

Application Note

TMPM4KNA User Guide

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1. Preface

This application note describes a reference for the usage environment when running the sample program on TPM4KNA.

If you select something other than TPM4KNA 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
TMPM4K Group(2) 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	TMPM4KNFYAFG / TMPM4KNF10AFG	-
Used Board	SBK-M4KN / SBK-M4KN10	-
Integrated Development Environment	IAR Embedded Workbench for ARM	9.20.2
Integrated Development Environment	Arm® Keil® MDK	5.36.00
Integrated Development Environment	SEGGER Embedded Studio	8.10b
Sample Program	TXZp_TMPM4KN_Vxxx	2.2.0

4.1. Target Settings

Integrated Development Environment Settings	TMPM4KNFYA	TMPM4KNF10A
Arm® Keil® MDK : Target Selection	Sample_FYAx	Sample_F10Ax
IAR Embedded Workbench for ARM : Build Configuration	Sample_FYAx	Sample_F10Ax
SEGGER Embedded Studio : Configuration	Sample_FYAx	Sample_F10Ax

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	-

5.3. 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	FLASH10MUD32-A

8.2. Code Flash Required specification control range

Code Area	Start	Stop	Notes	Notes
Code Flash All area(FYA)	0x00000000	0x0003FFFF	256 kbyte	Sample_FYAx
Code Flash All area(F10A)	0x00000000	0x000FFFFF	1M byte	Sample_F10Ax
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
1.1	2024-03-25	Added M4KNF10 information
1.2	2024-07-18	Software version correction

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