ARM® Cortex®-M0

32-bit Microcontroller

NuMicro® Family
M451 Series BSP
Revision History

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Revision 3.01.007 (Released 2024-07-26)

1. Added SPI_DualMode_Flash and SPI_QuadMode_Flash sample code.
2. Used "volatile" with the function pointer to disable compiler optimizations in I2C sample code.
3. Added CAN_BasicMode_SilentMode and CAN_NormalMode_SilentMode sample code.
4. Added slew rate control for SPI sample codes.
5. Added alignment check for PDMA buffer.
6. Fixed the problem that ISP_CAN sample code cannot run to APROM.
7. Fixed MASS_STORAGE_OFFSET to prevent APROM from being overwritten.
8. Enabled LVR in SYS_PowerDown_MinCurrent sample code to prevent power on/off fail.
9. Updated USBD HID keyboard sample code to support LED status.
10. Fixed clock setting issue in ISP_HID and ISP_DFU sample code.
11. Added SYS_PowerDown_MinCurrent sample code.
12. Updated SPI_Loopback sample code.
13. Modified SYS_UnLockReg() time-out handler.
14. Called UART FIFO size from uart.h in USBD VCOM sample code.
15. Added timeout handler for infinite loop.

Revision 3.01.006 (Released 2022-08-16)

1. Updated ThirdParty/FreeRTOS to v10.4.6.
2. Fixed FreeRTOS sample code running issue.
3. Fixed USBD_Mass_Storage_CDROM crash on Linux.
4. Added I2C hang up and recover mechanism for I2C Master and Slave sample code.
5. Updated project option of reg based FMC_IAP sample code.
6. Enabled schmitt trigger of I2C sample code.
7. Added enable UART NVIC IRQ in sample code for sync UART driver in USBD_VCOM sample code.
8. Fixed UART TX FIFO control issue in USBD_VCOM sample code.

Revision 3.01.005 (Released 2021-01-22)

1. Fixed SetMultiRxMsg MsgCount in Library/StdDriver/src/can.c
2. Fixed data access fail issue of USBD_Mass_Storage_CDROM sample code.
3. Added to pass USB-IF CV-Chapter 9 & Class test of all USBD Sample code.
4. Add MPU sample code.
5. Added Apache-2.0 license declaration in driver source.
6. Added README.md file.

Revision 3.01.004 (Released 2019-11-11)

1. Added ISP Sample codes to bsp\SampleCode\ISP folder.
2. Supports GNU GCC.
3. Added Mass Storage sample code to support SD Card.
4. Selected HCLK clock divider as 2 before enabling PLL in PWM_PDMA_Capture sample code.
5. Added FMCIDLE_MODULE definition in CLK driver.

Revision 3.01.003 (Released 2018-02-21)

1. Fixed I2C driver bug of clock source.
2. Updated USBD_Audio_HID_NAU8822 sample code to support sync frame.

3. Revised I2S driver to improve sample rate calculation accuracy.
4. Revised USB interrupt flag handling of USB device sample code.
5. Added USB Host driver and sample code for CDC.

Revision 3.01.002 (Released 2017-10-24)

1. Added CLK_SysTickLongDelay() for long delay.
2. Fixed clear Receive Line Status interrupt flag bug in UART_ClearIntFlag().
3. Fixed u32idmask for Standard ID issue in CAN_SetRxMsgObjAndMsk().
4. Fixed PLL clock source selection bug in CLK_SetCoreClock().
5. Modified to disable debug message when enabling semihost without NuLink connecting.
6. Add ADC_MeasureAVDD() sample code.

Revision 3.01.001 (Released 2015-08-15)

1. Added Nu-LB-M451, NuEdu and USB device sample code.
2. Added a lack macro, SYS_IS_LVR_RST() to SYS driver.
3. Added a sample code of DAC_PDMA_ScatterGather_PWMTrigger to use PDMA scatter gather mode and trigger DAC by PWM
4. Added counter type constant definitions: PWM_UP_COUNTER, PWM_DOWN_COUNTER, PWM_UP_DOWN_COUNTER
5. Added DAC_PDMA_PWMTrigger sample code to use PDMA and trigger DAC by PWM.
6. Added EADC_PDMA_PWM_Trigger sample code to trigger EADC with PWM and copy result by PDMA.
7. Added new function to control systick and select systick clock source, CLK_EnableSysTick() and CLK_DisableSysTick() in CLK driver.
8. Added 'NMIEN' and 'NMISTS' control registers to M451Series.h for NMI control.
9. Added PDMA_ScatterGather_PingPongBuffer sample code to create ping-pong buffer with PDMA scatter gather mode.
10. Added 'PE_DRVCTL' register of GPIO to M451Series.h for GPIO driving strength control.
11. Added PWM_PDMA_Capture sample code to transfer PWM capture data by PDMA.
12. Added SCLIB_ActivateDelay API for initial SC with non-standard H/W design in SC driver
13. Fixed the bug of EADC_IS_INT_FLAG_OV()that access the incorrect register.
14. Fixed the bug of EADC_IS_SAMPLE_MODULE_OV() that access the incorrect register.
15. Fixed the bug of EADC_SetExtendSampleTime() for shift position error in EADC driver.
16. Fixed the bug of EADC_SetTriggerDelayTime() for shift position error in EADC driver.
17. Fixed the bug of PWM_ENABLE_OUTPUT_INVERTER () that output inverter function can't be disabled.
18. Fixed the bug of PWM_MASK_OUTPUT() in PWM driver that mask function can't be disabled.
19. Fixed CAN_STATUS_LEC_Msk from 0x03 to 0x07.
20. Fixed COUNTFLAG may not be cleared bug of CLK_SysTickDelay() in CLK driver.
21. Fixed CTL and PINCTL regsiter synchronise issue by wait synchronise ready flag in SC driver.
22. Fix DAC_SetDelayTime() calculation error in DAC driver. Because the dac->TCTL only use 10bit, not 14bit.
23. Fixed EADC_CMP_ADCMPIE_DISABLE definition error.

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25. Fixed IAR entry point from __iar_program_start to Reset_Handler
26. Fixed PWM_ConfigOutputChannel() return value bug in PWM driver.
27. Fixed a bug of PWM_ConfigSyncPhase() that cannot configure synchronize source for channel2~5.
28. Fixed SC_SET_STOP_BIT_LEN definition error.
29. Fixed SCUART baudrate return error in SCUART_Open and SCUART_SetLineConfig API of SCUART driver.
30. Fixed SCUART_PARITY_NONE/SCUART_PARITY_EVEN/SCUART_PARITY_ODD definition bug in SCUART driver.
31. Fixed setting u32DataWidth error by sc->UARTCTL in SCUART_SetLineConfig API of SCUART driver.
32. Fixed SMBD_Enable constant value define error in I2C driver.
33. Fixed the problem that MSC device detection is aborted due to REQUEST_SENSE command not ready.
34. Fixed UART clock setting bug in UART_Open(), UART_SetLine_Config() and UART_SelectIrDAMode() of UART driver.
35. Improved compatibility of USBH driver for pen driver.
36. Improved EADC_ConfigSampleModule() to support rising and falling trigger at the same time.
37. Improved EBI_SRAM sample code to add PDMA data transfer with EBI.
38. Improved SC driver to support more than one SC port.
39. Improved USBH driver to support composite HID devices
40. Improved USBD driver to support more USB device sample code.
41. Modified I2C_STOP() from #define to inline and add waiting STO bit clear to 0 . This modified is safe for next START coming soon.
42. Removed CRC clock enabled in CRC_Open(). User should enable CRC clock in system initialization before any CRC operation.
43. Removed FMC_ReadDID() in FMC driver. This function was no longer supported.
44. Removed I2C_CTL_STA_STO_SI and I2C_CTL_STA_STO_SI_AA definitions to avoid STOP and START write to control bit at the same time.

Revision 3.00.005 (Released 2014-12-25)

1. Fixed EADC_CTL_DMOF_STRAIGHT_BINARY and EADC_CTL_DMOF_TWOS_COMPLEMENT definition error of EADC driver.
2. Fixed EADC_FALLING_EDGE_TRIGGER definition error of EADC driver.
3. Fixed EADC_RISING_EDGE_TRIGGER definition error of EADC driver.
4. Fixed UART transmit data bug in UART_TEST_HANDLE() of UART_TxRxFunction sample code.
5. Fixed data missing bug when BULK IN transfer is end by max packet size packet at last packet in USBD_VCOM sample code.
6. Fixed program user configuration area without erase in USBD_MassStorage_DataFlash sample code.
7. Fixed switching HCLK to HIRC before enable PLL bug in CLK_SetCoreClock() of CLK driver.
8. Fixed isochronous transfer bugs of USB Host library.
9. Fixed Clear Modem Status Interrupt flag bug in UART_ClearIntFlag() of UART driver.
10. Fixed Timeout flag clear bug in I2C_ClearTimeoutFlag() of I2C driver.
11. Replaced PERIOD0~5 with PERIOD[6] in PWM_T, and revise PERIOD bit field constant definition in M451Series.h.

12. Replaced CMPDAT0~5 with CMPDAT0[6] in PWM_T, and revise CMPDAT bit field constant definition in M451Series.h.
13. Replaced CNT0~5 with CNT[6] in PWM_T, and revise CNT bit field constant definition in M451Series.h.
14. Replaced PBUF0~5 with PBUF[6] in PWM_T, and revise PBUF bit field constant definition in M451Series.h.
15. Replaced CMPBUF0~5 with CMPBUF[6] in PWM_T, and revise CMPBUF bit field constant definition in M451Series.h.
16. Replaced CURSCAT0~CURSCAT11 with CURSCAT[12] in PDMA_T of M451Series.h.
17. Modified CLK_WaitClockReady() timeout to about 300ms in CLK driver.
18. Updated USB USBD_MassStorage_DataFlash sample code and USB Driver to pass USB-IF MSC test. (The MassStorage size must > 64KB, otherwise Command Set test will fail in MSC test)
19. Replaced old HID library file (open source) with Nuvoton HID library in USB Host library.
20. Added USBH_Audio_Class and USBH_UAC_HID sample code for USB Host to support UAC + HID device.

Revision 3.00.004 (Released 2014-11-12)

1. Fixed the timeout from 5ms to 300ms in CLK_WaitClockReady() of CLK driver.
2. Fixed the bug of UART_ClearIntFlag() of UART driver to only clear one flag at one time.
3. Fixed missing parameter, UART clock source LXT for CLK_SetModuleClock() of UART driver.
4. Fixed clear data and CTS wake up flag bug to clear one flag in one time in UART1_IRQHandler() of UART_Wakeup sample code.
5. Fixed the bug of RS485_HANDLE() in the UART_RS485_Slave sample code to only clear one flag at one time.
6. Fixed clear auto baud rate detect finished and time-out flag bug to clear one flag one time in AutoBaudRate_RxTest() of UART_AutoBaudRate_Slave sample code.
7. Fixed typo that modify NVIC_EnableIRQ() to NVIC_DisableIRQ() after CHIP wake-up in I2C_Wakeup_Slave sample code.
8. Fixed multi-function setting error of SC CD pin in USBD_CCID sample code.
9. Fixed PD.7 (Headphone output control pin) output mode configuration in WAU8822_Setup() of USBD_Audio_NAU8822 sample code.
10. Fixed wrong CLK_WaitClockReady parameter in I2C_GCMode_Slave sample code.
11. Fixed UART data transfer bug of USBD_VCOM sample code.
12. Updated CLK driver to avoid HIRC force enable in CLK_SetHCLK() and CLK_SetCoreClock().
13. Updated USBD driver for pass USB-IF MSC Test.
14. Updated USBD_MassStorage_DataFlash sample code to pass USB-IF MSC Test.
15. Updated driver of VCOM for win8 certification of USBD_VCOM sample code.
16. Added HID Media key supporting in USBD_Audio_HID_NAU8822 sample code.
17. Added new sample code USBH_UAC_HID of USB Host to support UAC + HID device.
18. Added new sample code USBH_Audio_Class to support USB audio class device (UAC).

Revision 3.00.003 (Released 2014-10-02)

1. Added USBD_Audio_HID_NAU8822 sample code

Revision 3.00.002 (Released 2014-09-09)

1. Fixed serial number code in device descriptor
2. Fixed EBI_Open API did not perform u32CSActiveLevel parameters to setting CS pin polar
3. Fixed SMBus Bus time-out & Clock Lo time-out API
4. Fixed I2C0,1 IP reset of SYS_IPRST1
5. Fixed include path of CMSIS
6. Fixed SPI_CLR_UNIT_TRANS_INT_FLAG( ) definition
7. Fixed Revise USBD_INT_WAKEUP definition
8. Fixed Modify to support USB remote wake-up function
9. Fixed Modify M451 RAM setting for Algorithm

Revision 3.00.001 (Released 2014-06-06)

1. Initial Release.

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