

M2L31 Series CMSIS BSP Guide

Directory Introduction for 32-bit NuMicro® Family

Directory Information

Document	Driver reference guide and revision history.
Library	Driver header and source files.
SampleCode	Driver sample code.

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1 Document

CMSIS.html	Document of CMSIS version 5.1.1.
NuMicro M2L31 Driver Reference Guide.chm	This document describes the usage of drivers in M2L31 BSP.
NuMicro M2L31 Series CMSIS BSP Revision History.pdf	This document shows the revision history of M2L31 BSP.

2 Library

CMSIS	Cortex® Microcontroller Software Interface Standard (CMSIS) V5.1.1 definitions by Arm® Corp.
Device	CMSIS compliant device header file.
PowerDeliveryLib	Power Delivery Libraries and header files for dual, source and sink role.
StdDriver	All peripheral driver header and source files.
TKLib	Touch Key Libraries and header files for calibration and free-run.
UsbHostLib	USB host library source code.

3 SampleCode

Hard_Fault_Sample	<p>Show hard fault information when hard fault happened.</p> <p>The hard fault handler show some information included program counter, which is the address where the processor was executing when the hard fault occurs. The listing file (or map file) can show what function and instruction that was.</p> <p>It also shows the Link Register (LR), which contains the return address of the last function call. It can show the status where CPU comes from to get to this point.</p>
ISP	Sample codes for In-System-Programming.
PowerDelivery	Demonstrate Dual, Source, and Sink role sample code that is based on MAD025_UTCPD_V1 board.
PowerManagement	Sample codes for power management.
Semihost	Show how to print and get character through IDE console window.
StdDriver	Sample code to demonstrate the usage of M2L31 series MCU peripheral driver APIs.
Template	A project template for M2L31 series MCU.
TouchKey	Demonstrate how to calibrate Touch Key through NuSenAdj Tool. After calibration stage, show how to free-run the Touch Key based on the calibration data.

4 SampleCode\ISP

ISP_CAN	In-System-Programming Sample code through CANFD interface.
ISP_DFU	In-System-Programming Sample code through USB interface and following Device Firmware Upgrade Class Specification.
ISP_HID	In-System-Programming Sample code through USB HID interface.
ISP_I2C	In-System-Programming Sample code through I ² C interface.
ISP_MSC	In-System-Programming Sample code through USB interface and following Mass Storage Class Specification.
ISP_RS485	In-System-Programming Sample code through RS485 interface.
ISP_SPI	In-System-Programming Sample code through SPI interface.
ISP_UART	In-System-Programming Sample code through UART interface.

5 SampleCode\PowerDelivery

UTCPD_DualRole	Demonstrate Dual Role Power Device.
UTCPD_SinkRole	Demonstrate Sink Power Device.
UTCPD_SourceRole	Demonstrate Source Power Device.

6 SampleCode\PowerManagement

SYS_DPDMode_Wakeup	Show how to wake up system from DPD Power-down mode by Wake-up pin 0 (PC.0) or Wake-up Timer or RTC Tick or RTC Alarm or RTC Tamper 0.
SYS_PowerDownMode	Show how to enter different Power-down mode and wake up by RTC.
SYS_PowerMode	Show how to set different core voltage.
SYS_SPDMode_Wakeup	Show how to wake up system from SPD Power-down mode by Wake-up pin (PC.0) or Wake-up Timer or Wake-up ACMP or RTC Tick or RTC Alarm or RTC Tamper 0 or BOD or LVR.
SYS_SPDMode_WakeupAndReturn	Show how to continue executing code after wake-up from SPD Power-down mode by SRAM data retention function.
SYS_SPDMode_WakeupVTOR	Show how to continue executing code after wake-up from SPD Power-down mode by VTOR function.
SYS_SRAMPowerMode	Show how to select SRAM power mode in system Power-down mode.

7 SampleCode\StdDriver

System Manager (SYS)

SYS_BODWakeup	Demonstrate how to wake up system from Power-down mode by brown-out detector interrupt.
SYS_PLLClockOutput	Change system clock to different PLL frequency and output system clock from CLK0 pin.
SYS_PowerDown_MinCurrent	Demonstrate how to minimize power consumption when entering power down mode.

RRAM Memory Controller (RMC)

RMC_CRC32	Demonstrate how to use RMC CRC32 ISP command to calculate the CRC32 checksum of APROM and LDROM.
RMC_DualBank	Demonstrate how dual processes work in dual bank Flash architecture.
RMC_ExecInSRAM	Implement a code and execute it in SRAM to program embedded Flash.
RMC_IAP	Demonstrate RMC IAP boot mode and show how to use vector remap function. LDROM image was embedded in APROM image and be programmed to LDROM Flash at run-time. This sample also shows how to branch between APROM and LDROM.
RMC_MultiBoot	Implement a multi-boot system to boot from different applications in APROM or LDROM by VECMAP.
RMC_MultiWordProgram	Show how to use RMC multi-word (word line) program flow to program APROM and LDROM.
RMC_OTP	Demonstrate how to program, read and lock OTP.
RMC_ReadAllOne	Demonstrate how to use RMC Read-All-One ISP command to verify APROM or LDROM pages are all 0xFFFFFFFF or not.
RMC_RW	Show RMC read Flash IDs, erase, read, and write

	functions.
RMC_XOM	Show how to configure and set up an XOM region then perform XOM function.

General Purpose I/O (GPIO)

GPIO_EINTAndDebounce	Show the usage of GPIO external interrupt function and de-bounce function.
GPIO_INT	Show the usage of GPIO interrupt function.
GPIO_OutputInput	Show how to set GPIO pin mode and use pin data input and output control.
GPIO_PowerDown	Show how to wake up system from Power-down mode by GPIO interrupt.

PDMA Controller (PDMA)

PDMA_BasicMode	Use PDMA0 channel 2 to transfer data from memory to memory.
PDMA_ScatterGather	Use PDMA0 channel 4 to transfer data from memory to memory by scatter-gather mode.
PDMA_ScatterGather_PingPongBuffer	Use PDMA0 to implement Ping-Pong buffer by scatter-gather mode (memory to memory).
PDMA_TimeOut	Demonstrate PDMA0 channel 1 get/clear timeout flag with UART0.

Timer Controller (TIMER)

TIMER_ACMPTrigger	Use ACMP to trigger Timer0 counter reset mode.
TIMER_CaptureCounter	Show how to use the Timer capture function to capture Timer counter value.
TIMER_Delay	Demonstrate the usage of TIMER_Delay API to generate a 1 second delay.

TIMER_EventCounter	Use TM0 pin to demonstrate Timer event counter function.
TIMER_FreeCountingMode	Use the timer TM0_EXT pin to demonstrate timer free counting mode function. And displays the measured input frequency to UART console.
TIMER_InterTimerTriggerMode	Use the timer TM0 pin to demonstrate inter timer trigger mode function. Also display the measured input frequency to UART console.
TIMER_Periodic	Use the Timer periodic mode to generate Timer interrupt every 1 second.
TIMER_PeriodicINT	Implement Timer counting in periodic mode.
TIMER_PWM_AccumulatorINTStopMode	Demonstrate TIMER PWM accumulator interrupt to stop counting.
TIMER_PWM_AccumulatorINTTriggerPDMA	Demonstrate TIMER PWM accumulator interrupt to trigger PDMA transfer.
TIMER_PWM_ChangeDuty	Change duty cycle and period of output waveform in PWM up count type.
TIMER_PWM_OutputWaveform	Demonstrate output different duty waveform in Timer0~3 PWM.
TIMER_TimeoutWakeup	Use timer to wake up system from Power-down mode periodically.
TIMER_ToggleOut	Demonstrate the Timer0 toggle out function on TM0 pin.

Watchdog Timer (WDT)

WDT_TimeoutWakeupAndReset	Implement WDT time-out interrupt event to wake up system and generate time-out reset system event while WDT time-out reset delay period expired.
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Window Watchdog Timer (WWDT)

WWDT_ReloadCounter	Show how to reload the WWDT counter value.
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Real Timer Clock (RTC)

RTC_Alarm_Test	Demonstrate the RTC alarm function. It sets an alarm 10 seconds after execution.
RTC_Alarm_Wakeup	Use RTC alarm interrupt event to wake up system.
RTC_SpareRegisterRW	Demonstrate the RTC spare register read/write function and displays test result to the UART console.
RTC_Tamper	Demonstrate the RTC tamper function.
RTC_Time_Display	Demonstrate the RTC function and displays current time to the UART console.
RTC_TimeAndTick	Get the current RTC data/time per tick.

Pulse Width Modulation Controller (PWM)

PWM_240KHz_SwitchDuty	Demonstrate how to set PWM0 channel 0 output 240 kHz waveform and switch duty in each 0.5%.
PWM_Brake	Demonstrate how to use PWM brake function.
PWM_Capture	Capture the PWM Channel 2 waveform by PWM Channel 0.
PWM_DeadTime	Demonstrate how to use PWM Dead Time function.
PWM_DoubleBuffer	Change duty cycle and period of output waveform by PWM double buffer function.
PWM_OutputWaveform	Demonstrate how to use PWM counter output waveform.
PWM_PDMA_Capture	Capture the PWM0 Channel 0 waveform by PWM0 Channel 2, and use PDMA to transfer captured data.
PWM_PDMA_Capture_1MHzSingal	Capture the PWM0 Channel 0 waveform by PWM0 Channel 2, and use PDMA to transfer captured data. The frequency of PWM Channel 0 is 1 MHz, which is used to test the maximum input frequency for PWM Capture function.
PWM_SwitchDuty	Change duty cycle of output waveform by configured

	period.
PWM_SyncStart	Demonstrate how to use PWM counter synchronous start function.

Enhanced Pulse Width Modulation Controller (EPWM)

EPWM_AccumulatorINT_Trigger PDMA	Demonstrate how to use EPWM accumulator interrupt trigger PDMA.
EPWM_Brake	Demonstrate how to use EPWM brake function.
EPWM_Capture	Capture the EPWM1 Channel 0 waveform by EPWM1 Channel 2.
EPWM_DeadTime	Demonstrate how to use EPWM Dead Time function.
EPWM_DoubleBuffer	Change duty cycle and period of output waveform by EPWM Double Buffer function.
EPWM_OutputWaveform	Demonstrate how to use EPWM counter output waveform.
EPWM_PDMA_Capture	Capture the EPWM1 Channel 0 waveform by EPWM1 Channel 2, and use PDMA to transfer captured data.
EPWM_SwitchDuty	Change duty cycle of output waveform by configured period.
EPWM_SyncStart	Demonstrate how to use EPWM counter synchronous start function.

UART Interface Controller (UART)

UART_AutoBaudRate	Show how to use auto baud rate detection function.
UART_AutoFlow	Transmit and receive data using auto flow control.
UART_IrDA	Transmit and receive UART data in UART IrDA mode.
UART_LIN	Transmit LIN frame including header and response in UART LIN mode.

UART_PDMA	Demonstrate UART transmit and receive function with PDMA.
UART_RS485	Transmit and receive data in UART RS485 mode.
UART_SingleWire	Transmit and receive data in UART single-wire mode.
UART_TxRxFunction	Transmit and receive data from PC terminal through RS232 interface.
UART_Wakeup	Show how to wake up system from Power-down mode by UART interrupt.

Serial Peripheral Interface (SPI)

SPI_Loopback	SPI read/write demo connecting SPI MISO and MOSI pins.
SPI_MasterFIFOmode	Configure SPI as Master mode and demonstrate how to communicate with an off-chip SPI slave device with FIFO mode. This sample code needs to work with SPI_SlaveFIFOmode.
SPI_PDMA_LoopTest	SPI read/write demo in PDMA mode. Connecting SPI MISO and MOSI pins. Both TX PDMA function and RX PDMA function will be enabled.
SPI_SlaveFIFOmode	Configure SPI as Slave mode and demonstrate how to communicate with an off-chip SPI master device with FIFO mode. This sample code needs to work with SPI_MasterFIFOmode.
SPII2S_Master	Configure SPI in I ² S Master mode and demonstrate how I ² S works in Master mode.
SPII2S_PDMA_NAU8822	An I ² S demo with PDMA function connected to audio codec NAU8822.
SPII2S_PDMA_Play	An I ² S demo for playing data and demonstrating how I ² S works with PDMA.
SPII2S_PDMA_PlayRecord	An I ² S demo for playing and recording data with PDMA function.

SPII2S_PDMA_Record	An I ² S demo for recording data and demonstrating how I ² S works with PDMA.
SPII2S_Slave	Configure SPI as I ² S Slave mode and demonstrate how I ² S works in Slave mode. This sample code needs to work with SPII2S_Master.

Quad Serial Peripheral Interface (QSPI)

QSPI_DualMode_Flash	Access SPI Flash using QSPI dual mode.
QSPI_QuadMode_Flash	Access SPI Flash using QSPI quad mode.
QSPI_Slave3Wire	Configure QSPI0 as Slave 3 wire mode and demonstrate how to communicate with an off-chip SPI Master device with FIFO mode. This sample code needs to work with SPI_MasterFIFOmode sample code.

I²C Serial Interface Controller (I²C)

I2C_Double_Buffer_Slave	Demonstrate how to set I ² C two-level buffer in Slave mode to receive 256 bytes data from a master. This sample code needs to work with I2C_MultiBytes_Master.
I2C_EEPROM	Show how to use I ² C interface to access EEPROM.
I2C_Loopback	Demonstrate how to set I ² C Master mode and Slave Mode, and show how a master accesses a slave on a chip.
I2C_Master	Show how a master accesses a slave. This sample code needs to work with I2C_Slave.
I2C_MultiBytes_Master	Show how to set I ² C Multi bytes API Read and Write data to Slave. This sample code needs to work with I2C_Slave.
I2C_PDMA_TRX	Demonstrate I ² C PDMA mode and need to connect I2C0 (master) and I2C1 (slave).
I2C_SingleByte_Master	Show how to use I ² C Single byte API Read and Write data to Slave. This sample code needs to work with

	I2C_Slave.
I2C_Slave	Demonstrate how to set I ² C in Slave mode to receive 256 bytes data from a master. This sample code needs to work with I2C_Master.
I2C_SMBus	Demonstrate how to control SMBus interface and use SMBus protocol between Host and Slave.
I2C_Wakeup_Slave	Show how to wake up MCU from Power-down mode via the I ² C interface. This sample code needs to work with I2C_Master.

Universal Serial Control Interface Controller – UART Mode (USCI-UART)

USCI_UART_AutoBaudRate	Show how to use auto baud rate detection function.
USCI_UART_Autoflow	Transmit and receive data using auto flow control.
USCI_UART_PDMA	Transmit and receive UART data with PDMA.
USCI_UART_RS485	Transmit and receive data in RS485 mode.
USCI_UART_TxRxFunction	Transmit and receive data from PC terminal through a RS232 interface.
USCI_UART_Wakeup	Show how to wake up system from Power-down mode by USCI interrupt in UART mode.

Universal Serial Control Interface Controller – SPI Mode (USCI-SPI)

USCI_SPI_Loopback	Implement USCI_SPI0 Master loop back transfer. This sample code needs to connect USCI_SPI0_MISO pin and USCI_SPI0_MOSI pin together. It will compare the received data with transmitted data.
USCI_SPI_MasterMode	Configure USCI_SPI0 as Master mode and demonstrate how to communicate with an off-chip SPI Slave device. This sample code needs to work with USCI_SPI_SlaveMode sample code.
USCI_SPI_PDMA_LoopTest	Demonstrate USCI_SPI data transfer with PDMA. USCI_SPI0 will be configured as Master mode and USCI_SPI1 will be configured as Slave mode. Both TX

	PDMA function and RX PDMA function will be enabled.
USCI_SPI_SlaveMode	Configure USCI_SPI0 as Slave mode and demonstrate how to communicate with an off-chip SPI Master device. This sample code needs to work with USCI_SPI_MasterMode sample code.

Universal Serial Control Interface Controller – I²C Mode (USCI-I2C)

USCI_I2C_EEPROM	Demonstrate how to access EEPROM through a USCI_I2C interface.
USCI_I2C_Loopback	Demonstrate how a Master accesses 7-bit address Slave (loopback)
USCI_I2C_Loopback_10bit	Demonstrate how a Master accesses 10-bit address Slave (loopback)
USCI_I2C_Master	Demonstrate how a Master accesses Slave. This sample code needs to work with USCI_I2C_Slave sample code.
USCI_I2C_Master_10bit	Demonstrate how a Master uses 10-bit addressing access Slave. This sample code needs to work with USCI_I2C_Slave_10bit sample code.
USCI_I2C_Monitor	Demonstrate how USCI_I2C monitors transmission between I2C Master and I2C Slave.
USCI_I2C_MultiBytes_Master	Demonstrate how to use multi-bytes API to access slave. This sample code needs to work with USCI_I2C_Slave sample code.
USCI_I2C_SingleByte_Master	Demonstrate how to use single byte API to access slave. This sample code needs to work with USCI_I2C_Slave sample code.
USCI_I2C_Slave	Demonstrate how to set USCI_I2C in slave mode to receive the data from a Master. This sample code needs to work with USCI_I2C_Master sample code.
USCI_I2C_Slave_10bit	Demonstrate how to set USCI_I2C in 10-bit addressing slave mode to receive the data from a Master. This sample code needs to work with

	USCI_I2C_Master_10bit sample code.
USCI_I2C_Wakeup_Slave	Demonstrate how to set USCI_I2C to wake up MCU from Power-down mode. This sample code needs to work with USCI_I2C_Master sample code.

External Bus Interface (EBI)

EBI_NOR	Configure EBI interface to access NOR Flash connected on EBI interface.
EBI_SRAM	Configure EBI interface to access SRAM connected on EBI interface.

USB 1.1 Device Controller (USBD)

USBD_HID_Keyboard	Demonstrate how to implement a USB keyboard device. It supports to use GPIO to simulate key input.
USBD_HID_Mouse	Show how to implement a USB mouse device. The mouse cursor will move automatically when this mouse device connecting to PC by USB.
USBD_HID_MouseKeyboard	Simulate an USB HID mouse and HID keyboard. Mouse draws circle on the screen and Keyboard use GPIO to simulate key input.
USBD_HID_RemoteWakeup	Demonstrate how to implement a USB mouse device. It uses PA0 ~ PA5 to control mouse direction and mouse key. It also supports USB suspend and remote wakeup.
USBD_HID_Touch	Demonstrate how to implement a USB touch digitizer device. Two lines demo in Paint.
USBD_HID_Transfer	Demonstrate how to transfer data between USB device and PC through USB HID interface. A windows tool is also included in this sample code to connect with a USB device.
USBD_HID_Transfer_And_Keyboard	Demonstrate how to implement a composite device (HID Transfer and Keyboard). Transfer data between USB device and PC through USB HID interface. A windows tool is also included in this sample code to connect with

	a USB device.
USBD_HID_Transfer_And_MSC	Demonstrate how to implement a composite device (HID Transfer and Mass storage). Transfer data between USB device and PC through USB HID interface. A windows tool is also included in this sample code to connect with a USB device.
USBD_HID_Transfer_CTRL	Use USB Host core driver and HID driver. It shows how to submit HID class request and how to read data from control pipe. A windows tool is also included in this sample code to connect with a USB device.
USBD_Mass_Storage_CDROM	Demonstrate the emulation of USB Mass Storage Device CD-ROM.
USBD_Mass_Storage_Flash	Use Flash as storage to implement a USB Mass-Storage device.
USBD_Mass_Storage_SRAM	Use internal SRAM as back end storage media to simulate an USB pen drive.
USBD_Micro_Printer	Demonstrate how to implement a USB micro printer device.
USBD_Printer_And_HID_Transfer	Demonstrate how to implement a composite device (USB micro printer device and HID Transfer). Transfer data between a USB device and PC through a USB HID interface. A windows tool is also included in this sample code to connect with a USB device.
USBD_VCOM_And_HID_Keyboard	Demonstrate how to implement a composite device (VCOM and HID Keyboard).
USBD_VCOM_And_HID_Transfer	Demonstrate how to implement a composite device (VCOM and HID Transfer). It supports one virtual COM port and transfers data between a USB device and PC through a USB HID interface. A windows tool is also included in this sample code to connect with a USB device.
USBD_VCOM_and_MassStorage	Demonstrate how to implement a composite device of VCOM and mass storage.

USBD_VCOM_DualPort	Demonstrate how to implement a USB dual virtual COM port device.
USBD_VCOM_SerialEmulator	Demonstrate how to implement a USB virtual COM port device.

CRC Controller (CRC)

CRC_CCITT	Implement CRC in CRC-CCITT mode and get the CRC checksum result.
CRC_CRC32_PDMA	Implement CRC in CRC-32 mode and get the CRC checksum result.
CRC_CRC8	Implement CRC in CRC-8 mode and get the CRC checksum result.
CRC_POLYNOMIAL	Demonstrate how to use polynomial mode and get the CRC checksum result.

Cryptographic Accelerator (CRYPTO)

CRYPTO_AES	Show Crypto IP AES-128 ECB mode encrypt/decrypt function.
CRYPTO_PRNG	Generate random numbers using Crypto IP PRNG.

Enhanced Analog-to-Digital Converter (EADC)

EADC_Accumulate	Demonstrate how to get accumulate conversion result.
EADC_ADINT_Trigger	Use ADINT interrupt to do the EADC continuous scan conversion.
EADC_Average	Demonstrate how to get average conversion result.
EADC_BandGap	Convert Band-gap and print conversion result.
EADC_EPWM_Trigger	Demonstrate how to trigger EADC by EPWM.
EADC_PDMA_EPWM_Trigger	Demonstrate how to trigger EADC by EPWM and transfer conversion data by PDMA.

EADC_Pending_Priority	Demonstrate how to trigger multiple sample modules and got conversion results in order of priority.
EADC_ResultMonitor	Monitor the conversion result of channel 2 by the digital compare function.
EADC_SwTrg_Trigger	Trigger EADC by writing EADC software trigger register.
EADC_TempSensor	Convert temperature sensor and print conversion result.
EADC_Timer_Trigger	Show how to trigger EADC by Timer.

Digital-to-Analog Converter (DAC)

DAC_PDMA_TimerTrigger	Show how Timer triggers DAC to fetch data with PDMA and convert sine wave outputs.
DAC_SoftwareTrigger	Demonstrate how software triggers DAC to convert sine wave outputs.
DAC_TimerTrigger	Demonstrate how Timer triggers DAC to convert sine wave outputs.

Analog Comparator Converter (ACMP)

ACMP_CompareVBG	Demonstrate analog comparator (ACMP) comparison by comparing ACMP1_P1 input and VBG voltage and shows the result on UART console.
ACMP_Wakeup	Use ACMP to wake up system from Power-down mode while comparator output changes.
ACMP_WindowCompare	Show how to monitor ACMP input with window compare function.
ACMP_WindowLatch	Demonstrate how to use ACMP window latch mode.

OP Amplifier (OPA)

OPA_NonInvertingAmp	Demonstrate how to use OPA as a non-inverting amplifier.
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OPA_InvertingAmp	Demonstrate how to use OPA as an inverting amplifier.
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Controller Area Network with Flexible DataRate (CANFD)

CANFD_CAN_Loopback	Use CAN mode function to do internal loopback test.
CANFD_CAN_MonitorMode	Use CAN Monitor mode to listen to CAN bus communication test.
CANFD_CAN_TxRx	Transmit and receive CAN message through CAN interface.
CANFD_CAN_TxRxINT	An example of interrupt control using CAN bus communication.
CANFD_CANFD_Loopback	Use CANFD mode function to do internal loopback test.
CANFD_CANFD_MonitorMode	Use CANFD Monitor mode to listen to CAN bus communication test.
CANFD_CANFD_TxRx	Transmit and receive CANFD message through CAN interface.
CANFD_CANFD_TxRxINT	An example of interrupt control using CANFD bus communication.

Enhanced Input Capture Timer (ECAP)

ECAP_GetInputFreq	Show how to use ECAP interface to get input frequency.
ECAP_GetQEIFreq	Show how to use ECAP interface to get QEI-A frequency.

Enhanced Quadrature Encoder Interface (EQEI)

EQEI_CompareMatch	Show the usage of EQEI compare function.
EQEI_PeriodicINT	Show the usage of EQEI Unit Timer function.

USB Host Controller (USBH)

USBH_AudioClass	Demonstrate how to use USBH Audio Class driver. It shows the mute, volume, auto-gain, channel and sampling rate control.
USBH_DEV_CONN	Use connect/disconnect callback functions to handle of device connect and disconnect events.
USBH_HID	Use USB Host core driver and HID driver. This sample demonstrates how to submit HID class request and how to read data from interrupt pipe. This sample supports dynamic device plug/un-plug and multiple HID devices.
USBH_HID_KEYBOARD	Demonstrate reading key inputs from USB keyboards. This sample includes an USB keyboard driver which is based on the HID driver.
USBH_HID_Mouse_Keyboard	Use USB Host core driver and HID driver. This sample demonstrates how to support mouse and keyboard input.
USBH_MassStorage	Use a command-shell-like interface to demonstrate how to use USBH mass storage driver and make it working as a disk driver under FATFS file system.
USBH_UAC_HID	Show how to use USBH Audio Class driver and HID driver at the same time. The target device is a Game Audio (UAC+HID composite device).
USBH_VCOM	Receive audio data from UAC device, and immediately send back to that UAC device.

Random Number Generator (RNG)

RNG_EntropyPoll	Generate random numbers using TRNG.
RNG_Random	Generate random numbers using TRNG.

Tick Timer Controller (TTMR)

TTMR_Delay	Demonstrate the usage of TTMR_Delay() API to
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	generate a 1 second delay.
TTMR_Periodic	Use the TTMR periodic mode to generate timer interrupt every 1 second.
TTMR_PeriodicINT	Implement TTMR counting in periodic mode.
TTMR_TimeoutWakeup	Use TTMR to wake up system from Power-down mode periodically.

Low Power Analog to Digital Converter (LPADC)

LPADC_MaxSps_ContinuousScanMode	Demonstrate how to use PCLK2 as LPADC clock source to achieve maximum kps LPADC conversion rate.
LPADC_ADINT_Trigger	Use ADINT interrupt to do the LPADC Single-cycle scan conversion.
LPADC_AutoOperation	Demonstrate how to enable LPADC Auto-operation mode to convert when chip enters Power-down mode.
LPADC_BandGap	Convert Band-gap and print conversion result.
LPADC_BandGapCalculateAVDD	Demonstrate how to calculate AVdd voltage by using Band-gap.
LPADC_BurstMode	Perform A/D Conversion with LPADC burst mode.
LPADC_ContinuousScanMode	Perform A/D Conversion with LPADC continuous scan mode.
LPADC_LPPDMA_PWM_Trigger	Demonstrate how to trigger LPADC by PWM and transfer conversion data by LPPDMA.
LPADC_PWM_Trigger	Demonstrate how to trigger LPADC by PWM.
LPADC_ResultMonitor	Monitor the conversion result of channel 2 by the digital compare function.
LPADC_SingleCycleScanMode	Perform A/D Conversion with LPADC single cycle scan mode.
LPADC_SingleMode	Perform A/D Conversion with LPADC single mode.

LPADC_STADC_Trigger	Show how to trigger LPADC by STADC pin.
LPADC_SwTrg_Trigger	Trigger LPADC by writing LPADC software trigger register.
LPADC_Timer_Trigger	Show how to trigger LPADC by Timer.

Low Power General Purpose I/O Controller (LPGPIO)

LPGPIO_OutputInput	Show how to set LPGPIO pin mode and use pin data input/output control.
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Low Power I²C Serial Interface Controller (LPI2C)

LPI2C_AutoOperation	Demonstrate LPI2C Auto-operation mode when chip enters Power-down mode. This sample code needs to work with LPI2C_Slave.
LPI2C_EEPROM	Show how to use LPI2C interface to access EEPROM.
LPI2C_LPPDMA_TRX	Demonstrate LPI2C LPPDMA mode and need two boards to connect LPI2C0 (Master) and LPI2C0 (Slave).
LPI2C_Master	Show how a master accesses a slave. This sample code needs to work with LPI2C_Slave.
LPI2C_MultiBytes_Master	Show how to set LPI2C use Multi bytes API Read and Write data to Slave. This sample code needs to work with LPI2C_Slave sample code.
LPI2C_SingleByte_Master	Show how to use LPI2C Single byte API Read and Write data to Slave. This sample code needs to work with LPI2C_Slave sample code.
LPI2C_Slave	Show how to set LPI2C in Slave mode and receive the data from Master. This sample code needs to work with LPI2C_Master.
LPI2C_Wakeup_Slave	Show how to wake up MCU from Power-down mode through LPI2C interface. This sample code needs to work with LPI2C_Master.

Low Power PDMA Controller (LPPDMA)

LPPDMA_BasicMode	Use LPPDMA0 channel 2 to transfer data from memory to memory.
LPPDMA_ScatterGather	Use LPPDMA0 channel 2 to transfer data from memory to memory by scatter-gather mode.
LPPDMA_ScatterGather_PingPongBuffer	Use LPPDMA0 to implement Ping-Pong buffer by scatter-gather mode (memory to memory).

Low Power Serial Peripheral Interface (LPSPI)

LPSPI_AutoOperation	Demonstrate how to do LPSPI loopback test in Auto-operation mode when chip enters Power-down mode
LPSPI_Loopback	LPSPI read/write demo by connecting LPSPI MISO and MOSI pins.
LPSPI_MasterFIFOmode	Configure LPSPI as Master mode and demonstrate how to communicate with an off-chip SPI slave device with FIFO mode. This sample code needs to work with LPSPI_SlaveFIFOmode.
LPSPI_LPPDMA_LoopTest	LPSPI read/write demo in LPPDMA mode. Connecting LPSPI MISO and MOSI pins. Both TX LPPDMA function and RX LPPDMA function will be enabled.
LPSPI_SlaveFIFOmode	Configure LPSPI as Slave mode and demonstrate how to communicate with an off-chip SPI master device with FIFO mode. This sample code needs to work with LPSPI_MasterFIFOmode.

Low Power Timer Controller (LPTMR)

LPTMR_ACMPTrigger	Use ACMP to trigger LPTMR0 counter reset mode.
LPTMR_CaptureCounter	Show how to use the LPTMR capture function to capture LPTMR counter value.
LPTMR_Delay	Demonstrate the usage of LPTMR_Delay() API to

	generate a 1 second delay.
LPTMR_EventCounter	Use LPTM0 pin to demonstrates LPTMR event counter function.
LPTMR_FreeCountingMode	Use the LPTMR LPTM0_EXT pin to demonstrate timer free counting mode function. And displays the measured input frequency to UART console.
LPTMR_Periodic	Use the LPTMR periodic mode to generate timer interrupt every 1 second.
LPTMR_PeriodicINT	Implement LPTMR counting in periodic mode.
LPTMR_PWM_AccumulatorINTStopMode	Demonstrate LPTMR PWM accumulator interrupt to stop counting.
LPTMR_PWM_AccumulatorINTTriggerLPPDMA	Demonstrate LPTMR PWM accumulator interrupt to trigger LPPDMA transfer.
LPTMR_PWM_ChangeDuty	Change duty cycle and period of output waveform in PWM up count type.
LPTMR_PWM_OutputWaveform	Demonstrate output different duty waveform in LPTMR0~1 PWM.
LPTMR_TimeoutWakeup	Use LPTMR to wake up system from Power-down mode periodically.
LPTMR_ToggleOut	Demonstrate the LPTMR toggle out function on LPTM0 pin.

Low Power UART Interface Controller (LPUART)

LPUART_AutoBaudRate	Show how to use auto baud rate detection function.
LPUART_AutoFlow	Transmit and receive data using auto flow control.
LPUART_LPPDMA	Demonstrate LPUART transmit and receive function with LPPDMA.
LPUART_PD_LPTMR0_Trigger	Demonstrate how to enable LPUART Auto-operation mode to transmit and receive data when chip enters

	Power-down mode.
LPUART_RS485	Transmit and receive data in LPUART RS485 mode.
LPUART_SingleWire	Transmit and receive data in LPUART single-wire mode.
LPUART_TxRxFunction	Transmit and receive data from PC terminal through RS232 interface.
LPUART_Wakeup	Show how to wake up system from Power-down mode by LPUART interrupt.

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