

Arm® Cortex®-M23
32-bit Microcontroller

M251/M252/M254/M256/M258 Series
CMSIS BSP
Revision History

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Revision 3.02.008 (Released 2025-10-08)

- Standard driver
 - I2C: Added STOP bit check for I2C transmission completely.
 - PDMA
 - PDMA_INT_TRANS_DONE, PDMA_INT_EMPTY, PDMA_INT_TIMEOUT, PDMA_DisableInt, PDMA_EnableInt: Supported multi-bit mask.
 - PDMA_INT_ALIGN: Added.
 - SPI: SPI_DISABLE_3WIRE_MODE and SPI_ENABLE_3WIRE_MODE added.
- Sample code
 - BPWM_DoubleBuffer, PWM_DeadTime, PWM_DoubleBuffer, TIMER_PWM_ChangeDuty: IRQ handler cleared interrupt flag at first.
 - EADC_AverageCMP, QSPI_PDMA_Master, QSPI_PDMA_Slave: Added.
 - ISP_I2C and ISP_SPI: Fixed potential command failure.
 - USB_D_HID_RemoteWakeup: Fixed host cannot sleep issue.
 - VS Code projects upgraded to use GCC 14.3.1.
- Tool
 - TouchView and TouchView_MP replaced NuSenadj and NuSenadj_MP.

Revision 3.02.007 (Released 2024-09-25)

- CMSIS: Upgraded to v6.1.0.
- Keil startup_M251.c: Instead of ASM code.
- Standard driver
 - UART: UART_RESET_RXFIFO and UART_RESET_TXFIFO added.
- Sample code
 - Added VS Code projects with AC6/GCC toolchain.
 - I2C_Loopback_10bit: Merged into I2C_Loopback.
 - I2C_Master_10bit: Merged into I2C_Master.
 - I2C_Slave_10bit: Merged into I2C_Slave.
 - ISP_UART: Reset RX FIFO after response sent.
 - USB_D_Audio_Headset: Added.
 - USB_D_Mass_Storage_SRAM: Reserved memory space for mass storage instead of direct addressing.

Revision 3.02.006 (Released 2024-03-21)

- Peripheral header
 - rtc_reg.h: Fixed RTC_CLKFMT_DCOMPEN_Pos.
- Standard driver

- retarget.c: Fixed __ARM_use_no_argv multiple definition issue in newer Keil versions.
- BPWM: BPWM_ConfigOutputChannel fixed duty issue.
- CLK
 - CLK_PowerDown cleared CPU deep sleep mode select after wakeup.
 - CLK_SysTickDelay Improved robustness.
- I2C: I2C_WAIT_READY fixed potential blocking issue.
- LCD: LCD_SetPixel and LCD_SetAllPixels fixed segment count issue.
- PWM: PWM_ConfigOutputChannel fixed duty issue.
- TIMER_PWM: TPWM_ConfigOutputFreqAndDuty fixed duty issue.
- Sample code
 - BPWM_SwitchDuty, PWM_SwitchDuty: Fixed 100% duty issue.
 - I2C_Master, I2C_Master_10bit: Added I2C_DisableTimeout().
 - ISP_DFU, ISP_MSC: Reduced code size.
 - NK_M258KE_LCD_TK: Supported NuMaker M258KE board V1.1 and above.
 - QSPI_DualMode_Flash, QSPI_QuadMode_Flash, SPI_Flash: Supported more Winbond SPI flashes.
 - SYS_PowerDown_MinCurrent: Removed LVR disable setting.
 - USB_D samples: Removed LPM support.
 - USB_D HID samples: Supported LED status.

Revision 3.02.005 (Released 2023-08-07)

- Library
 - LDROM.icf and LDROM.sct: Fixed LDROM address.
- Sample code
 - ISP samples: Fixed LDROM download failure in IAR and Keil.
 - ISP_DFU: Updated Windows driver with Nuvoton vendor name.
 - NK_M258KG_LCD_TK: Improved touch key sensitivity.
 - USB_D samples: Removed EP1 stall while setup error occurred.

Revision 3.02.004 (Released 2023-02-06)

- Library
 - TKLib: Added hysteresis recover mechanism for baseline tracking.
- Sample code
 - NK_M256SD_LCD_TK and NK_M258KE_LCD_TK: TK_SE_NUM added.
 - SYS_PowerDown_MinCurrent: Added.

- USB samples: Avoided wakeup failure.

Revision 3.02.003 (Released 2022-07-21)

■ Standard driver

- retarget.c: Fixed print issue with IAR EWARM v9.20.
- CLK
 - CLK_PowerDown added check of LIRC disable for DPD mode.
 - CLK_WaitClockDisable added.
- I2C: Error codes added.
- LCD
 - LCD output control constant definitions added.
 - LCD_SetSavingMode added.
- SYS: SYS_GPA_MFPH_PA8MFP_DAC0_OUT and SYS_GPA_MFPH_PA9MFP_DAC1_OUT added.
- UART: UART_RX_IDEL replaced by UART_RX_IDLE.

■ Library

- SmartcardLib: Supported cards not compatible with ISO-7816.

■ Sample code

- ACMP_CompareDAC: Added external negative source from DAC voltage output.
- DAC samples: Extended DAC output pin to support more chips.
- FreeRTOS Blinky sample: Added.
- I2C samples: Improved error handling.
- I2C_Loopback_10bit, I2C_Master_10bit, I2C_Slave_10bit, LCD_PowerConsumption, TK_PowerDownMode, and Level1_Training samples: Added.
- ISP_DFU, ISP_HID, and ISP_MSC: Enabled USB trim function.
- ISP_SPI: Added GCC project.
- ISP samples
 - Added IAR projects.
 - Added scatter file to check image size.
 - Enabled function section linking and image size optimization in Keil projects.
- NK_M256SD_LCD_TK and NuMaker-M256SD LCD samples: Added.
- NK_M258KE_LCD_TK, NK_M258KG_LCD_TK, and LCD samples: Added LCD output setting.
- RTC samples: Skipped time setting if RTC initialized.

- RTC_Alarm_Wakeup: Moved to PowerManagement folder.
- SYS_DPDMMode_Wakeup: Added wait for LIRC disable.
- SYS_DPDMMode_Wakeup and SYS_PowerDownMode: Added reset status check.
- UART_PDMA: Fixed compiling issue of polling method.
- ThirdParty
 - FreeRTOS: Added.

Revision 3.02.002 (Released 2022-03-15)

- Library
 - LCDLib: Synchronized with NuTool-LCDView tool.
 - TKLib: Improved anti-noise capability.
- Sample code
 - DAC_GroupMode, EADC_BPWM_Trigger, EADC_PDMA_BPWM_Trigger, and NK_M258KG_LCD_TK: Added.
 - LCD_Blinking and LCD_Pixel_OnOff: Used default Charge Pump setting.
 - LCD samples: Used new LCDLib.
- Tool
 - NuSenadj_MP: Updated.

Revision 3.02.001 (Released 2022-01-20)

- Supported CRYPTO.
- Peripheral header
 - dac_reg.h: Fixed DAC_CTL_GRPEN_Msk.
 - lcd_reg.h: Updated base on TRM.
 - tk_reg.h: Supported up to 24 keys.
- Standard driver
 - Improved infinite loop prevention with timeout counter and error code.
 - BPWM: BPWM_ConfigCaptureChannel and BPWM_ConfigOutputChannel fixed wrong clock for chips without PLL.
 - CLK: CLK_EnableSysTick correctly used external reference clock.
 - DAC: DAC_SetDelayTime fixed calculation overflow issue.
 - GPIO: PF15 added.
 - LCD
 - LCD_GET_CHARGE_TIME and LCD_WAVEFORM_TYPE fixed.
 - LCD_SET_CONTINUOUS_FRAME and LCD_SET_NULL_FRAME_TIME removed.

- LCD_SET_PAUSE_TIME and LCD_SET_PAUSE_TYPE added.
- PWM: PWM_ConfigCaptureChannel and PWM_ConfigOutputChannel fixed wrong clock for chips without PLL.
- RTC: RTC_Open added return value.
- SCUART: SCUART_Write added return value.
- SPI: Supported SPI1.
- TIMER: TIMER_Delay and TIMER_ResetCounter added return value.
- TK: Supported up to 24 keys.
- Library
 - TKLib: Supported up to 24 keys.
- Sample code
 - EADC_Timer_Trigger: Fixed wrong timer period.
 - I2C samples: Removed redundant code.
 - ISP_I2C, ISP_RS485, and ISP_UART: Added GCC project.
 - ISP_MSC: Added.
 - SPI_HalfDuplex and SPI_PDMA_LoopTest: QSPI0 replaced by USPI0.
 - USB HID samples: Unified INT_IN interval.
 - USB_Mass_Storage_CDROM: Fixed Linux and Mac compatibility issue.
- Tool
 - NuSenadj: Updated.

Revision 3.01.002 (Released 2021-06-25)

- system_M251.h: __HXT and __LXT added redefinition check.
- Peripheral header
 - psio_reg.h: A reserved member added to GNCT_T structure.
- Standard driver
 - SYS: PF.15 MFP added.
- Library
 - LCDLib
 - Fixed display flicker.
 - Variable legality check for LCD print and putchar.
 - TKLib
 - Added all key calibration for power-down mode, store address scan, and store pin selection to Flash.
 - Decreased parameters Flash size.
 - Fixed reference CB overflow, power-on fine tune.
- Sample code

- BPWM_Capture: Replaced PWM0 channel 0 with Timer0.
- I2C and USCI_I2C samples: Enabled schmitt trigger of I²C pins.
- ISP_HID, ISP_I2C, ISP_RS485, and ISP_UART: Enabled GPIO and SysTick clocks.
- NuMaker-M258KE: Supported CKO shielding, default calibration parameters, and null frame in power-down mode.
- SPI_SlaveFIFOModeINT, USCI_SPI_SlaveModeINT: Added.
- TIMER_FreeCountingMode: Saved the first captured data.
- UART_Wakeup: Provided more wake-up methods.
- USBD_Audio_Codec: Refactored.
- USBD_MassStorage_CDROM: Removed 2 KB file size limitation.
- USBD_VCOM samples: Fixed potential UART Tx FIFO overflow issue.
- USBD_VCOM_DaulPort: Fixed power-down blocked issue and wrong baud rate issue.
- Tool
 - NuSenadj: Moved to TK subfolder.
 - NuSenadj_MP: Added.

Revision 3.01.001 (Released 2020-11-16)

- Supported M254/M256/M258 series.
- Peripheral header
 - lcd_reg.h, tk_reg.h: Added.
 - eadc_reg.h: EADC_T.OFFSETCAL, EADC_CTL_CALEN_Msk, EADC_CTL_CALEN_Pos, EADC_OFFSETCAL_OFFSETCANCEL_Msk, and EADC_OFFSETCAL_OFFSETCANCEL_Pos removed.
- Standard driver
 - retarget.c: Fixed program terminated issue with optimization level 0 of Arm Compiler 6.
 - EADC
 - EADC_ENABLE_CMP0, EADC_ENABLE_CMP1, EADC_ENABLE_CMP2, and EADC_ENABLE_CMP3 fixed bits overwritten issue.
 - EADC_DISABLE_OFFSETCANCEL and EADC_ENABLE_OFFSETCANCEL removed.
 - LCD, TK: added.
 - QSPI: QSPI_DISABLE_TX_RX_PDMA and QSPI_TRIGGER_TX_RX_PDMA added.
 - SPI: SPI_DISABLE_TX_RX_PDMA and SPI_TRIGGER_TX_RX_PDMA added.

- SYS: SYS_SetPowerLevel improved power level switch stability.
- USCI-SPI: USPI_DISABLE_TX_RX_PDMA and USPI_TRIGGER_TX_RX_PDMA added.
- USCI-UART: UART_PDMA_DISABLE and UART_PDMA_ENABLE added.
- Library
 - LCDLib, TKLib: Added.
- Sample code
 - EADC_BandGapCalculateAVDD, LCD_Blinking, LCD_Pixel_OnOff, LCD_Print_Text, NK_M258KE_LCD_TK, and USBD_BC12_HID_Mouse: Added.
 - EADC_OffsetCancel: Removed.
 - GPIO samples: Enabled GPIO clock.
 - PDMA_BasicMode: Fixed miss word alignment.
 - USBD_Audio_Codec: Fixed noise and I²C timeout.
 - USBD_VCOM_DualPort: Fixed only one VCOM port in Linux.

Revision 3.00.005 (Released 2020-06-10)

- Added Apache-2.0 license declaration.
- Standard driver
 - retarget.c: SendChar fixed uninitialized pointer.
 - TIMER: TIMER_SET_OPMODE added.
 - UART: UART_DEGLITCH_DISABLE, UART_DEGLITCH_ENABLE, UART_PDMA_DISABLE, and UART_PDMA_ENABLE added.
 - USCI-UART: UART_DEGLITCH_DISABLE and UART_DEGLITCH_ENABLE added.
- Sample code
 - CLK_ClockDetector: HCLK clock source used HXT instead of PLL.
 - GPIO_SingleCycleIO, I2C_SMBus, MPU, SYS_PowerDownMode, Sys_PowerMode, and USB_D_CCID: Added.
 - QSPI_DualMode_Flash, QSPI_QuadMode_Flash, and SPI_Flash: Fixed the 256th byte written issue.

Revision 3.00.004 (Released 2019-12-31)

- Removed CRYPTO.
- Standard driver
 - retarget.c: _write and SendChar_ToUART fixed '\r' issue.
 - CRC: CRC_SET_WDATA_LEN added.
 - FMC
 - FMC_Write128 added note to run in SRAM instead of inline function.
 - FMC_WriteConfig fixed return value.
 - SYS: Replaced SYS_PLCTL_PLSEL_PL2 with SYS_PLCTL_PLSEL_PL3.
 - TIMER_PWM: TPWM_ConfigOutputFreqAndDuty fixed wrong configuration for 1 Hz.
- Sample code
 - FMC_MultiWordProgram: Used FMC driver API.
 - I2C_Wakeup_Slave: Improved wakeup robustness.
 - ISP_DFU: Added.
 - UART_LIN and UART_SingleWire: Fixed '\r' issue.
 - USB_D samples: Improved USB compatibility.

Revision 3.00.003 (Released 2019-08-30)

- M251.h: Included core_cm23.h instead of core_armv8mbl.h.
- Peripheral header
 - clk_reg.h, rtc_reg.h: Updated base on TRM.
- Standard driver
 - I2C: I2C_SetSlaveAddr and I2C_SetSlaveAddrMask supported 10-bit slave address and error handling for new transfer.
 - TIMER
 - TIMER_GetModuleClock used correct PCLK.
 - TIMER_Open fixed return value.
 - TIMER_PWM
 - TPWM_ClearWakeupFlag, TPWM_DisableTrigger, TPWM_DisableWakeup, TPWM_EnableTrigger, TPWM_EnableWakeup, TPWM_GetWakeupFlag, TPWM_CLEAR_TRG_DAC_STATUS, TPWM_CLEAR_TRG_PDMA_STATUS, TPWM_GET_TRG_DAC_STATUS, and TPWM_GET_TRG_PDMA_STATUS added.
 - TPWM_OUTPUT_TOGGLE, TPWM_OUTPUT_NOTHING, TPWM_OUTPUT_LOW, TPWM_OUTPUT_HIGH, TPWM_CLKSRC_HXT, TPWM_CLKSRC_LXT, TPWM_CLKSRC_PCLK, TPWM_CLKSRC_TX, TPWM_CLKSRC_LIRC, and TPWM_CLKSRC_HIRC removed.
 - USCI_SPI: USPI_SET_SS_HIGH fixed implementation.
- Library
 - SmartcardLib: SCLIB_CheckCDEvent_ByVar added.
- Sample code
 - EADC_BandGap: Showed voltage result and modified extern sample time for band-gap.
 - FMC_ExecInSRAM: Added GCC project.
 - I2C_Master_PDMA, I2C_PDMA, and I2C_Slave_PDMA: Replaced by I2C_PDMA_TRX.
 - ISP samples, QSPI_Slave3Wire, and SPI_HalfDuplex: Added.
 - SC_ReadATR and SC_ReadSimPhoneBook: Added software card detection.
 - UART_TxRx_Function: Fixed data lost.
 - USB_D samples: Fixed potential issue.
 - USCI_SPI_Loopback, USCI_SPI_MasterMode, and USCI_SPI_SlaveMode: Added using GPIO pin instead of SS pin.

Revision 3.00.002 (Released 2019-02-22)

- system_M251.c: Set flash access cycle to 0x03.
- Standard driver
 - CLK: CLK_SET_PCLK_DIVIDER removed.
- Sample code
 - Used other clock source instead of HXT.
 - SYS_TrimHIRC: Added auto trim disable.
 - USBD_Audio_Codec: Cleared buffer before play / record.

Revision 3.00.001 (Released 2018-12-25)

- Initial release.

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