

Application Note

TRM

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1. Preface

This application note describes sample software TRM using the Trimming Circuit (TRM).

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
Timer	T32A:32-bit Timer Event Counter
TRM	Trimming Circuit
UART	Universal Asynchronous Receiver Transmitter

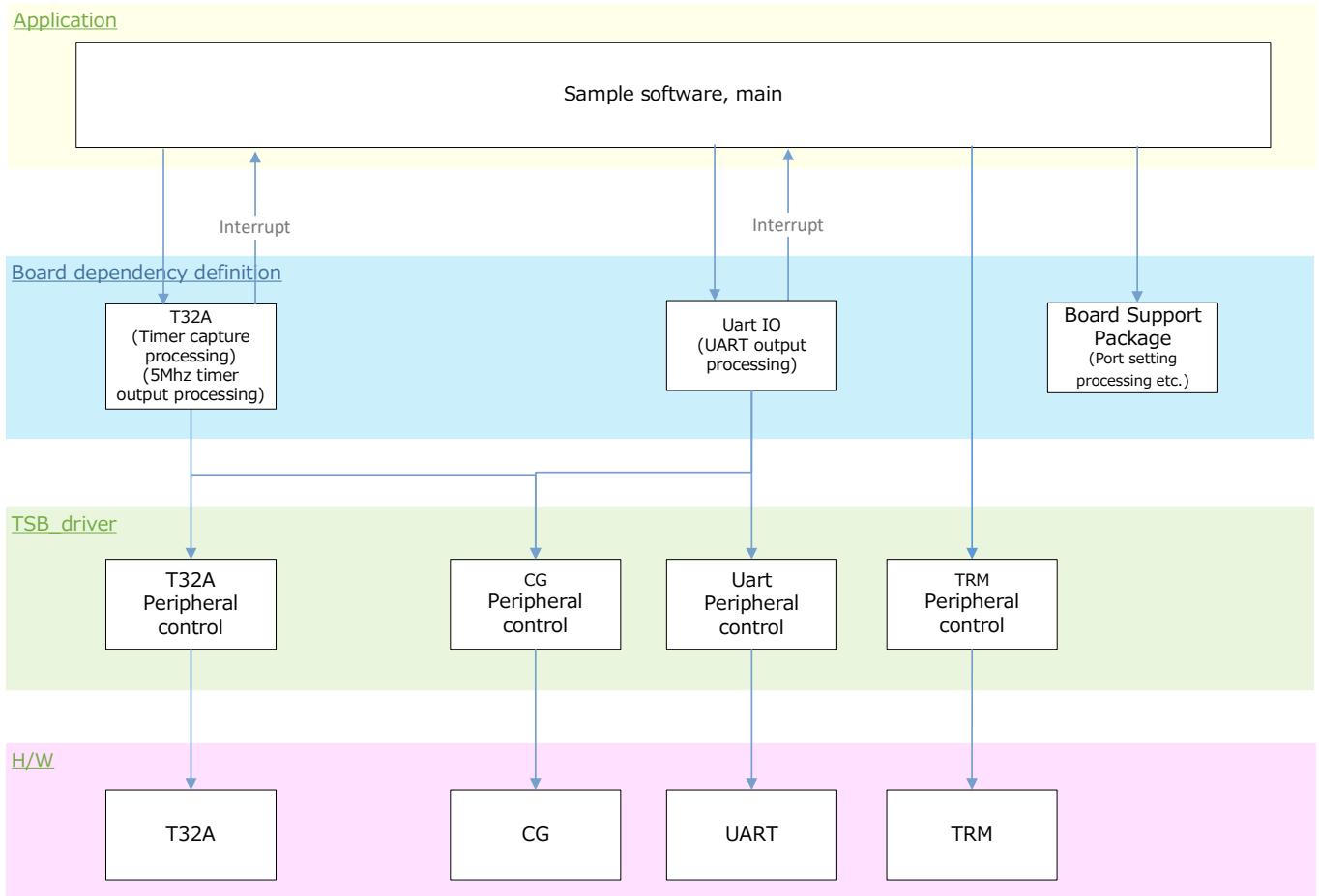
3. Reference Document

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
TRM	Sample program of TRM function

5. Configuration Diagram



6. Sample Program: TRM

This is sample software that trims the built-in oscillation (fIHOSC) using the reference clock or external reference clock (BSP_T32A_CAPT_1).

The compile options to switch the reference clock.

6.1. Outlines of Operation

Pulse B is output from BSP_T32A_PPG_2. After that, set the trimming initial setting value. Error measurement (waveform measurement) is performed until the number of trimmings is reached.

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
T32A	BSP_T32A_CAPT_1	For pulse measurement. Used to measure the external reference clock (Pulse A).
	Note1: BSP_T32A_TRM_fs	For pulse measurement. Used to measure fs
	BSP_T32A_PPG_2	For pulse output. Used to check error correction results (Pulse B)
UART	BSP_UART_1	For terminal emulator communication

6.3. Interrupt to Use

Interrupt	Outlines
(Note1)	T32A chx Timer y Capture 0 For pulse measurement. Used to measure the external reference clock.
(Note2)	T32A chx Timer y Capture 1 For pulse measurement. Used to measure the external reference clock.
(Note3)	T32A chx Timer y Capture 1 For pulse measurement. Used to measure fs
(Note4)	UART Transmit Interrupt
(Note5)	UART Error Interrupts

Note1: SBK-M471,
AdBun-M3QA,
Note2: SBK-M471,
AdBun-M3QA,
Note3: AdBun-M3QA,
Note4 SBK-M471,
AdBun-M3HQA,
Note5: SBK-M471,
AdBun-M3HQA,

“INTT32A04BCAP0”
“INTT32A02ACAP0”
“INTT32A04BCAP1”
“INTT32A02ACAP”
“INTT32A06BCAP1”
“INTSC0TX”
“INTUART0TX”
“INTSC0ERR”
“INTUART0ERR”

6.4. Configuration

Configuration setting.

Configuration	Soft Definition Name	Current Value (Defaults)	Description
Reference clock	TRM_SELECT_TYPE	BSP_PPG_SELECT	Switches the external reference clock. BSP_PPG_SELECT, BSP_UART_SELECT, and BSP_LOSC_SELECT can be switched.
Pulse_A Cycle_A Duty_A	None (Determined by external reference clock input waveform)	240Hz 50%	This is the input waveform of the external reference clock. It has a low width specification. Note: This specification assumes the waveform that can be generated by sending 0xF0 (1 byte) at UART 2400 bps.
Cycle_B	BSP_PPG_FRQ	5	Output waveform for checking trimming results (Pulse B) Cycle (Unit: MHz)
Duty_B	BSP_PPG_DUTY	0.5	Output waveform for checking trimming results (Pulse B) Duty50%
Trimming times	COUNTMAX	10	When the trimming count is reached, an error will occur.
Trimming default value	BSP_TRM_INIT	M471:0x00000080 M3H:0x00000080	To conduct a trimming demo, we will shift the adjustment value once.

6.5. Example of Terminal Emulator Output

6.5.1. Normal Operation

```
please wait...
-----
| start |
-----
TRMOSC_RUN
<TRIMSET>:D
TRMOSC_RUN
<TRIMSET>:F
TRMOSC_DONE
<TRIMSET>:F
```

6.5.2. Case of Error Occurrence

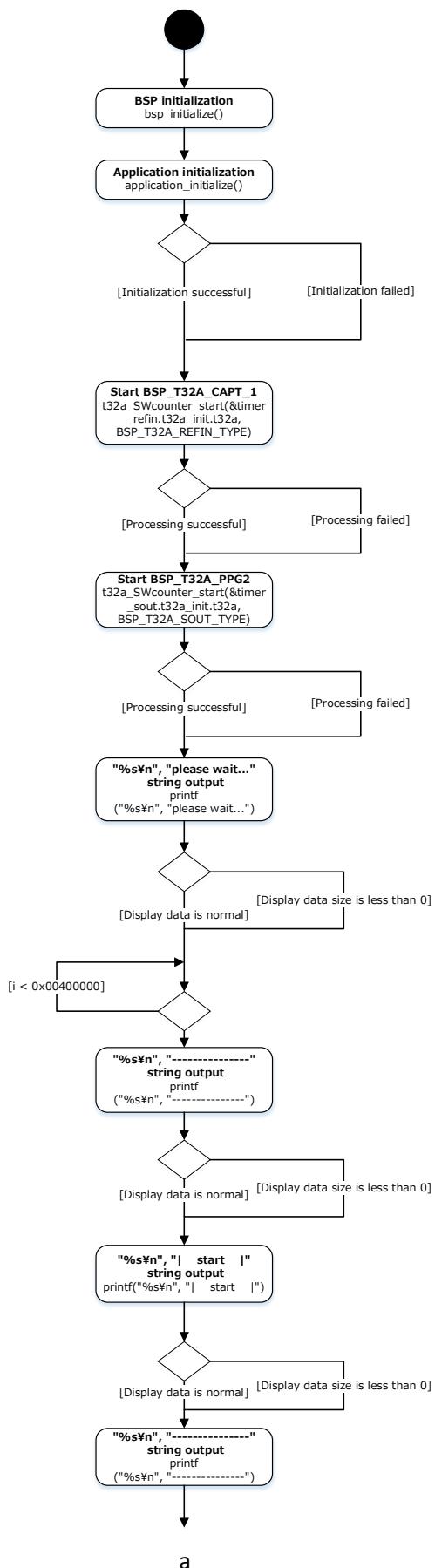
```
please wait...
```

```
-----| start |-----
```

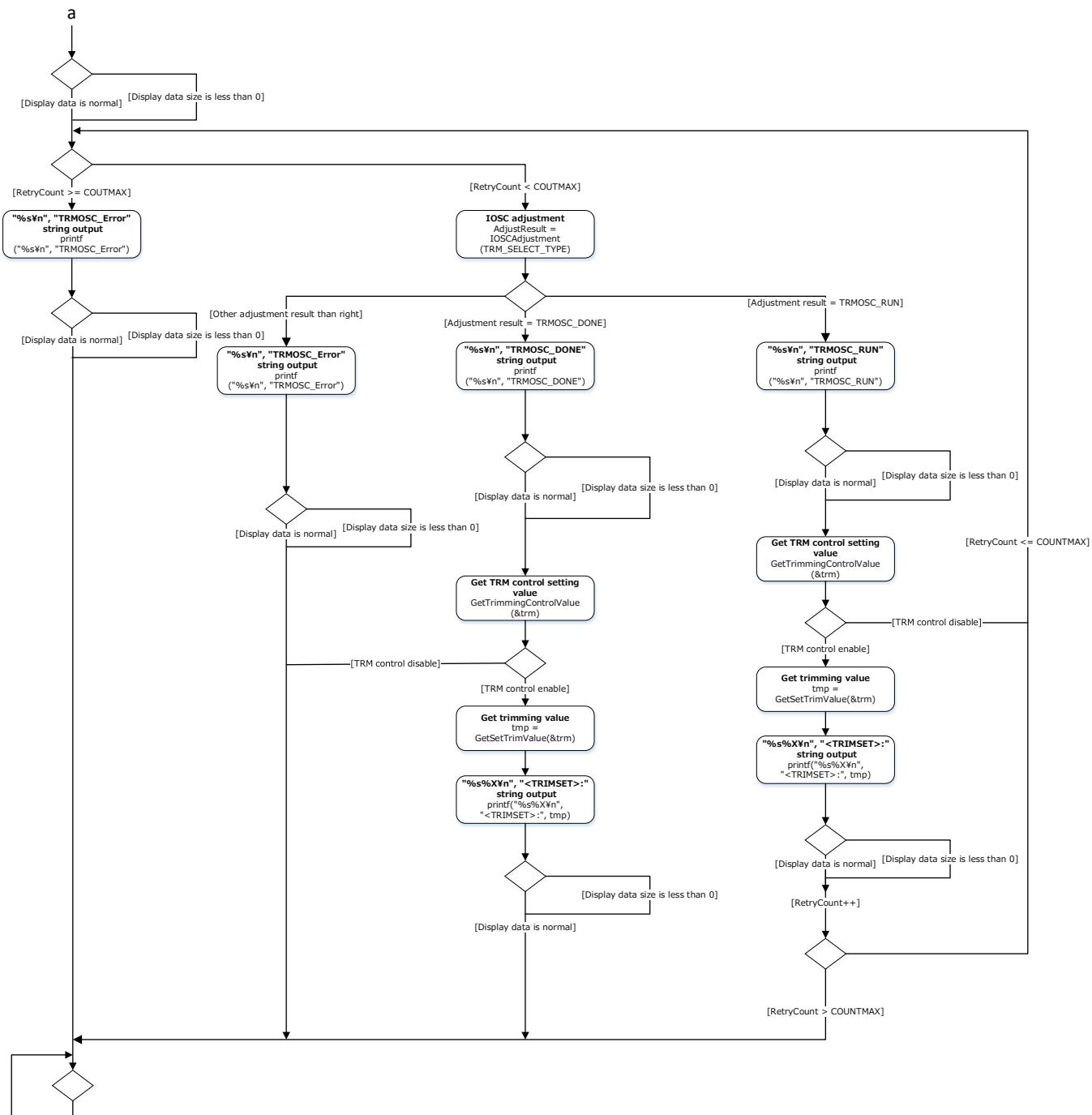
```
TRMOSC_Error
```

7. Activity diagram

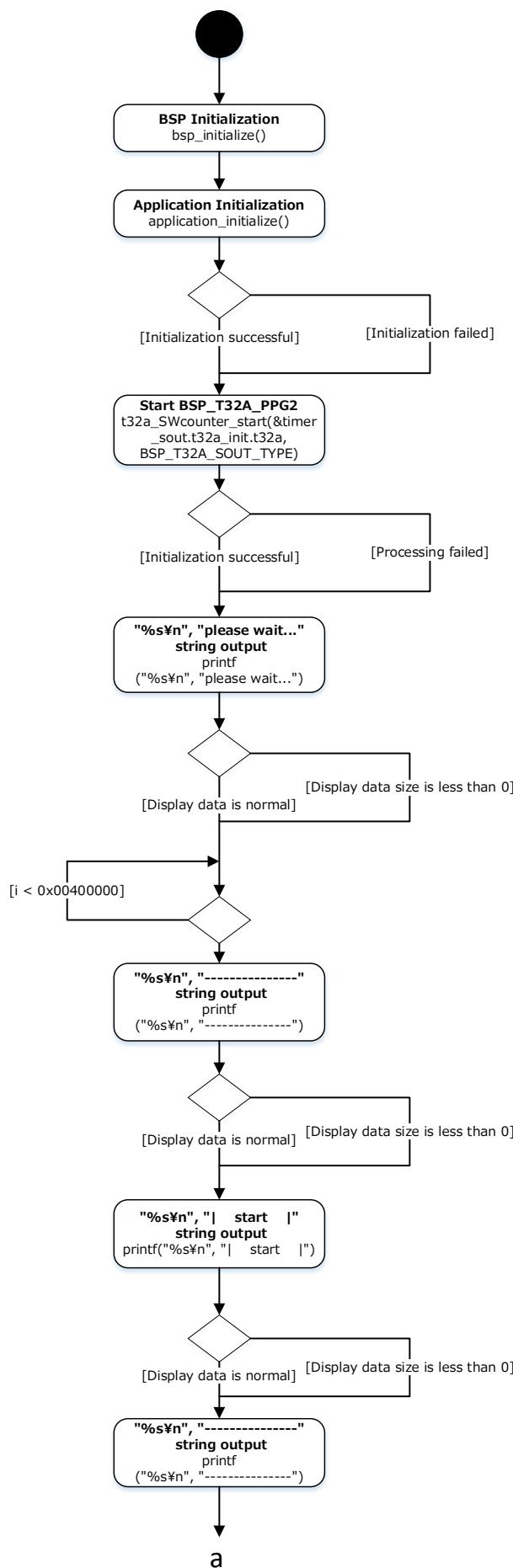
7.1. main

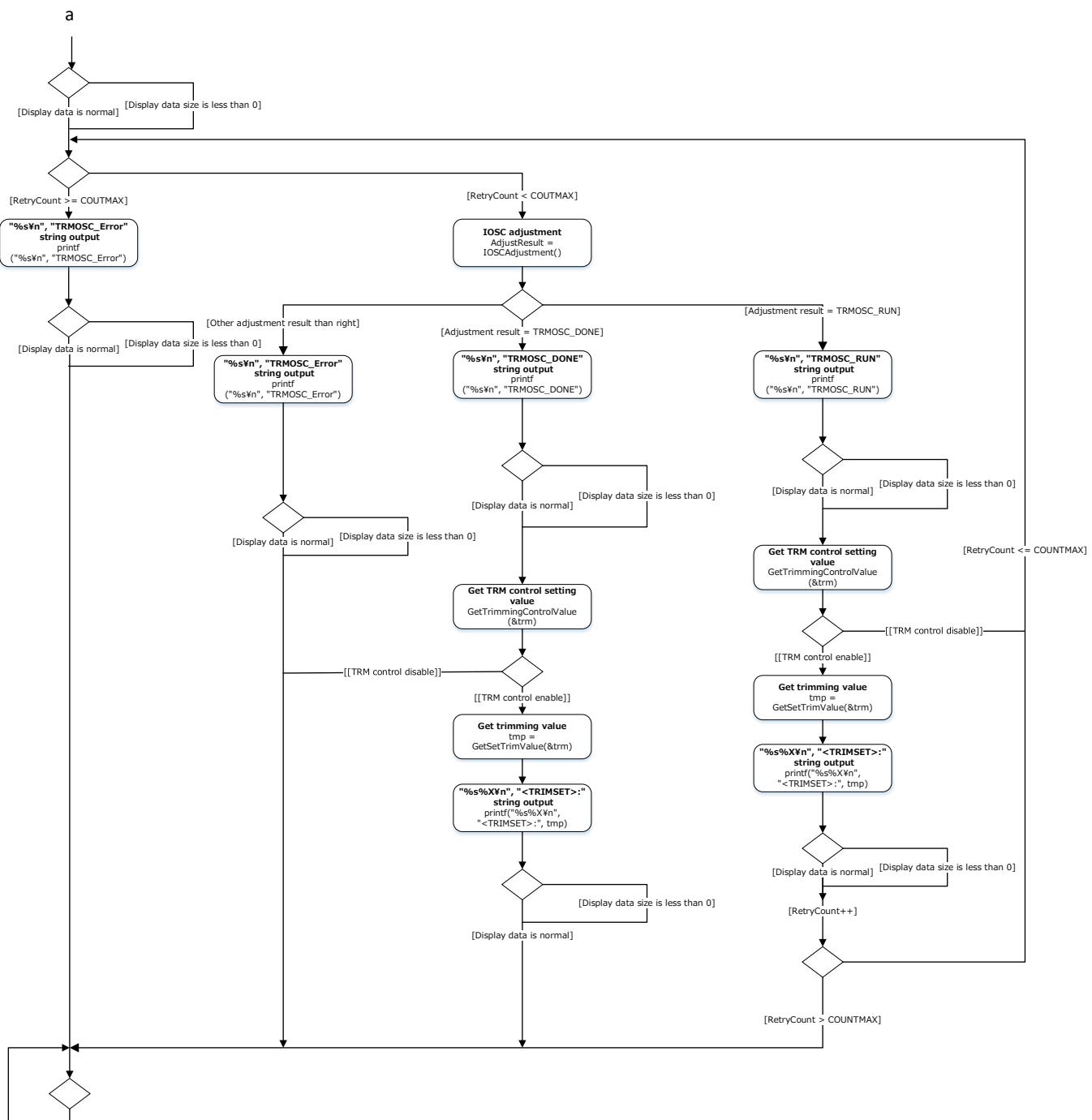


a

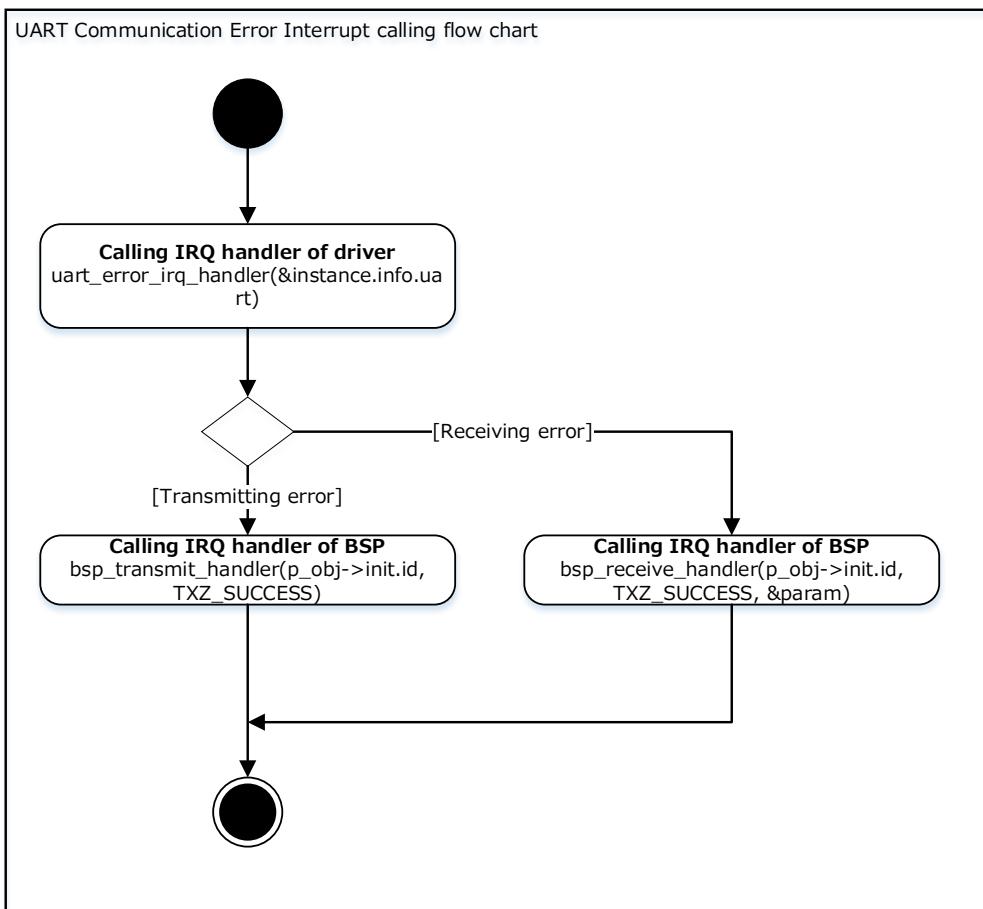
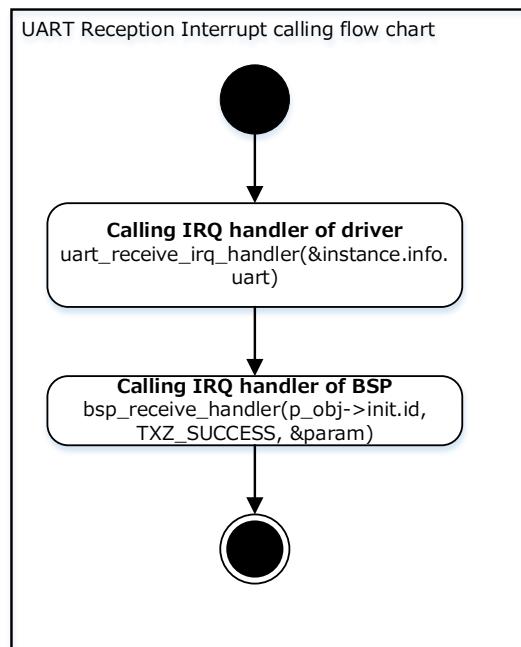
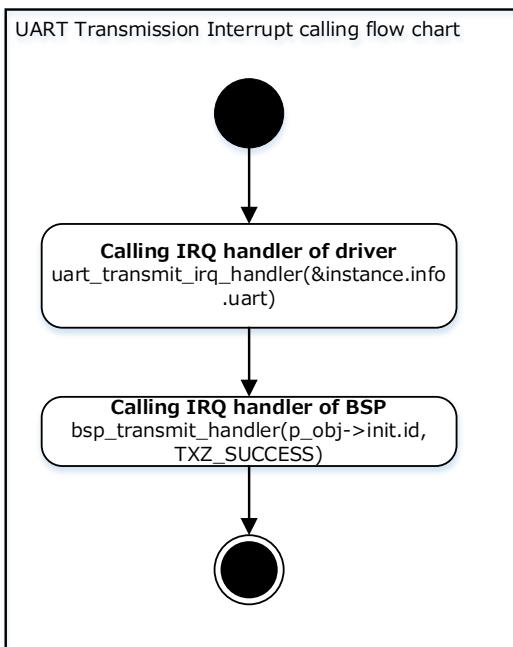


7.2. main_LOSC





7.3. Interrupt



8. Revision History

Revision	Date	Description
1.0	2025-01-20	First release
1.1	2025-10-30	6.3Interrupt to Use Added M3H Interrupt Name.

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