

## **ARM® Cortex®-M0**

### **32-bit Microcontroller**

# **NuMicro® Family**

## **M051 Series BSP**

## **Revision History**

*The information described in this document is the exclusive intellectual property of Nuvoton Technology Corporation and shall not be reproduced without permission from Nuvoton.*

*Nuvoton is providing this document only for reference purposes of NuMicro microcontroller based system design. Nuvoton assumes no responsibility for errors or omissions.*

*All data and specifications are subject to change without notice.*

For additional information or questions, please contact: Nuvoton Technology Corporation.

[www.nuvoton.com](http://www.nuvoton.com)

#### Revision 3.01.006 (Released 2024-12-04)

---

1. Modify settings of KEIL/IAR to fix run code issue in FMC\_MultiBoot.
2. Update project settings and fix can't run code in FMC\_MultiBoot\_SwReset.

#### Revision 3.01.005 (Released 2024-08-02)

---

1. Fixed infinite loop.
2. Set [clear ADF flag operation] to the first operation in ADC\_IRQHandler.
3. Fixed multi-function pin setting of SPI sample code.
4. Used "volatile" with the function pointer to disable compiler optimizations in I2C sample code.
5. Enabled LVR in SYS\_PowerDown\_MinCurrent sample code to prevent power on/off fail.
7. Added time-out handler for infinite loop.
8. Fixed uart.c parentheses issue.
9. Added SYS\_PowerDown\_MinCurrent sample code.
10. Updated SPI\_Loopback sample code.
11. Added I2C hang up & recover mechanism for I2C Master and Slave sample code.

#### Revision 3.01.004 (Released 2020-09-15)

---

1. Append \r char before sending \n when use printf.
2. Fixed warnings of ADC driver.
3. Added Apache-2.0 license declaration in driver source.
4. Fixed CLK\_SetModuleClock() clear others divider issue.
5. Added README.md file.

#### Revision 3.01.003 (Released 2019-11-07)

---

1. Added ISP Sample codes to bsp\SampleCode\ISP folder.
2. Revised to do ADC\_POWER\_ON() before ADC\_Open() for ADC StdDriver sample codes.
3. Added GCC projects.
4. Fixed timer frequency inaccurate issue.
5. Fixed PWM\_DisableCaptureInt error.
6. Fixed CLK driver CLK\_SetHCLK() bug: to enable HIRC before switch HCLK and disable HIRC if it is not enabled before.
7. Fixed CLK\_EnablePLL() wrong PLL default setting value.
8. Revised MFP coding style and deleted useless files.
9. Modified UART/I2C MFP Setting.
10. Revised multi-function pins settings:
  1. To avoid overwrite the previous correct settings.
  2. Impact on EBI, TIMER, WDT ,WWDT and SPI sample codes.
11. Fixed MFP configuration in Hard Fault sample code.

#### Revision 3.01.002 (Released 2017-10-05)

---

1. Fixed clear Receive Line Status interrupt flag bug in UART\_ClearIntFlag().
2. Modified to ignore debug message when enabling semihost without connecting NuLink ICE.
3. Fixed PLL clock source selection bug in CLK\_SetCoreClock().
4. Add CLK\_SysTickLongDelay() for long delay in clk.h.

**Revision 3.01.001 (Released 2015-08-04)**


---

1. Fixed the bug about wrong TIMER\_Delay pre-scale setting in TIMER driver.
2. Fixed the bug about wrong P4.5 mode setting in main() of GPIO\_INT sample code.
3. Fixed the bug about wrong I<sup>2</sup>C clock rate calculation in I2C\_EEPROM, I2C\_GCMode\_Slave and I2C\_GCMode\_Master sample code.
4. Fixed the active level definition bug of UART\_RTS\_LEVEL\_TRIGGER in UART driver.
5. Fixed the implement bug of SYS\_CLEAR\_RST\_SOURCE() in SYS driver.
6. Fixed the bug that SPI peripheral clock is not disabled in SPI\_Close() of SPI driver.
7. Fixed the shift position bug in PWM\_ConfigCaptureChannel() of PWM driver.
8. Fixed the PWM output bug in PWM driver that when PWM duty is set to 0 by PWM\_ConfigOutputChannel() in PWM driver.
9. Fixed the pin mask control bug of GPIO\_ENABLE\_DOUT\_MASK() and GPIO\_DISABLE\_DOUT\_MASK() in GPIO driver.
10. Fixed the bug that IRQ is not disabled after chip wake-up in I2C\_Wakeup\_Slave sample code
11. Fixed IAR reset entry as Reset\_Handler for all sample code.
12. Fixed the HIRC clock switching bug of CLK\_SetCoreClock() in CLK driver.
13. Fixed the bug that FMC\_Erase() disables ISP function when erase error occurred in FMC driver.
14. Fixed the bug that delay time may not be correct in CLK\_SysTickDelay() of CLK driver.
15. Fixed the bug that CLK\_EnableModuleClock() does not enable clock source when enabling the WWDT module.
16. Fixed the bug of RS485\_HANDLE() in the UART\_RS485\_Slave sample code to only clear one flag at one time.
17. Fixed the bug of UART\_RS485\_CLEAR\_ADDR\_FLAG() in UART driver to only clear one flag at one time.  
Fixed the bug of UART\_ClearIntFlag() in UART driver to only clear one flag at one time.
18. Fixed the macro implement bug of ADC\_IS\_DATA\_OVERRUN in ADC driver.
19. Fixed a bug on SPI\_CLR\_UNIT\_TRANS\_INT\_FLAG() definition, and removed a redundant right parenthesis.
20. Added UART\_Wakeup sample code to show how to wake up system by UART.
21. Added SYS\_IS\_LVR\_RST() to support LVR reset status in SYS driver.
22. Added SPI\_Loopback sample code for SPI0 simple data loopback demo.
23. Added RX1, TX1, and VARCLK registers to SPI\_T to support M05xxBN in the header file.
24. Added multi-function constant definitions SYS\_MFP\_P02\_TXD, SYS\_MFP\_P03\_RXD, SYS\_MFP\_P30\_RXD, SYS\_MFP\_P31\_TXD, SYS\_MFP\_P32\_nINT0, and SYS\_MFP\_P33\_nINT1.
25. Added GC mode constant definitions for I2C\_SetSlaveAddr() in I<sup>2</sup>C driver.
26. Added FMC\_MultiBoot\_SwReset sample code to show how to boot from a different application using VECMAP and software jump.
27. Added CLK\_GetPCLKFreq() function to CLK Driver to support getting PCLK clock frequency.
28. Removed unsupported register MCUIRQ from GCR\_INT\_T.

**Revision 3.00.002 (Released 2014-07-18)**


---

1. Fixed constant definitions of Timer 2 and Timer 3 in clk.h

2. Fixed SYS\_Init() GPIO initial bug of \SampleCode\StdDriver\ACMP.

---

**Revision 3.00.001** (Released 2014-02-14)

1. Updated all driver, API, and relative sample code.
2. Updated CMSIS to v3.01.
3. Changed directory structure.

---

**Revision 2.02.004** (Released 2014-02-14)

1. Modified ACMP driver sample code to show message by semihost to avoid UART0/ACMP I/O conflict.
2. Fixed no sound issue of ADC\_PWM of learning board sample code.
3. Fixed no message on LCD issue of Idle of learning board sample code.
4. Fixed FMC and UART\_LIN target device setting.

---

**Revision 2.02.003** (Released 2014-02-11)

1. Moved semihost relative code to retarget.c and add semihost sample code.
2. Fixed macro definition bug of PWM driver.

---

**Revision 2.02.002** (Released 2013-08-22)

1. Supported M05xxDE.
2. Modified ACMP names (e.g. Renamed ACMPA to ACMP01, ACMPB to ACMP23).
3. Renamed Hardware divider prefix name from DIV to HDIV.

---

**Revision 2.02.001** (Released 2013-06-10)

1. Supported new hardware functions of M05xxDN.
2. Modified and add more driver sample code for M05xxDN.
3. Added ACMP.h
4. Removed 24MHz macro setting for PLLCON.

---

**Revision 2.01.002** (Released 2012-08-10)

1. Fixed the \_TIMER\_RESET definition.
2. Fixed the SYSCLK\_CLKSEL1\_PWM23\_HCLK definition.
3. Removed the IARv6 directory and supported only IAR v6.21 and higher versions.
4. Modified PLL enable procedure to avoid unstable condition caused by PLL frequency changes.

---

**Revision 2.01.001** (Released 2012-04-24)

1. Provided a new driver for faster performance with smaller code size.
2. Created a new directory hierarchy.

---

**Revision 1.02.003** (Released 2012-03-12)

1. Fixed the UART driver bug.

---

**Revision 1.02.002** (Released 2011-08-26)

1. Added the NuvotonPlatform\_IARv6 directory to support IAR tool v6.10 and later.
2. Supported semihosted input by IAR.

---

**Revision 1.02.001** (Released 2011-07-08)

1. Updated the header to support 32-bit word access for control registers.

---

**Revision 1.01.005** (Released 2011-06-20)

1. Fixed the bug about wrong clock source of timer driver.

---

**Revision 1.01.004** (Released 2011-06-08)

1. Fixed the \_PORT\_DOUT definition of GPIO header.
2. Fixed the GPIO example in the Driver Reference Guide.

---

**Revision 1.01.003** (Released 2011-05-31)

1. Added new sample code of learning board in KEIL environment: Smpl\_I2C\_SW, Smpl\_I2C\_SW\_I, Smpl\_Idle.
2. Fixed driver bugs.
3. Updated the clock diagram in the Driver Reference Guide.

---

**Revision 1.01.002** (Released 2011-01-05)

1. Fixed bugs and added more samples.
2. Added sample code for the learning board.

---

**Revision 1.01.001** (Released 2010-12-01)

1. Fixed bugs and added more samples.
2. Defaulted the NMI\_SEL to 0x31 (assigned NMI to reserved IRQ).
3. Updated the clock diagram in the Driver Reference Guide for the PLL source.
4. Removed the second parameter (E\_ADC\_INPUT\_MODE) from DrvADC\_SetADCChannel().
5. Removed multi-function pin configurations from SPI driver (DrvSPI\_Open()).
6. Removed multi-function pin configurations from ADC driver [ DrvADC\_Open( ) & DrvADC\_SetADCChannel( ) ]. User needs to control the multi-function I/O by GPIO driver before they can use the I/O of ADC or SPI.
7. Added sample code for M051-LB\_004 (Learning Board).
8. Fixed the gau32ClkSrcTbl setting to avoid wrong system clock calculation.
9. Fixed the bug about EINT0, EINT1 handler cleaning status.
10. Removed unused register definitions in startup\_M051Series.s.
11. Fixed the GCR\_INT\_T definition in M051Series.h.
12. Fixed the wrong definition of DRVUART\_STOPBITS\_1\_5 and DRVUART\_STOPBITS\_2.

---

**Revision 1.00.001** (Released 2010-08-20)

1. Initial Release

### Important Notice

Nuvoton Products are neither intended nor warranted for usage in systems or equipment, any malfunction or failure of which may cause loss of human life, bodily injury or severe property damage. Such applications are deemed, "Insecure Usage".

Insecure usage includes, but is not limited to: equipment for surgical implementation, atomic energy control instruments, airplane or spaceship instruments, the control or operation of dynamic, brake or safety systems designed for vehicular use, traffic signal instruments, all types of safety devices, and other applications intended to support or sustain life.

All Insecure Usage shall be made at customer's risk, and in the event that third parties lay claims to Nuvoton as a result of customer's Insecure Usage, customer shall indemnify the damages and liabilities thus incurred by Nuvoton.

---

*Please note that all data and specifications are subject to change without notice.  
All the trademarks of products and companies mentioned in this datasheet belong to their respective owners.*