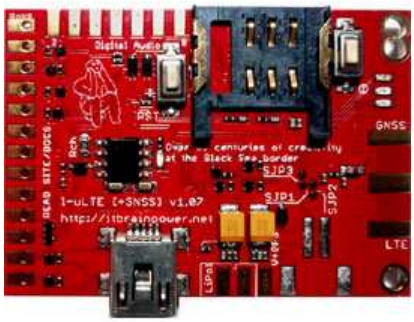
l-LTE 4G/LTE+GNSS shield

ARDUINO, BEAGLEBONE & RASPBERRY PI 4G/LTE shield



l-LTE EUROPE versions:
FDD LTE B1/B3/B5/B7/B8/B20
TDD LTE B38/B40/B41[only CAT4 version]
WCDMA B1/B5/B8
GSM B3/B8

l-LTE NORTH AMERICA versions:
FDD LTE B2/B4/B12
WCDMA B2/B4/B5

l-LTE CAT4 transfer speeds:
- *LTE FDD* Max 150Mbps (DL) Max 50Mbps (UL)
- *LTE TDD* Max 130Mbps (DL) Max 35Mbps (UL), only for the European version

l-LTE CAT1 transfer speeds:
- *LTE-FDD* Max 10Mbps (DL) Max 5Mbps (UL)

high performances GNSS engine embedded - parallel GPS and GLONASS satellites interpolation for best accuracy
RPI & BEAGLEBONE compatible built in USB interface

built in LiPol battery charger
1.35"x1.93" (34.29 x 49.02mm), around 11g implementation

l-LTE v1.07 - ARDUINO, BEAGLEBONE & RASBERRY PI 4G modular shield, our latest released product, compact as 1.35"x1.93" (34.29 x 49.02mm) and with weight around 11g, it is the first and the most compact 4G modular shield available today.
l-LTE series shares the same ITBMM interface [itbrainpower.net modular modem interface] with all our previous modular modems: dual SIM GSM only version (c-uGSM dual SIM shield), GSM + BTH 3.0 version (h-nanoGSM shield) and the 3G/UMTS version (d-u3G shield). Together, are parts of our modular modem designed around our original "plug-able boards" concept.
Accessories as: 4V and 5 V switching power supplies (g-SPS v1.02 LiPOL and DDRV), i-hatGSM3G (RASPBERRY PI adapter board for ITBP modular modem shields) and j-328GSM3GLader (Arduino Micro / Arduino Mini / Arduino Nano adapter board for ITBP modular modem shields) are pin to pin compatible with l-LTE.

l-LTE shields was released without performance compromises and brings to you the best market solution at reasonable cost and becomes the reference for this new product class. The l-LTE 4G modem family was designed and it is manufactured in EUROPE by R&D Software Solutions team -awarded in 2006 with the GST SSC Bronze Award.

l-LTE v1.07 4G / LTE modular modem integrates in this format the following main features:

- **high performances GNSS engine embedded** with parallel GPS and Glonass satellites interpolation for best accuracy and signal sensitivity. Supports active and passive GNSS antennas.
- USB serial connectivity adapter with **RaspberryPI, BeagleBone, Windows and Linux**. The USB connection, offers multiple serial ports support for concurrent application/threads communication.
- 2.8-5V auto-level digital interfaces (UART TX+RX / RESET / POWER ON-OFF / RI / STS / RTS / CTS / SLEEP), for direct interfacing with **Arduino boards, BeagleBone, Raspberry PI** or any other 2.8V up to 5V micro-controller board
- build in Lithium Polymer battery charger. Depending on powering schema, all boards version can be used with or without LiPol battery.
- Plug-able accessories as: switching power supply (stand alone or with LiPol usage), adapter boards for RPI, Arduino and BeagleBone and (future) u-controller boards, other.
- POWER ON / OFF and RESET push micro switches
- Standard size SIM support
- uFL or SMA F antenna connector [4G side] and uFL antenna connector [GNSS side]

The l-LTE modular modem series answers at your needs for a fully lightweight, integrated, fully functional and affordable cellular 4G modem shield / platform. Smart complete design of the l-LTE modular shield brings you the flexibility and easiness in integration, wherever your platform and application. Beyond ARDUINO / BEAGLEBONE / RASPBERRY PI / others hobby / DYI platforms integration, the l-LTE family can be easily and in a time manner incorporated into your equipment regardless your previous experience in the modem technology. The l-LTE series represents your best choice for usage into a wide range of designs requiring robust 4G/3G mobile communications and reliable performance, having in plus a embedded multi constelation satellite positioning engine.

Manufactured in EU.

ARDUINO, BEAGLEBONE & RASPBERRY PI I&II direct interfacing compatibility with auto 2.8-5V interfaces Windows and Linux PC

connectivity via USB
uFL or SMA F connector

Standard size SIM

Digital audio inteface

C and Python complex code examples

Ideal for small & medium series gadget / drones / wearables / IoT project integration where sizes and weights and high speed mobile internet connection matters.

Part number	Description	Usage
LLTE107-CAT4#UFL-EUR	LTE / 4G CAT4 module [3GPP E-UTRA Release 11], FDD LTE B1/B3/B5/B7/B8/B20, TDD LTE B38/B40/B41, WCDMA B1/B5/B8 and GSM B3/B8, with speeds up to LTE FDD Max 150Mbps (DL) Max 50Mbps (UL) / LTE TDD Max 130Mbps (DL) Max 35Mbps (UL) - equipped with u.FL connector [4G/3G/GSM side] and u.FL connector [GNSS side]	EUROPE *
LLTE107-CAT4#SMA-EUR	LTE / 4G CAT4 module [3GPP E-UTRA Release 11], FDD LTE B1/B3/B5/B7/B8/B20, TDD LTE B38/B40/B41, WCDMA B1/B5/B8 and GSM B3/B8, with speeds up to LTE FDD Max 150Mbps (DL) Max 50Mbps (UL) / LTE TDD Max 130Mbps (DL) Max 35Mbps (UL) - equipped with SMA F connector [4G/3G/GSM side] and u.FL connector [GNSS side]	EUROPE *
LLTE107-CAT1#UFL-EUR	LTE / 4G IoT/M2M-optimized CAT1 module [3GPP E-UTRA Release 11], FDD LTE B1/B3/B5/B7/B8/B20, WCDMA B1/B5/B8 and GSM B3/B8, with speeds up to LTE-FDD Max 10Mbps (DL) Max 5Mbps (UL) - equipped with u.FL connector [4G/3G/GSM side] and u.FL connector [GNSS side]	EUROPE *
LLTE107-CAT1#SMA-EUR	LTE / 4G IoT/M2M-optimized CAT1 module [3GPP E-UTRA Release 11], FDD LTE B1/B3/B5/B7/B8/B20, WCDMA B1/B5/B8 and GSM B3/B8, with speeds up to LTE-FDD Max 10Mbps (DL) Max 5Mbps (UL) - equipped with SMA F connector [4G/3G/GSM side] and u.FL connector [GNSS side]	EUROPE *
LLTE107-CAT4#UFL-NA	LTE / 4G CAT4 module [3GPP E-UTRA Release 11], FDD LTE B2/B4/B12 and WCDMA B2/B4/B5, with speeds up to LTE FDD Max 150Mbps (DL) Max 50Mbps (UL), - equipped with u.FL connector [4G/3G/GSM side] and u.FL connector [GNSS side]	NORTH AMERICA *
LLTE107-CAT4#SMA-NA	LTE / 4G CAT4 module [3GPP E-UTRA Release 11], FDD LTE B2/B4/B12 and WCDMA B2/B4/B5, with speeds up to LTE FDD Max 150Mbps (DL) Max 50Mbps (UL), - equipped with SMA F connector [4G/3G/GSM side] and u.FL connector [GNSS side]	NORTH AMERICA *
LLTE107-CAT1#UFL-NA	LTE / 4G IoT/M2M-optimized CAT1 module [3GPP E-UTRA Release 11], FDD LTE B2/B4/B12 and WCDMA B2/B4/B5, with speeds up to LTE-FDD Max 10Mbps (DL) Max 5Mbps (UL) - equipped with u.FL connector [4G/3G/GSM side] and u.FL connector [GNSS side]	NORTH AMERICA *
LLTE107-CAT1#SMA-NA	LTE / 4G IoT/M2M-optimized CAT1 module [3GPP E-UTRA Release 11], FDD LTE B2/B4/B12 and WCDMA B2/B4/B5, with speeds up to LTE-FDD Max 10Mbps (DL) Max 5Mbps (UL) - equipped with SMA F connector [4G/3G/GSM side] and u.FL connector [GNSS side]	NORTH AMERICA *

Part number	Accessories description
ihatGSM3G101B	**Raspberry PI[Zero, B+, II, II, 3] HAT adapter board** - connect the l-LTE shield with the your RPI without wires
j328GSM3GLader102B	**Arduino Micro / Arduino Mini / Arduino Nano adapter board** - connect the l-LTE shield with the your Arduino Micro / Arduino Nano USB / ArduinoPro Mini (or othe compatible boards) without wires
gSPS102#4V(DDRV)	**g-SPS 4V adapter board** external plug-able switching power supply, 5-25V input, 4V output, max 2A. 20.3x34.29mm. Use in "without LiPol/stand-alone" l-LTE boards configuration.
gSPS10#5V(LiPOL)	**g-SPS 5V adapter board** external plug-able switching power supply, 6-25V input, 5V output, max 2A. 20.3x34.29mm. Use in "with LiPol battery" l-LTE boards configuration, when main power supply voltage is bigger than 5V.
ITBP-EMB1-UFL#50	sticker embedded flex antenna 850Mhz->2250Mhz u.FL and 50mm 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

* EUROPE and other countries with FDD LTE B1/B3/B5/B7/B8/B20, TDD LTE B38/B40/B41 - [only for CAT4 version], WCDMA B1/B5/B8 and GSM B3/B8 networks
* NORTH AMERICA and other countries with FDD LTE B2/B4/B12 and WCDMA B2/B4/B5 bands network

FEATURES AT A GLANCE:

4G / LTE engine performances:

High speed 4G LTE CAT4 module - Quectel EC25, for the LLTE107-CAT4#xxx-yyy variants:

- *North American* FDD LTE B2/B4/B12 and WCDMA B2/B4/B5, with speeds up to LTE FDD Max 150Mbps (DL) Max 50Mbps (UL), or
- *European versions* with FDD LTE B1/B3/B5/B7/B8/B20, TDD LTE B38/B40/B41, WCDMA B1/B5/B8 and GSM B3/B8, with speeds up to LTE FDD Max 150Mbps (DL) Max 50Mbps (UL) / LTE TDD Max 130Mbps (DL) Max 35Mbps (UL).

or,

IoT/M2M-optimized 4G LTE CAT4 module - *Quectel EC21*, for the *LLTE107-CAT1#xxx-yyy* variants:

- North American FDD LTE B2/B4/B12 and WCDMA B2/B4/B5, with speeds up to LTE FDD Max 10Mbps (DL) Max 5Mbps (UL), or
- European versions with FDD LTE B1/B3/B5/B7/B8/B20, WCDMA B1/B5/B8 and GSM B3/B8, with speeds up to LTE FDD Max 10Mbps (DL) Max 5Mbps (UL).

GNSS [GPS + GLONASS] engine: **High performances GNSS engine embedded** having parallel GPS and GLONASS satellites interpolation for best sensitivity and accuracy.

Very compact and light weight: 1.35"x1.93" (34.29 x 49.02mm), around 11 grams, the best in class.

Embedded USB adapter with SERIAL to USB bridge adapter - with micro-USB type B socket (you can **connect the l-LTE shield, via USB or SERIAL UART with your Raspberry PI or with your BEAGLEBONE** or you can use it as wireless USB modem with your Windows or Linux PC).
Digital interface (SERIAL and CONTROL interfaces): 3-5V auto-level (UART TX+RX / RESET / POWER ON-OFF / RI / STS / RTS / CTS / SLP); **you can directly connect (without the need for any level adapter board) your d-u3G shield with any 3/5V Arduino shield or any version of RASPBERRY PI, BEAGLEBONE, BANANA PI or any other 3V up to 5V compatible microcontroller.** The digital (and powering) interface it is available in standard 0.1"(2.54mm) pin header and it is compliant with the ITBMM interface [itbrainpower.net modular modem interface]; in other words, the digital and powering l-LTE interface it is compatible with the interface used by any of our modular modems [c-uGSM - dual SIM shield, h-nanoGSM – GSM +BTH 3.0 shield and d-u3G – 3G/UMTS shield].

Embedded LiPol battery charger - the d-u3G shield can run in configurations with or without LiPolimer battery, depending on chosen powering schema.

STANDARD SIZE SIM 1x[4G] STANDARD SIM/USIM format.

Multiple powering schemas: - via USB, via POWERING, SERIAL and CONTROL interface (digital inteface) or via optional external(20.3x34.29mm) pin to pin plug-able 5-25V switching power supply

Digital audio interface - via standard 0.1"(2.54mm) pin header

Two embedded switches: control for modem POWER ON / OFF & modem RESET

Extended Arduino, Beaglebone and RaspberryPI code examples support files: - 4G, LTE, 3G, UMTS, GSM, SMS, DTMF, TCP/UDP, HTTPS and HTTP over 4G/3G/GPRS*, smart features like RAM DISK SYSTEM for FILE STORAGE and other. RaspberryPI and BeagleBone PPP and TCPIP routing support (Debian distribution based) trough easy installation and usage scripts. And, last but not least, l-LTE it is supported by our "mobile IoT 2 CLOUD" for Arduino prototype - quite tiny IoT implementation (~16Kb free on ATMEGA328).

* 4G/LTE speeds depending on the l-LTE model [read up-here].
3G/UMTS HSDPA Release 7 (category 8) 7.2Mbps max. and 3G/UMTS HSUPA Release 7 (category 6) 5.76Mbps max.
High Speed GPRS Multi-slot class 12 (configurable 1~12) Downlink and uplink speed - 85.6 kbps max.

INTERFACES, SWITCHES and CONNECTORS:

SHIELD POWERING, SERIAL and CONTROL INTERFACE

In the left edge of the top PCB side, top to bottom:

1. RX(TXD) - 4G SHIELD SERIAL RX (TXD) - input
2. TX(RXD) - 4G SHIELD SERIAL TX (RXD) - output
3. RESET - 4G SHIELD RESET - input, active HIGH*
4. POWER ON - 4G SHIELD POWER ON - input, active HIGH*
5. Vusb - POWER PIN - output +5V (USB +5V)
6. Vin - POWER PIN - input +5V for LiPol charger only
7. Vcc - POWER PIN - input/output +4V**
8. GND - POWER and DIGITAL GROUND
9. RI - 4G SHIELD RING INDICATOR - output
10. STATUS - 4G SHIELD STATUS - output
11. RTS - 4G SHIELD READY TO SEND - output
12. CTS - CLEAR TO SEND - input
13. SLP - SLEAP - input, active HIGH

* min. 200msec. pulse

** read POWERING SECTION, bellow

4G [LTE] SHIELD l-LTE v 1.07 top PCB view

SHIELD ANTENNAS

In the right edge of the top PCB side, top to bottom:

1. 4G/LTE antenna connector - uFL or SMA F
2. GNSS [GPS+GLONASS] antenna connector - uFL

DIGITAL AUDIO INTERFACE

In the top edge of the top PCB side, left to right:

1-8. DIGITAL AUDIO interface**

** pin2 on DIGITAL AUDIO interface can be used as secondary GND connection on the board.

SIM and SWITCHES

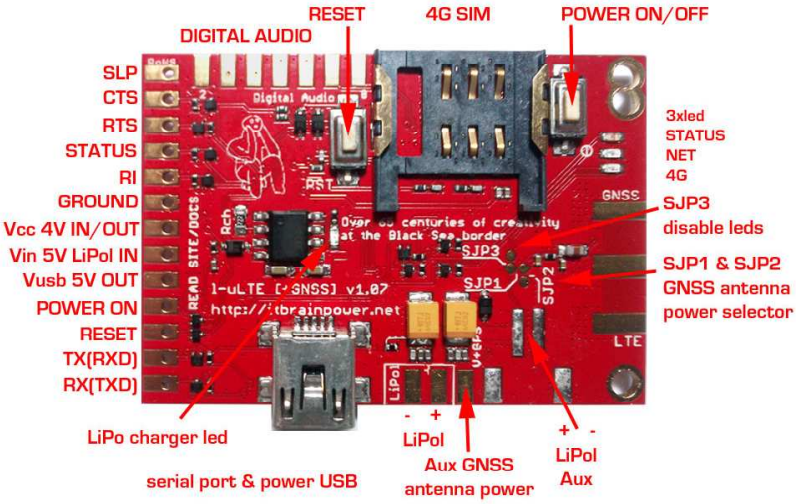
In the bottom edge of the top PCB side, left to right:

1. RESET SWITCH - 4G SHIELD RESET
2. SIM SOCKET - STANDARD SIZE 1.8-3V, 4G SIM/USIM supported
3. POWER ON/OFF SWITCH - 4G SHIELD POWER ON / OFF

USB PORT, LiPO battery & AUX GNSS POWER

In the bottom PCB side, left to right:

1. USB PORT - mini USB type B - 4G SHIELD POWERING and SERIAL to USB bridge adapter
2. LiPol - connect - pole of the LiPo battery [GND]
3. LiPol - connect + pole of the LiPo battery
4. Auxiliary GNSS antenna power - may connect the positive pole of aux power supply for the GNSS antenna powering.
5. Auxiliary LiPol - connect + pole of the LiPo battery
6. Auxiliary LiPol - connect - pole of the LiPo battery [GND]



4G [LTE] SHIELD l-LTE v 1.07 top PCB view

Arduino /Raspberry PI logical interfacing

l-LTE shield PIN NAME	UNO / MINI / NANO / (Mega328)	MEGA2560 using software serial	DUE / MEGA2560 using hardware serial	Raspberry PI B+, Raspberry PI II, Raspberry PI 3
1. RX(TXD)	D3	D3	D18(TX1)	PIN10 RXD0 *
2. TX(RXD)	D2	D10	D19(RX1)	PIN08 TXD0 *
3. RESET	D6	D6	D6	PIN18
4. POWER ON	D7	D7	D7	PIN16
6. Vin (5V LiPol)**	+5V	+5V	+5V	PIN02 or 04
8. GND	GND	GND	GND	PIN04 or 14
10. STATUS	D5	D5	D5	PIN 12

* Raspberry PI: do not wire 1 and 2 (serial TX and RX) if USB communication is used!

Raspberry PI interfacing schema: http://itbrainpower.net/images/4G-SHIELD-RPI-logical-wiring-l-LTE.png

BeagleBone logical interfacing

Read: http://itbrainpower.net/a-gsm/BBB-gsm-how-to [BeagleBone Black and ITBP modular modem interfacing how to]

CODE EXAMPLES and UTILITIES:

Arduino code examples [C], Raspberry PI and BeagleBone code examples [PYTHON] and Raspberry PI and BeagleBone [Debian distribution] PPP:
http://itbrainpower.net/4G-shield-modular-modem-l-LTE/resources#CODE%20EXAMPLES
and
http://itbrainpower.net/downloads#l-LTE

Additional info, documentation and how to:
http://itbrainpower.net/4G-shield-modular-modem-l-LTE/features
http://itbrainpower.net/4G-shield-modular-modem-l-LTE/resources
http://itbrainpower.net/a-gsm/gsm-shield-Arduino-RaspberryPI-projects