



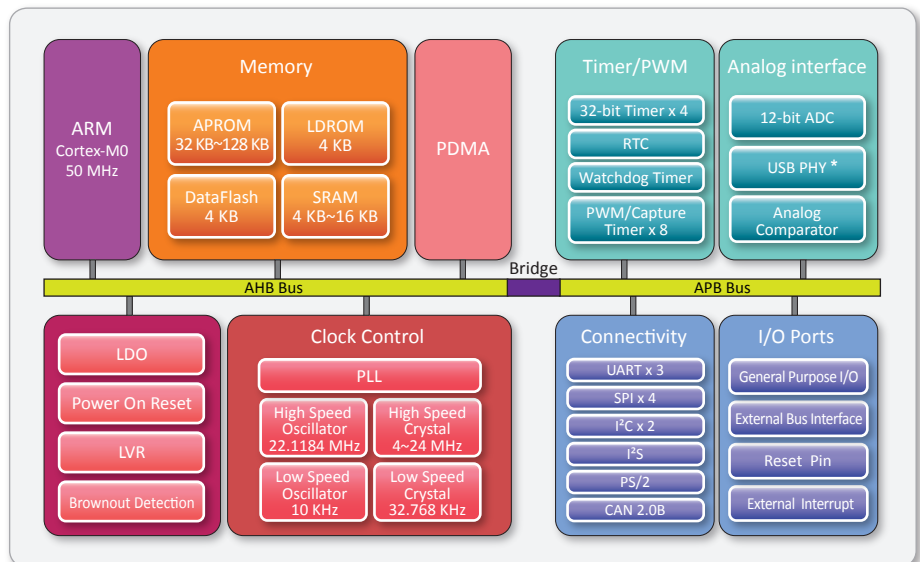
Nuvoton NuMicro™ Family

# NuMicro™ NUC130/140 Series

Powerful Cortex™-M0 MCU with C-CAN  
for full connectivity requirement

## » Applications

- ◆ Car Network Control
- ◆ Vehicle Electronic Diagnostic
- ◆ Embedded Network Application
- ◆ Elevator Network Control System
- ◆ Industrial and Auto-control



\*USB PHY not offer support for NUC130

## » Selection Guide

| Part No.                 | Flash | SRAM | Data Flash   | ISP Loader ROM | I/O      | Timer    | Connectivity |     |                  |     |     |     | I <sup>2</sup> S | Comp. | PWM | ADC      | RTC | EBI | ISP ICP | IRC 22MHz | PDMA | Package |
|--------------------------|-------|------|--------------|----------------|----------|----------|--------------|-----|------------------|-----|-----|-----|------------------|-------|-----|----------|-----|-----|---------|-----------|------|---------|
|                          |       |      |              |                |          |          | UART         | SPI | I <sup>2</sup> C | USB | LIN | CAN |                  |       |     |          |     |     |         |           |      |         |
| NUC130 Automotive Line   |       |      |              |                |          |          |              |     |                  |     |     |     |                  |       |     |          |     |     |         |           |      |         |
| NUC130LC1CN              | 32K   | 4K   | 4K           | 4K             | up to 35 | 4x32-bit | 3            | 1   | 2                | -   | 2   | 1   | 1                | 1     | 4   | 8x12-bit | v   | -   | v       | v         | 9    | LQFP48  |
| NUC130LD2CN              | 64K   | 8K   | 4K           | 4K             | up to 35 | 4x32-bit | 3            | 1   | 2                | -   | 2   | 1   | 1                | 1     | 4   | 8x12-bit | v   | -   | v       | v         | 9    | LQFP48  |
| NUC130LE3CN              | 128K  | 16K  | Configurable | 4K             | up to 35 | 4x32-bit | 3            | 1   | 2                | -   | 2   | 1   | 1                | 1     | 4   | 8x12-bit | v   | -   | v       | v         | 9    | LQFP48  |
| NUC130RC1CN              | 32K   | 4K   | 4K           | 4K             | up to 49 | 4x32-bit | 3            | 2   | 2                | -   | 2   | 1   | 1                | 2     | 6   | 8x12-bit | v   | v   | v       | v         | 9    | LQFP64  |
| NUC130RD2CN              | 64K   | 8K   | 4K           | 4K             | up to 49 | 4x32-bit | 3            | 2   | 2                | -   | 2   | 1   | 1                | 2     | 6   | 8x12-bit | v   | v   | v       | v         | 9    | LQFP64  |
| NUC130RE3CN              | 128K  | 16K  | Configurable | 4K             | up to 49 | 4x32-bit | 3            | 2   | 2                | -   | 2   | 1   | 1                | 2     | 6   | 8x12-bit | v   | v   | v       | v         | 9    | LQFP64  |
| NUC130VE3CN              | 128K  | 16K  | Configurable | 4K             | up to 80 | 4x32-bit | 3            | 4   | 2                | -   | 2   | 1   | 1                | 2     | 8   | 8x12-bit | v   | v   | v       | v         | 9    | LQFP100 |
| NUC140 Connectivity Line |       |      |              |                |          |          |              |     |                  |     |     |     |                  |       |     |          |     |     |         |           |      |         |
| NUC140LC1CN              | 32K   | 4K   | 4K           | 4K             | up to 31 | 4x32-bit | 2            | 1   | 2                | 1   | 2   | 1   | 1                | 1     | 4   | 8x12-bit | v   | -   | v       | v         | 9    | LQFP48  |
| NUC140LD2CN              | 64K   | 8K   | 4K           | 4K             | up to 31 | 4x32-bit | 2            | 1   | 2                | 1   | 2   | 1   | 1                | 1     | 4   | 8x12-bit | v   | -   | v       | v         | 9    | LQFP48  |
| NUC140LE3CN              | 128K  | 16K  | Configurable | 4K             | up to 31 | 4x32-bit | 2            | 1   | 2                | 1   | 2   | 1   | 1                | 1     | 4   | 8x12-bit | v   | -   | v       | v         | 9    | LQFP48  |
| NUC140RC1CN              | 32K   | 4K   | 4K           | 4K             | up to 45 | 4x32-bit | 3            | 2   | 2                | 1   | 2   | 1   | 1                | 2     | 4   | 8x12-bit | v   | v   | v       | v         | 9    | LQFP64  |
| NUC140RD2CN              | 64K   | 8K   | 4K           | 4K             | up to 45 | 4x32-bit | 3            | 2   | 2                | 1   | 2   | 1   | 1                | 2     | 4   | 8x12-bit | v   | v   | v       | v         | 9    | LQFP64  |
| NUC140RE3CN              | 128K  | 16K  | Configurable | 4K             | up to 45 | 4x32-bit | 3            | 2   | 2                | 1   | 2   | 1   | 1                | 2     | 4   | 8x12-bit | v   | v   | v       | v         | 9    | LQFP64  |
| NUC140VE3CN              | 128K  | 16K  | Configurable | 4K             | up to 76 | 4x32-bit | 3            | 4   | 2                | 1   | 2   | 1   | 1                | 2     | 8   | 8x12-bit | v   | v   | v       | v         | 9    | LQFP100 |

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## ❖ Features of NUC130/140 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

- 32K/64K/128K bytes flash memory for program memory (APROM)
- 4K bytes flash memory for loader memory (LDROM)
- Configurable data flash address and size for 128K bytes system, fixed 4K bytes data flash (DataFlash) for the 32K bytes and 64K bytes system
- 4K/8K/16K bytes embedded SRAM
- Support PDMA mode

### ◆ Clock Control

- Flexible selection from different clock source
- Build-in 22.1184 MHz high speed oscillator (trimmed to 1%) for system operation, and low power 10 KHz low speed oscillator for Watchdog timer and Wake-up operation
- Support one PLL, up to 50 MHz, for high performance system operation
- External 4 ~ 24 MHz high speed crystal input for precise timing operation
- External 32.768 KHz low speed crystal input for RTC function and low power system operation

### ◆ Timers

- Support 4 sets of 32-bit timers with 24-bit up-timer and one 8-bit pre-scale counter
- Independent clock source for each timer
- Provide one-shot, periodic, toggle and continuous counting operation modes
- Support event counting function
- Support input capture function

### ◆ PWM

- Built-in up to four 16-bit PWM generators provide eight PWM outputs or four complementary paired PWM outputs
- Each PWM generator equipped with one clock source selector, one clock divider, one 8-bit pre-scale and one Dead-Zone generator for complementary paired PWM
- Up to eight 16-bit digital capture timers (shared with PWM timers) provide eight rising/falling capture inputs
- Support capture interrupt

### ◆ ADC

- 12-bit SAR ADC with 700K SPS
- Up to 8-ch single-end input or 4-ch differential input
- Single scan/single cycle scan/continuous scan
- Each channel with individual result register
- Scan on enabled channels
- Threshold voltage detection
- Conversion start by software programming or external input
- Support PDMA mode

### ◆ Communication Interface

- Maximum 3 UARTs, up to 1 Mbit/s with flow control
- Maximum 4 SPIs, up to 32 MHz (Master@5V), 10 MHz (Slave)
- 2 I<sup>2</sup>Cs
- Support IrDA (SIR) function
- Support RS485

### ◆ I<sup>2</sup>S

- Interface with external audio CODEC
- Operate as either master or slave mode

- Capable of handling 8-, 16-, 24- and 32-bit word sizes
- Support mono and stereo audio data

### ◆ USB 2.0 Full-Speed Device (NUC140 only)

- One set of USB 2.0 FS Device 12 Mbps
- On-chip USB Transceiver
- Provide 1 interrupt source with 4 interrupt events
- Support Control, Bulk In/Out, Interrupt and Isochronous transfers
- Provide 6 programmable endpoints
- 512 bytes internal SRAM as USB buffer included
- Provide remote wake-up capability

### ◆ CAN 2.0

- Support CAN protocol version 2.0 part A and B
- Bit rates up to 1 Mbit/s
- 32 Message Objects
- Each message object has its own identifier mask
- Programmable FIFO mode (concatenation of Message Object)
- Maskable interrupt
- Disabled Automatic Re-transmission mode for Time Triggered CAN applications
- Support power down wake-up function

### ◆ Analog Comparator

- Up to two analog comparators
- External input or internal bandgap voltage selectable at negative node
- Interrupt when compare result change
- Power down wake-up

### ◆ RTC

- Support software compensation by setting frequency compensate register (FCR)
- Support RTC counter (second, minute, hour) and calendar counter (day, month, year)
- Support alarm registers (second, minute, hour, day, month, year)

### ◆ EBI Bus (100-pin and 64-pin package only)

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

### ◆ Brownout Detector

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

### ◆ GPIOs

- Up to 80 general-purpose I/O (GPIO) pins
- Four I/O modes:
  - Quasi bi-direction
  - Push-Pull output
  - Open-Drain output
  - Input only with high impedance
- 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)

- LQFP48 (7x7mm)
- LQFP64 (10x10mm)
- LQFP100 (14x14mm)