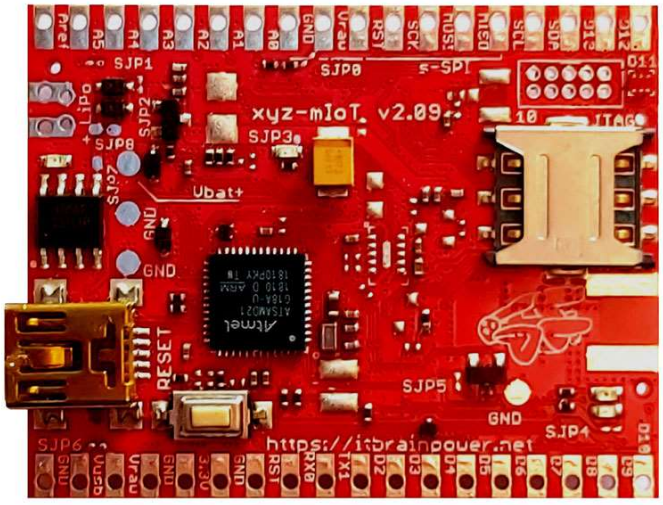


xyz-mIoT w. M95FA by itbrainpower.net

low power IoT node w. 2G (GSM/GPRS) modem, Global version

Equipped with Quectel M95FA

Radio protocols supported:
2G (GSM/GPRS/DTMF/SMS)

Coverage: ***Global (all over the world)***

GNSS support: no

SIM support: 1 x (nano)SIM/USIM socket

Built around **Microchip / ATMEL** *ATSAMD21G* ARM0 microcontroller and having integrated Lithium battery (*LiPO / LiION*) charger, the ***xyz-mIoT shield equipped with Quectel M95FA modem*** , 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 IoT nodes *are designed and manufactured in EU by R&D Software Solutions*.

xyz-mIoT M95FA 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 M95FA by itbrainpower.net commercial versions:

- PN: XYZMIOT209#M95FA-UFL-0000000 SKU: ITBP-4009 - no embedded sensors
- PN: XYZMIOT209#M95FA-SMA-0000000 SKU: ITBP-4009S - no embedded sensors
- embedded sensor versions are available as special order

xyz-mIoT equipped with M95FA :: brief overview

Modem side - Quectel M95FA

Radio protocols: *2G (GSM/GPRS/DTMF/SMS)*
Radio coverage: *Global (all over the world)*
Bands: 850/ 900/ 1800/ 1900MHz
Speeds: GPRS class 12 - max. 85.6Kbps (DL), max. 85.6Kbps (UL);
GNSS support: no

More specifications: https://itbrainpower.net/downloadables/Quectel_M95_GSM_Specification_V3.0.pdf
AT commands: https://itbrainpower.net/downloadables/Quectel_WCDMA_UGxx_AT_Commands_Manual_V1.7.pdf

SIM support: 1 x NANO SIM/USIM socket.
***External* SIM**: *supported as default - 5 pin 1.27mm interface*.
***Embedded* SIM**: *option* (feature available for high volume batches and for selected partners only)

Modem power management – power isolation controlled by MCU
GSM radio hardware connector – u.FL (SMA connector version available)
USB soldering pads for modem – yes

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 reserved for modem communication
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 equipped with M95FA :: 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. 500mA sustained and 2A pulse capable) 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;

Additional modem power management: yes (modem power isolation controlled by MCU)

* 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

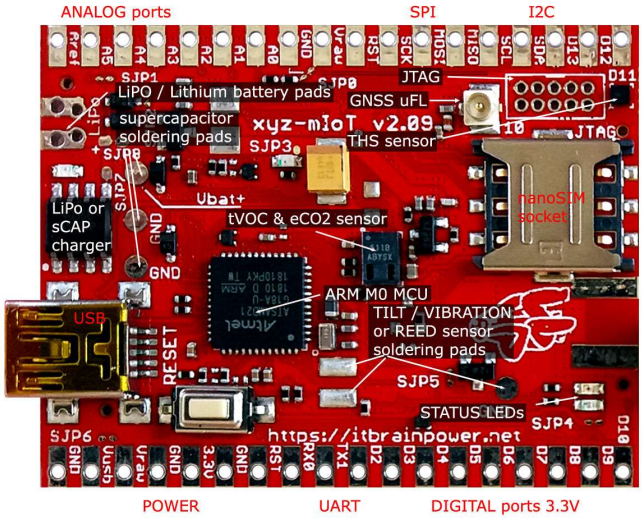
Dimensions: 1.4"x1.8" (35.56 x 45.72mm)
Weight: ~7g
Mechanical drawing: https://itbrainpower.net/downloadables/xyz-mIoT_mechanical_drawing.png

xyz-mIoT equipped with M95FA :: INTERFACES, PADS / PORTS and CONNECTORS

PADS / PORTS

Right image: bottom PCB with component identification*.
* GNSS 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

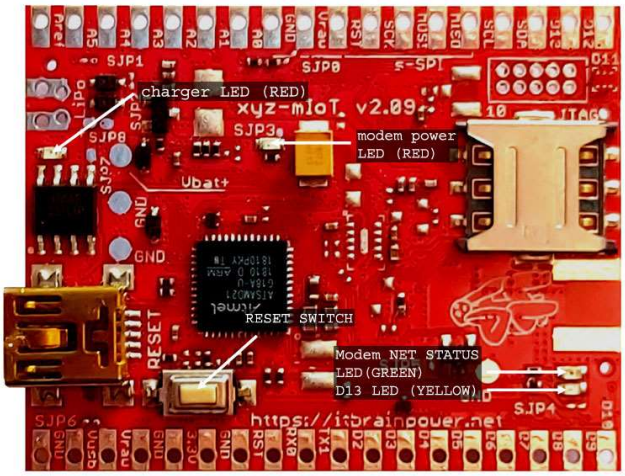
xyz-mIoT equipped with M95FA :: INTERFACES, PADS / PORTS and CONNECTORS (continuation)

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

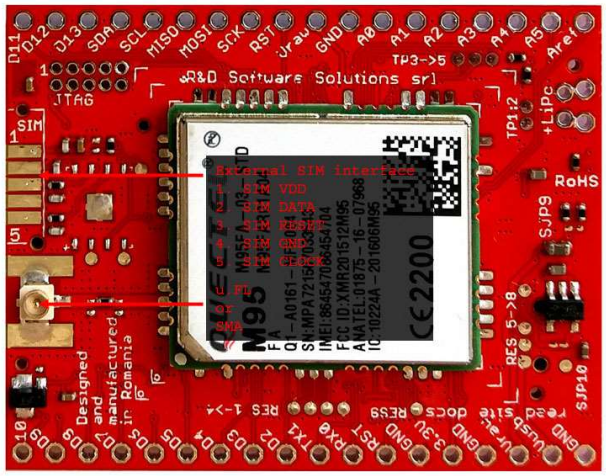


Hints:
- full resolution picture https://itbrainpower.net/images/xyz-mIoT-M95FA_LEDs_RESET.jpg

External SIM CARD port, antenna connector

External SIM card interface*
1. SIM VDD
2. SIM DATA
3. SIM RESET
4. SIM GND
5. SIM CLOCK

* if not used, do not connect them
* if used, in order to avoid interferences, keep the wires as short as possible and take in to account the wires routing.



GSM side antenna connector
xyz-mIoT shield may be ordered with *u.FL connector* or equipped with *SMA-F connector*.

Hints:
- full resolution picture https://itbrainpower.net/images/xyz-mIoT-M95FA-externalSIM-interface.jpg
- uFL/SMA options, read https://itbrainpower.net/downloadables/xyz-mIoT_shields_features_and_capabilities.pdf

xyz-mIoT equipped with M95FA :: 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 equipped with M95FA :: DOCUMENTATION DOWNLOAD/ONLINE

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

xyz-mIoT equipped with M95FA :: 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 equipped with M95FA :: part number / SKU

a. commercial versions:

xyz-mIoT M95FA, uFL, no embedded sensors	- PN: XYZMIOT209#M95FA-UFL-0000000 / SKU: ITBP-4009
xyz-mIoT M95FA, SMA, no embedded sensors	- PN: XYZMIOT209#M95FA-SMA-0000000 / SKU: ITBP-4009S

b. special order versions (most common):

xyz-mIoT M95FA, uFL, *CCS811, HDC2010 and DRV5032*	- PN: XYZMIOT209#M95FA-UFL-1100100 / SKU: ITBP-4007
xyz-mIoT M95FA, uFL, *HDC2010 and DRV5032*	- PN: XYZMIOT209#M95FA-UFL-1100000 / SKU: ITBP-4008
xyz-mIoT M95FA, SMA, *CCS811, HDC2010 and DRV5032*	- PN: XYZMIOT209#M95FA-SMA-1100100 / SKU: ITBP-4007S
xyz-mIoT M95FA, SMA, *HDC2010 and DRV5032*	- PN: XYZMIOT209#M95FA-SMA-1100000 / SKU: ITBP-4008S