

## Application Note

# TMPM4MNA User Guide

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## 1. Preface

This application note describes a reference for the usage environment when running the sample program on TPM4MNA.

If you select something other than TPM4MNA on the MCU, a compile error may occur due to insufficient terminal or IP channel.

In that case, please modify the program and check the operation.

## 2. Technical Term

Term/Abbreviation	Definition
BSP	Board Support Package
UART	Universal Asynchronous Receiver Transmitter
LED	Light-emitting diode
TSPI	Toshiba Serial Peripheral Interface
I2C	Inter-Integrated Circuit
EI2C	Enhanced Inter-Integrated Circuit

## 3. Reference Document

Document	Notes
TPM4M Group(1) Data sheet	-
Reference manual	Refer to the reference manual of each IP to be used.
Application note	Refer to the application note of sample software to be used.

## 4. Operation Confirmation Condition

Item	Name	Version
Used Microcontroller	TMPM4MNFYAFG	-
Used Board	SBK-M4MN	-
Unified Development Environment	IAR Embedded Workbench for ARM	8.50.6
Unified Development Environment	Arm® Keil® MDK	5.31.00
Sample Program	TXZp_TMPM4MN_V091	V0.9.1

## 5. Used Channel and Port Assignment

### 5.1. User Interface

#### 5.1.1. Push-Switch

Channel	Function	Port
BSP_PSW_1	Input	PD1
BSP_PSW_2	Input	PD0
BSP_PSW_3	Input	PU4
BSP_PSW_4	Input	PU5
BSP_PSW_5	Input	(Substitute with BSP_SSW_1)

#### 5.1.2. Slide-Switch

Channel	Function	Port
BSP_SSW_1	Input	PG3
BSP_SSW_2	Input	PG4
BSP_SSW_3	Input	PG5
BSP_SSW_4	Input	PG6

#### 5.1.3. LED

Channel	Function	Port
BSP_LED_1	Output	PB0
BSP_LED_2	Output	PB2
BSP_LED_3	Output	PB4
BSP_LED_4	Output	PV0

### 5.2. Communication

#### 5.2.1. UART Communication

Channel	Peripheral Channel	Function	Port
BSP_UART_1	ch0	BSP_UART1_TXD	PC0
		BSP_UART1_RXD	PC1
		BSP_UART1_CTS	-
		BSP_UART1_RTS	-
BSP_UART_2	-	BSP_UART2_TXD	-
		BSP_UART2_RXD	-
		BSP_UART2_CTS	-
		BSP_UART2_RTS	-

### 5.2.2. TSPI Communication

Channel	Peripheral Channel	Function	Port
BSP_TSPI_1	ch0	BSP_SPI1_TXD	PA3
		BSP_SPI1_RXD	PA2
		BSP_SPI1_SCK	PA4
		BSP_SPI1_CS	PC2
		BSP_SPI1_CSIN	PA0
BSP_TSPI_2	-	BSP_SPI2_TXD	-
		BSP_SPI2_RXD	-
		BSP_SPI2_SCK	-
		BSP_SPI2_CS	-
		BSP_SPI2_CSIN	-

### 5.2.3. I2C Communication

Channel	Peripheral Channel	Function	Port
BSP_I2C_1	ch1	BSP_I2C1_SCL	PD4
		BSP_I2C1_SDA	PD3
BSP_I2C_2	-	BSP_I2C2_SCL	-
		BSP_I2C2_SDA	-

### 5.2.4. EI2C Communication

Channel	Peripheral Channel	Function	Port
BSP_EI2C_1	ch1	BSP_EI2C1_SCL	PD4
		BSP_EI2C1_SDA	PD3
BSP_EI2C_2	-	BSP_EI2C2_SCL	-
		BSP_EI2C2_SDA	-

### 5.2.5. CAN Communication

Channel	Peripheral Channel	Function	Port
BSP_CAN_1	unit A	BSP_CAN1_TX	PE0
		BSP_CAN1_RX	PE1
BSP_CAN_2	-	BSP_CAN2_TX	-
		BSP_CAN2_RX	-

### 5.3. Timer

Channel	Peripheral Channel	Function	Port
BSP_T32A_1	BSP_T32A_TIMER_1	1ms Timer	-
BSP_T32A_2	BSP_T32A_PPG_1	ch3A:Pulse Output	PE2
BSP_T32A_3	BSP_T32A_PPG_2	ch3B:Pulse Output (TRM)	PE6
BSP_T32A_4	BSP_T32A_CAPT_1	ch1A:Pulse Input (Capture)	PF3
BSP_T32A_5	BSP_T32A_TRM_fs	ch6A:trimming(fs)	-
BSP_T32A_6	BSP_T32A_TIMER_APP	ch-:application	-
BSP_T32A_7	BSP_T32A_CAPT_2	ch3B: Pulse Input (Capture)	-

### 5.4. ADC

Channel	Peripheral Channel	Function	Port
BSP_ADC_1	BSP_THERMISTOR_1	Variable resistance voltage	PJ0
BSP_ADC_2	BSP_VR_1	Variable resistance voltage	PJ0
BSP_ADC_3	BSP_VR_2	Variable resistance voltage	PJ0

### 5.5. A-ENC32

Channel	Peripheral Channel	Function	Port
BSP_ENC_1	BSP_ENC1_A	Encoder input	PN0
	BSP_ENC1_B	Encoder input	PN1
	BSP_ENC1_Z	Encoder input	-
BSP_ENC_2	BSP_ENC2_A	Encoder input	-
	BSP_ENC2_B	Encoder input	-
	BSP_ENC2_Z	Encoder input	-

## 6. System Setting

### 6.1.1. Power supply voltage

V	Notes
5.0	—

### 6.1.2. Clock setting

Clock	Function	MHz	Notes
fEHOSC	External oscillator	10	-
fIHOSC	Internal oscillator	10	-
fs	Low-speed oscillator	None	-
fc	High-speed clock	160	-
fsys	-	-	-
fsysh	High speed system clock	160	-
fsysm	Medium speed system clock	80	-
φT0	-	-	-
φT0h	High speed pre-scaler clock	160	-
φT0m	Medium speed pre-scaler clock	80	-
SCLK	AD pre-scaler output	40	-

\*It's basic setting. Settings change depending on the sample software.

## 7. Communication Setting

### 7.1. UART Communication Setting

#### 7.1.1. UART Setting

Item	Setting Value	Notes
Baud Rate	115200(bps)	-
Data Length	8(bit)	-
Parity	None	-
Stop Bit	1(bit)	-
Flow Control	None	-

#### 7.1.2. Log Control line feed code

Item	Setting Value	Notes
[line feed] (Send to Terminal emulator)	LF	-
[line feed] (Receive from Terminal emulator)	LF	-

#### 7.1.3. Log Control error

Item	Setting Value	Notes
Error Log_Command	"Command Error!![line feed]"	When an unsupported command is entered
Error Log_Parameter	"Parameter Error!![line feed]"	Command parameter is not the expected value
Error Log_Input	"Input Error!![line feed]"	When an input request other than a command is not an expected value
Error Log_Erasing	"Erasing Error!![line feed]"	Flash
Error Log_Writing	"Writing Error!![line feed]"	Flash, I2C
Error Log_Reading	"Reading Error!![line feed]"	Flash, I2C
Error Log_Receive	"Receive Error!![line feed]"	UART
Error Log_Transmit	"Transmit Error!![line feed]"	-

#### 7.1.4. Log Control and others

Item	Setting Value	Notes
MCU name	TMPM4KNFYA	-

### 7.2. I2C Communication Setting

#### 7.2.1. I2C Setting

Item	Setting Value	Notes
I2C Clock (EI2C-A)	800kHz	In Master operation
I2C Clock (I2C-B)	400kHz	In Master operation
Data Length	8bit	-
Acknowledge	Available	-
Start/Stop Condition	Generated	-

#### 7.2.2. Slave Operating Specifications

Item	Setting Value	Notes
Slave Address	0x60	Indicates 7bit that enters <7:1>
Sub Address Size	0x02	Sub Address is 2byte
Start Sub Address	0x0000	Indicates the leading Address of Sub Address
Data Size	0x10	Indicates the valid data size (byte) >>Sub Address range:0000-000F
Init Value	0x55	Initial value of Data.
Dummy Data	0xAA	This is returned when Read request is out of scope

## 7.3. SPI Communication Setting

Item	Setting Value	Notes
SPI Clock	10MHz	In Master operation
Data Length	8bit	-
Parity	None	-
Data Transfer Direction	MSB	-

## 8. Flash Control range

### 8.1. Reference Manual

Reference manual	Notes
TXZ+ Family Reference Manual Flash Memory	FLASH512UD32-B

### 8.2. Code Flash Required specification control range

Code Area	Start	Stop	Notes	Notes
Code Flash All area	0x00000000	0x0007FFFF	512 kbyte	
Code Flash Block 0	0x00000000	0x00007FFF	32 kbyte	User Boot
Code Flash Page 0	0x00000000	0x00000FFF	4 kbyte	
Code Flash Page 1	0x00001000	0x00001FFF	4 kbyte	
Code Flash Page 2	0x00002000	0x00002FFF	4 kbyte	
Code Flash Page 3	0x00003000	0x00003FFF	4 kbyte	
Code Flash Page 4	0x00004000	0x00004FFF	4 kbyte	
Code Flash Page 5	0x00005000	0x00005FFF	4 kbyte	
Code Flash Page 6	0x00006000	0x00006FFF	4 kbyte	
Code Flash Page 7	0x00007000	0x00007FFF	4 kbyte	
Code Flash Page SIZE	0x1000	-	4 kbyte	
Code Flash Block 1	0x00008000	0x0000FFFF	32 kbyte	CODE areas A
Code Flash Block 2	0x00010000	0x00017FFF	32 kbyte	CODE areas B

### 8.3. Code Flash User Information Required specification control range

Code Area	Start	Stop	Notes	Notes
UserInformation All area	0x5E005000	0x5E005FFF	4 kbyte	

### 8.4. Data Flash Required specification control range

Code Area	Start	Stop	Notes	Notes
Data Flash All area	0x30000000	0x30007FFF	32 kbyte	
Data Flash Block 0	0x30000000	0x30000FFF	4 kbyte	
Data Flash Page 0	0x30000000	0x300000FF	256 byte	
Data Flash Page 1	0x30000100	0x300001FF	256 byte	
Data Flash Page SIZE	0x100	-	256 byte	



## 9. Precautions for Use

Please confirm the operation sufficiently if use in an environment other than the operation check environment.

## 10. Revision History

Revision	Date	Description
1.0	2024-01-12	First release

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