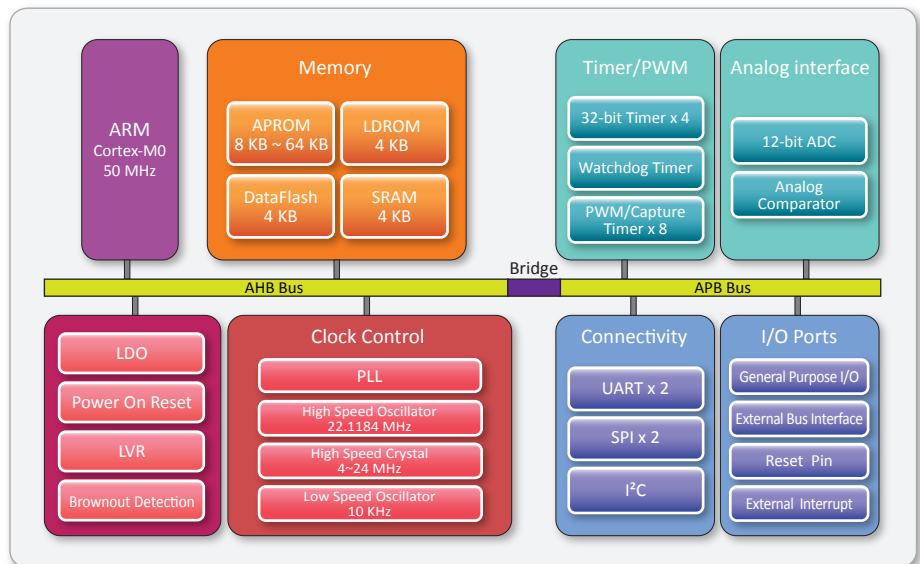# NUVOTON
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Nuvoton NuMicro™ Family

NuMicro M051™ Series

Cortex™-M0 MCU with 32-bit performance at traditional 8-bit MCU price

>> Applications

- ◆ Security Alarm System
- ◆ Industrial Control
- ◆ Communication System
- ◆ Smart Building Control
- ◆ BLDC Motor Control

>> Selection Guide

Part No.	Flash	SRAM	Data Flash	ISP Loader ROM	I/O	Timer	Connectivity			PWM	ADC	Comparator	EBI	ISP ICP	IRC 22MHz	Package
							UART	SPI	I²C							
M052LBN	8K	4K	4K	4K	40	4x32-bit	2	2	1	8	8x12-bit	2	v	v	v	LQFP48
M052ZBN	8K	4K	4K	4K	24	4x32-bit	2	1	1	5	5x12-bit	2	-	v	v	QFN33
M054LBN	16K	4K	4K	4K	40	4x32-bit	2	2	1	8	8x12-bit	2	v	v	v	LQFP48
M054ZBN	16K	4K	4K	4K	24	4x32-bit	2	1	1	5	5x12-bit	2	-	v	v	QFN33
M058LBN	32K	4K	4K	4K	40	4x32-bit	2	2	1	8	8x12-bit	2	v	v	v	LQFP48
M058ZBN	32K	4K	4K	4K	24	4x32-bit	2	1	1	5	5x12-bit	2	-	v	v	QFN33
M0516LBN	64K	4K	4K	4K	40	4x32-bit	2	2	1	8	8x12-bit	2	v	v	v	LQFP48
M0516ZBN	64K	4K	4K	4K	24	4x32-bit	2	1	1	5	5x12-bit	2	-	v	v	QFN33

Contact us: NuMicro@nuvoton.com

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⟫ Features of M051 series

◆ **Core**
- ARM® Cortex™-M0 core runs up to 50 MHz
- One 24-bit system timer
- Support low power sleep mode
- Single-cycle 32-bit hardware multiplier
- NVIC for the 32 interrupt inputs, each with 4-levels of priority
- Support Serial Wire Debug (SWD) interface and 2 watchpoints/4 breakpoints

◆ **Memory**
- 8K/16K/32K/64K bytes flash memory for program memory (APROM)
- 4K bytes flash memory for data memory (DataFlash)
- 4K bytes flash memory for loader memory (LDROM)
- 4K bytes embedded SRAM
- Support In System Programming (ISP) update APROM
- Support 2 wire In Circuit Programming (ICP) update APROM or LDROM or DataFlash
- Support fast parallel programming mode to update APROM or LDROM or DataFlash

◆ **Clock Control**
- Programmable system clock source
- 4 ~ 24 MHz external crystal input
- 22.1184 MHz internal oscillator (trimmed to 1% accuracy @ room temp.)
- 10 KHz low power oscillator for Watchdog timer and Wake-up in sleep mode
- PLL allows CPU operation up to the maximum 50 MHz

◆ **Timers**
- Provide four channel 32-bit timers, one 8-bit pre-scale counter with 24-bit up-timer for each timer
- Independent clock source for each timer
- 24-bit timer value is readable through TDR (Timer Data Register)
- Provide one-shot, periodic and toggle operation modes
- Provide event counter function
- Provide external capture/reset counter function equivalent to 8051 Timer2

◆ **PWM**
- Built-in up to four 16-bit PWM generators; providing eight PWM outputs or four complementary paired PWM outputs
- Individual clock source, clock divider, 8-bit pre-scale and Dead-Zone generator for each PWM generator
- PWM interrupt synchronized to PWM period
- 16-bit digital capture timers (shared with PWM timers) with rising/falling capture inputs
- Support capture interrupt

◆ **ADC**
- 12-bit SAR ADC with 760K SPS
- Up to 8-ch single-ended input or 4-ch differential input
- Support single mode/ burst mode/ single-cycle scan mode/ continuous scan mode
- Support 2' complement/ un-signed format in differential mode conversion result

- Each channel with an individual result register
- Support conversion value monitoring (or comparison) for threshold voltage detection
- Conversion can be started either by software trigger or external pin trigger

◆ **Communication Interface**
- 2 UARTs up to 1 Mbit/s with flow control
- 2 SPIs up to 16 MHz (Master@5V), 10 MHz (Salve)
- 1 I²C
- Support IrDA (SIR) function
- Support RS485, LIN

◆ **Analog Comparator**
- Up to 2 comparator analog modules
- External input or internal band gap voltage selectable at negative node
- Interrupt when compare result change
- Power down wake-up

◆ **Wake-Up Sources**
- Watchdog timer, all GPIOs, UARTs, Comparators, BOD

◆ **EBI Bus**
- Accessible space: 64K bytes in 8-bit mode or 128K bytes in 16-bit mode
- Support 8-bit/16-bit data width
- Support byte-write in 16-bit data width

◆ **Brownout Detector**
- With 4 levels: 4.5V / 3.8V / 2.7V / 2.2V
- Support brownout interrupt and reset option

◆ **GPIOs**
- Up to 40 general-purpose I/O (GPIO) pins
- Four I/O modes:
  - Quasi bi-direction
  - Push-Pull output
  - Open-Drain output
  - Input only with high impendence
- TTL/Schmitt trigger input selectable
- All GPIO pins can be configured as interrupt source with edge/level setting

◆ **Built-in LDO for Wide Operating Voltage Range**
- 2.5V to 5.5V

◆ **Operating Temperature**
- - 40°C ~ 85°C

◆ **Packages (RoHS)**
- QFN33 (4x4mm)
- QFN33 (5x5mm)
- LQFP48 (7x7mm)