

NM1230 CMSIS BSP Guide

Directory Introduction for 32-bit NuMicro® Family

Directory Information

Please extract the “NM1230 BSP_CMSIS_V3.00.004.zip” file firstly, and then put the “NM1230 BSP_CMSIS_V3.00.004” folder into the working folder (e.g. .\Nuvoton\BSP Library).

This BSP folder contents:

Document\	Device driver reference manual and reversion history.
Library\	Device driver header and source files.
SampleCode\	Device driver sample code.

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1 .\Document\

CMSIS.html	<p>Introduction of CMSIS version 4.5.0. CMSIS components included CMSIS-CORE, CMSIS-Driver, CMSIS-DSP, etc.</p> <ul style="list-style-type: none"> ● CMSIS-CORE: API for the Cortex-M0 processor core and peripherals. ● CMSIS-Driver: Defines generic peripheral driver interfaces for middleware making it reusable across supported devices. ● CMSIS-DSP: DSP Library Collection with over 60 functions for various data types: fix-point (fractional q7, q15, q31) and single precision floating-point (32-bit).
NuMicro NM1230 CMSIS BSP Revision History.pdf	The revision history of NM1230 BSP.
NuMicro NM1230 Driver Reference Guide.chm	The usage of drivers in NM1230 BSP.

2 .\Library\

CMSIS\	Cortex® Microcontroller Software Interface Standard (CMSIS) V4.5.0 definitions by ARM® Corp.
Device\	CMSIS compliant device header file.
StdDriver\	All peripheral driver header and source files.

3 .\Sample Code\

Hard_Fault_Sample\	<p>Show hard fault information when hard fault happened.</p> <p>The hard fault handler shows some information included program counter, which is the address where the processor was executing when a hard fault occurred. 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>
NUROM_Execute_Sample\	<p>Show how to execute code on APROM and NUROM in the project.</p>
Semihost\	<p>Show how to print and get character through IDE console window.</p>
RegBase\	<p>The sample codes which access control registers directly.</p>
SPROM_Execute_Sample\	<p>Show how to execute code on APROM and SPROM0/1/2 in the project.</p>
StdDriver\	<p>Demonstrate the usage of NM1230 MCU peripheral driver APIs.</p>
Template\	<p>A project template for NM1230 MCU.</p>
ISP_Sample	<p>User can connect to NM1230 and update APROM with NUVOTON ISP tool and UART0 PD5/PD6 of NM1230.</p> <p>User must load the ISP sample code to LDROM and set booting configuration to LDROM.</p>

4 .\SampleCode\RegBase

ACMP	Demonstrate analog comparator (ACMP) comparison by comparing ACMP0_P0 input and VBG voltage and show the result on UART console.
ADC_DAC	Show how to output ADC0 channel 0 sample value to DAC0.
ADC_Ind2SH	Convert ADC0 channel 0 and ADC1 channel 0 in Independent 2SH mode and print conversion results.
ADC_IndSimple	Convert ADC0 channel 0 and ADC1 channel 0 in Independent Simple mode and print conversion results.
ADC_IndSimple_BandGap	Convert ADC0 channel 6 (Band-Gap) in Independent Simple mode and print conversion results.
ADC_IndSimple_TempSensor	Convert ADC1 channel 6 (Temperature Sensor) in Independent Simple mode and print conversion results.
ADC_PWMTrigger	Configure PWM0 to trigger ADC0 channel 0 periodically and print conversion results.
ADC_SimSeq3R	Convert ADC0 channel 0, channel 6, and ADC1 channel 0 in EADC Simultaneous Sequential 3R mode and print conversion results.
ADC_SimSeq4R	Convert ADC0 channel 0, channel 6, ADC1 channel 0, and channel 3 in EADC Simultaneous Sequential 4R mode and print conversion results.
ADC_SimSimple	Convert ADC0 channel 0 and ADC1 channel 0 in Simultaneous Simple mode and print conversion results.
ADC_TimerTrigger	Configure Timer0 to trigger ADC0 channel 0 periodically and print conversion results.

ADC_Valid_Overrun	Demonstrate how to check OVERRUN status, VALID status, and read data by correct order.
ADC_WCompare	Demonstrate EADC conversion and window comparison function by monitoring the conversion result of ADC0 channel 0.
BPWM_DeadZone	Demonstrate the BPWM dead-zone feature.
BPWM_DoubleBuffer	Demonstrate the BPWM double buffer feature.
CLK_Auto_HIRC_Calibration	Demonstrate the HIRC calibration using LXT 32.768 Hz.
CRC16	Demonstrate how to get the CRC16 results by CRC16 engine.
ECAP_Capture	Demonstrate ECAP capture function.
ECAP_CmpMatch	Demonstrate ECAP capture and compare match function by monitoring the capture result of ECAP channel 0.
EPWM_BDC	Demonstrate the BDC PWM control sample.
EPWM_DeadZone	Demonstrate the EPWM dead-zone feature.
EPWM_DoubleBuffer	Demonstrate the EPWM double buffer feature.
FMC_CRC32	Show FMC CRC32 calculation capability.
FMC_IAP	Include LDROM image (fmc_ld_iap) and APROM image (fmc_ap_main), which shows how to branch between APROM and LDROM. To run this sample code, the boot mode must be "Boot from APROM with IAP".
FMC_RW	Show FMC read Flash IDs, erase, read, and write functions.
GPIO_IOTest	Use GPIO driver to control the GPIO pin direction and the high/low state, and show how to use GPIO interrupts.
GPIO_PowerDown	Demonstrate how to wake up system form Power-down mode by GPIO interrupt.

HDIV	Demonstrate how to divide two signed integers by HDIV engine.
PGA_PGAO	Demonstrate how to amplify input signals with different gain levels and output to PGA_O output pin.
QEI_CompareMatch	Show the usage of QEI compare function.
SYS_CLKO	Demonstrate how to output different clocks one after another to the same CLKO (PA0) pin.
SYS_Control	Demonstrate some system manager controller functions, including reading PDID, getting reset source, system write-protection, power-down wake up by Watchdog timer, and CPU reset.
TIMER_CoutinuousCaptureMode	Use the EPWM0 to demonstrate continuous capture mode function. And displays the measured input period to console
TIMER_Delay	Demonstrate the usage of TIMER_Delay() API to generate a 1 second delay.
TIMER_EventCounter	Use pin PB.3 to demonstrate timer event counter function.
TIMER_FreeCountingMode	Use the ACMP0 positive input pin to demonstrate timer free counting mode function, and display the measured input frequency to console.
TIMER_Periodic	Use the timer periodic mode to generate timer interrupt every 1 second.
TIMER_ToggleOut	Demonstrate the timer 0 toggle out function on the pin PB.3.
TIMER_Wakeup	Use the timer to wake up system from Power-down mode periodically.
USCI_I2C_EEPROM	Show how to use USCI_I2C interface to access EEPROM.
USCI_I2C_Master	Show how to set USCI_I2C in Master mode and send data to Slave device. This sample code needs to work with USCI_I2C_Slave.

USCI_I2C_Slave	Show how to set USCI_I2C in Slave mode and receive the data from Master. This sample code needs to work with USCI_I2C_Master.
USCI_I2C_Wakeup_Slave	Show how to wake up system from I2C.
USCI_SPI_Loopback	Implement USCI_SPI1 Master loop back transfer. This sample code needs to connect USCI_SPI1_MISO pin and USCI_SPI1_MOSI pin together. It will compare the received data with transmitted data.
USCI_SPI_MasterMode	Configure USCI_SPI1 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.
USCI_SPI_SlaveMode	Configure USCI_SPI1 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.
USCI_UART_AutoBaudRate	Show how to use AutoBaudRate function.
USCI_UART_LIN	Show how to Transmit LIN message.
USCI_UART_TxRxFunction	Transmit and receive data from PC terminal through an RS232 interface.
WDT_Polling	Use polling mode to check WDT time-out state and reset WDT after time out occurs.
WDT_Wakeup	Use WDT to wake up system from Power-down mode periodically.

5 .\SampleCode\StdDriver

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