The NuMicro® M481 Base series is a high performance, low power microcontroller powered by the Arm® Cortex®-M4F core with DSP extension. It can run up to 192 MHz with 175 µA/ MHz dynamic low power consumption. The 512/ 256 KB embedded dual bank Flash memory supports OTA (Over-The-Air) firmware upgrade, and the 160/ 96 KB embedded SRAM includes 32 KB cache to speed up external SPI Flash code execution. The factory pre-loaded bootloader delivers Secure Boot functionality to provide the code integrity check in embedded Flash memory. The built-in Secure Protection ROM provides a safe space for saving confidential program or data. One-Time Programmable ROM is also included for product life-cycle management.

The NuMicro® M481 Base series supports operating voltage from 1.8V to 3.6V, and industrial operating temperature from - 40 $^{\circ}$ C to 105 $^{\circ}$ C. It is equipped with high speed UART / SPI / I²C / PWM peripherals. Package type includes QFN33, LQFP48 and LQFP64.

Target Application:

IoT Device, Data Collector, etc.

Key Features:

- Core
 - Up to 192 MHz Arm® Cortex ®-M4F delivering 1.25 DMIPS per MHz
 - DSP instruction set
 - Memory Protection Unit (MPU)

Memory

- 512/256/128 KB zero-wait state Flash memory
- 160/ 128/ 64 KB SRAM
- 4 KB Secure Protection ROM
- 2 KB One-Time-Programmable ROM
- Cyclic Redundancy Calculation Unit
- 16-ch Peripheral DMA Controller

• External Bus Interface

- LCD parallel interface, i80 mode

Clocks

- 4 to 24 MHz crystal oscillator
- 32 kHz oscillator for RTC
- Internal 12 MHz RC oscillator
- Internal 10 kHz RC oscillator
- Internal PLL up to 480 MHz

• RTC

- 80 bytes of battery-powered backup registers
- Timer & PWM
 - Four 32-bit timers
 - Twelve Enhanced PWM with twelve 16-bit timers
 - Twelve Basic PWM with two 16-bit timers
 - One 24-bit count-down SysTick timer

- One watchdog timer
- One window watchdog timer
- Analog Peripheral
 - One 12-bit, up to 16-ch 5MSPS SAR ADC
 - Two 12-bit, 1 MSPS DAC
 - Two rail-to-rail comparators
 - Two operational amplifiers

Communication Interface

- Up to 6 low power UART interfaces (17 Mbps), including 2 LIN interfaces
- Up to 3 ISO-7816 interfaces (3.4 MHz) , supporting full duplex UART mode
- Three I²C interfaces (Up to 3.4 Mbps)
- One SPI Flash interface (Up to 96 MHz) supports quad mode
- One Quad- SPI interface (Up to 96 MHz)
- Up to 4 SPI / I²S interfaces (SPI up to 96 MHz , I²S up to 192 kHz/16-bit)
- One I²S interface (192 kHz/32-bit)
- Two USCI interfaces, supporting configurable UART / SPI / I²C
- Two Secure Digital Host Controllers (50 MHz)

Control Interface

- Two quadrature encoder interfaces
- One 24-bit, 3-ch input capture timer/counter units

Operating Characteristic

- Voltage range: 1.8V to 3.6V
- Temperature range: 40 °C to +105 °C