



Nuvoton NuMicro™ Family

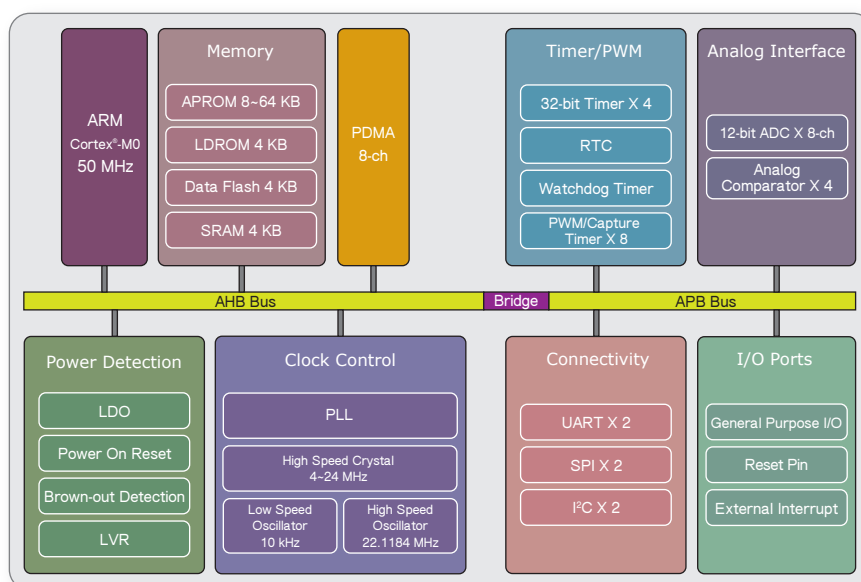
# NuMicro™ M051 Series



## High Performance ARM® Cortex®-M0 MCU for Industrial and Consumers Applications

### Applications

- ◆ Industrial Control
- ◆ Security System
- ◆ Motor Control
- ◆ Consumers Electronics
- ◆ Audio/Video Application



### Selection Guide

Part No.	Flash (Kbytes)	SRAM (Kbytes)	Data Flash (Kbytes)	ISP ROM (Kbytes)	I/O	Timer (32-bit)	Connectivity			PWM (16-bit)	ADC (12-bit)	Comparator	EBI	ICP ISP IAP	IRC 22 MHz	Package	Operating Temp. Range(°C)
							UART	SPI	I²C								
NuMicro™ M051 Base Series																	
M052ZDN	8	4	4	4	24	4	2	1	2	5	5	3	-	√	√	QFN33	-40 to +85
M054ZDN	16	4	4	4	24	4	2	1	2	5	5	3	-	√	√	QFN33	-40 to +85
M058ZDN	32	4	4	4	24	4	2	1	2	5	5	3	-	√	√	QFN33	-40 to +85
M0516ZDN	64	4	4	4	24	4	2	1	2	5	5	3	-	√	√	QFN33	-40 to +85
M052LDN	8	4	4	4	40	4	2	2	2	8	8	4	√	√	√	LQFP48	-40 to +85
M054LDN	16	4	4	4	40	4	2	2	2	8	8	4	√	√	√	LQFP48	-40 to +85
M058LDN	32	4	4	4	40	4	2	2	2	8	8	4	√	√	√	LQFP48	-40 to +85
M0516LDN	64	4	4	4	40	4	2	2	2	8	8	4	√	√	√	LQFP48	-40 to +85
NuMicro™ M051 Series																	
M052ZDE	8	4	4	4	24	4	2	1	2	5	5	3	-	√	√	QFN33	-40 to +105
M054ZDE	16	4	4	4	24	4	2	1	2	5	5	3	-	√	√	QFN33	-40 to +105
M058ZDE	32	4	4	4	24	4	2	1	2	5	5	3	-	√	√	QFN33	-40 to +105
M0516ZDE	64	4	4	4	24	4	2	1	2	5	5	3	-	√	√	QFN33	-40 to +105
M052LDE	8	4	4	4	40	4	2	2	2	8	8	4	√	√	√	LQFP48	-40 to +105
M054LDE	16	4	4	4	40	4	2	2	2	8	8	4	√	√	√	LQFP48	-40 to +105
M058LDE	32	4	4	4	40	4	2	2	2	8	8	4	√	√	√	LQFP48	-40 to +105
M0516LDE	64	4	4	4	40	4	2	2	2	8	8	4	√	√	√	LQFP48	-40 to +105

Contact us: NuMicro@nuvoton.com

## ❖ Features of NuMicro™ M051 Series

### ◆ Core

- ARM® Cortex®-M0 core running up to 50 MHz
- One 24-bit system tick timer
- Single-cycle 32-bit hardware multiplier
- NVIC for the 32 interrupt inputs, each with four levels of priority
- Serial Wire Debug (SWD) interface and two watch points/four breakpoints

### ◆ Wide Operating Voltage - Single power supply: 2.5V ~ 5.5V

### ◆ Memory

- 8/16/32/64 Kbytes Flash memory for program memory (APROM)
- 4 Kbytes Flash memory for loader memory (LDROM)
- 4 Kbytes embedded SRAM
- 4 Kbytes Data Flash

### ◆ Clock Control

- Programmable system clock source
- 22.1184 MHz internal oscillator
- 4 ~ 24 MHz external crystal oscillator input for precise timing operation
- 10 kHz low-power oscillator for watchdog timer and wake-up in sleep mode
- PLL allows CPU operation up to 50 MHz

### ◆ Timers

- Four sets of 32-bit timers with 24-bit up-timer and one 8-bit pre-scale counter
- Counter auto reload
- Watchdog timer with 8-bit selectable time out period
- Event counter and pulse width capture mode

### ◆ PWM/Capture

- 8 channels 16-bit PWM and 16-bit digital capture timers
- Dead-zone generator for complementary paired PWM

### ◆ GPIOs

- Up to 40 general-purpose I/O (GPIO) pins
- Four I/O modes:
  - Quasi – bidirectional
  - Push-Pull output
  - Open-Drain output
  - Input only with high impedance
- All I/O pins can be configured as interrupt source with edge/level setting

### ◆ ADC

- 8 channels 12-bit SAR ADC, up to 760 KSPS

### ◆ Communication Interfaces

- Two UARTs (two UARTs up to 1 Mbit/s with flow control)
- Two SPIs, up to 32 MHz (Master), 16 MHz (Slave)
- Two I<sup>2</sup>Cs (up to 1 Mbit/s)

### ◆ Brown-out Detector

- Four levels: 4.4V / 3.7V / 2.7V/2.2V
- Brown-out interrupt and reset option

### ◆ Operating Temperature

- - 40°C ~ +85°C (DN), - 40°C ~ +105°C (DE)

### ◆ Reliability

- ESD HBM pass 8kV, EFT > ± 4kV

### ◆ Code Security and Series Number

- 96-bit unique ID
- 128-bit unique customer ID

### ◆ Packages (RoHS)

- LQFP48 (7x7mm)
- QFN33 (5x5mm)