

Application Note

ADC Monitor

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1. Preface

This application note describes sample software for the analog-to-digital converter (ADC) monitoring function. This document helps the user check operation of a product under development and develop its program.

2. Technical Term

Term/Abbreviation	Definition
ADC	Analog-to-Digital Converter
BSP	Board Support Package
UART	Universal Asynchronous Receiver Transmitter
Timer	T32A : 32-bit Timer Event Counter

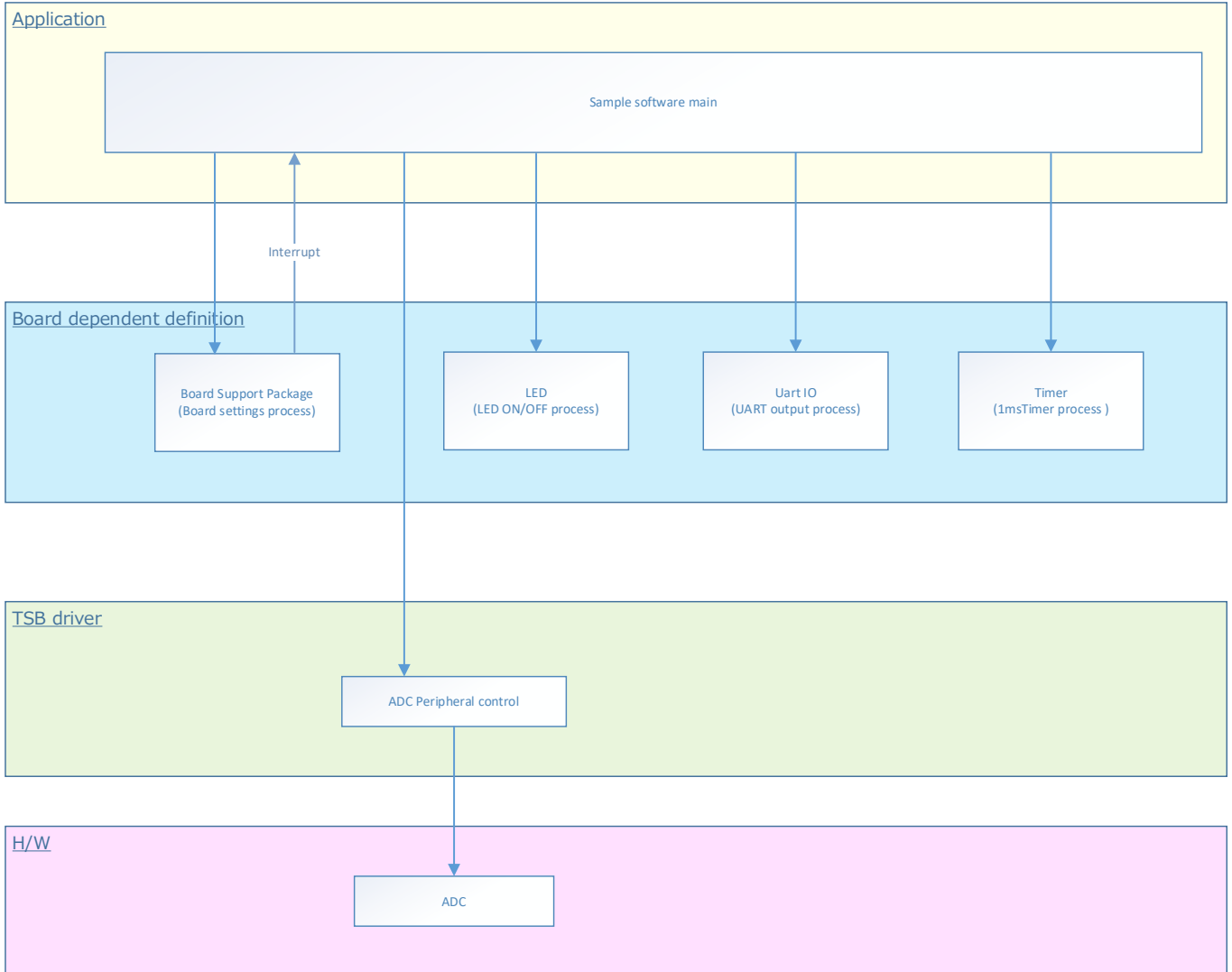
3. Reference Document

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 guide to be used.

4. Target Sample Program

Sample Program	Outline
ADC_Monitor	Sample program of ADC monitoring function

5. Configuration Diagram



6. Sample Program : ADC_Monitor

This is sample software that changes the LED display pattern according to temperature changes using the ADC monitoring function.

6.1. Outlines of Operation

The output voltage of BSP_THERMISTOR_1 is measured by ADC and converted to temperature. If the temperature-converted value is lower than the temperature A, turn off BSP_LED_1 and BSP_LED_2. If the temperature-converted value is above temperature A and below temperature B, BSP_LED_1 is turned off and BSP_LED_2 is turned on. If the temperature-converted value is temperature B or higher, BSP_LED_1 and BSP_LED_2 light up. For the values of temperature A and B, refer to 6.4. Configuration.

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
ADC	BSP_THERMISTOR_1	For thermistors
PORT	BSP_LED_1	For operation check
	BSP_LED_2	For operation check
UART	BSP_UART_1	For terminal emulator communication (Outputs log)
T32A	BSP_T32A_TIMER_1	Used as a 1ms interval timer

6.3. Interrupt to Use

Interrupt	Outlines
INTUART0RX	UART ch0 Receive interrupt for terminal emulator
INTUART0TX	UART ch0 Transmission interrupt for terminal emulator
INTUART0ERR	UART ch0 Error interrupt for terminal emulator
INTT32A00A	T32A Timer A Timer counter increment every 1ms for display update
INTADACP0	ADC monitor for temperature information monitoring
INTADACP1	ADC monitor for temperature information monitoring

6.4. Configuration

“main.c” configuration setting.

Configuration	Current Value	Description
Timer A	5s	-
Temperature_A	25 degrees	-
Temperature_B	36 degrees	-

6.5. Example of Terminal Emulator Output

6.5.1. Normal Operation

Convert Result Value [THERMISTOR]:0x128(26 degrees)

6.5.2. Case of Error Occurrence

Nothing.

7. ADC Driver

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

Driver	Control Outlines
adc_ch_init	ADC Initialization of channel object
adc_ch_deinit	ADC Release channel object
Adc_ch_int_enable	Interrupt enabled
adc_ch_int_disable	Interrupt disabled
adc_ch_get_value	Get the converted value
get_conversion_data	Get the converted value from ADxREGn
adc_dma_init	ADC DMA Object initialization
adc_dma_deinit	ADC DMA Release the object
adc_dma_start	Non-blocking Start single conversion of DMA
adc_dma_stop	Non-blocking Stop single conversion of DMA
adc_init	ADC Object initialization
adc_deinit	ADC Release the object
adc_channel_setting	ADC Channel settings
adc_channel_clear	ADC Channel clear
adc_cmp_init	ADC Initialize comparison register
adc_cmp_deinit	ADC Release comparison register
adc_channel_get_value	Get AD value
adc_start	ADC Start conversion
adc_stop	ADC Stop conversion
adc_poll_conversion	Wait for a single conversion to complete
adc_get_status	ADC Get conversion status

8. Revision History

Revision	Date	Description
1.0	2023-06-28	First release

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