

M4K Group (1)
Application Note
Input / Output Ports
(PORT-M4K(1))

Outlines

This application note is a reference material for developing products using the Input and output ports (PORT) of M4K Group (1).

This document helps the user check operation of the product and develop its program.

Target sample program: GPIO_LED

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1. Preface

This sample program is used to control the lighting of LED's using the Input and output ports. When a push switch is pushed down, the corresponding LED lights.

2. Reference Document

1. Datasheet
TMPM4K Group (1) datasheet Rev2.0 (Japanese edition)
2. Reference manual
Input/Output Ports (PORT-M4K(1)) Rev2.0 (Japanese edition)
3. Application note
M4K Group (1) Application Note Startup (CMSIS System & Clock Configuration) Rev1.0
4. Other reference document
TMPM4KxA Group Peripheral Driver User Manual (Doxygen) V1.0.4.0

3. Function to Use

IP	Channel	Port	Function/Operation mode
Input/Output Ports	—	PJ0 (Output Port)	Output
	—	PJ2 (Output Port)	
	—	PJ4 (Output Port)	
	—	PL4 (Output Port)	
	—	PL0 (Input port)	Input
	—	PL1 (Input port)	
	—	PL2 (Input port)	
	—	PL3 (Input port)	

4. Target Device

The target devices of this application note are as follows;

TMPM4K4FYAUG	TMPM4K4FWAUG	TMPM4K4FUAUG	TMPM4K4FSAUG
TMPM4K4FYAFG	TMPM4K4FWAFG	TMPM4K4FUAFG	TMPM4K4FSAFG
TMPM4K2FYADUG	TMPM4K2FWADUG	TMPM4K2FUADUG	TMPM4K2FSADUG
TMPM4K1FYAUG	TMPM4K1FWAUG	TMPM4K1FUAUG	TMPM4K1FSAUG
			TMPM4K0FSADUG

* This sample program operates on the evaluation board of TMPM4K4FYAUG.

If other function than the TMPM4K4 one is checked, it is necessary that CMSIS Core related files (the startup file and I/O header file) should be changed properly.

Additionally, the name of microcontroller which is set to the project should be changed.

The BSP related file is dedicated to the evaluation board (TMPM4K4FYAUG). If other function than the TMPM4K4 one is checked, the BSP related file should be changed properly.

5. Operation Confirmation Condition

Used microcontroller	TMPM4K4FYAUG
Used board	TMPM4K4 evaluation board (Product of ESP-kikaku Co. Ltd.)
Integrated development environment	IAR Embedded Workbench for ARM 8.22.2
Integrated development environment	Arm® Keil® MDK Version 5.24.2.0
Sample program	v1.0.0

6. Evaluation Board Operation

The sample program should be started up.

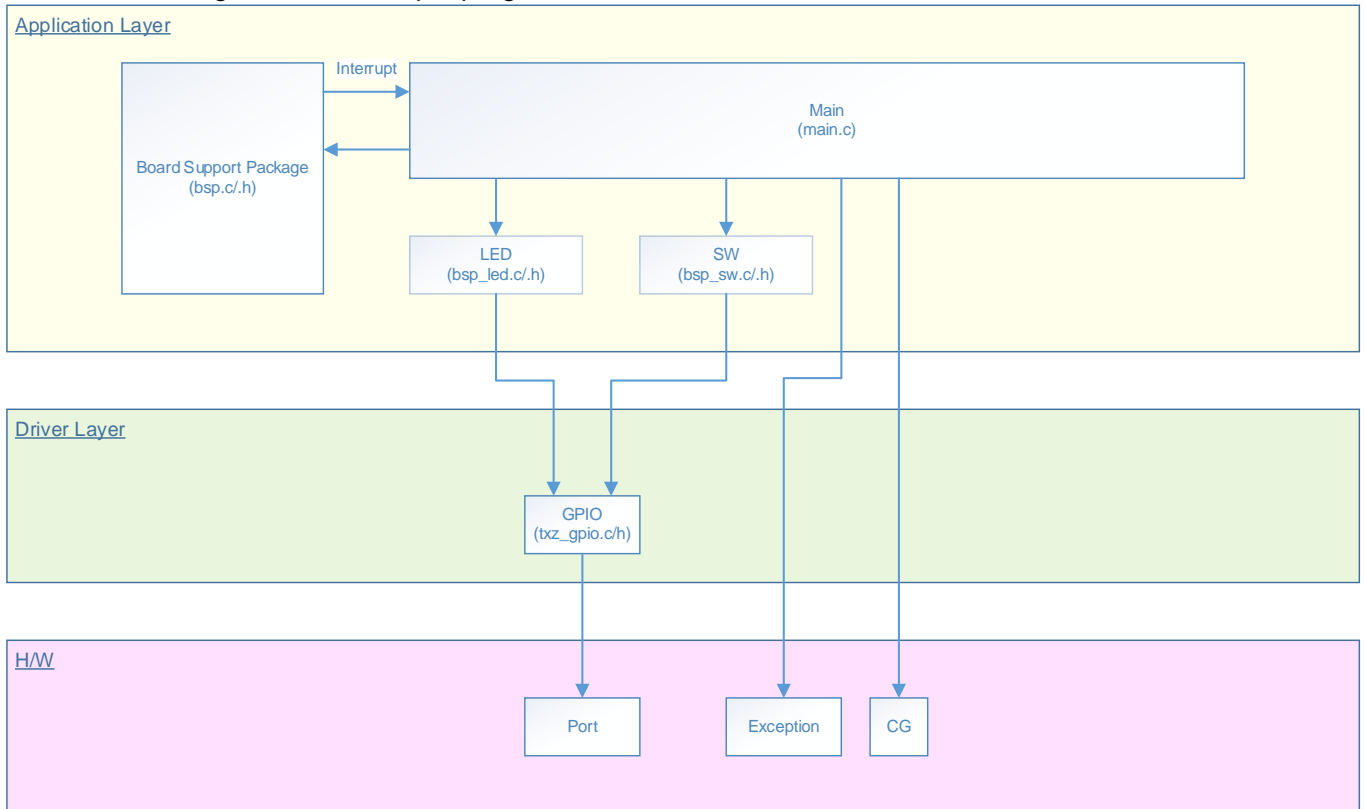
While the SW input pin is set to low, the corresponding output port is low.

Switch: Input port	LED: Output port	Description
SW1: PL0	LED1: PJ0	—
SW2: PL1	LED2: PJ2	—
SW3: PL2	LED3: PJ4	—
SW4: PL3	— : PL4	Unconnected.

7. Sample Program

7.1. Structure Diagram of Sample Program

The structure diagram of the sample program is shown below.



7.2. Startup Routine

The following initialization is done after power is supplied.

The initialization of each clock setting and the initialization of the watchdog timer setting are done.

7.3. Main Operation

The initialization of the BSP is done.

The initialization of the LED's and the initialization of the switches are done as the initialization of the application software.

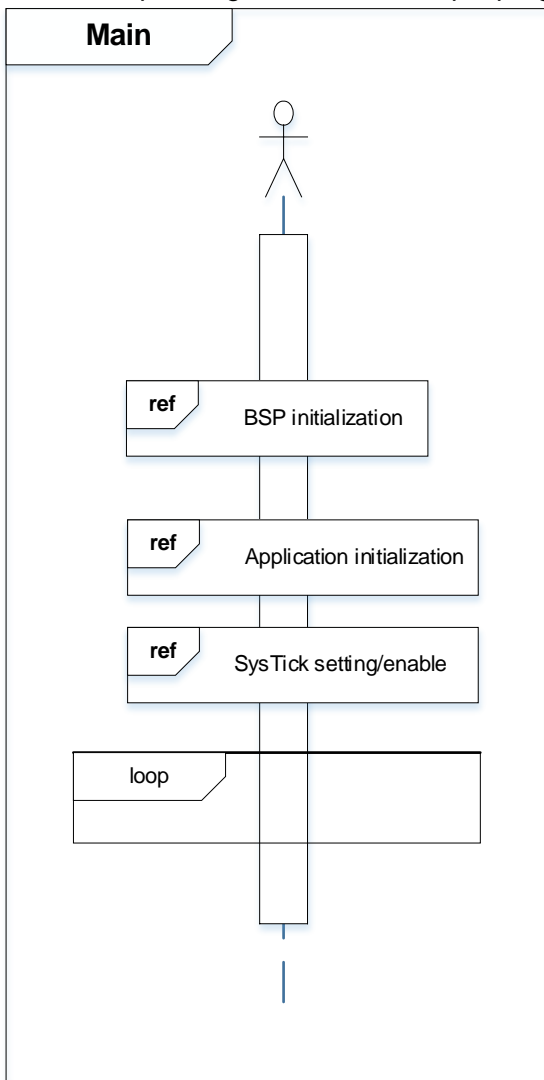
The initialization of the system clock is done. The SysTick interrupt which is generated every 10 ms is enabled.

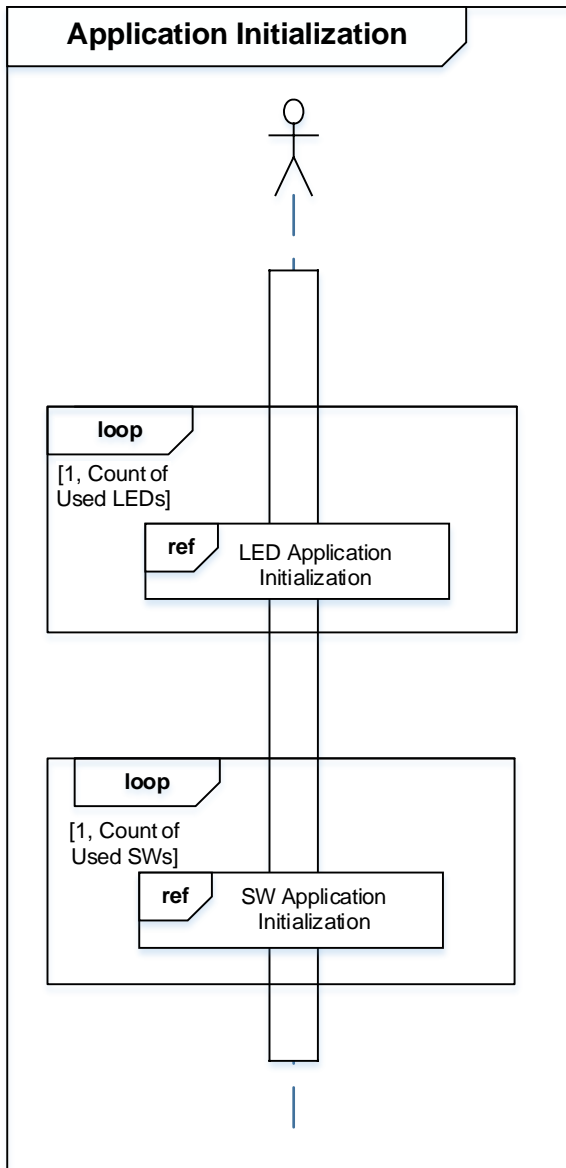
The status of the push switches is checked by the SysTick interrupt. If one of the switches is in the Low state, the corresponding port outputs the Low level.

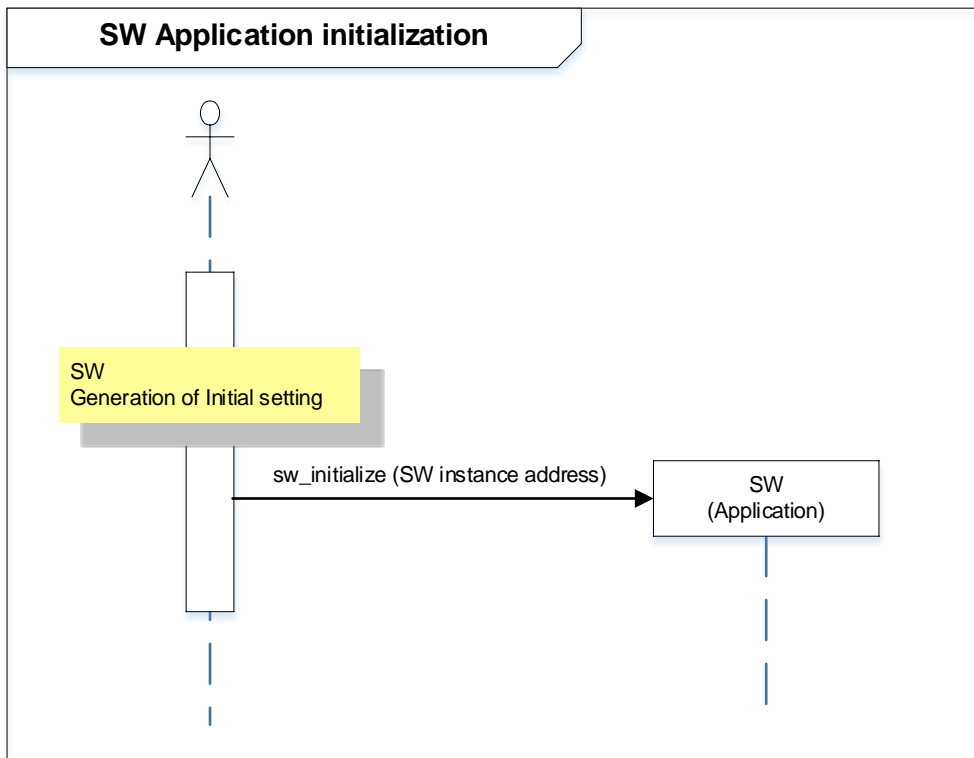
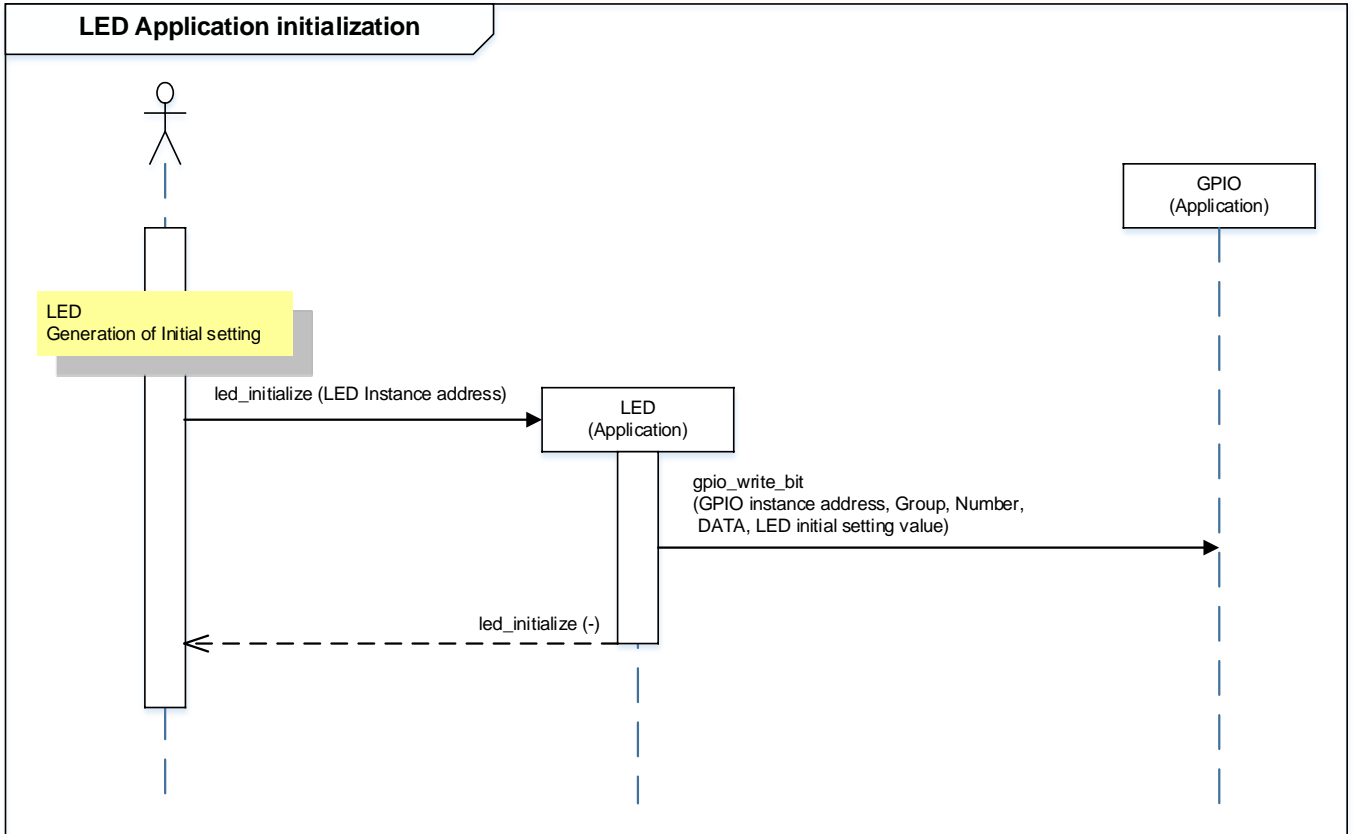
When the port is connected to an LED, the LED lights.

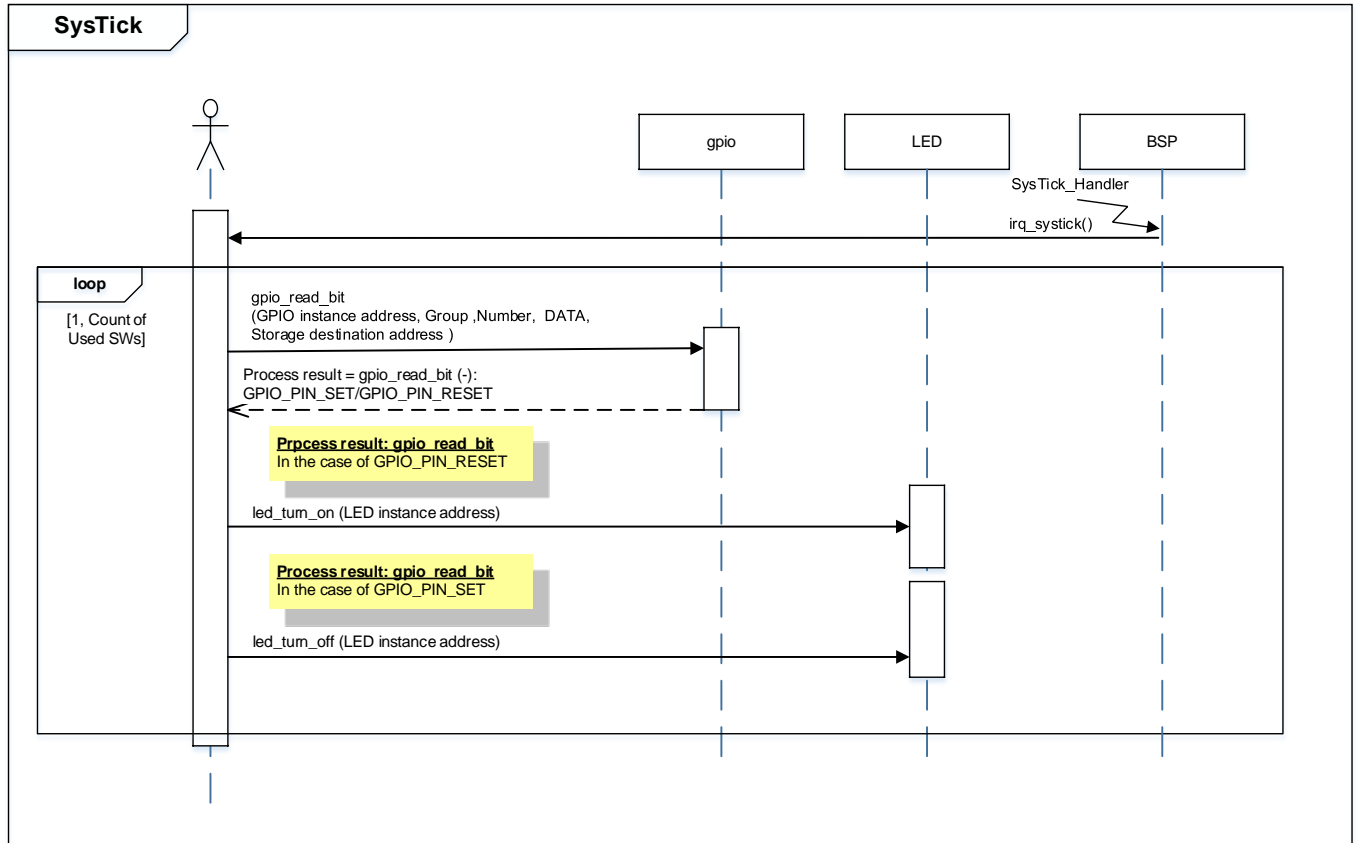
7.4. Operating Flow of Sample Program

The basic operating flows of the sample program are shown in the following;









8. Points to Remember on Handling of Sample Programs

When using the sample program with other than “Operation Confirmation Condition” please check the operation sufficiently.

9. Revision History

Revision	Date	Description
1.0	2019-10-15	First release

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