

xyz-mIoT - low power ARM0 IoT shield family

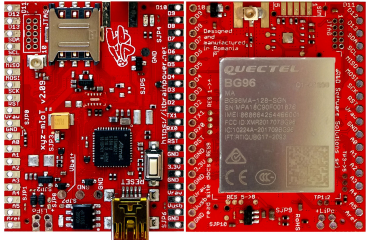
with optional GSM / 3G / LTE / low power LTE modem and sensors, Arduino programmable



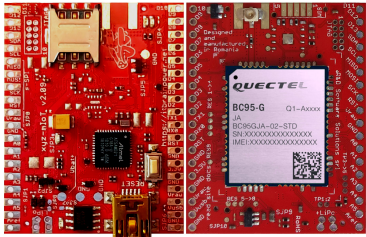
xyz-mIoT equipped w. EG91E modem
LTE CAT1 + 3G + 2G European (EMEA)



xyz-mIoT equipped w. EG95A modem
LTE CAT4 + 3G North America + GNSS



xyz-mIoT equipped w. BG96 modem
LTE CAT-M1 + NB IoT + EGPRS GLOBAL + GNSS



xyz-mIoT equipped w. BC95G modem
NB IoT only GLOBAL



xyz-mIoT equipped w. M95FA modem
GSM / GPRS GLOBAL



xyz-mIoT basic IoT
no embedded modem

Commercially available from April 08'th 2018, the **xyz-mIoT v2.09 by itbrainpower.net** is the worldwide *first* and *most compact* (35x45mm / around 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.

Built around Microchip / ATMEL ATSAMD21G ARM0 microcontroller and having integrated Lithium battery (*LiPO* / *LiION*) charger, the xyz-mIoT shields support 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 **primer Lithium battery powered low power applications** (down to 35-37uA total shield sleep current).

Special customized **ultra low power (ULP*)** versions for Lithium Primer battery applications may reach even 5-7uA deep sleep total shield current.

* for ULP versions contact us directly

About embedded modem - the xyz-mIoT shield is commercially available in *basic variant* (no embedded modem) or *equipped with various Quectel modems* in order to fit your application requirements:

- no modem – xyz-mIoT basic IoT
- **2G / GSM** (global coverage) – xyz-mIoT equipped with M95FA
- Low power **NB IoT** (global coverage) – xyz-mIoT equipped with BC95G
- Low power **LTE CATM1 / NB IoT / EGPRS** (global coverage) + **GNSS** – xyz-mIoT equipped with BG96
- **LTE CAT1 / 3G / 2G** (EMEA) – xyz-mIoT equipped with EG91E
- **LTE CAT4 / 3G** (North America) – xyz-mIoT equipped with EG95A

All xyz-mIoT variants with modems are equipped with *Nano SIZE SIM socket*, have standard *external SIM interface* and provides support for industrial Embedded SIM. Standard radio (GSM side) interface connector is uFL, but SMA F version is available for selected customers.

Other variants as **ultra low power** versions or 3G/2G global modems may be available as samples and in high volume batches for selected partners.

Talking about embedded **sensors***, the xyz-mIoT shield may have 0 up to 5 integrated sensors, as:

- high accuracy **THS** (temperature and humidity sensors) – TI *HDC2010*,
- **tVOC & eCO2** (air quality sensor - *total volatile organic compounds* and *carbon dioxide*) – AMS *CCS811*,
- **HALL** (magnetic sensor) - DRV5032 or **IR** (infrared sensor) *KP-2012P3C*,
- secondary **IR** (infrared sensor) - *KP-2012P3C*,
- **TILT** (movement vibration sensor) or **REED** (magnetic sensor) - *SW200D*

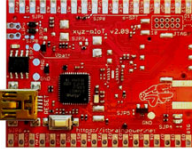
The **xyz-mIoT by itbrainpower.net** shields are Arduino programmable and are supported by RTCC, WDT, low power and other Arduino libraries.

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.

Designed and manufactured in EU.

* modem and embedded sensors that populates the xyz-mIoT shields are dependent on PN ordered. Read bellow PN and capabilities section.

xyz-mIoT by itbrainpower.net specific features per model part number

PN – category	Description	Image	Usage
XYZMIOT209#BG96-UFL-xxxxxxx <i>Low Power LTE modem</i>	MODEM - Quectel BG96 - LTE CATM1 + NB IoT + EGPRS + GNSS 3GPP E-UTRA Release 13 Bands: FDD LTE - B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B26/B28 TDD LTE - B39 [CAT M1 only] GSM - 850/900/1800/1900 MHz Speeds: CAT M1 - up to Max 300Kbps (DL), Max. 375Kbps (UL) NB IoT - up to Max. 32Kbps (DL), Max. 70Kbps (UL) EDGE/GPRS - up to Max. 296Kbps (DL), Max. 236.8Kbps (UL) / Max. 107Kbps (DL), Max. 85.6Kbps (UL) GNSS: - Galileo, GPS, GLONASS, BeiDou/Compass, QZSS equipped with u.FL connector - GSM, u.FL connector - GNSS SENSORS - by PN suffix coding (xxxxxxx) - XYZMIOT209#BG96-UFL-0000000 - no embedded sensors - SKU: ITBP-4003 - XYZMIOT209#BG96-UFL-1100000 - HDC2010 and DRV5032 - SKU: ITBP-4002 - XYZMIOT209#BG96-UFL-1100100 - CCS811, HDC2010 and DRV5032 - SKU: ITBP-4001		Global
XYZMIOT209#BG96-SMA-xxxxxxx <i>Low Power LTE</i>	Same as above, but with SMA F connector - GSM and u.FL connector - GNSS. SKU - just add "S" at final for corresponding uFL version. Eg.: ITBP-4003 → ITBP-4003S		Global
XYZMIOT209#BC95G-UFL-xxxxxxx <i>Low Power LTE modem</i>	MODEM - Quectel BC95G - NB IoT only Bands: LTE - B1/B3/B8/B5/B20/B28** Speeds: NB IoT Single Tone / Multi Tone** - Max. 25.2Kbps (DL), Max. 15.625 / 54 Kbps (UL) equipped with u.FL connector SENSORS - by PN suffix coding (xxxxxxx) - XYZMIOT209#BC95G-UFL-0000000 - no embedded sensors - SKU: ITBP-4006 - XYZMIOT209#BC95G-UFL-1100000 - HDC2010 and DRV5032 - SKU: ITBP-4005 - XYZMIOT209#BC95G-UFL-1100100 - CCS811, HDC2010 and DRV5032 - SKU: ITBP-4004		Global
XYZMIOT209#BC95G-SMA-xxxxxxx <i>Low Power LTE modem</i>	Same as above, but with SMA F connector. SKU - just add "S" at final for corresponding uFL version. Eg.: ITBP-4006 → ITBP-4006S		Global
XYZMIOT209#EG91E-UFL-xxxxxxx <i>LTE / 4G modem</i>	MODEM - Quectel EG91E - LTE / 4G LTE IoT/M2M-optimized CAT1 3GPP E-UTRA Release 11 Bands: FDD LTE - B1/B3/B7/B8/B20/B28A** WCDMA - B1/B5/B8 GSM - B1/B8 Speeds: LTE-FDD - up to Max 10Mbps (DL)/Max 10Mbps (UL) DC-HSDPA: - Max 42Mbps (DL); HSUPA: Max 5.76Mbps (UL); WCDMA: Max 384Kbps (DL)/Max 384Kbps (UL) EDGE/GPRS - up to Max. 296Kbps (DL), Max. 236.8Kbps (UL) / Max. 107Kbps (DL), Max. 85.6Kbps (UL) equipped with u.FL connector SENSORS - by PN suffix coding (xxxxxxx) XYZMIOT209#EG91E-UFL-0000000 - no embedded sensors - SKU: ITBP-4012		Europe*
XYZMIOT209#EG91E-SMA-xxxxxxx <i>LTE / 4G modem</i>	Same as above, but with SMA F connector. SKU: ITBP-4012S		Europe*
XYZMIOT209#EG95A-UFL-xxxxxxx <i>LTE / 4G modem</i>	MODEM - Quectel EG95A - LTE / 4G LTE IoT/M2M-optimized CAT1 3GPP E-UTRA Release 11 Bands: FDD LTE - B2/B4/B5/B12/B13 WCDMA - B2/B4/B5 GNSS: - Galileo, GPS, GLONASS, BeiDou/Compass, QZSS Speeds: LTE-FDD - up to Max 150Mbps (DL)/Max 50Mbps (UL) DC-HSDPA: - Max 42Mbps (DL); HSUPA: Max 5.76Mbps (UL); WCDMA: Max 384Kbps (DL)/Max 384Kbps (UL) equipped with u.FL connector SENSORS - by PN suffix coding (xxxxxxx) XYZMIOT209#EG91E-UFL-0000000 - no embedded sensors - SKU: ITBP-4021		N. America
XYZMIOT209#EG95A-SMA-xxxxxxx <i>LTE / 4G modem</i>	Same as above, but with SMA F connector - GSM and u.FL connector - GNSS. SKU: ITBP-4021S		N. America
XYZMIOT209#M95FA-UFL-xxxxxxx <i>2G (GSM / GPRS) modem</i>	MODEM - Quectel M95FA - 2G [GSM / GPRS / EDGE] GSM - 850/900/1800/1900 MHz Speeds: EDGE/GPRS - up to Max. 296Kbps (DL), Max. 236.8Kbps (UL) / Max. 107Kbps (DL), Max. 85.6Kbps (UL) equipped with u.FL connector SENSORS - by PN suffix coding (xxxxxxx) - XYZMIOT209#M95FA-UFL-0000000 - no embedded sensors - SKU: ITBP-4009 - XYZMIOT209#M95FA-UFL-1100000 - HDC2010 and DRV5032 - SKU: ITBP-4008 - XYZMIOT209#M95FA-UFL-1100100 - CCS811, HDC2010 and DRV5032 - SKU: ITBP-4007		Global
XYZMIOT209#M95FA-SMA-xxxxxxx <i>2G (GSM / GPRS) modem</i>	Same as above, but with SMA F connector. SKU - just add "S" at final for corresponding uFL version. Eg.: ITBP-4009 → ITBP-4009S		Global
XYZMIOT209#NOMODEM-000-xxxxxxx <i>NO embedded modem</i>	MODEM - no embedded modem SENSORS - by PN suffix coding (xxxxxxx) - XYZMIOT209#NOMODEM-000-0000000 - no embedded sensors - SKU: ITBP-5002 - XYZMIOT209#NOMODEM-000-1100000 - HDC2010 and DRV5032 - SKU: ITBP-5001		-

xyz-mIoT by itbrainpower.net specific features per model part number - continuation

Part number	Accessories description
gSPS101#4V(DDRV)	g-SPS 4V adapter board external plug-able switching power supply, 5-19V input, 4V output, 650mA sustained and max 2A pulse. 20.3x34.29mm. Use in "without LiPol/stand-alone" u-GSM boards configuration.
gSPS101#5V(LiPOL)	g-SPS 5V adapter board external plug-able switching power supply, 6-19V input, 5V output, 650mA sustained and max 2A pulse. 20.3x34.29mm. Use in "with LiPol battery" u-GSM boards configuration, when main power supply voltage is bigger than 5V.
ITBP-EMB2-UFL#100	embedded GSM antenna, 850Mhz->2250Mhz, u.FL connector and 100mm cable
ITBP-UFL-SMAF#100	u.FL to SMA female panel 100mm pigtail
ITBP-UFL-SMAF#085	u.FL to SMA female panel 85mm pigtail
ITBP-GSM-ANT-SMA90D#001	mini GSM/UMTS antenna, 0-1db, rod type, SMA F, 90 degree, no cable
SCAP1F5V#001	super capacitor for itbrainpower modular modems - 1F, 5V, ESR 150 mOhm
ITBP-LiPOL-CON#TP01	Lithium Polymer battery connector

* EUROPE and other countries having compatible frequency networks (Europe, Middle East, Asia and Africa)

** under development

xyz-mIoT by itbrainpower.net w. modem (EG91E, BG96, BC95G or M95FA), common features, GSM side

- NANO size SIM socket push pull
- 1.27 mm pitch soldering pads for external SIM card socket
- embedded SIM support
- modem UART port soldering pads for AT debug
- modem power separation mechanism (MCU controlled)
- modem USB soldering pads (only for EG91E, BG96)
- GNSS active antenna powering control (MCU controlled – only for BG96)

xyz-mIoT by itbrainpower.net all models, common features – summary

- AT SAMD21G Cortex®-M0+ 32bit low power ARM micro-controller
- flash memory - 256kBytes (MCU)
- SRAM - 32Kbytes
- clock - 32.768kHz (crystal controlled) RTCC/WDT, 48Mhz
- mini USB type B - Programming + debug ports. Can be used for powering.
- power inputs: USB, Vraw (4.8-7V for modem versions, 3.3-7V for basic IoT version)
- max. DC current per digital output pin - 7mA
- max. available current on 3.3V pad (from LDO) - 75mA minus the total current sink by output ports
- 13 x digital ports [12 ports PWM capable]
- 8 external interrupts
- 1 x UART hardware port
- 1 x I2C port
- 1 x SPI port
- all digital ports are 3.3V compliant
- 5 x analog inputs (10/12bits)
- integrated battery / super -capacitor charger
- supported batteries - LiPo / LiION single cell min. 250mAh or super-capacitor >1F/>5V having ESR <150mOhm
- super compact format - 1.4"x1.8" (35.56 x 45.72mm)
- low power design – down to 35-40uA total shield sleep current support and bellow**
- Arduino programable

** measured at 25 C, RTCC and GPIO interrupt wake routines, crystal controlled RTCC and clock, two UART and I2C. No embedded sensors variant was used for this test.

** special Lithium primer battery only versions is capable of down to typical 5-7uA deep sleep current (contact us).

xyz-mIoT by itbrainpower.net - online information

xyz-mIoT equipped with BG96 [LTE CATM1, NB10T, EGPRS + GNSS - GLOBAL] → https://itbrainpower.net/xyz-mIoT_BG96

xyz-mIoT equipped with BC95G [NB10T only - GLOBAL] → https://itbrainpower.net/xyz-mIoT_BC95G

xyz-mIoT equipped with M95FA [GSM / GPRS - GLOBAL] → https://itbrainpower.net/xyz-mIoT_M95FA

xyz-mIoT equipped with EG91E [LTE CAT1, 3G, 2G - EUROPEAN] → https://itbrainpower.net/xyz-mIoT_EG91E

xyz-mIoT equipped with EG95A [LTE CAT4, 3G - N. AMERICAN] → https://itbrainpower.net/xyz-mIoT_EG95A

xyz-mIoT basic [no embedded modem] → https://itbrainpower.net/xyz-mIoT_basic

xyz-mIoT shields family → <https://itbrainpower.net/xyz-mIoT>

xyz-mIoT related downloads → <https://itbrainpower.net/downloads#xyz-mIoT>

xyz-mIoT related documentation → https://itbrainpower.net/downloads#xyz-mIoT_documentation

xyz-mIoT getting started and how to → <https://itbrainpower.net/projects>