

NuMicro[®] Family
1T 8051 Microcontroller

N76S003 Series
Product Brief

The information described in this document is the exclusive intellectual property of Nuvoton Technology Corporation and shall not be reproduced without permission from Nuvoton.

Nuvoton is providing this document only for reference purposes of NuMicro[®] microcontroller and microprocessor based system design. Nuvoton assumes no responsibility for errors or omissions.

All data and specifications are subject to change without notice.

For additional information or questions, please contact: Nuvoton Technology Corporation.

www.nuvoton.com

1 GENERAL DESCRIPTION

The NuMicro® N76S003 Series is an embedded Flash type 1T 8051-based microcontroller. The instruction set is fully compatible with the standard 80C51 and performance enhanced. It supports 16 MHz core speed and features up to 18 Kbytes Flash memory, 256 Bytes of RAM and 1 Kbyte of auxiliary RAM (XRAM), 4 Kbytes of Flash loader memory (LDROM), 2.4V to 5.5V operating voltage, and -40°C to 105°C operating temperature.

The N76S003 Series also provides plenty of peripherals including two 16-bit Timers, one 16-bit Timer with three-channel input capture mode, one Watchdog Timer, one Self Wake-up Timer, one 16-bit auto-reload Timer3 for general purpose or baud rate generator, two UARTs with frame error detection and automatic address recognition, one set of SPI, one set of I²C, six enhanced PWM output channels, eight-channel shared pin interrupt for all I/O, and eight-channel of 12-bit 500 kSPS ADC.

Supported small form factor packages include two types, TSSOP 20-pin and QFN 20-pin.

For the development, Nuvoton provides the NuMaker evaluation board and Nuvoton Nu-Link debugger. The 3rd Party IDE such as Keil C51, IAR EW8051, and NuEclipse SDCC compilers are also supported.

1.1 Key Features and Applications

Product Line	UART	I ² C	SPI	Timer	PWM	ADC
N76S003	2	1	1	4	6	8

Table 1.1-1 NuMicro N76S003 Series Key Features Support Table

The N76S003 Series is suitable for a wide range of applications such as:

- Home appliances
- LED lighting controls
- Motor controls
- Industrial automation

2 FEATURES

- **Operating Characteristics**
 - Voltage range: 2.4V to 5.5V
 - Temperature range: -40°C to +105°C
 - EFT ± 4.4 KV
 - ESD HBM ± 7 KV
- **Core**
 - Fully static design 8-bit high performance 1T 8051-based CMOS microcontroller, running up to 16 MHz
 - Instruction set fully compatible with MCS-51
 - 4-priority-level interrupts capability
 - Dual Data Pointers (DPTRs)
- **Memories**
 - 18 KB Flash
 - 256 Bytes on-chip RAM and 1 KB auxiliary RAM (XRAM)
 - 4 KB Flash for user program loader (LDROM)
 - 128 Bytes security protection ROM (SPROM)
- **Clocks**
 - 16 MHz high-speed internal oscillator (HIRC) trimmed to $\pm 1\%$ (accuracy at 25°C, 3.3 V), $\pm 2\%$ in -20°C ~105°C
 - 10 kHz low-speed internal oscillator (LIRC) calibrating to $\pm 10\%$ typically
- **Power Management**
 - POR with 1.15V threshold voltage level
 - Supports BOD (4.4/3.7/2.7/2.2V falling edge)
 - LVR with 2.0V threshold voltage level
- **Timers**
 - Two 16-bit Timers/Counters 0 and 1
 - One 16-bit Timer2 with three-channel input capture mode and 9 input pin can be selected
 - One 16-bit auto-reload Timer3, supporting the clock source of UART0 and UART1
 - One Watchdog Timer
 - One 16-bit Wake-up timer
- **PWM**
 - Supports complementary mode for 3 complementary paired PWM output channels
 - Supports 16-bit resolution PWM counter; PWM0 module with 8-bit resolution supporting Dead-time insertion and brake function.
- **IEC-60730**
 - Supports IEC-60730 Safety specifications
- **Analog**
 - 8 single-end channels of 12-bit 500 kSPS SAR ADC
- **Communication interfaces**
 - 2 sets of UART interfaces
 - 1 set of I²C interface supporting Master/Slave mode with up to 400 kbps transmission rate
 - 1 set of SPI supporting Master/Slave mode
- **Up to 18 I/O with interrupt capability**
 - Schmitt trigger input / TTL mode selectable.
 - I/O all supports interrupt capability
 - Supports INT0/INT1 interrupt pins
 - Supports wake-up function
- **Development Platform Support**
 - Arm Keil C51 and IAR EW8051 IDE support for debugging
 - Free GNU compiler with Eclipse IDE support
 - ICP (In Circuit Programmer) support for updating internal code via Nu-Link debugger
 - ISP (In System Programmer) support for updating internal code through UART, SPI, I²C peripheral interface
 - Pin Viewer for real time monitoring the status of all I/O pins
 - PinConfigure tool for pin assignment, initial code generation and OrCAD/Protel part generation
 - ClockConfigure tool for generating the initial source code of system clock
- **96-bit Unique ID (UID)**
- **128-bit Unique Customer ID (UCID)**
- **Package**
 - Package is Halogen-free, RoHS-compliant and TSCA-compliant.

Pin Count	20	20
Type	TSSOP	QFN
I/O Pin	18	18
Lead Pitch	0.65	0.4
Dimensions (mm)	4.4x6.5	3x3

3 BLOCK DIAGRAM

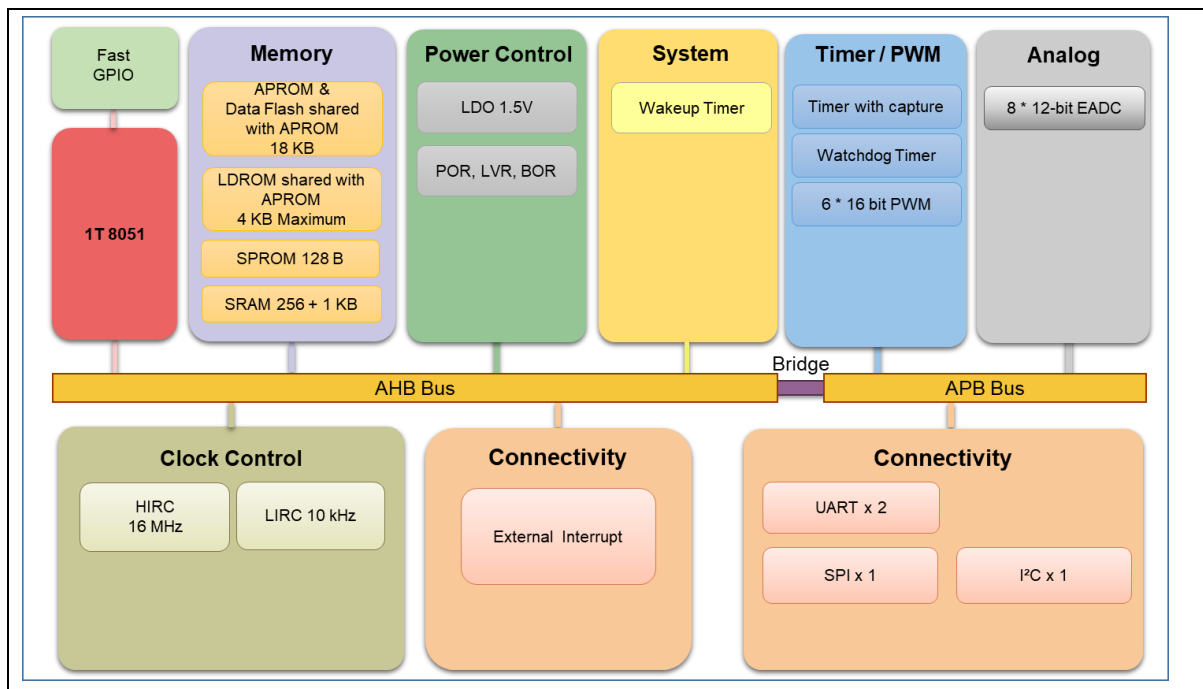


Figure 3-1 NuMicro N76S003 Series Block Diagram

4 PARTS INFORMATION

4.1 N76S003 Series Package Type

Package is Halogen-free, RoHS-compliant and TSCA-compliant.

	TSSOP20	QFN20
Part No.	N76S003AT20	N76S003AQ20

4.2 N76S003 Series Selection Guide

Part Number	Flash (KB)	SRAM (KB)	LDROM (KB) ^[1]	I/O	Timer	PWM	Connectivity				ADC(12-Bit)	Package
							ISO 7816-3 ^[2]	UART	SPI	I2C		
N76S003AQ20	18	1	4	18	4	6	-	2	1	1	8-ch	QFN20
N76S003AT20	18	1	4	18	4	6	-	2	1	1	8-ch	TSSOP20
Note: - ISP ROM programmable 1/2/3/4 KB Flash for user program loader (LDROM) share from ARPOM. - This document is only for 16/32 KB Flash size part number product.												

5 DEVELOPMENT PLATFORM

5.1 Programmer and Debugger

Nu-Link	Basic full speed USB2.0 hardware debugger/programmer
Nu-Link-Pro	Advanced hardware debugger/programmer with programming counter
Nu-Link 2.0	Advanced high speed USB2.0 hardware debugger/programmer with multi-functions
Nu-Link-Gang	Off-line hardware programmer supporting up to four chips programming for mass-production
ISP	In System Programmer, a software programming tool supporting UART/USB
ICP	In Chip Programmer, a software programming tool supporting Nu-Link programmer

5.2 Development Environment

Programming IDE	Keil MDK, IAR, NuEclipse SDCC
Software Package	Board Support Package (BSP), Sample Code
Development IDE	NuTool-PinConfigure

5.3 Development Board

EVB NuMaker	Part Number	Feature
NT-N76S003AT	N76S003AT20, N76S003AQ20	Support Expand Connector

6 REVISION HISTORY

Date	Revision	Description
2023.10.11	1.00	Initial version.

Important Notice

Nuvoton 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, the control or operation of dynamic, brake or safety systems designed for vehicular use, traffic signal instruments, all types of safety devices, and other applications intended to support or sustain life.

All Insecure Usage shall be made at customer's risk, and in the event that third parties lay claims to Nuvoton as a result of customer's Insecure Usage, customer shall indemnify the damages and liabilities thus incurred by Nuvoton.

Please note that all data and specifications are subject to change without notice.
All the trademarks of products and companies mentioned in this datasheet belong to their respective owners.