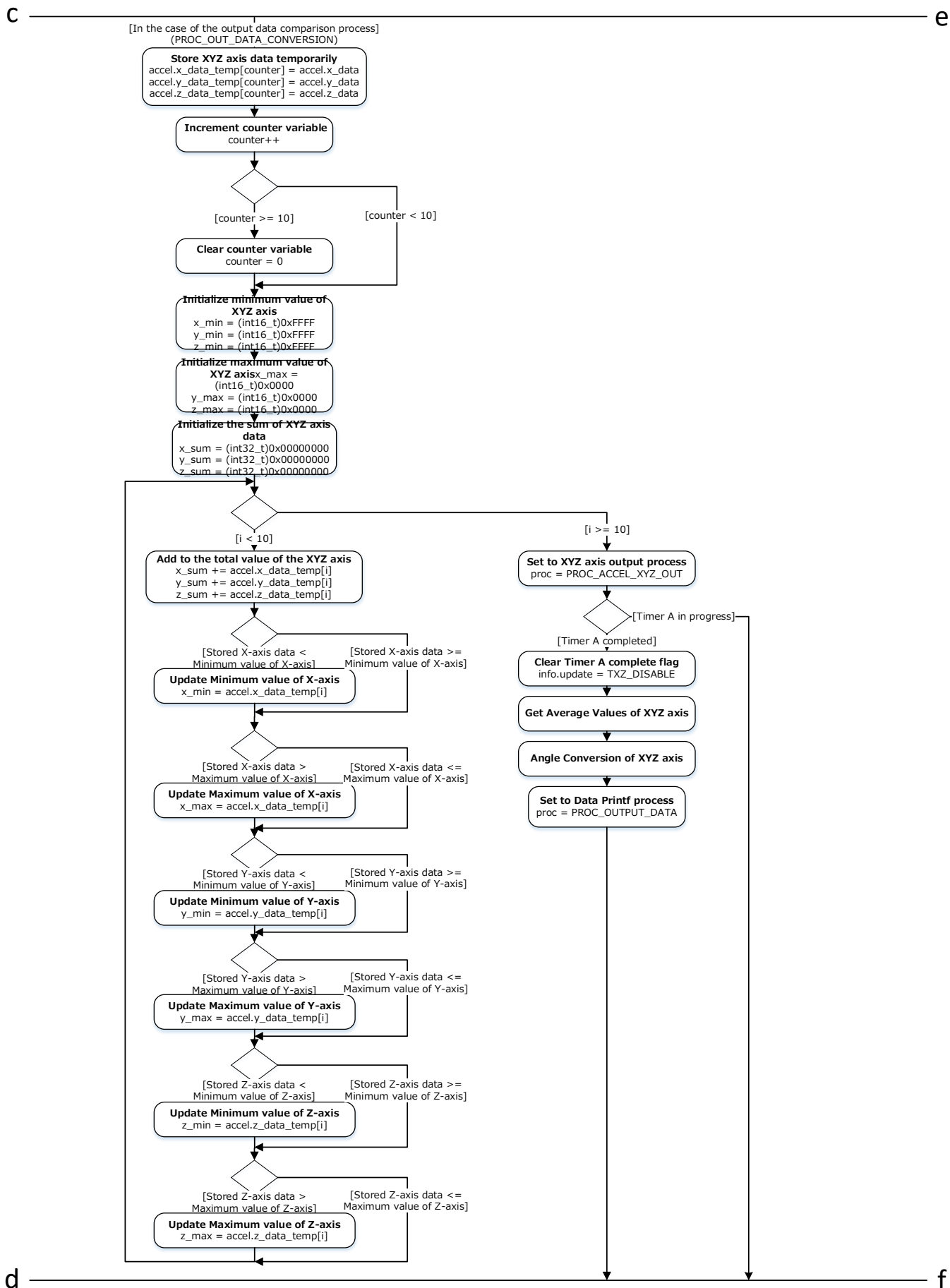
```
X:0 Y:0 Z:0
X:-5 Y:0 Z:5
X:2 Y:-3 Z:4
X:1 Y:0 Z:1
Detection angle over!!
Detection angle over!!
Detection angle over!!
Detection angle over!!
Detection angle over!!
Detection angle over!!
X:4 Y:5 Z:7
X:4 Y:5 Z:7
X:4 Y:5 Z:7
```

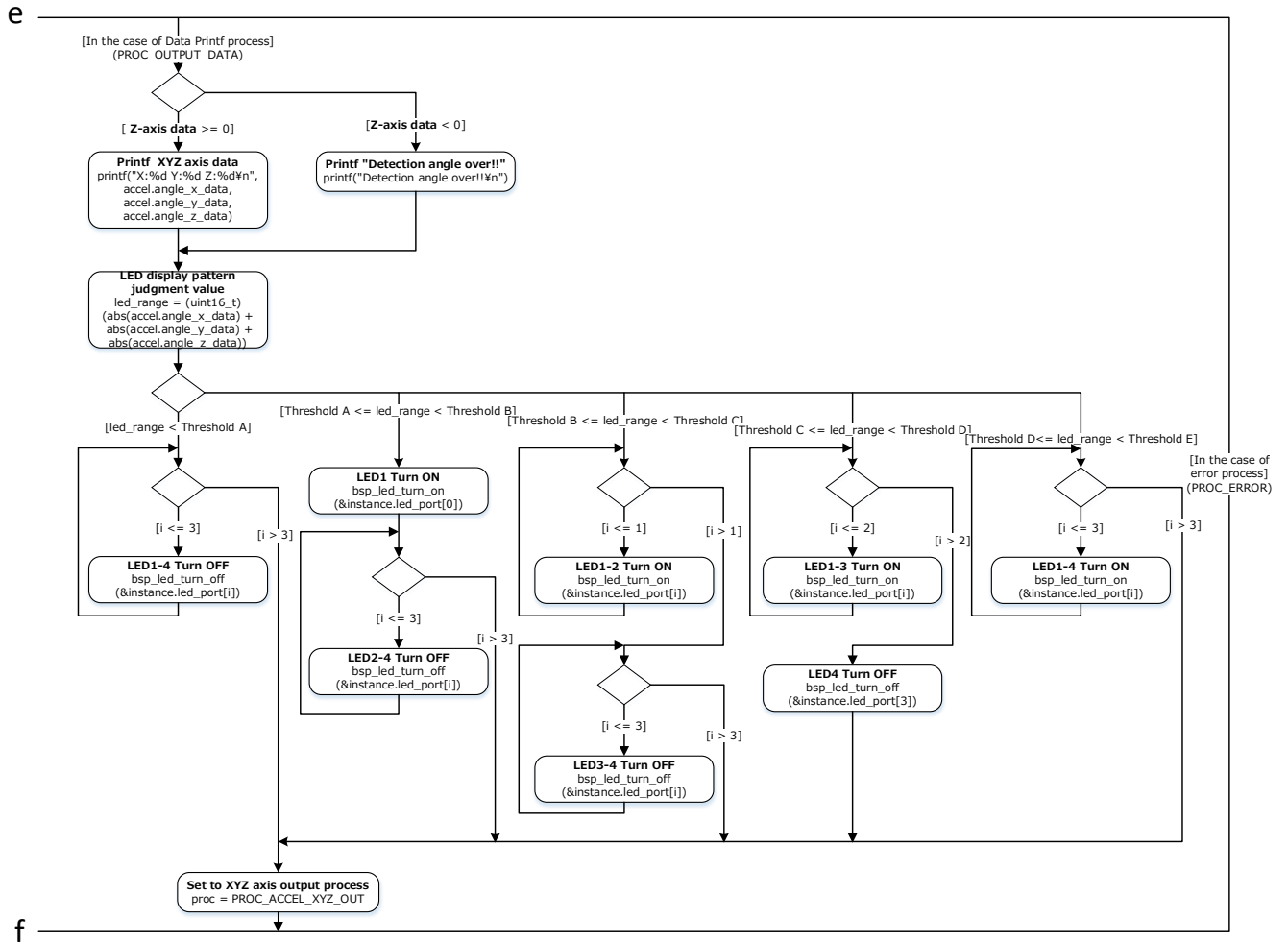
7. Activity diagram

7.1. main

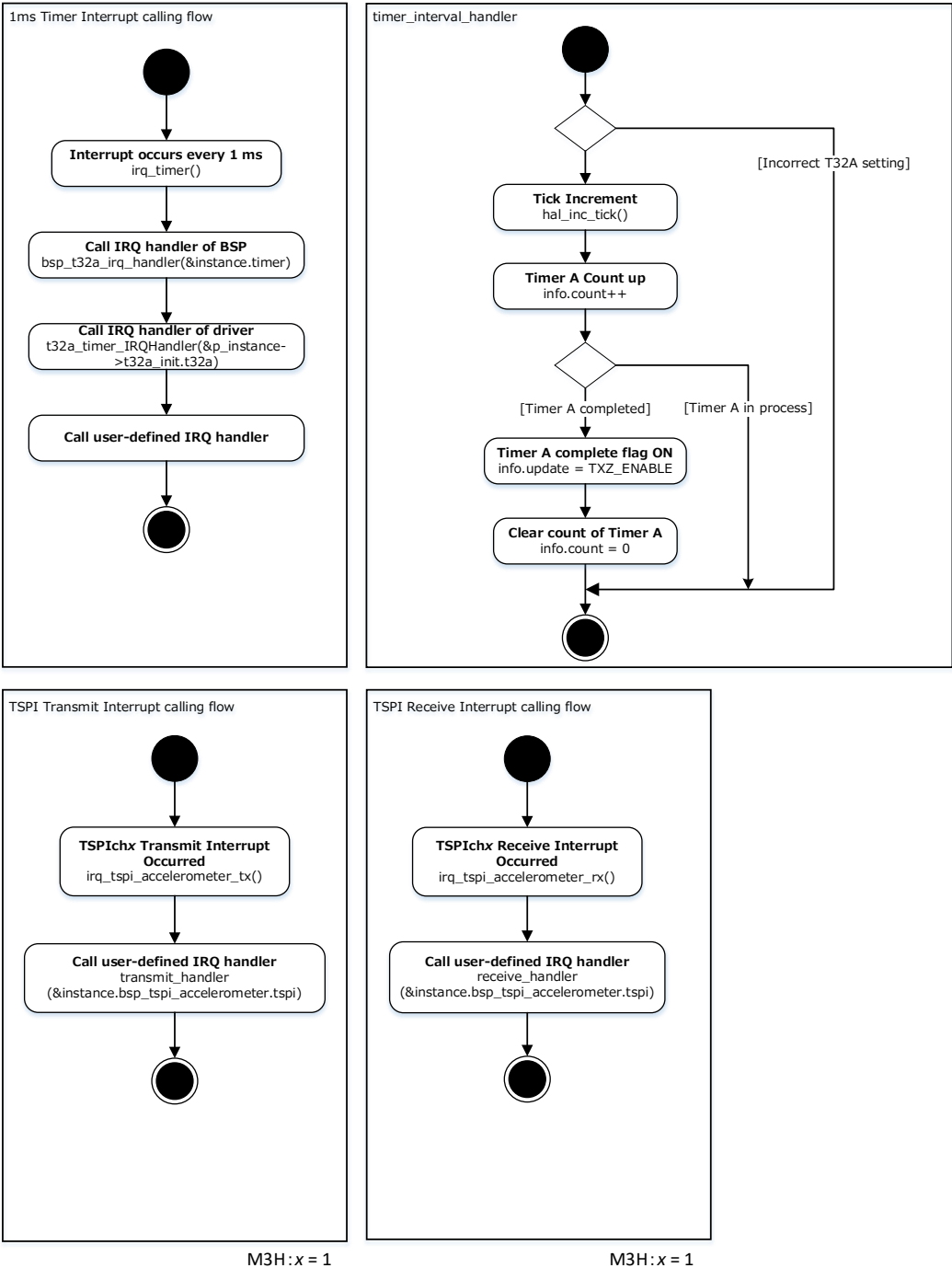




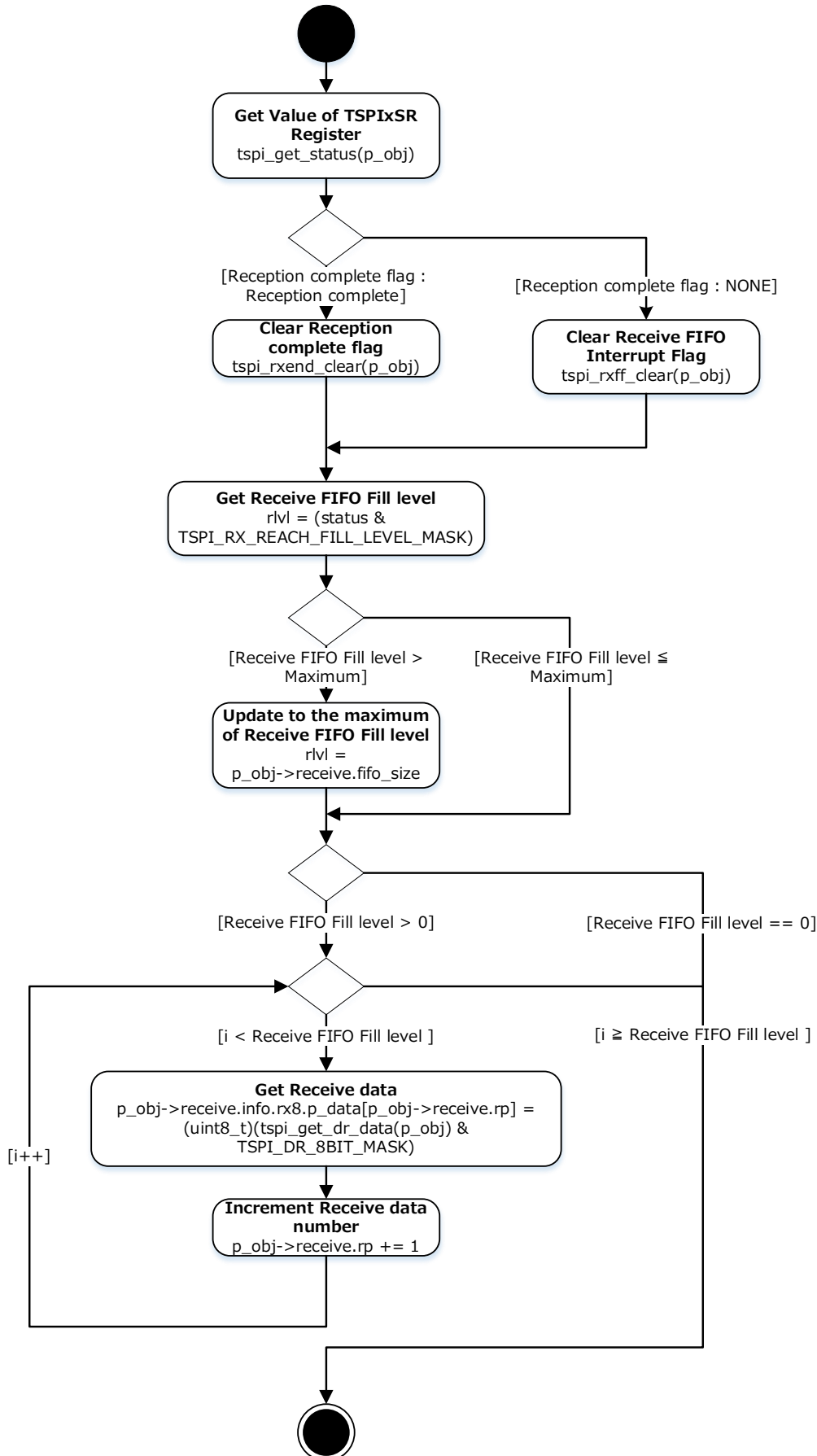




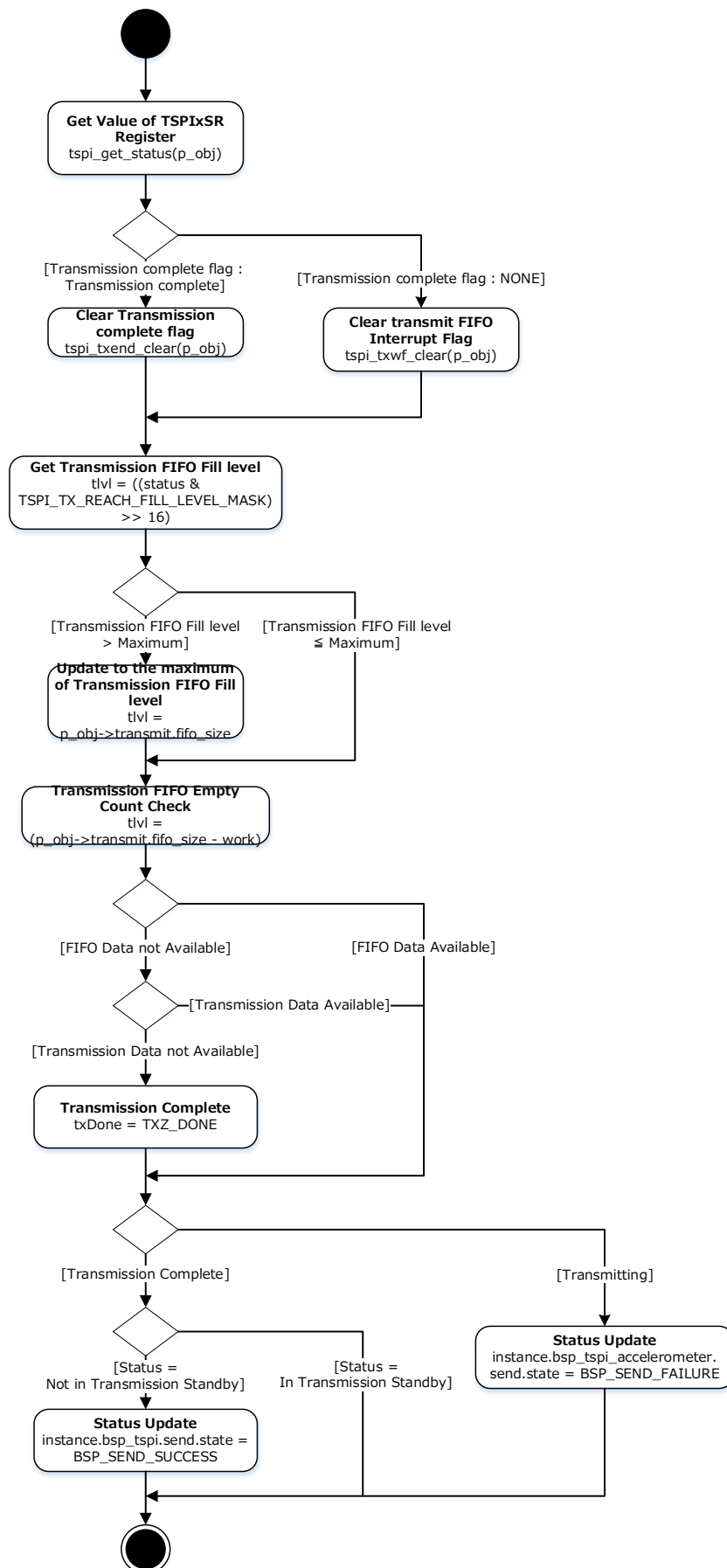
7.2. Interrupt



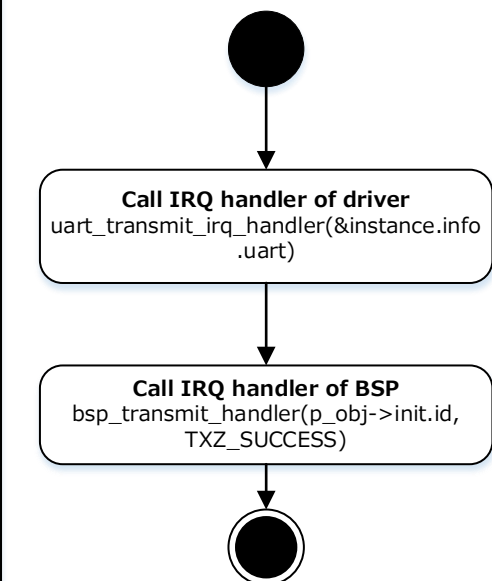
receive_handler



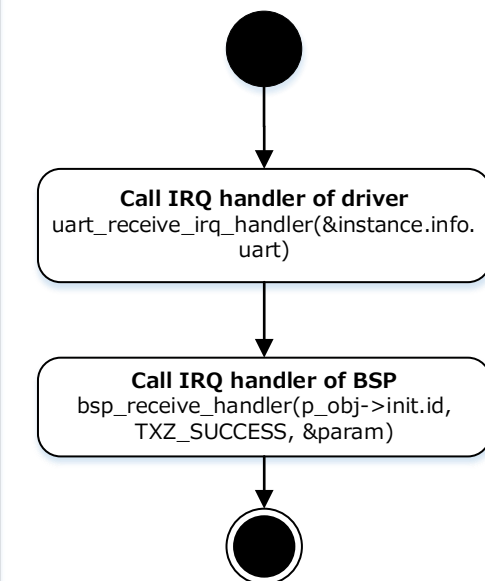
transmit_handler



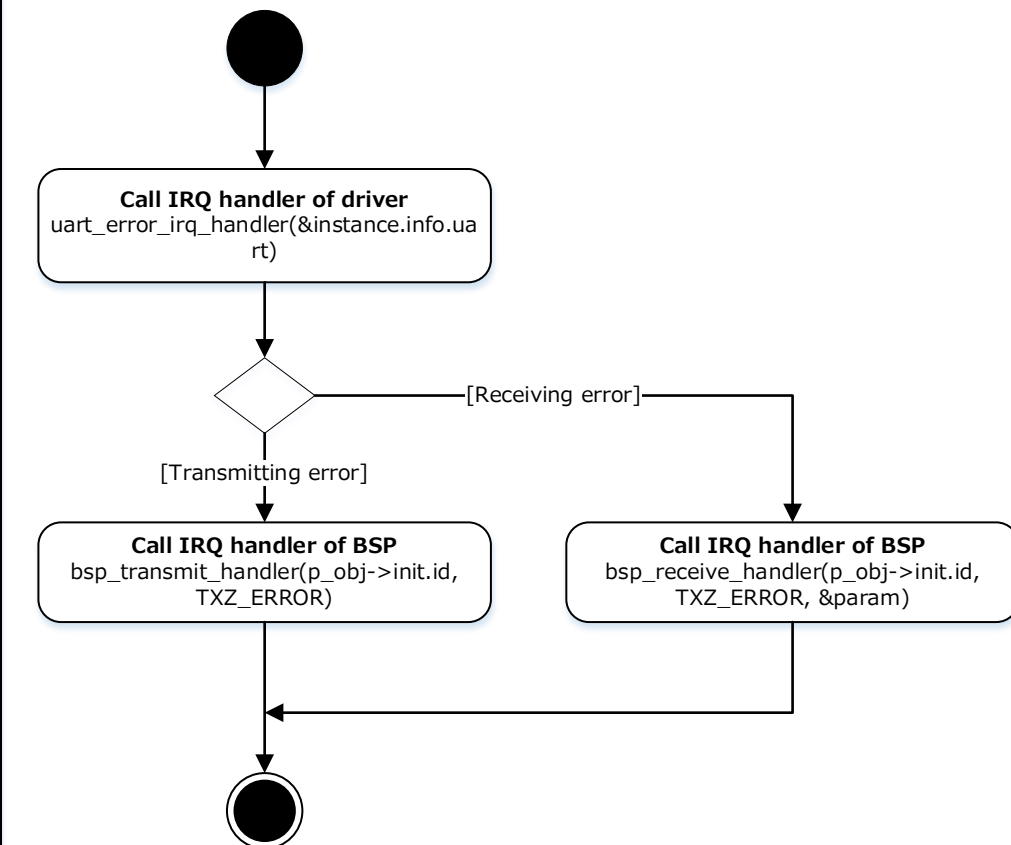
UART TX Interrupt calling flow



UART RX Interrupt calling flow



UART Communication Error Interrupt calling flow



8. Revision History

Revision	Date	Description
1.0	2025-10-30	First release

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