



Nuvoton NuMicro™ Family

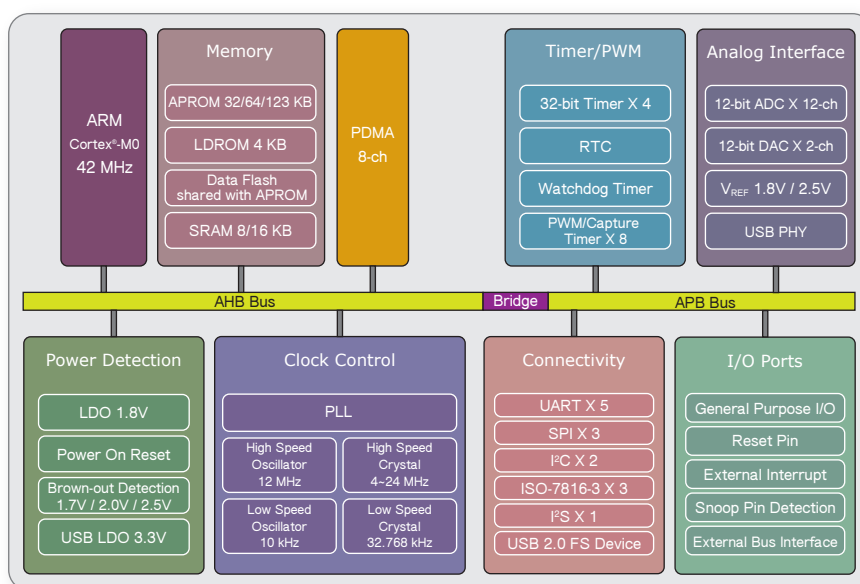
# NuMicro™ Nano120 USB Series



Ultra-Low Power ARM® Cortex®-M0 MCU for Battery-powered Devices Equipped With USB

## Applications

- ◆ Wearable Device
- ◆ Pedometer
- ◆ Wireless Audio, Motion Gaming
- ◆ Smart Remote Control
- ◆ Portable 1D Barcode Scanner
- ◆ Portable RFID Reader
- ◆ Portable Medical Device
- ◆ Portable GPS and Sport Device
- ◆ Portable USB Payment Smart Card Reader
- ◆ E-Dog



## Selection Guide

Part No.	Flash (Kbytes)	SRAM (Kbytes)	Data Flash (Kbytes)	ISP ROM (Kbytes)	I/O	Timer (32-bit)	Connectivity				I <sup>2</sup> S	PWM (16-bit)	ADC (12-bit)	RTC	EBI	IRC 10 kHz 12 MHz	PDMA	LCD	DAC (12-bit)	ISO- 7816-3*	ICP ISP IAP	Package	Operating Temp. Range(°C)
							UART*	SPI	I <sup>2</sup> C	USB													
NuMicro™ Nano120 USB Connectivity Series (Ultra-Low Power)																							
NANO120LC2BN	32	8	Configurable	4	34	4	2+2	3	2	1	1	4	7	√	-	√	8	-	2	2	√	LQFP48	-40 to +85
NANO120LD2BN	64	8	Configurable	4	34	4	2+2	3	2	1	1	4	7	√	-	√	8	-	2	2	√	LQFP48	-40 to +85
NANO120LD3BN	64	16	Configurable	4	34	4	2+2	3	2	1	1	4	7	√	-	√	8	-	2	2	√	LQFP48	-40 to +85
NANO120LE3BN	128	16	Configurable	4	34	4	2+2	3	2	1	1	4	7	√	-	√	8	-	2	2	√	LQFP48	-40 to +85
NANO120SC2BN	32	8	Configurable	4	48	4	2+3	3	2	1	1	8	7	√	-	√	8	-	2	3	√	LQFP64*	-40 to +85
NANO120SD2BN	64	8	Configurable	4	48	4	2+3	3	2	1	1	8	7	√	-	√	8	-	2	3	√	LQFP64*	-40 to +85
NANO120SD3BN	64	16	Configurable	4	48	4	2+3	3	2	1	1	8	7	√	-	√	8	-	2	3	√	LQFP64*	-40 to +85
NANO120SE3BN	128	16	Configurable	4	48	4	2+3	3	2	1	1	8	7	√	-	√	8	-	2	3	√	LQFP64*	-40 to +85
NANO120KD3BN	64	16	Configurable	4	86	4	2+3	3	2	1	1	8	8	√	√	√	8	-	2	3	√	LQFP128	-40 to +85
NANO120KE3BN	128	16	Configurable	4	86	4	2+3	3	2	1	1	8	8	√	√	√	8	-	2	3	√	LQFP128	-40 to +85

\*Marked in the table (2+3) means 2 UART+ 3 ISO-7816 UART

\*ISO-7816 UART supports half duplex mode

LQFP64\*: 7x7mm

Contact us: NuMicro@nuvoton.com

## ❖ Features of NuMicro™ Nano120 USB Series

### ◆ Core

- ARM® Cortex®-M0 core running up to 42 MHz
- 24-bit system tick timer
- Single-cycle 32-bit hardware multiplier
- NVIC for 32 interrupt inputs, each with four levels of priority
- Serial Wire Debug (SWD) interface and two watch points/four breakpoints

### ◆ Ultra-low Power

- Single power supply: 1.8V ~ 3.6V
- Normal mode: 200 uA/MHz at 12 MHz
- Idle mode: 75 uA/MHz at 12 MHz
- Power-down mode:
  - 2.5 uA (RTC on, RAM retention)
  - 1 uA (RTC off, RAM retention)
- Wake-up time: less than 3.5 us

### ◆ Memory

- 32/64/123 Kbytes Flash memory for program memory (APROM)
- 4 Kbytes Flash memory for loader memory (LDRAM)
- 512 bytes page erase for Flash memory
- 8/16 Kbytes embedded SRAM
- Configurable Data Flash (shared with APROM)

### ◆ Clock Control

- 12 MHz internal RC oscillator
  - ±2% deviation at -40°C ~ +85°C, 1.8V ~ 3.6V
  - ±0.25% deviation at -40°C ~ +85°C, 1.8V ~ 3.6V by 32.768 kHz oscillator auto calibration
- 10 kHz internal RC oscillator for Watchdog timer and Wake-up
- 4 ~ 24 MHz external crystal oscillator input for precise timing operation
- 32.768 kHz external crystal oscillator input for RTC function and low power system operation
- On-chip PLL, up to 120 MHz, for high performance system operation and USB application (48 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
- Supports event counter and pulse width capture mode

### ◆ Peripheral DMA

- 8 channels PDMA for peripheral timer, UARTs, SPIs, I<sup>2</sup>C, ADC, DAC, VDMA, CRC

### ◆ CRC

- CRC-CCITT, CRC-8, CRC-16, and CRC-32

### ◆ RTC

- Supports software compensation
- RTC counter, calendar counter and alarm
- 80 bytes backup register with snoop pin detection

### ◆ PWM/Capture

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

### ◆ ADC/DAC

- 12 channels 12-bit SAR ADC up to 2 MSPS
- 2 channels 12-bit DAC up to 400 KSPS
- 1.8V/2.5V internal voltage reference
- On-chip temperature sensor

### ◆ USB 2.0 Full-Speed Device

- One set of USB 2.0 FS Device 12 Mbps
- On-chip USB Transceiver
- One interrupt source with 4 interrupts events
- Supports Control, Bulk In/Out, Interrupt and Isochronous transfers
- Eight programmable endpoints
- 512 bytes internal SRAM as USB buffer
- On-chip 5V to 3.3V LDO for USB transceiver

### ◆ Communication Interfaces

- Five UARTs, (two UARTs up to 1 Mbit/s with flow control)
- Three SPIs, up to 32 MHz (Master), 16 MHz (Slave)
- Two I<sup>2</sup>Cs, up to 1 Mbit/s
- Three ISO7816-3 (Smart card interface) and UARTs function
- RS485, LIN, IrDA (SIR) function

### ◆ I<sup>2</sup>S

- Interface with external audio CODEC
- Operates as either Master or Slave mode
- Capable of handling 8, 16, 24 and 32-bit word sizes
- Mono and stereo audio data

### ◆ Wake-up Sources

- RTC, WDT, I<sup>2</sup>C, Timer, UARTs, SPIs, BOD, GPIOs, USB

### ◆ EBI Bus

- Accessible space: 64 Kbytes in 8-bit mode or 128 KB in 16-bit mode
- 8/16-bit data width

### ◆ Brown-out Detector

- Three levels: 1.7V/2.0V/2.5V
- Brown-out interrupt and reset option

### ◆ GPIOs

- Up to 86 general-purpose GPIO pins
- Three I/O modes: Push-Pull output, Open-Drain output, Input only with high impedance
- All inputs with Schmitt trigger
- All I/O pins can be configured as interrupt source with edge/level setting
- Input 5V tolerance

### ◆ Built-in LDO for Wide Operating Voltage Range

- 1.8V to 3.6V

### ◆ Operating Temperature

- -40°C ~ +85°C

### ◆ 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)
- LQFP64 (7x7mm)
- LQFP128 (14x14mm)