MOD-GSM-EDGE development board
Users Manual

All boards produced by Olimex are ROHS compliant

Pb-free, Green

Rev. B, July 2012

INTRODUCTION

MOD-GSM-EDGE, connected to other Olimex board with UEXT connector is excellent choice for adding remote monitoring and control in remote places by GSM cellular network. Depending on the features of the other board, for example, you can transfer digital data, measure analog values, connect to internet by GSM network. MOD-GSM-EDGE can be connected to computer via on-board mini USB connector. Also the board can work in standalone mode, but only when the SIM card is without PIN code. In standalone mode MOD-GSM-EDGE requires usage of AT commands. It can receive information by GSM network, but if you want to operate with this information, you will need appropriate board with UEXT connected to MOD-GSM-EDGE. Choose the other board depending on the application you want to have. MOD-GSM-EDGE contains SIM700D - quad-band GSM GPRS/EDGE module 850/900/1800/1900Mhz inside which covers most used GSM networks around the world. SIM700D supports EDGE protocol which assures faster data transfer. The GSM antenna is built in the board so no need for external expensive GSM antennas.

BOARD FEATURES

- SIM700D - GSM/GPRS/EDGE quad-band MODULE 850/900/1800/1900Mhz with build on-board GSM cellular antenna
- Li-ion backup battery 3.7 V 1200mA for up to 200 hours of GSM module stand-by
- SIM-card holder
- USB mini interface
- Status LED
- On-GSM module temperature sensor
- UEXT connector
- PWR_EXT connector
- PWRKEY button
- On-board DC-DC converter for standalone mode and battery charger
- PCB: FR-4, 1 mm (0,039"), solder mask, silkscreen component print
- Dimensions: 79.2x57.6 mm (3.118x2.268")

ELECTROSTATIC WARNING

The MOD-GSM-EDGE board is shipped in protective anti-static packaging. The board must not be subject to high electrostatic potentials. General practice for working with static sensitive devices should be applied when working with this board.

BOARD USE REQUIREMENTS

Hardware: 12V, 800mA Power Supply, if you want to recharge the battery.
 An Olimex board with UEXT.
Mini USB cable.

Important: If your board does not work, first try to charge the battery as you power supply the board for few hours.
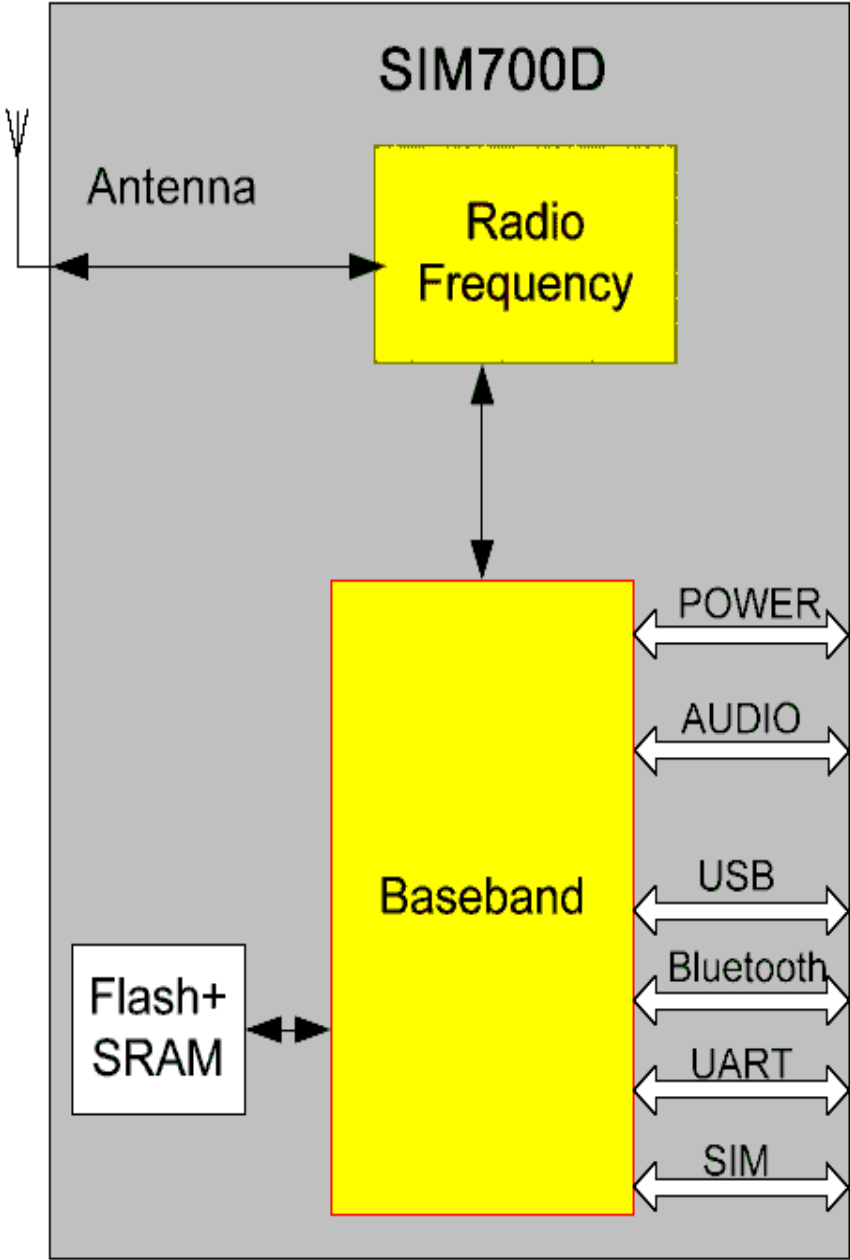
MODULE FEATURES

– Power Supply – Single Supply voltage 3.4V – 4.5V

– Power saving – Typical power consumption in SLEEP mode (BS-PA-MFRMS=5) is 4mA

– Frequency bands:

    – Quad-band: GSM 850, GSM 900, DCS 1800, PCS 1900.

    – Compliant to GSM Phase 2/2+

– GSM class – Small MS

– Transmit Power

  – GMSK:
    – Class 4 (2W)@GSM850/GSM900
    – Class 1 (1W)@DCS1800/PCS1900
  – 8PSK:

    – Class E2 (0.5)@GSM850/GSM900

    – Class E2 (0.4W)@DCS1800/PCS1900

– GPRS connectivity

    – Multi-slot class 12

    – Coding scheme: CS1~4

    – Mobile station class B

– EDGE connectivity

    – Multi-slot class 12

    – Modulation and coding scheme: MCS1~9

    – Mobile station class B

– DATA transfer

    – CSD: up to 9.6kbps, support non-transparent and transparent mode

    – GPRS: downlink max: 85.6kbps; uplink max: 85.6kbps

    – EDGE: downlink max: 236.8kbps; uplink max: 236.8kbps

    – Coding scheme: CS1~4, MCS1~9

    – Support PBCCH

    – Support USSD

– TCP/IP protocol stack – Access by AT commands

– Temperature range

    – Normal operation: -20ºC to +60ºC

    – Restricted operation: -30ºC to -20ºC and +60ºC to +80ºC [1]

    – Storage temperature: -40ºC to +85ºC

– SIM interface – Support SIM card: 3V and 1.8V

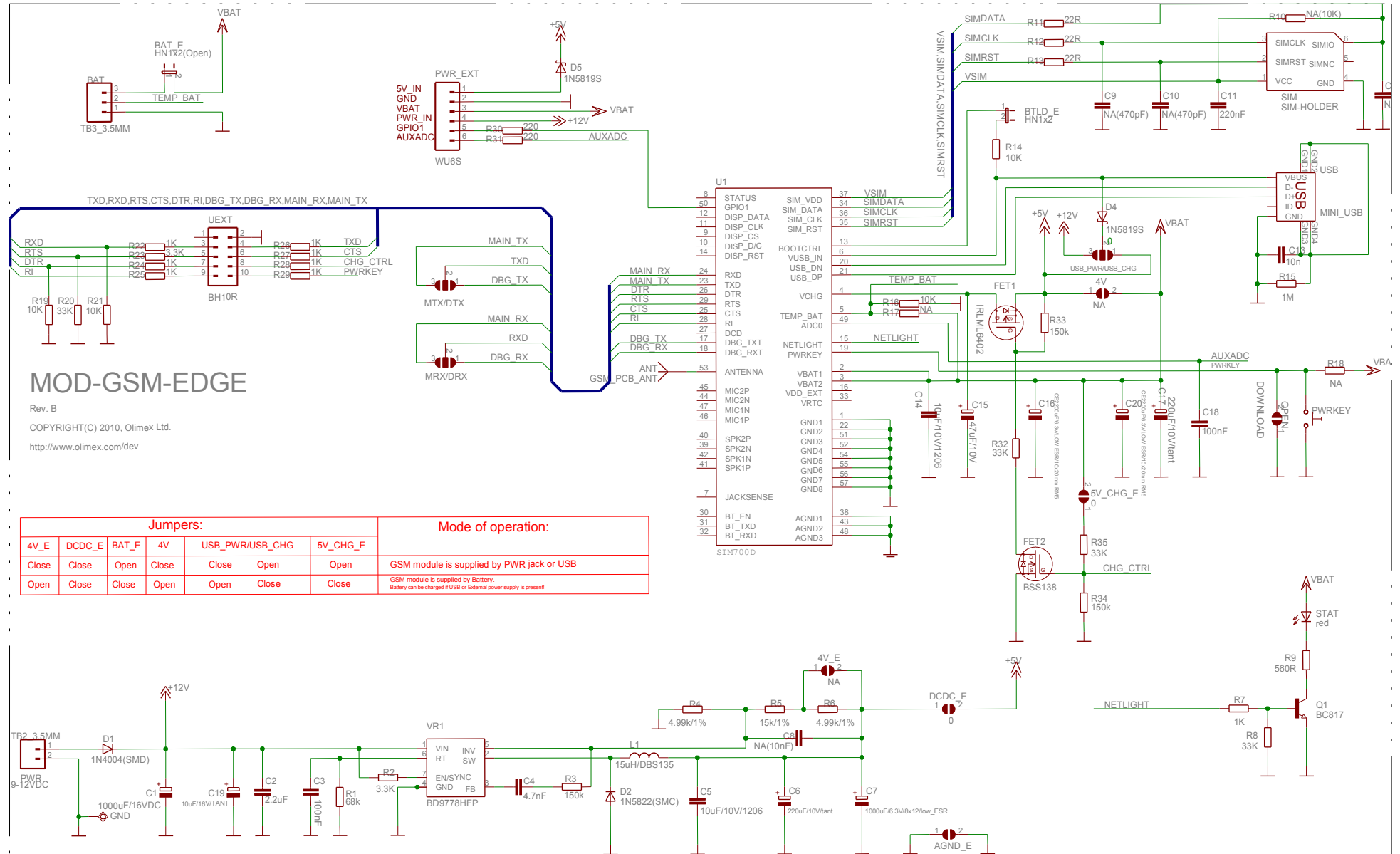– External antenna – connected via 50 Ohm antenna pad

- Audio features
  - Speech codec modes:
    - Half Rate (ETS 06.20)
    - Full Rate (ETS 06.10)
    - Enhanced Full Rate (ETS 06.50/06.60/06.80)
    - Echo Cancellation
    - Noise reduction
    - AMR
- Main serial port
  - Seven lines on Main serial Port
  - CSD FAX, GPRS/EDGE services
  - AT commands of controlling module
  - Multiplexing function
  - Autobauding baud rate
- USB interface – support an USB 2.0 Full Speed (12Mbit/s) device interface
- Phonebook management – support phonebook types: SM, LD, MC, RC, ME, ON, VM, LA, DC, SD, FD, BN
- SIM Application Toolkit – support SAT class 3, GSM 11.14 Release 99
- Real Time clock – implemented
- Timer function – Programmable via AT commands
- Physical characteristics
  - Size: 43.5x26x2.9 mm
  - Weight: 7g
- Firmware upgrade – via main serial port or USB interface

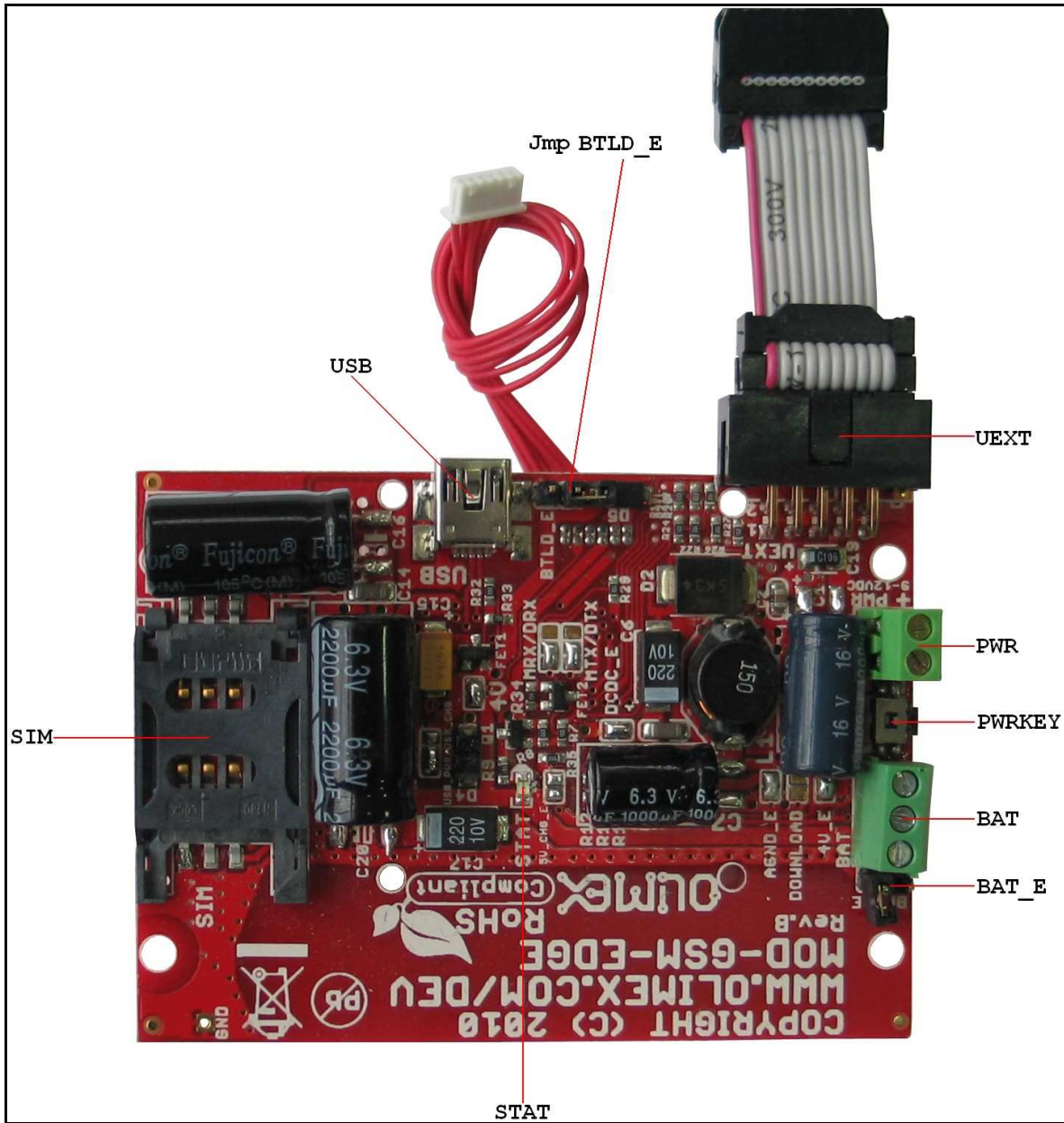(1) SIM700D works, but deviations from GSM specification may cause errors.
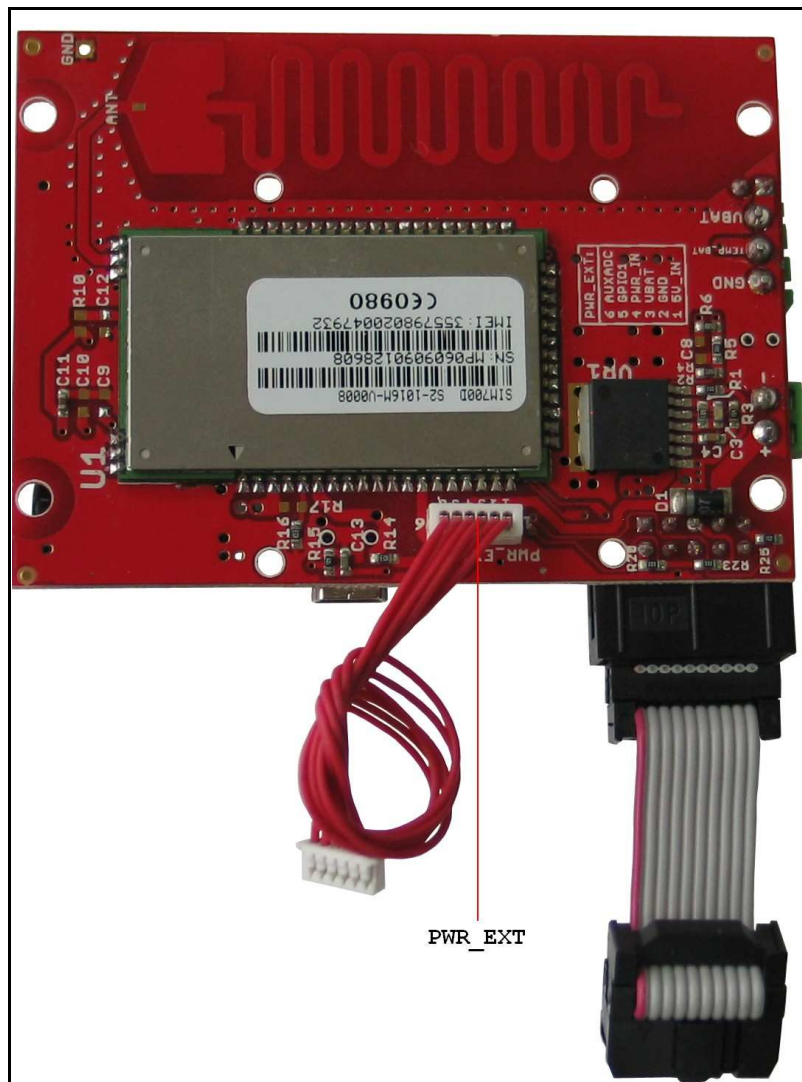
FUNCTIONAL DIAGRAM

SCHEMATIC

MOD-GSM-EDGE

Rev. B

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U1 — SIM700D

BAT_E HN1x2(Open)

BAT / TB3_3.5MM — TEMP_BAT / VBAT

PWR_EXT — WU6S
- 1 — 5V_IN
- 2 — GND
- 3 — VBAT — VBAT
- 4 — PWR_IN — +12V
- 5 — GPIO1 — R30 220
- 6 — AUXADC — R31 220 — AUXADC

D5 1N5819S / +5V

TXD,RXD,RTS,CTS,DTR,RI,DBG_TX,DBG_RX,MAIN_RX,MAIN_TX

UEXT — BH10R
- RXD — R22 1K / R26 1K — TXD
- RTS — R23 3.3K / R27 1K — CTS
- DTR — R24 1K / R28 1K — CHG_CTRL
- RI — R25 1K / R29 1K — PWRKEY

R19 10K / R20 33K / R21 10K

MTX/DTX — MAIN_TX — TXD — DBG_TX
MRX/DRX — MAIN_RX — RXD — DBG_RX

GSM_PCB_ANT — ANT

SIM700D pin list:
- 8 STATUS
- 50 GPIO1
- 12 DISP_DATA
- 11 DISP_CLK
- 9 DISP_CS
- 10 DISP_D/C
- 14 DISP_RST
- 24 RXD / MAIN_RX
- 23 TXD / MAIN_TX
- 26 DTR / DTR
- 29 RTS / RTS
- 25 CTS / CTS
- 28 RI / RI
- 27 DCD
- 17 DBG_TXT / DBG_TX
- 18 DBG_RXT / DBG_RX
- 53 ANTENNA
- 45 MIC2P
- 44 MIC2N
- 47 MIC1N
- 46 MIC1P
- 40 SPK2P
- 39 SPK2N
- 42 SPK1N
- 41 SPK1P
- 7 JACKSENSE
- 30 BT_EN
- 31 BT_TXD
- 32 BT_RXD
- 37 SIM_VDD / VSIM
- 34 SIM_DATA / SIMDATA
- 36 SIM_CLK / SIMCLK
- 35 SIM_RST / SIMRST
- 13 BOOTCTRL
- 6 VUSB_IN
- 19 USB_DN
- 20 USB_DP / USB_DP
- 4 VCHG
- 5 ADC0 / TEMP_BAT
- 15 NETLIGHT
- 19 PWRKEY
- 2 VBAT1
- 3 VBAT2
- 16 VDD_EXT
- 33 VRTC
- 1 GND1 / 22 GND2 / 51 GND3 / 52 GND4 / 54 GND5 / 55 GND6 / 56 GND7 / 57 GND8
- 38 AGND1 / 43 AGND2 / 48 AGND3

SIM — SIM-HOLDER
- SIMCLK — R11 22R — SIMCLK — SIMIO
- SIMRST — R12 22R — SIMRST — SIMNC
- VSIM — R13 22R — VCC — GND
- SIMDATA — R10 NA(10K)

C9 NA(470pF) / C10 NA(470pF) / C11 220nF

VSIM,SIMDATA,SIMCLK,SIMRST

BTLD_E HN1x2 / R14 10K

D4 1N5819S / USB_PWR/USB_CHG

USB — MINI_USB
- VBUS / D- / D+ / ID / GND

C13 10n / R15 1M

FET1 IRLML6402 / 4V NA
R16 10K / R17 NA
R33 150k

C14 10uF/10V/1206 / C15 47uF/10V / C16 220uF/6.3V/LOW ESR/10x20mm RM5 / C20 220uF/6.3V/LOW ESR/10x20mm RM5 / C17 220uF/10V/tant / C18 100nF

R32 33K

5V_CHG_E 0

FET2 BSS138 / CHG_CTRL
R35 33K / R34 150k

AUXADC / PWRKEY / R18 NA — VBAT

DOWNLOAD / OPEN1 / PWRKEY

STAT red / R9 560R / Q1 BC817 / NETLIGHT / R7 1K / R8 33K

Jumpers:

4V_E	DCDC_E	BAT_E	4V	USB_PWR/USB_CHG		5V_CHG_E	Mode of operation:
Close	Close	Open	Close	Close	Open	Open	GSM module is supplied by PWR jack or USB
Open	Close	Close	Open	Open	Close	Close	GSM module is supplied by Battery. Battery can be charged if USB or External power supply is present!

Power supply section:

TB2_3.5MM / PWR 9-12VDC
D1 1N4004(SMD) / +12V
C1 1000uF/16VDC / C19 10uF/16V/TANT / C2 2.2uF / C3 100nF / R1 68k / R2 3.3K

VR1 — BD9778HFP
- VIN / RT / EN/SYNC / GND — INV / SW / FB

C4 4.7nF / R3 150k / D2 1N5822(SMC)

L1 15uH/DBS135

4V_E NA / R4 4.99k/1% / R5 15k/1% / R6 4.99k/1% / DCDC_E 0 / +5V

C8 NA(10nF)

C5 10uF/10V/1206 / C6 220uF/10V/tant / C7 1000uF/6.3V/8x12/low_ESR

AGND_E

BOARD LAYOUT

PWR_EXT

POWER SUPPLY CIRCUIT

The MOD-GSM-EDGE board may be supplied in different ways:

1. External power supply (+9 – 12VDC), or USB power supply without using the internal backup battery.
   The module is powered only from external 12V and the battery is not connected. In this case:
   – jumper BAT_E must be open
   – jumper 4V_E must be closed
   – jumper 4V must be closed
   – jumper 5V_CHG_E must be open.
   – USB_PWR/USB_CHG must be in position USB_PWR
   – DCDC_E must be closed
   – BTLD_E must be open
   Power consumption in this mode is:
   – Up to 70mA when during conversation.
   – Around 20mA in normal mode (no conversation in progress).

   Important: 4V_E, 4V and 5V_CHG_E jumpers have to be moved together.

2. Power from +12VDC with backup battery.
   The module is powered with battery and allows battery charging. In this case:
   – jumper BAT_E must be closed
   – jumper 4V_E must be open
   – jumper 4V must be open
   – jumper 5V_CHG_E must be closed
   – USB_PWR/USB_CHG must be in position USB_CHG
   – DCDC_E must be closed
   – BTLD_E must be open
   – Power consumption in this mode:
   Depends on live of the battery and vary from 270mA to 330mA (related to external power supply). If we supply the module only via the battery, without external power supply, the current through the battery is between 12mA and 18mA when GSM is connected to the network (stat led blinks with frequency ~ 0.25Hz) if there is no conversation in progress, and between 60mA to 180mA during conversation.

CONNECTOR DESCRIPTIONS
UEXT

Pin #	Signal Name
1	NC
2	GND
3	RXD
4	TXD
5	RTS
6	CTS
7	DTR
8	CHG_CTRL
9	RI
10	PWRKEY
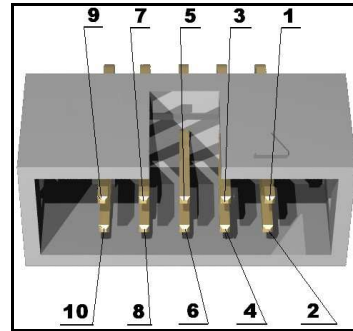
This connector allows connecting to other Olimex boards with UEXT connector.

SIM-CARD

Pin #	Signal Name
1	VSIM
2	SIMRST
3	SIMCLK
4	GND
5	NC
6	SIMDATA
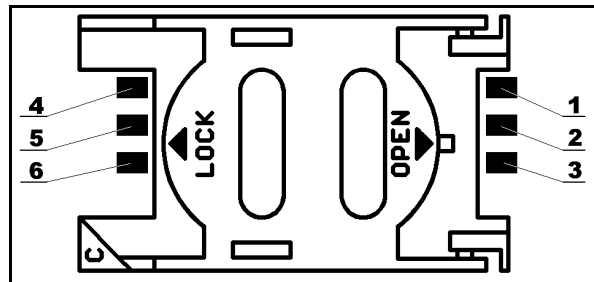
This is standard SIM card connector, to operate MOD-GSM-EDGE should have inserted valid SIM card for your operator network.

PWR-CON

Pin #	Signal Name
1	+12V
2	GND
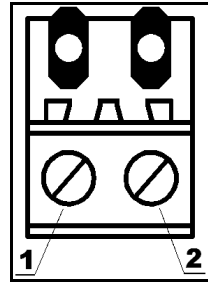
This connector is used to power the MOD-GSM-EDGE. External (+9-12VDC) power source have to be applied to this pins.

PWR_EXT

Pin #	Signal Name	Description
1	5V_IN	5V input for battery recharge
2	GND	Ground
3	VBAT	Output – for power supplying other devices from the GSM battery
4	PWR_IN	Optional input for external power supply
5	GPIO1	Doesn't work
6	AUXADC	Input for analog signal
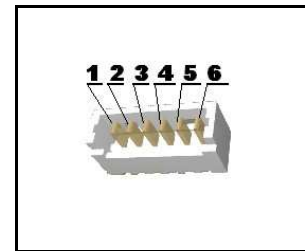
BAT

Pin #	Signal Name
1	GND
2	TEMP_BAT
3	Via jmp BAT_E to VBAT
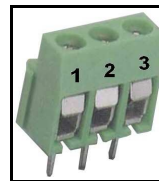
Note: The battery doesn't support TEMP_BAT.

USB

Pin #	Signal Name
1	VUSB_IN
2	USB_DN
3	USB_DP
4	NC
5	GND
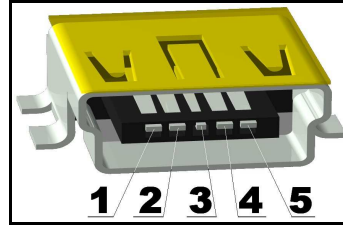
JUMPER DESCRIPTION

BAT_E

Connects 3.7V Li-ion battery to the GSM module. Default state is open to not drain the battery during stocking the modules.

Default state – open.

BTLD_E

When SIM700D firmware needs to be updated, the jumper should be closed before SIM700D powers up and the BOOTCTRL pin is pulled up to VBUS, and USB download mode is selected. Then SIM700D firmware could be updated through the USB PORT.

If USB download mode is used, there is a popup dialog window on the computer screen when SIM700D powers up first. Users need to install the USB driver manually. So the SIM700D couldn't provide the AUTORUN function.

Default state is open.

4V_E

This jumper is used when power the module without battery. When connected enable 4V to the DCDC output.

Default state – open.

4V

This jumper is used when powering the module without battery. When connected the jumper enables 4V to VBAT power pins of SIM700D module.

Default state – open.

5V_CHG_E

This jumper is used when the battery is present and allows battery charging. Connects the DCDC converter output (5V or 4V according 4V_E jumper state) to VCHG power pin of SIM700D module.

Default state closed

Important: 4V_E, 4V and 5V_CHG_E jumpers have to be moved together.

Do not plug in external +12V if BAT_E jumper is open!

DCDC_E

Enable DCDC. Connect DCDC output (5V or 4V according 4V_E jumper state) to the module.

Default state closed

Download

When the jumper is closed SIM700D firmware upgrade is allowed.

Default state – open

MTX/DTX

The MainTX/DebugTX defines whether Main TX terminal or Debug TX terminal of SIM700D module is connected to FT232RL virtual com port driver.

Default state is DTX

MRX/DRX

The MainRX/DebugRX define whether Main RX terminal or Debug RX terminal of SIM700D module is connected to FT232RL virtual com port driver.

Default state is DRX

AGND_E

Enable board analog ground.

Default state is closed

USB_PWR_E

Enable USB +5 V power supply.
Default state is closed

INPUT/OUTPUT

PWRKEY button – turns on the MOD-GSM-EDGE module. You can turn on the SIM700D by driving the PWRKEY to a low level voltage for period time from 500mS to 1S

Status LED (red) with name **STAT** – indicates the state of SIM700D module.
STAT is off state - SIM700D is not running
64ms On/ 800ms Off - SIM700D does not find the network
64ms On/ 3000ms Off - SIM700D find the network
64ms On/ 300ms Off - GPRS communication

IMPORTANT NOTE ABOUT THE UEXT

If MOD-GSM doesn't transmit properly data on the UEXT of another Olimex board, it might be because some other boards can interfere with MOD-GSM's signals. If the host board has any signal on the I2C and/or the SPI on the UEXT there is very high chance of erroneous behavior.

There are two workarounds:

1. Cut the UEXT cable wires 5,6,7,8,9,10. Only wires 1,2,3,4 (NC, GND, RXD, TXD) should remain.

OR

2. Remove resistors R23, R24, R25, R27, R28, R29

MECHANICAL DIMENSIONS
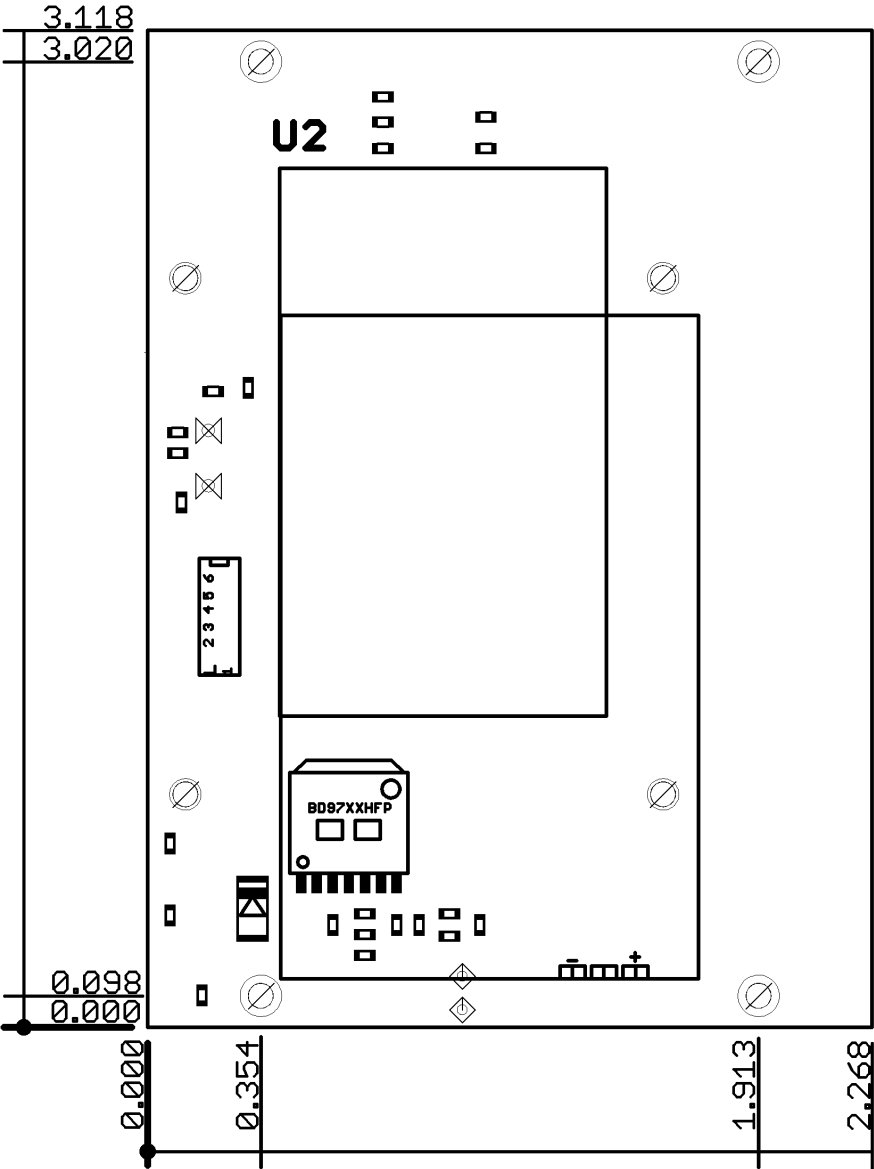
All measures are in inches.

AVAILABLE DEMO SOFTWARE

- [EW-ARM Demo code for MOD-GSM and MOD-GSM-EDGE (high speed) GSM modules](#) connected to STM32-LCD board by Olimex.

ORDER CODE

MOD-GSM-EDGE assembled and tested.

How to order?
You can order to us directly or by any of our distributors.
Check our web www.olimex.com/dev for more info.

All boards produced by Olimex are ROHS compliant

Revision history:

Board's revision: REV. B   - created July 2010

Manual's revision: REV. Initial   - created March 2011
                                      REV. B   - July 2012