# Application Note

# TRMOSC

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# 1. Preface

This application note describes the sample software of TRMOSC using Trimming circuit (TRM) and Universal Asynchronous Receiver Transmitter (UART). 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 |
| TRMOSC | Trimming circuit |
| IOSC | Internal Oscillator |
| UART | Universal Asynchronous Receiver Transmitter |
| T32A | 32bit 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<br>MCU User Guide | Refer to the MCU user manual to be used. |

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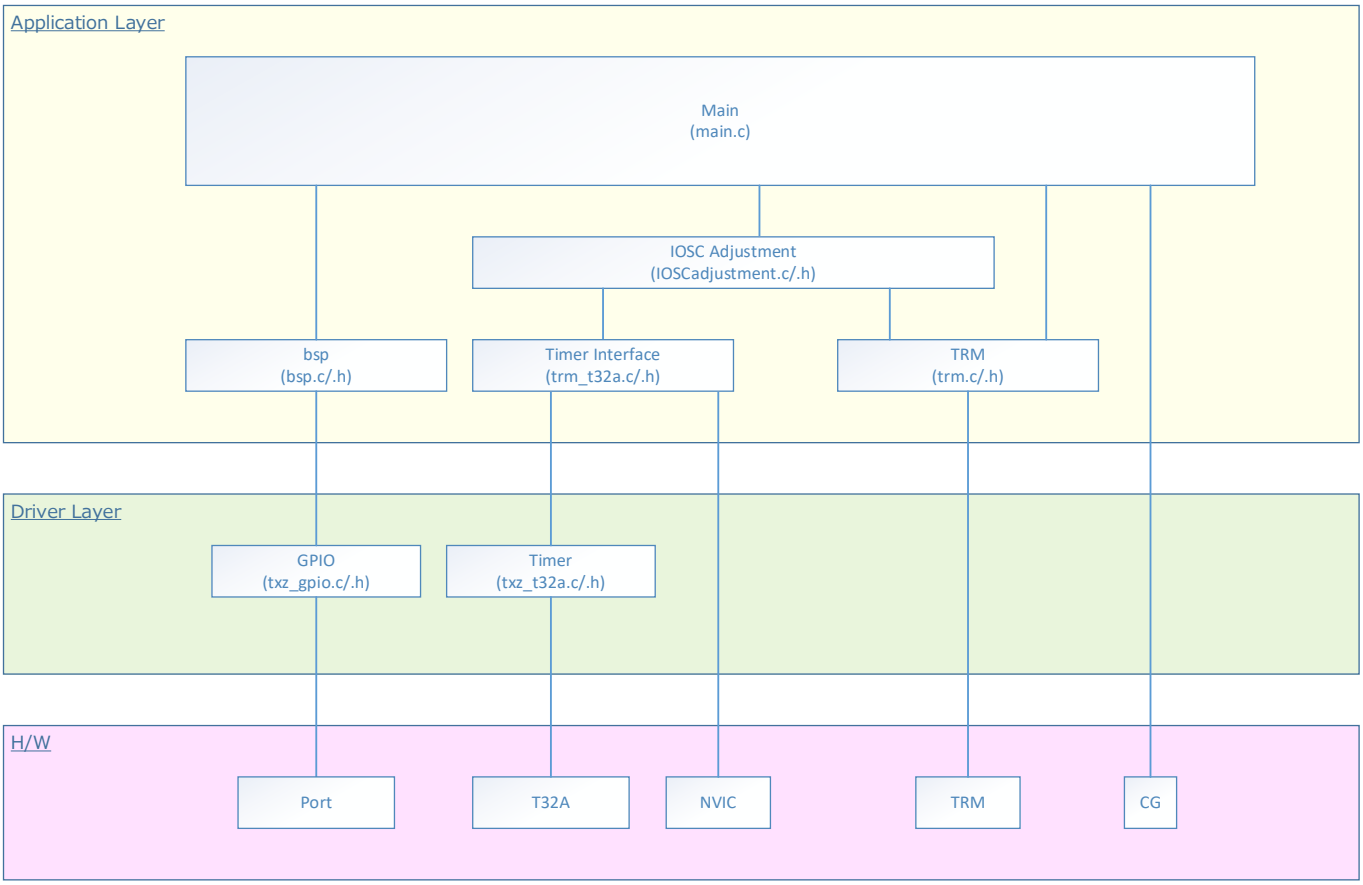
# 4. Target Sample Program

| Sample Program | Outlines |
|---|---|
| TRMOSC | Sample of Trimming circuit (TRM) function |

# 5. Configuration Diagram



# 6. Sample Program: TRMOSC

This sample software adjusts the frequency of the internal oscillator using Trimming circuit (TRM).

## 6.1. Outlines of Operation

External reference clock and Low-speed clock (32.768 kHz) are available as the reference clock.
The sample program calculates the error value and sets an adjustment value to the internal oscillator adjustment register.

- Output specifications
  Check is done by monitoring the output waveform.
  Frequency after adjustment (expected value): 5 MHz
  Internal oscillator frequency: 10 MHz
  Source clock φT0: 10 MHz/2 = 5 MHz
  Output waveform is reversed at 5 MHz: 5 MHz(Duty50%)

- Input specifications
  Use function generator
  wave: Square Wave
  frequency: 240Hz

## 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 |
| T32A | BSP_T32A_REFIN | Reference clock input |
| | BSP_T32A_SOUT | Signal output |
| TRM | - | Trimming control |

## 6.3. Interrupt to Use

| Interrupt | Outlines |
|---|---|
| Timer Interrupt | Interval timer interrupt |
| UART Interrupt | UART reception interrupt |
| | UART transmission interrupt |
| | UART ERROR interrupt |

## 6.4. Configuration

“TRMOSC” configuration setting

| Configuration | Set Value | Description |
|---|---|---|
| TRMOSC_LOSC | Defined value | Reference clock selection (defined: Low-speed clock) |

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## 6.5. Example of Terminal Emulator Output

### 6.5.1. Normal Operation

```
 - - - - - - - - - - -
 | TRMOSC_demo       |
 - - - - - - - - - - -
Please wait…
 - - - - - - - - - -
 |        start        |
 - - - - - - - - - -
TRMOSC RUN
<TRIMSET>:B2
TRMOSC_DONE
<TRIMSET>:B2
```

### 6.5.2. Case of Error Occurrence

Nothing.

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# 7. Revision History

| Revision | Date | Description |
|---|---|---|
| 1.0 | 2021-11-04 | First release |

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