N32WB03x Series Bluetooth® Low Energy SoC

Product Brief

N32WB03x series use 32-bit ARM Cortex-M0 core, support BLE 5.1 and SIG Mesh, and feature a frequency up to 64 MHz, 4.2 mA radio transmit current, 3.8 mA radio receive current , +6 dBm maximum transmitting power, and -96 dBm @BLE 1 Mbps RX sensitivity.

N32WB03x Bluetooth® Low Energy wireless SoC Family is NSING' next generation of high performance, ultra-low power dissipation chips that support BLE 5.1. Equipped with 32-bit ARM Cortex®-M0 core, it features a frequency up to 64 MHz, 48 KB SRAM integrated on the chip, and 256/512 KB Flash.

Integrated with an advanced BLE 5.1 RF transceiver, it is compliant with the BLE 5.1 standard and provided with multiple modes including standard 1 Mbps BLE mode, enhanced 2 Mbps BLE mode, 125 kbps BLE remote mode (S8), and 500 kbps BLE remote mode (S2). In the 1 Mbps or 2 Mbps BLE mode, it supports AOA and AOD, RSSI, master/slave role, multi-connection, packet length expansion, KEYSCAN, IRC, 10-bit 1.33 Msps ADC (configurable as 16-bit 16 Ksps), analog MIC input, PGA, basic, universal and advanced timers, RTC, WWDG, IWDG, LPUART, USART, SPI, I2C, and other peripherals.

It is applicable to many application scenarios including Bluetooth KEY, OBU, data transmission module, Bluetooth voice remote controller, and smart home.

Main Features

- CPU Core
  - 32-bit ARM Cortex-M0 core
  - Frequency up to 64 MHz
- Storage
  - 256/512 KB Flash
  - 48 KB SRAM
- Power consumption
  - Radio receive current: 3.8 mA@3.3 V
  - Radio transmit current: 4.2 mA @0 dBm/3.3 V
  - Sleep mode (48 KB RAM retention): 1.4 μA@3 V
  - PD mode: 130 nA
- RF specification
  - RX sensitivity: -96 dBm @BLE 1 Mbps
  - RX sensitivity: -93 dBm @BLE 2 Mbps

NSING Technologies Pte. Ltd.
Add: NSING, Teletech Park #02-28, 20 Science Park Road, Singapore 117674
Tel: +65 69268090
Email: sales@nsing.com.sg

- Power of programmable transmitter: up to +6 dBm
- Single end antenna

- Clock
  - HSE: 32 MHz high speed external crystal
  - LSE: 32.768 KHz low speed external crystal
  - HSI: high speed internal RC 64 MHz
  - LSI: low speed internal RC 32 KHz
  - Support one clock output; different clock output can be configured; clock can be output after divided by four.
- Reset
  - Power-on/off/external pin reset
  - Watchdog reset
- Communications interfaces
  - 2 × USART interfaces, with rate up to 4 Mbps (configurable as ISO7816, IrDA, LIN)
  - 1 × LPUART interface, featuring low-power dissipation, supporting communication rate up to 9,600 bps and low-power wakeup in Sleep mode
  - 2 × SPI interfaces, with rate up to 16 MHz, master/slave configurable, supporting I2S
  - 1 × I2C interface, with rate up to 1 MHz, master/slave configurable
- Timers
  - 1 × 16-bit advanced counter, supporting functions like input capture, output compare, PWM output, and quadrature encoder input; 4 independent channels, 3 of which support 6 complementary PWM outputs
  - 1 × 16-bit general-purpose counter, supporting functions like input capture, output compare, PWM output, and monopulse output, with 4 independent channels
  - 1 × 16-bit basic counter
  - 1 × 24-bit system timer
  - 1 × 7-bit window watchdog (WWDG)
  - 1 × 12-bit independent watchdog (IWDG)
- Analog interfaces
  - 1 × 10-bit 1.33 Msps ADC (configurable as 16-bit 16 Ksps), supporting 5 external single-ended channels, 1 differential MIC channel, 2 internal channels

NSING Technologies Pte. Ltd.
Add: NSING, Teletech Park #02-28, 20 Science Park Road, Singapore 117674
Tel: +65 69268090
Email: sales@nsing.com.sg

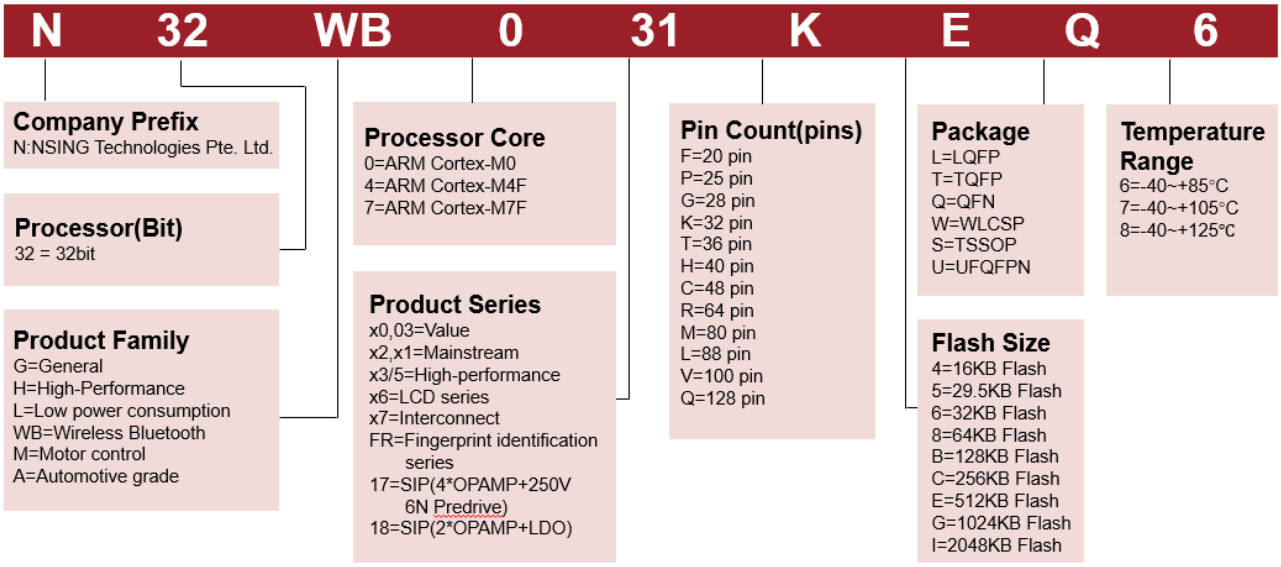
- Built-in PGA up to 128x
- MIC BIAS voltage, adjustable between 1.6 V and 2.3 V

- 21 × GPIO, supporting multiplexing
- 1 × high speed 5-channel DMA controller
- 1 × IR transmission controller, supporting all infrared remote control protocols
- 1 × KEYSCAN module, where 8/10/13 GPIOs support 44/65/104 key functions respectively
- RTC real-time clock, supporting perpetual calendar (that can identify leap years), alarm events, and periodic wakeup
- Support hardware CRC16 and CRC32 operations
- Operating Conditions
  - Operating voltage: 1.8V/2.32 V~3.6 V
  - Operating temperature: -40°C~85°C
  - ESD: ±2 KV (HBM)
- Package
  - QFN32 (4 mm × 4 mm)
- Ordering information

Series	Part Number
N32WB03x	N32WB031KEQ6-2 N32WB031KCQ6-1

NSING Technologies Pte. Ltd.
Add: NSING, Teletech Park #02-28, 20 Science Park Road, Singapore 117674
Tel: +65 69268090
Email: sales@nsing.com.sg

1 Naming Convention



NSING Technologies Pte. Ltd.
Add: NSING, Teletech Park #02-28, 20 Science Park Road, Singapore 117674
Tel: +65 69268090
Email: sales@nsing.com.sg

2 Disclaimer

This document is the exclusive property of NSING TECHNOLOGIES PTE. LTD.(Hereinafter referred to as NSING). This document, and the product of NSING described herein (Hereinafter referred to as the Product) are owned by NSING under the laws and treaties of Republic of Singapore and other applicable jurisdictions worldwide. The intellectual properties of the product belong to Nations Technologies Inc. and Nations Technologies Inc. does not grant any third party any license under its patents, copyrights, trademarks, or other intellectual property rights. Names and brands of third party may be mentioned or referred thereto (if any) for identification purposes only. NSING reserves the right to make changes, corrections. enhancements, modifications, and improvements to this document at any time without notice. Please contact NSING and obtain the latest version of this document before placing orders. Although NATIONS has attempted to provide accurate and reliable information, NATIONS assumes no responsibility for the accuracy and reliability of this document. It is the responsibility of the user of this document to properly design, program, and test the functionality and safety of any application made of this information and any resulting product. In no event shall NATIONS be liable for any direct, indirect, incidental, special, exemplary, or consequential damages arising in any way out of the use of this document or the Product.

NATIONS Products are neither intended nor warranted for usage in systems or equipment, any malfunction or failure of which may cause loss of human life, bodily injury or severe property damage. Such applications are deemed, Insecure Usage’. Insecure usage includes, but is not limited to: equipment for surgical implementation, atomic energy control instruments, airplane or spaceship instruments, all types of safety devices, and other applications intended to supporter sustain life. All Insecure Usage shall be made at user's risk. User shall indemnify NATIONS and hold NATIONS harmless from and against all claims, costs, damages, and other liabilities, arising from or related to any customer's Insecure Usage Any express or implied warranty with regard to this document or the Product, including, but not limited to. The warranties of merchantability, fitness for a particular purpose and non-infringement are disclaimed to the fullest extent permitted by law. Unless otherwise explicitly permitted by NATIONS, anyone may not use, duplicate, modify, transcribe or otherwise distribute this document for any purposes, in whole or in part.

NSING Technologies Pte. Ltd.
Add: NSING, Teletech Park #02-28, 20 Science Park Road, Singapore 117674
Tel: +65 69268090
Email: sales@nsing.com.sg