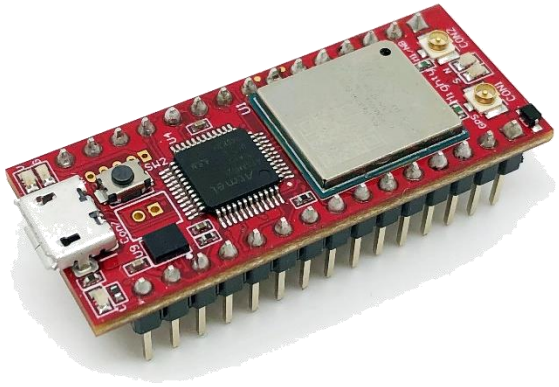
Mighty Net



PRODUCT SPECIFICATION

MTduino-NBQBG77001

M0 and LTE Cat M1/Cat NB2
connectivity module

MTduino-NBQBG77001

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1. General Description

The MTduino-NBQBG77001 is powered by Atmel's SAMD21 MCU, featuring a 32-bit ARM Cortex® M0 core. With the addition of the M0 board, the Arduino family becomes larger with a new member providing increased performance.

It is based on the Microchip SAMD21 and Quectel BG77（LTE Cat M1/Cat NB2）module.

2.Technical Specifications

Microcontroller	SAMD21 Cortex®-M0+ 32bit low power ARM MCU
Radio module	Quectel BG77 LTE Cat M1 (LTE-FDD: B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B25/B26/B27/B28/B66/B85*) LTE Cat NB2 (LTE-FDD: B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B25/B28/B66/B71/B85*) GNSS (GPS/GLONASS/BeiDou/Galileoeo/QZSS)
Board Power Supply (USB/VIN)	5V
Supported Batteries(*)	Li-polymer battery, 3.7V
Circuit Operating Voltage	3.3V
DC Current per I/O Pin	7 mA
Clock Speed	48 MHz
CPU Flash Memory	256 KB
SRAM	32 KB
EEPROM	None
Digital Input / Output Pins	14
PWM Pins	11 (2, 3, 5, 6, 9, 10, 11, 12, 16 / A2, 17 / A3, 19 / A5)
UART	1
SPI	1
I2C	1
Analog Input Pins	8 (ADC 8/10/12 bit)
Analog Output Pins	1 (DAC 10 bit)
External Interrupts	All digital pins (all analog pins can also be used as interrupt pins, but will have duplicated interrupt numbers)
LED_BUILTIN	13
USB	Native in the SAMD21 Processor
IMU	LSM6DS3
Lenght	45 mm
Width	18 mm

3.Power

The MTduino-NBQBG77001 can be powered via the micro USB connection or with an external power supply. The power source is selected automatically. External (non-USB) power can come either from Lithium-battery. The MTduino-NBQBG77001 will automatically detect which power sources are available and choose which one to use according to the following priority:

- External power: Li-polymer battery
- Target USB

The MTduino-NBQBG77001 is a Constant-Voltage (CV) and Constant-Current (CC) type charging IC for linear charging of single-cell Li-ion batteries and Li-polymer batteries.

4.Input and Output

Each of the 14 digital i/o pins on the MTduino-NBQBG77001 can be used as an input or output, using pinMode(), digitalWrite(), and digitalRead() functions. They operate at 3.3 volts. 7mA as maximum DC current for I/O pins and an internal pull-up resistor (disconnected by default) of 20-60 kOhms. In addition, some pins have specialized functions:

- Serial: 0 (RX) and 1 (TX). Used to receive (RX) and transmit (TX) TTL serial data using the ATSAMD21G18 hardware serial capability. Note that on the M0, the SerialUSB class refers to USB (CDC) communication; for serial on pins 0 and 1, use the Serial5 class.

- TWI: SDA and SCL. Support TWI communication using the Wire library.

- PWM: Pins 11 (2, 3, 5, 6, 9, 10, 11, 12, 16 / A2, 17 / A3, 19 / A5) Provide PWM output with the analogWrite() function. The resolution of the PWM can be changed with the analogWriteResolution() function.

- Analog Inputs: A0-A7. The M0 has 8 analog inputs, labeled A0 through A7. Pins A0-A7 appear in the same locations as on the Uno; Each analog input provides 12 bits of resolution By default the analog inputs measure from ground to 3.3 volts, though is it possible to change the upper end of their range using the AREF pin and the analogReference() function.

- DAC: pin A0 provides true analog outputs with 10-bits resolution (1023 levels) with the analogWrite() function. This pin can be used to create an audio output using the Audio library.

- Reset: Bring this line LOW to reset the microcontroller. This is typically used to add a reset button when shields are used that block the one already present on the board.

5.Communication

The MTduino-NBQBG77001 has a number of facilities for communicating with a computer, with another Arduino or other microcontrollers, and with different devices like phones, tablets, cameras and so on. The SAMD21 provides one hardware UART and three hardware USARTs for 3.3V serial communication. The Arduino software includes a serial monitor allowing simple textual data to be sent to and from the board. The RX and TX LEDs on the board will flash when data is being transmitted via the ATSAMD21G18chip and USB connection to the computer (but not for serial communication on pins 0 and 1). The Native USB port is connected to the SAMD21. It allows for serial (CDC) communication over USB. This provides a serial connection to the Serial Monitor or other applications on your computer. The SAMD21 also supports TWI and SPI communication. The Arduino software includes a Wire library to simplify use of the TWI bus. For SPI communication, you can use the SPI library.on the board.

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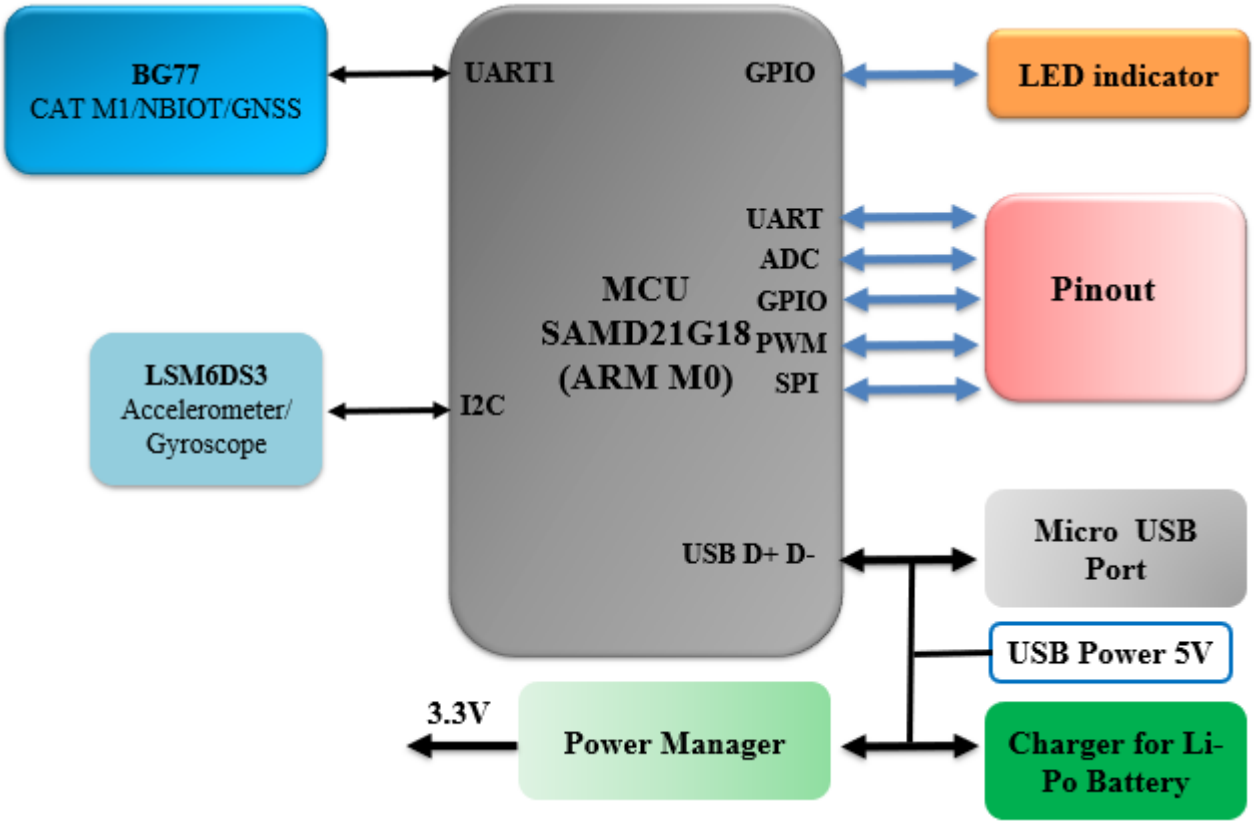
MTDuino IOT Block Diagram



MTduino-NBQBG77001

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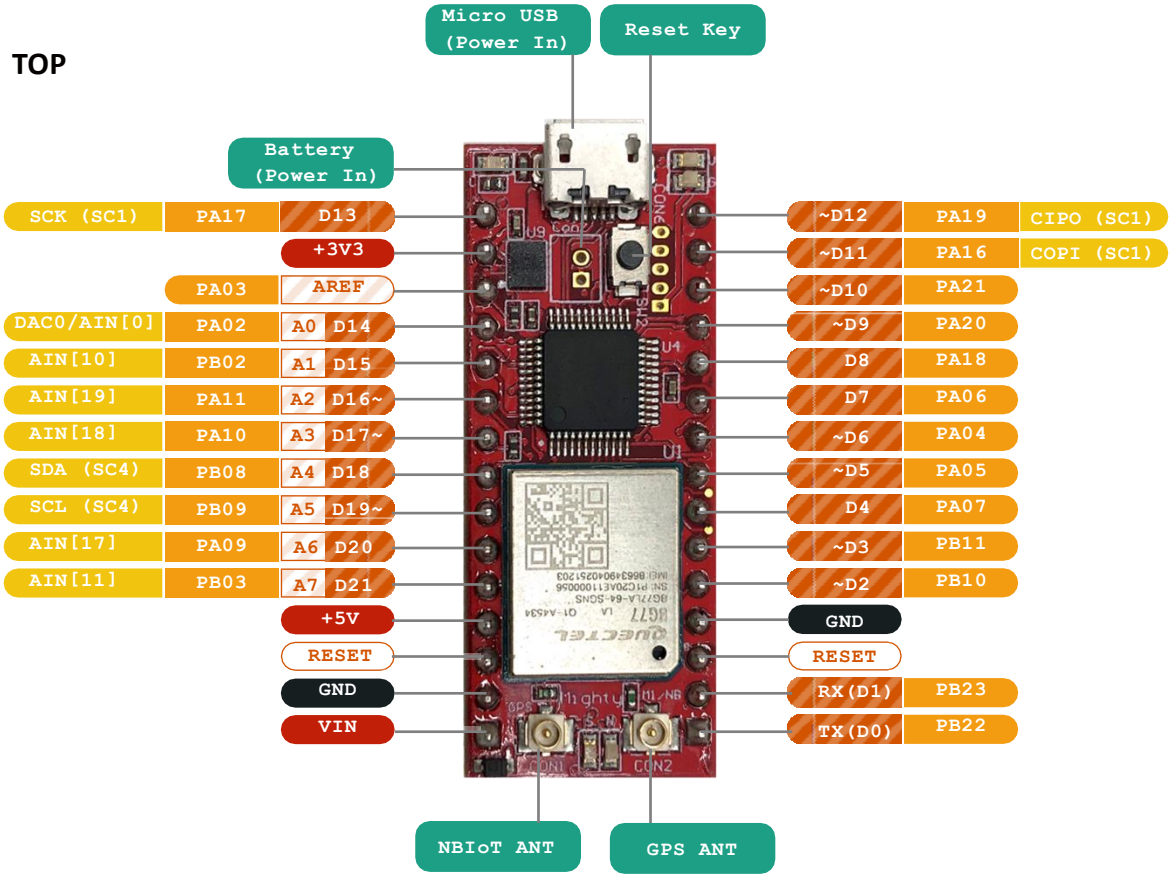
TOP



NOTE: CIPO/COPI have previously been referred to as MISO/MOSI

BOTTOM

Pin Assignment

Digital 0~13

Pin number	NANO Board pin	PIN	Notes	Peri.A	Peripheral B			Perip.C	Perip.D	Peri.E	Peri.F	Periph.G	Periph.H
				EIC (EXTINT)	ADC (AIN)	AC (AIN)	PTC	DAC	SERCOMx (x/PAD)	SERCOMx (x/PAD)	TCCx (x/WO)	TCCx (x/WO)	COM	AC/GLCK
	Digital Low													
0	0 -> RX	PB23		07						*5/03	TC7/1			GCLK_IO1
1	1 <- TX	PB22		06						*5/02	TC7/0			GCLK_IO0
2	~D2	PB10		*10						4/02	*TC5/0	TCC0/4	I2S/MCK1	GCLK_IO4
3	~D3	PB11		*11						4/03	*TC5/1	TCC0/5	I2S/SCK1	GCLK_IO5
4	D4	PA07		07	*07	03	Y05			0/03	*TCC1/1		I2S/SD0	
5	~D5	PA05		05	*05	01	Y03			0/01	*TCC0/1			
6	~D6	PA04		04	*04	00	Y02			0/00	*TCC0/0			
7	D7	PA06		06	*06	02	Y04			0/02	TCC1/0			
	Digital High													
8	D8	PA18		02			X06		1/02	3/02	TC3/0	TCC0/2		AC/CMP0
9	~D9	PA20		*04			X08		5/02	3/02	TC7/0	*TCC0/6		GCLK_IO4
10	~D10	PA21		*05			X09		5/03	3/02	TC7/1	*TCC0/7	I2S/FS0	GCLK_IO5
11	~D11	PA16		*00			X04		*1/00	3/00	*TCC2/0	TCC0/6		GCLK_IO2
12	~D12	PA19		03			X07		*1/03	3/03	*TC3/1	TCC0/3	I2S/SD0	AC/CMP0
13	D13	PA17	LED	01			X05		*1/01	3/01	TCC2/1	TCC0/7		GCLK_IO3

Analog 0~7

Pin number	MKR Board pin	PIN	Notes	Peri.A	Peripheral B				Perip.C	Perip.D	Peri.E	Peri.F	Periph.G	Periph.H
				EIC (EXTINT)	ADC (AIN)	AC (AIN)	PTC	DAC	SERCOMx (x/PAD)	SERCOMx (x/PAD)	TCCx (x/WO)	TCCx (x/WO)	COM	AC/GLCK
	Analog Connector													
14	A0	PA02	A0	02	*00		Y00	OUT						
15	A1	PB02	A1	*02	*10		Y08			5/00	TC6/0			
16	A2	PA11	A2	11	*19		X03		0/03	2/03	TCC1/1	*TCC0/3	I2S/FS0	GCLK_IO5
17	A3	PA10	A3	10	*18		X02		0/02	2/02	TCC1/0	*TCC0/2	I2S/SCK0	GCLK_IO4
18	A4	PB08	A4 SDA	08	*02		Y14			*4/00	TC4/0			
19	A5	PB09	A5 SCL	*09	*03		Y15			*4/01	*TC4/1			
20	A6	PA09	A6	09	*17		X01		0/01	2/01	TCC0/1	TCC1/3	I2S/MCK0	
21	A7	PB03	A7	*03	*11		Y09			5/01	TC6/1			

BG77 control pin

Pin number	MKR Board pin	PIN	Notes	Peri.A	Peripheral B				Perip.C	Perip.D	Peri.E	Peri.F	Periph.G	Periph.H
				EIC (EXTINT)	ADC (AIN)	AC (AIN)	PTC	DAC	SERCOMx (x/PAD)	SERCOMx (x/PAD)	TCCx (x/WO)	TCCx (x/WO)	COM	AC/GLCK
22	1	PA12	GNSS TX	12					*2/00	4/00	TCC2/0	TCC0/6		AC/CMP0
23	2	PA13	GNSS RX	13					*2/01	4/01	TCC2/1	TCC0/7		AC/CMP1
29		PA22	NBIOT TX	*06			X10		3/00	5/00	*TC4/0	TCC0/4		GCLK_IO6
30		PA23	NBIOT RX	*07			X11		3/01	5/01	*TC4/1	TCC0/5	USB/SOF	GCLK_IO7
26		PA27	BG77 PWRKEY	*15										GCLK_IO0
27		PA08	BG77 RESET	NMI	16		X00		0/00	2/00	TCC0/0	TCC1/2	I2S/SD1	

Reference

[Microchip SAM D21 Data Sheet]
[Quectel BG77 Data Sheet]