xyz-mIoT basic by itbrainpower.net

low power IoT node basic (no modem) version

Built around **Microchip / ATMEL** *ATSAMD21G* ARM0 microcontroller and having integrated Lithium battery (*LiPO / LiION*) charger, the **xyz-mIoT basic shield,** member of the **xyz-mIoT IoT node family**, supports endless devices / sensors / actuators interfacing via abundant 3.3V compliant interfaces (1 * I2C, 1 * SPI, 1 * UART, 13 * digital I/O - 1WIRE and PWM capable, 5 analog inputs and more) and providing support for solar powered applications and for *Lithium primer battery powered low power applications* (down to 35-37uA total shield sleep current and even further for particular configurations).

xyz-mIoT IoT node family is the worldwide first and most compact (35x45mm/~7g) IoT board in this class, class that combines the functionality of the low power Arm® Cortex®-M0 32-bit SAMD21G microcontroller (in Arduino Zero / MKR compatible design) with THS + tVOC + HALL + IR + tilt / vibration sensors bundled and global low power LTE (CATM1 or NB-IoT) / LTE / 3G / GSM connectivity.

xyz-mIoT basic by itbrainpower.net shields are *Arduino programmable* and are supported by RTCC, WDT, low power and other Arduino libraries.

GETTING STARTED posts containing powering, low power / solar powering tips and tricks and interfacing guidelines for GSM / low power modems, ethernet, WIFI, LORA, SD card reader, TFT displays, sensors, relays and other modules, together with CLOUD integration examples can be found in https://itbrainpower.net/projects section.

xyz-mIoT IoT nodes are designed and manufactured in EU by R&D Software Solutions.

xyz-mIoT basic by itbrainpower.net commercial versions:
- PN: XYZMIOT209#NOMODEM-000-0000000 SKU: ITBP-5002 - no embedded sensors
- embedded sensor versions are available as special order

xyz-mIoT basic :: brief overview

Modem side – no embedded modem

MCU side - ATMEL SAMD21G - Arm® Cortex®-M0 32-bit

Clock Speed:	32.768 kHz (RTCC) - crystal controlled, 48 MHz
Flash Memory / SRAM:	256 KB / 32KB
WDT:	yes, having crystal time accuracy support
Interfacing Voltage:	3.3V
Digital I/O Pins:	13 + (analog, I2C, SPI, other) pins via alternate function + 2 reserved for shield power management DC current per I/O Pin: 7 mA
PWM pins:	12
UART (hardware):	1 + 1 available trough soldering pads
SPI(hardware)	1
I2C (hardware)	1
Analog Input Pins	5 (ADC 8/10/12 bit)
External Interrupts	8
More specifications:	https://itbrainpower.net/downloadables/40001882A.pdf

Embedded SENSORS - by PN suffix coding (xxxxxxx)

voltage samplers (standard): 2 dedicated ADCs for Vraw (power in line) and Vbat (battery voltage)

optional sensors: up to six sensors
THS sensor (optional): HDC2010 - https://itbrainpower.net/downloadables/hdc2010.pdf
CO2 + TVOC sensor (optional): CCS811 - https://itbrainpower.net/downloadables/CCS811_DS000459_5-00.pdf
HALL sensor (optional): DRV5032 - https://itbrainpower.net/downloadables/drv5032.pdf
IR sensor (optional): KP-2012P3C - https://itbrainpower.net/downloadables/KP-2012P3C.pdf
vibration / tilt sensor (optional): https://itbrainpower.net/downloadables/SW-200d.pdf

Shields without optional sensors embedded are available as standard commercial products. Versions having embedded sensors (THS / TVOC / HALL / TILT / IR / REED) are available as special order – https://itbrainpower.net/downloadables/xyz-mIoT_shields_features_and_capabilities.pdf and "**part number / SKU**" chapter bellow.

xyz-mIoT basic :: brief overview (continuation)

Powering side and power management

low power design: yes – down to 35-40uA* (and bellow**) total shield sleep current support
direct powering (no battery): yes - 3.80-4.20 V supply (min. 100mA sustained) connected to VBAT and GND pins;

Lithium primer battery support: yes, default - via VBAT and GND pins**;
Integrated battery charger: yes, having 6V solar cell support;
Battery charger input voltages: USB (5V) / Vraw (4.8-7V);
Supported rechargeable batteries:
        single cell Lithium Polymer min. 75mAh,
        single cell Lithium ION min. 250mAh,
        super-capacitor >1F / >5V w. ESR less than 150mOhm

3.3V for MCU, sensors and external devices: via embedded LDO;
max. current on 3.3V PAD: 75mA minus the total current sink by output ports;
max. DC current per MCU I/O pin: 7 mA;

* measured at 25 C, *RTCC and GPIO interrupt wake routines, crystal controlled WDT and RTCC, two UART and I2C (no embedded sensors)*
*&** special Lithium primer battery only versions is capable of down to typical 5-7uA deep sleep current (contact us).

Mechanical info

Dimensions:	1.4"x1.8" (35.56 x 45.72mm)
Weight:	~7g
Mechanical drawing:	https://itbrainpower.net/downloadables/xyz-mIoT_mechanical_drawing.png

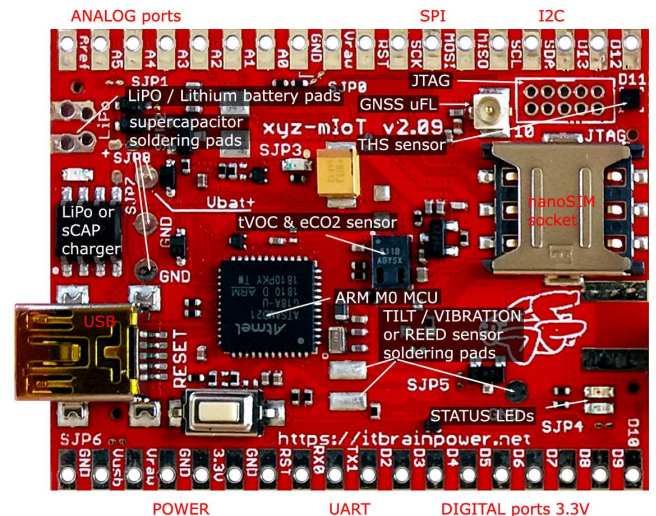# xyz-mIoT basic :: INTERFACES, PADS / PORTS and CONNECTORS

PADS / PORTS

Right image: bottom PCB with component identification*.
* GNSS, SIM card and SENSORS are NOT available for this variant!

PADS & PORTS information and more:
https://itbrainpower.net/xyz-mIoT/xyz-mIoT_Arduino_ports_mapping
https://itbrainpower.net/downloadables/xyz-mIoT_2_09_block_schema_rev1.pdf .

Hints:
- full resolution picture https://itbrainpower.net/images/xyz-mIoT-bottom-209_components_and_features_identification.jpg
- components / features are PN dependent https://itbrainpower.net/xyz-mIoT/xyz-mIoT_shields_features_and_capabilities

xyz-mIoT basic :: INTERFACES, PADS / PORTS and CONNECTORS (continuation)

LEDs, RESET SWITCH and additional info
1. RESET SWITCH - RESET/PROGRAMMING functions*
2. GREEN LED - network status LED
3. YELLOW LED - D13 - ARDUINO system LED
4. RED LED (left) - battery charger LED
5. RED LED (center) - modem power LED

* enable programming mode - push RESET twice (fast)
* reset shield - push RESET button only once

- on right side - nano SIM socket connector
- on left side - LiPO battery PADS (LiPO+/Vbat and GND)
- on left side - USB mini B connector
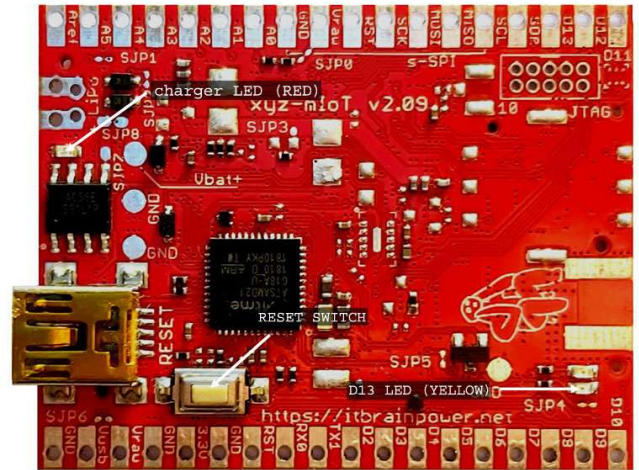
Hints:
- full resolution picture https://itbrainpower.net/images/xyz-mIoT-basic_LEDs_RESET.jpg

xyz-mIoT basic :: ARDUINO libraries, EXAMPLES and UTILITIES

xyz-mIoT shield Arduino board definition library, RTCC, WDT and low power Arduino support libraries, embedded sensors Arduino libraries and code examples for Arduino can be downloaded from https://itbrainpower.net/downloads.php#xyz-mIoT page.

Hint: Resources marked with "#", requires for download the following information: your name, email address and the modem IMEI. The modem IMEI can be found printed on the Quectel GSM module, or run AT+GMGS command.

xyz-mIoT basic :: DOCUMENTATION DOWNLOAD/ONLINE

The xyz-mIoT shield documentation can be downloaded from https://itbrainpower.net/downloads#xyz-mIoT_documentation page.

xyz-mIoT basic :: projects and how to

GETTING STARTED posts containing xyz-mIoT by itbrainpower.net powering, low power / solar cell powering tips and tricks and interfacing guidelines for GSM / low power modems, ethernet, WIFI, LORA, SD card reader, TFT displays, sensors, relays and other modules, together with CLOUD integration examples can be found at https://itbrainpower.net/projects.

xyz-mIoT basic :: part number / SKU

a. commercial versions:
    xyz-mIoT basic, no embedded sensors   - PN: XYZMIOT209#NOMODEM-000-0000000 / SKU: ITBP-5002
b. special order versions (most common):
    xyz-mIoT basic, *HDC2010 and DRV5032*   - PN: XYZMIOT209#NOMODEM-000-1100000 / SKU: ITBP-5001