

# NM1530 CMSIS BSP Directory

Directory Introduction for 32-bit NuMicro™ Family

## Directory Information

|                   |  |
|-------------------|--|
| <b>Document</b>   | Driver reference manual and reversion history. |
| <b>Library</b>    | Driver header and source files.                |
| <b>SampleCode</b> | Driver sample code.                            |

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## 1. Document Information

**NuMicro NM1530 Series  
CMSIS BSP Revision  
History.pdf**

Show all the revision history about specific BSP.

**NuMicro NM1530 Driver  
Reference Guide.chm**

Describe the definition, input and output of each API.

## 2. Library Information

|                   |  |
|-------------------|--|
| <b>CMSIS</b>      | CMSIS definitions by ARM® Corp.                |
| <b>Component</b>  | Library for peripheral components.             |
| <b>Device</b>     | CMSIS compliant device header file.            |
| <b>StdDriver</b>  | All peripheral driver header and source files. |
| <b>ThirdParty</b> | Library from third party                       |

### 3. Sample Code Information

|                                      |   |
|--------------------------------------|---|
| <b>\SampleCode\FreeRTOS</b>          | Simple FreeRTOS™ demo code.                               |
| <b>\SampleCode\Hard_Fault_Sample</b> | Show hard fault information when hard fault happened.     |
| <b>\SampleCode\Template</b>          | Software Development Template.                            |
| <b>\SampleCode\Semihost</b>          | Show how to debug with semi-host message print..          |
| <b>\SampleCode\RegBased</b>          | The sample codes which access control registers directly. |
| <b>\SampleCode\StdDriver</b>         | NM1530 Series Driver Samples                              |

#### 4. \SampleCode\RegBased

|                              |  |
|------------------------------|--|
| <b>ACMP</b>                  | Demonstrate how ACMP <sup>[1]</sup> works with internal band-gap voltage.  |
| <b>ACMP_Wakeup</b>           | Show how to wake up MCU from Power-down mode by ACMP wake-up function.   |
| <b>BPWM_Capture</b>          | Capture the BPWM0 Channel 0 waveform by BPWM0 Channel 1.   |
| <b>BPWM_DeadZone</b>         | Demonstrate how to use BPWM Dead Zone function.  |
| <b>BPWM_DoubleBuffer</b>     | Change duty cycle and period of output waveform by BPWM Double Buffer function.  |
| <b>CAN_Set_MaskFilter</b>    | Demonstrate how to use MaskFilter to receive message in Normal mode. This sample code needs to work with CAN_Test_MaskFilter.                |
| <b>CAN_Test_MaskFilter</b>   | Demonstrate how to use message object No.1 to send message objects (ID=0x700~0x70F). This sample code needs to work with CAN_Set_MaskFilter. |
| <b>EADC_ADINT_Trigger</b>    | Use ADINT interrupt to do the EADC continuous scan conversion.   |
| <b>EADC_PWM_Trigger</b>      | Demonstrate how to trigger EADC by BPWM.   |
| <b>EADC_ResultMonitor</b>    | Monitor the conversion result of channel 2 by the digital compare function.  |
| <b>EADC_SimultaneousMode</b> | Show how to converts two different input signal at the same time by simultaneous mode of EADC.   |
| <b>EADC_SWTRG_Trigger</b>    | Trigger EADC by writing ADSSTR register.   |
| <b>EADC_Timer_Trigger</b>    | Show how to trigger EADC by timer.   |
| <b>ECAP</b>                  | Show how to use ECAP to measure clock frequency  |
| <b>EPWM_DeadZone</b>         | Demonstrate how to use EPWM Dead Zone function.  |
| <b>EPWM_DoubleBuffer</b>     | Change duty cycle and period of output waveform by EPWM Double Buffer function.  |
| <b>FMC_IAP</b>               | Show how to call LDROM functions from APROM. The   |

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|-----------------------------|--|
|                             | code in APROM will look up the table at 0x100E00 to get the address of function of LDROM and call the function.                                |
| <b>FMC_MultiBoot</b>        | Implement a multi-boot system to boot from different applications in APROM. A LDROM code and 4 APROM code are implemented in this sample code. |
| <b>FMC_RW</b>               | Show how to read/program embedded flash by ISP function.   |
| <b>GPIO_EINTAndDebounce</b> | Show the usage of GPIO external interrupt function and debounce function.  |
| <b>GPIO_INT</b>             | Show the usage of GPIO interrupt function.   |
| <b>GPIO_OutputInput</b>     | Show how to set GPIO pin mode and use pin data input/output control.   |
| <b>GPIO_PowerDown</b>       | Show how to wake up system from Power-down mode by GPIO interrupt.   |
| <b>HDIV</b>                 | Show how to calculate with hardware divider.   |
| <b>I2C_EEPROM</b>           | Show how to use I <sup>2</sup> C interface to access EEPROM.   |
| <b>I2C_GCMode_Master</b>    | Show how a Master uses I <sup>2</sup> C address 0x0 to write data to Slave. This sample code needs to work with I2C_GCMode_Slave.              |
| <b>I2C_GCMode_Slave</b>     | Show a Slave how to receive data from Master in GC (General Call) mode. This sample code needs to work with I2C_GCMode_Master.                 |
| <b>I2C_Master</b>           | Show a Master how to access Slave. This sample code needs to work with I2C_Slave.  |
| <b>I2C_Slave</b>            | Show how to set I <sup>2</sup> C in Slave mode and receive the data from Master. This sample code needs to work with I2C_Master.               |
| <b>I2C_Wakeup_Master</b>    | Show how to wake up MCU from Power-down. This sample code needs to work with I2C_Wakeup_Slave.   |
| <b>I2C_Wakeup_Slave</b>     | Show how to wake up MCU from Power-down mode through I <sup>2</sup> C interface. This sample code needs to work with I2C_Wakeup_Master.        |

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| <b>MDU_FOC</b>                | To show how to use MDU + EPWM to implement FOC and output SVPWM waveform.  |
| <b>OPA</b>                    | Demonstrate how OPA works with schmitt trigger buffer.   |
| <b>QEI</b>                    | Show the usage of QEI compare function.  |
| <b>SPI_Flash_With_FIFO</b>    | Demonstrate how to access a Winbond 25Q16 SPI flash with FIFO buffers.   |
| <b>SPI_Flash_Without_FIFO</b> | Demonstrate how to access a Winbond 25Q16 SPI flash without FIFO buffers.  |
| <b>SPI_Loopback</b>           | Implement SPI Master loop back transfer. This sample code needs to connect SPI0_MISO pin and SPI0_MOSI pin together. It will compare the received data with transmitted data.          |
| <b>SPI_MasterFifoMode</b>     | Configure SPI0 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 sample code.  |
| <b>SPI_SlaveFifoMode</b>      | Configure SPI0 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 sample code. |
| <b>SYS</b>                    | Change system clock to different PLL frequency and output system clock from CLKO pin.  |
| <b>TIMER_Capture</b>          | Show how to use the timer2 capture function to capture timer2 counter value.   |
| <b>TIMER_Counter</b>          | Implement timer1 event counter function to count the external input event.   |
| <b>TIMER_PeriodicINT</b>      | Implement timer counting in periodic mode.   |
| <b>UART_Autoflow_Master</b>   | Transmit and receive data with auto flow control. This sample code needs to work with UART_Autoflow_Slave.   |
| <b>UART_Autoflow_Slave</b>    | Transmit and receive data with auto flow control. This sample code needs to work with UART_Autoflow_Master.  |
| <b>UART_IrDA_Master</b>       | Transmit and receive data in UART IrDA mode. This sample code needs to work with UART_IrDA_Slave.  |

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| <b>UART_IrDA_Slave</b>    | Transmit and receive data in UART IrDA mode. This sample code needs to work with UART_IrDA_Master.   |
| <b>UART_LIN</b>           | Transmit LIN frame including header and response in UART LIN mode.                                   |
| <b>UART_RS485_Master</b>  | Transmit and receive data in UART RS485 mode. This sample code needs to work with UART_RS485_Slave.  |
| <b>UART_RS485_Slave</b>   | Transmit and receive data in UART RS485 mode. This sample code needs to work with UART_RS485_Master. |
| <b>UART_TxRx_Function</b> | Transmit and receive data from PC terminal through RS232 interface.                                  |
| <b>UART_Wakeup</b>        | Show how to wake up system form Power-down mode by UART interrupt.                                   |
| <b>WDT_PowerDown</b>      | Use WDT time-out interrupt event to wake-up system.  |
| <b>WDT_TimeoutINT</b>     | Implement periodic WDT time-out interrupt event.   |
| <b>WDT_TimeoutReset</b>   | Show how to generate time-out reset system event while WDT time-out reset delay period expired.      |
| <b>WWDT_CompareINT</b>    | Show how to reload the WWDT counter value.   |

1. Analog Comparator (ACMP).



## 5. \SampleCode\StdDriver

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|--------------------------------|---|
| <b>ACMP</b>                    | Demonstrate how ACMP works with internal band-gap voltage.  |
| <b>ACMP_Wakeup</b>             | Show how to wake up MCU from Power-down mode by ACMP wake-up function.  |
| <b>BPWM_Capture</b>            | Capture the BPWM0 Channel 0 waveform by BPWM0 Channel 1.  |
| <b>BPWM_DeadZone</b>           | Demonstrate how to use BPWM Dead Zone function.   |
| <b>BPWM_DoubleBuffer</b>       | Change duty cycle and period of output waveform by BPWM Double Buffer function.                                 |
| <b>CAN_BasicMode_Receive</b>   | Demonstrate how to receive message in Basic mode. This sample code needs to work with CAN_BasicMode_Transmit.   |
| <b>CAN_BasicMode_Transmit</b>  | Demonstrate how to transmit message in Basic mode. This sample code needs to work with CAN_BasicMode_Receive.   |
| <b>CAN_NormalMode_Receive</b>  | Demonstrate how to receive message in Normal mode. This sample code needs to work with CAN_NormalMode_Transmit. |
| <b>CAN_NormalMode_Transmit</b> | Demonstrate how to transmit message in Normal mode. This sample code needs to work with CAN_NormalMode_Receive. |
| <b>CAN_Wakeup</b>              | Demonstrate how to wake up system form Power-down mode by detecting a transition.                               |
| <b>EADC_ADINT_Trigger</b>      | Use ADINT interrupt to do the EADC continuous scan conversion.  |
| <b>EADC_PWM_Trigger</b>        | Demonstrate how to trigger EADC by BPWM.  |
| <b>EADC_ResultMonitor</b>      | Monitor the conversion result of channel 2 by the digital compare function.                                     |
| <b>EADC_SimultaneousMode</b>   | Show how to converts two different input signal at the same time by simultaneous mode of EADC.                  |
| <b>EADC_SWTRG_Trigger</b>      | Trigger ADC by writing ADSSTR register.   |

|                             |   |
|-----------------------------|---|
| <b>EADC_Timer_Trigger</b>   | Show how to trigger EADC by timer.  |
| <b>ECAP</b>                 | Show how to use ECAP to measure clock frequency   |
| <b>EPWM_DeadZone</b>        | Demonstrate how to use EPWM Dead Zone function.   |
| <b>EPWM_DoubleBuffer</b>    | Change duty cycle and period of output waveform by EPWM Double Buffer function.   |
| <b>FMC_IAP</b>              | Show how to reboot to LDROM functions from APROM. This sample code set VECMAP to LDROM and reset to re-boot to LDROM.             |
| <b>FMC_RW</b>               | Show how to read/program embedded flash by ISP function.  |
| <b>GPIO_EINTAndDebounce</b> | Show the usage of GPIO external interrupt function and de-bounce function.  |
| <b>GPIO_INT</b>             | Show the usage of GPIO interrupt function.  |
| <b>GPIO_OutputInput</b>     | Show how to set GPIO pin mode and use pin data input/output control.  |
| <b>GPIO_PowerDown</b>       | Show how to wake up system from Power-down mode by GPIO interrupt.  |
| <b>HDIV</b>                 | Show how to calculate with hardware divider.  |
| <b>I2C_EEPROM</b>           | Show how to use I <sup>2</sup> C interface to access EEPROM.  |
| <b>I2C_GCMode_Master</b>    | Show how a Master uses I <sup>2</sup> C address 0x0 to write data to Slave. This sample code needs to work with I2C_GCMode_Slave. |
| <b>I2C_GCMode_Slave</b>     | Show a Slave how to receive data from Master in GC (General Call) mode. This sample code needs to work with I2C_GCMode_Master.    |
| <b>I2C_Master</b>           | Show a Master how to access Slave. This sample code needs to work with I2C_Slave.   |
| <b>I2C_Slave</b>            | Show how to set I <sup>2</sup> C in Slave mode and receive the data from Master. This sample code needs to work with I2C_Master.  |
| <b>I2C_Wakeup_Master</b>    | Show how to wake up MCU from Power-down. This   |

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|-------------------------------|--|
|                               | sample code needs to work with I2C_Wakeup_Slave.   |
| <b>I2C_Wakeup_Slave</b>       | Show how to wake up MCU from Power-down mode through I <sup>2</sup> C interface. This sample code needs to work with I2C_Wakeup_Master.  |
| <b>QEI</b>                    | Show the usage of QEI compare function.  |
| <b>SPI_Flash_With_FIFO</b>    | Demonstrate how to access a Winbond 25Q16 SPI flash with FIFO buffers.   |
| <b>SPI_Flash_Without_FIFO</b> | Demonstrate how to access a Winbond 25Q16 SPI flash without FIFO buffers.  |
| <b>SPI_Loopback</b>           | Implement SPI Master loop back transfer. This sample code needs to connect SPI0_MISO pin and SPI0_MOSI pin together. It will compare the received data with transmitted data.          |
| <b>SPI_MasterFifoMode</b>     | Configure SPI0 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 sample code.  |
| <b>SPI_SlaveFifoMode</b>      | Configure SPI0 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 sample code. |
| <b>SPI_SD_Card</b>            | Demonstrate how to access a SD card formatted in FAT file system.  |
| <b>SYS</b>                    | Change system clock to different PLL frequency and output system clock from CLKO pin.  |
| <b>TIMER_Capture</b>          | Show how to use the timer2 capture function to capture timer2 counter value.   |
| <b>TIMER_Counter</b>          | Implement timer1 event counter function to count the external input event.   |
| <b>TIMER_Delay</b>            | Show how to use timer0 to create various delay time.   |
| <b>TIMER_PeriodicINT</b>      | Implement timer counting in periodic mode.   |
| <b>UART_Autoflow_Master</b>   | Transmit and receive data with auto flow control. This sample code needs to work with UART_Autoflow_Slave.   |

|                            |   |
|----------------------------|---|
| <b>UART_Autoflow_Slave</b> | Transmit and receive data with auto flow control. This sample code needs to work with UART_Autoflow_Master. |
| <b>UART_IrDA_Master</b>    | Transmit and receive data in UART IrDA mode. This sample code needs to work with UART_IrDA_Slave.           |
| <b>UART_IrDA_Slave</b>     | Transmit and receive data in UART IrDA mode. This sample code needs to work with UART_IrDA_Master.          |
| <b>UART_LIN</b>            | Transmit LIN frame including header and response in UART LIN mode.  |
| <b>UART_RS485_Master</b>   | Transmit and receive data in UART RS485 mode. This sample code needs to work with UART_RS485_Slave.         |
| <b>UART_RS485_Slave</b>    | Transmit and receive data in UART RS485 mode. This sample code needs to work with UART_RS485_Master.        |
| <b>UART_TxRx_Function</b>  | Transmit and receive data from PC terminal through RS232 interface.   |
| <b>UART_Wakeup</b>         | Show how to wake up system from Power-down mode by UART interrupt.  |
| <b>WDT_PowerDown</b>       | Use WDT time-out interrupt event to wake-up system.   |
| <b>WDT_TimeoutINT</b>      | Implement periodic WDT time-out interrupt event.  |
| <b>WDT_TimeoutReset</b>    | Show how to generate time-out reset system event while WDT time-out reset delay period expired.             |
| <b>WWDT_CompareINT</b>     | Show how to reload the WWDT counter value.  |

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