



TELTONIKA

Development KIT



Development KIT for TM2 GSM/GPRS modem User's manual 1.2



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Attention!



Do not rip the device. Do not touch the device if the device block is broken or his connecting wires are without isolation.



All wireless devices for data transferring may be susceptible to interference, which could affect performance.



Only qualified personnel may install or repair this product



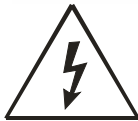
Use only in normal projected position. Don't touch the antenna unnecessarily.



Pay attention the device is connected to $\sim 220V$ high voltage supply network.



Your device is not water-resistant. Keep it dry.



Do not mount or serve device during a thunderbolt.



1. Basic Safety Requirements

In this document you will be introduced how to use the **“Development KIT for TM2 GPRS modem”** device safely. You will avoid dangerous situations and harming of yourself if you stick to these recommendations. You have to be familiar with the safety requirements before starting using the device!

To avoid burning and voltage caused traumas, of the personnel working with device, please follow these safety requirements.



Installation and technical support of the device can be performed only by a qualified personnel or a person who has enough knowledge about this device and safety requirements.

The device requires 9V $\overline{\text{DC}}$ power supply. The PC, to which the device **“Development KIT for TM2 GPRS modem“** is to be connected must have a RS232 or USB port applied to USB 1.1 or USB 2.0 standards. Nominal power supply voltage is 9V $\overline{\text{DC}}$. Available power supply source range is – 6V...15V $\overline{\text{DC}}$, power up to 300 mW.



The PC and power supply source, to which the device „Development KIT for TM2 GPRS modem“ is connected, should satisfy LST EN 60950 standard. The device can be used on first (Personal Computer) or second (Notebook) computer safety class.

To avoid mechanical damage of the device, it is recommended to transport the device packed in damage-proof pack. While using the device, it should be placed so, that its indication diodes would be visible as they inform in which working mode the device is and if it has any working problems.

In the installation place and supply circuits should be tool up protective devices (bipolar release device) which will protect the device from short-circuit and wrong ground installation. The power of connected device should satisfy the power of released device. The interstice between contacts should not be less than 3mm. Power supply network should be installed near device on easily accessible place.

If the device starts working insufficiently only qualified personnel may repair this product. We recommend to dismantle the device and forward it to repair centre or to manufacturers. No exchangeable parts inside of the device.



2. General Information

2.1 Introduction

“**Development KIT for TM2 GPRS modem**” is a device designed for testing TM2 GPRS module features and functionality. The design of this board enables the connection to your PC through RS232 or USB interface. Once the board is connected to the PC, you can get access to the TM2 module. Using AT commands you can test the functionality, such as writing SMS, making call or even sending DATA through GPRS.

2.2 About this document

This document describes “**Development KIT for TM2 GPRS modem**” hardware, quick guide, plug-in and operation. It should help board users to deploy the product.

2.3 Legal notice

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Other product and company names mentioned herein may be trademarks or trade names of their respective owners.

2.4 Contacts

If you encounter any problems when using our products, and can not solve them by yourself, please contact our technical support by writing an e-mail to support@teltonika.lt . We will be pleased to help you.

2.5 Acronyms

GPRS	General Packet Ratio Service
SIM	Subscriber Identity Module
USB	Universal Serial Bus
SMS	Short Message Service
GSM	Global System for Mobile



3. Package Contents

“Development KIT for TM2 GPRS modem“ is packed in carton box and contains all the accessories, needed for normal operation:

1. Carton box.
2. CD with User’s guide, schematics and software
3. Development KIT for TM2 GPRS modem device.
4. TM2 GPRS modem device
5. External GSM antenna
6. Serial cable
7. USB A ↔ USB B cable
8. AC/DC adapter

Note: the manufacturer does not provide SIM card, which is necessary for connecting to the GSM network! SIM card can be obtained from your GSM operator!

If any of the components is missing from your package, please contact manufacturer’s representative or reseller. (www.teltonika.lt)

4. Technical Specifications

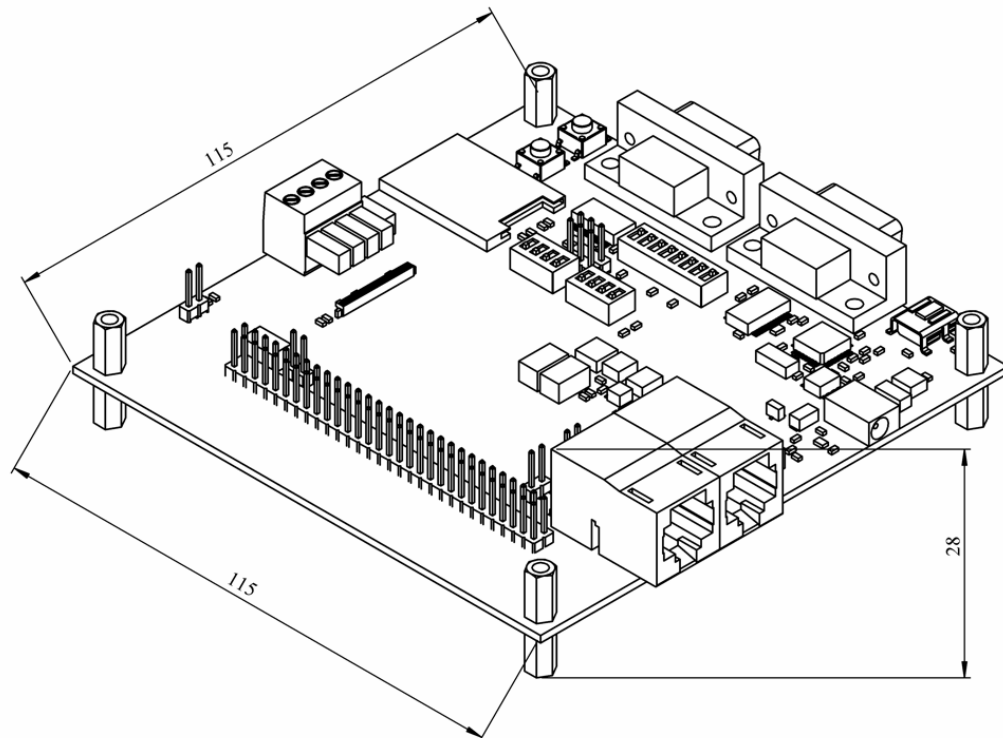
Data transfer

“**Development KIT for TM2 GPRS modem**“ supports below write bearers of GSM Network. Which data type is used depends on GSM operator and data transfer capacity in the chosen GSM Network.

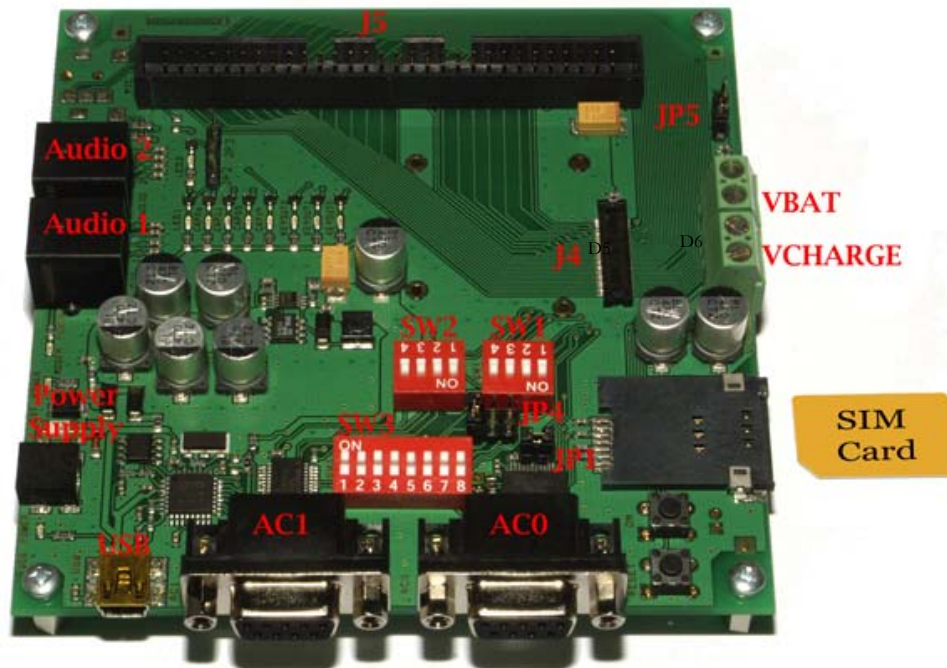
- GPRS class 10 (class B).
- CSD.
- CSF.
- SMS textual messages.

Mechanical characteristics

Device dimensions and general view is provided in Picture 6.2.1.



Pic 6.2.1 Development KIT for TM2 GPRS modem



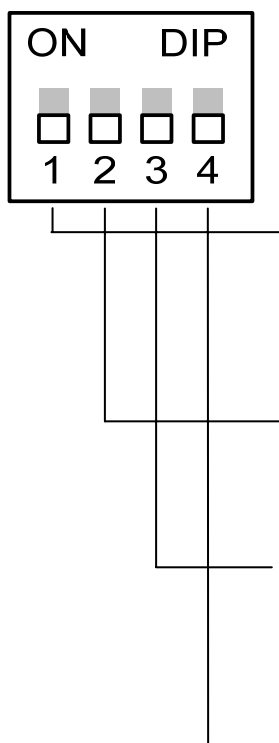
Picture 4.1. TM2 development board

AC0	Serial interface 0
AC1	Serial interface 1
USB	USB interface
Power Supply	Power Supply +9V
Audio 1	Audio interface not amplified
Audio 2	Audio interface amplified
J4	TM2 modem socket
J5	Socket isvadas
SW1 and SW2	Serial interface control switch
SW3	USB interface control switch
JP1	Serial interface enable/disable jumper
JP4	DSR signal jumper
JP5	Modem power supply jumper
VBAT	Connection of external battery
VCHARGE	Connection of charger for battery



4.1 Switchers

Switcher – SW1



1 (DCD) Data carrier detect (ON/OFF). If switcher 1 is ON, then TM2 module asynchronous serial interface output port is connected to peripheral devices through RS232 (AC0) and USB¹ ports. Otherwise, it is disconnected.

2 (RI) Ring indicator (ON/OFF). If switcher 2 is ON, then TM2 module ring indicator output port is connected with peripheral devices through RS232 (AC0) and USB² ports. Otherwise, it is disconnected.

3 (DTR) Data terminal ready (ON/OFF). If switcher 3 is ON, then TM2 module asynchronous serial interface output port is connected to peripheral devices through RS232 (AC0) and USB³ ports. Otherwise, it is disconnected.

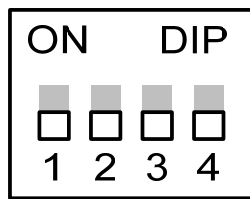
4 (DSR) Data set ready (ON/OFF). If switcher 4 is ON, then TM2 module asynchronous serial interface output port sending signal about controller data setup is connected with jumper TC 3 pin. Otherwise, it is disconnected.

¹ If switcher line – JLC, 7 switcher is OFF, then data interface output port is connected or disconnected with peripheral devices only through RS232 (J2) port.

² If switcher line – JLC, 8 switcher is OFF, then data interface output port is connected or disconnected with peripheral devices only through RS232 (J2) port.



Switcher – SW2



1 (CTS) Clear to send (ON/OFF). If switcher 3 is ON, then TM2 module clear to send port input is connected to peripheral devices through RS232 (AC0). Otherwise, it is disconnected.

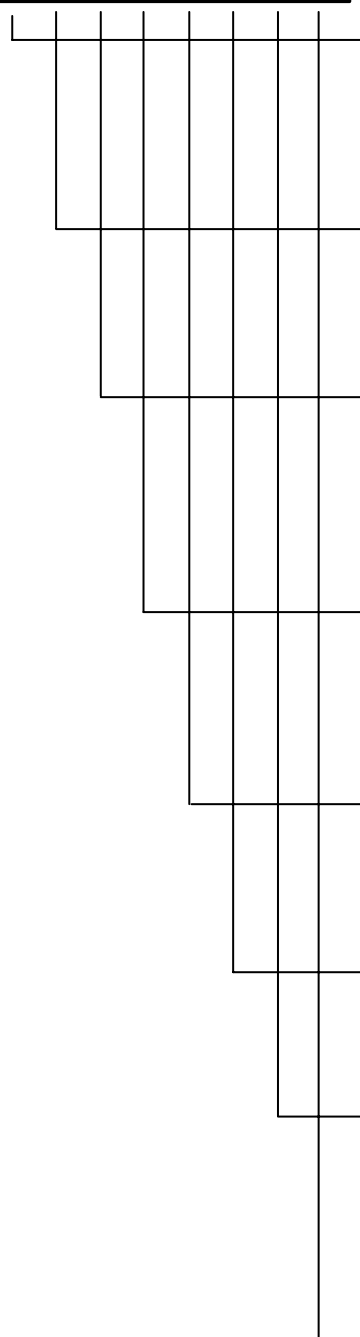
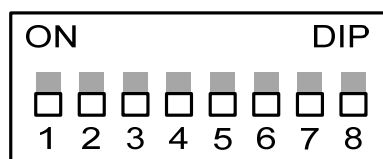
2 (RTS) Request to send to TM2 module (ON/OFF). If switcher 4 is (ON), then data transmit request to TM2 module output port is connected to peripheral devices through RS232 (AC0). Otherwise, it is disconnected.

3 (TXD) Transmitting data (ON/OFF). If switcher 1 is ON, then TM2 module asynchronous serial interface output port is connected to peripheral devices through RS232 (AC1). Otherwise, it is disconnected.

4 (RXD) Receiving data (ON/OFF). If switcher 3 is ON, then TM2 module asynchronous serial interface input port is connected to peripheral devices through RS232 (AC1). Otherwise, it is disconnected.



Switcher – SW3



1 (RXD) Receiving serial data (ON/OFF). If switcher 1 is ON, then TM2 module receiving serial data output is connected to peripheral devices through USB port. Otherwise, it is disconnected.

2 (TXD) Transmitting serial data (ON/OFF). If switcher 2 is ON, then TM2 module transmitting serial data output is connected to peripheral devices through USB port. Otherwise, it is disconnected.

3 (CTS) Clear to send (ON/OFF). If switcher 3 is ON, then TM2 module clear to send port input is connected to peripheral devices through USB port. Otherwise, it is disconnected.

4 (RTS) Request to send to TM2 module (ON/OFF). If switcher 4 is (ON), then data transmit request to TM2 module output port is connected to peripheral devices through USB port. Otherwise, it is disconnected.

5 (DTR)³ Data terminal ready (ON/OFF). If switcher 5 is ON, then TM2 module asynchronous serial interface input port is connected to peripheral devices through USB port. Otherwise, it is disconnected.

6 (DSR) Data set ready (ON/OFF). If switcher 6 is (ON), then peripheral devices are connected to jumper TC 2 pin through USB port. Otherwise, it is disconnected.

7 (DCD)⁴ Data carrier detect (ON/OFF). If switcher 7 is ON, then TM2 module asynchronous serial interface output port is connected to peripheral devices through USB port. Otherwise, it is disconnected.

8 (RI) Ring indicator (ON/OFF). If switcher 8 is ON, then TM2 module ring indicator output port is connected to peripheral devices through RS232⁵ (AC0) and USB ports. Otherwise, it is disconnected.

³ Switcher 3 must be ON for USB interface to be connected to switcher line JLA.

⁴ Switcher 1 must be ON for USB interface to be connected to switcher line JLA.

⁵ Switcher 2 must be ON for USB interface to be connected to switcher line JLA.



4.2 Jumpers

Jumper ports are numbered from left to right. The first jumper port is marked by a square and crossed upper left corner.

Jumper – JP1



If jumper is stored, then serial port AC0 will be enabled, USB will be disabled. Then jumper is not stored USB port is enabled, AC0 is disabled.

Jumper – JP2



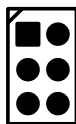
If jumper is stored, then indicator D5 shows incoming signal from TM2 module. If D5 indicator light is on, then TM2 module sends high voltage level. Otherwise, the level is low.

Jumper – JP3



If jumper is stored, then indicator D6 shows incoming signal from TM2 module. If D6 indicator light is on, then TM2 module sends high voltage level. Otherwise, the level is low.

Jumper – JP4



When jumpers TC ports 1 and 2 are stored, DSR signal will be connected to RS232 (J2) and USB ports. When jumper TC ports 3 and 4 are stored, DSR signal will be connected to +3.8V. When jumper TC ports 5 and 6 are stored, DSR signal will be connected to GND.

Jumper – JP5



Store 1-2 to connect TM2 module power to +3.8V
Store 2-3 to connect TM2 module power to GND

Jumper – JP7



Store JP7 to connect Vbat and Vcharge.

Connector - J5



6.5.1 Pic. General view of J5 connector

6.5.1 Table. Port description of J5 connector

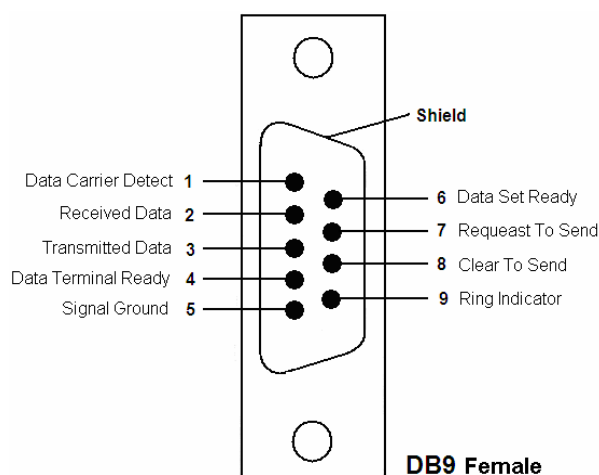
Pin.Nr.	I/O type	Function	Description
1	From 3.3 to 4.3 V (Typ: 3.8 V)	GSM Power Supply	Should be connected with pins 3, 5, 7
2	Ground	GSM Power Supply	Should be connected with pins 4, 6, 8
3	From 3.3 to 4.3 V (Typ: 3.8 V)	GSM Power Supply	Should be connected with pins 1, 5, 7
4	Ground	GSM Power Supply	Should be connected with pins 2, 6, 8
5	From 3.3 to 4.3 V (Typ: 3.8 V)	GSM Power Supply	Should be connected with pins 1, 3, 7
6	Ground	GSM Power Supply	Should be connected with pins 2, 4, 8
7	From 3.3 to 4.3 V (Typ: 3.8 V)	GSM Power Supply	Should be connected with pins 1, 3, 5
8	Ground	GSM Power Supply	Should be connected with pins 2, 4, 6
9	0 - 12V (Typ: 6V) Current limited to 600 mA	GSM Power Supply	Should be connected with pins 11
10	CMOS 3.3V compatible	Asynchronous Serial Interface 0	Data Carrier Detect
11	0 - 12V (Typ: 6V) Current limited to 600 mA	GSM Power Supply	Should be connected with pin 9
12	CMOS 3.3V compatible	Asynchronous Serial Interface	Data Terminal Ready
13	Supply 1.8V-3.3V	SIM interface	SIM power supply
14	CMOS 3.3V compatible	Asynchronous Serial Interface 0	Clear To Send
15	CMOS 3.3V compatible	SIM interface	SIM I/O serial data
16	CMOS 3.3V compatible	Asynchronous Serial Interface 0	Request to Send
17	CMOS 3.3V compatible	SIM interface	SIM clock signal
18	CMOS 3.3V compatible	Asynchronous Serial Interface 0	Receive Serial Data
19	CMOS 3.3V compatible	SIM interface	SIM reset signal
20	CMOS 3.3V compatible	Asynchronous Serial Interface 0	Transmit Serial Data
21	CMOS 3.3V compatible	Synchronous Serial Interface (SPI compatible)	Master Receive Slave Transmit
22	CMOS 3.3V compatible	Asynchronous Serial Interface 0	Ring Indicator
23	CMOS 3.3V compatible	Synchronous Serial Interface (SPI compatible)	Master Transmit Slave Receive
24	CMOS 3.3V compatible	Asynchronous Serial Interface 0	Data Set Ready
25	CMOS 3.3V compatible	Synchronous Serial Interface (SPI compatible)	Shift Clock
26	CMOS 3.3V compatible	Asynchronous Serial Interface 1	Receive Serial Data
27	CMOS 3.3V compatible	I2C bus interface	Serial Clock Line
28	CMOS 3.3V compatible	Asynchronous Serial Interface 1	Transmit Serial Data
29	CMOS 3.3V compatible	I2C bus interface	Serial Data Line
30	CMOS 3.3V compatible	Keypad interface / GPIO	Keypad output pin 0 / GPIO00
31	CMOS 3.3V compatible	Digital Audio Interface	DAI Clock
32	CMOS 3.3V compatible	Keypad interface / GPIO	Keypad output pin 1 / GPIO50
33	CMOS 3.3V compatible	Digital Audio Interface	DAI Receive
34	CMOS 3.3V compatible	Keypad interface /GPIO	Keypad output pin 2 / GPIO01
35	CMOS 3.3V compatible	Digital Audio Interface	DAI Transmit



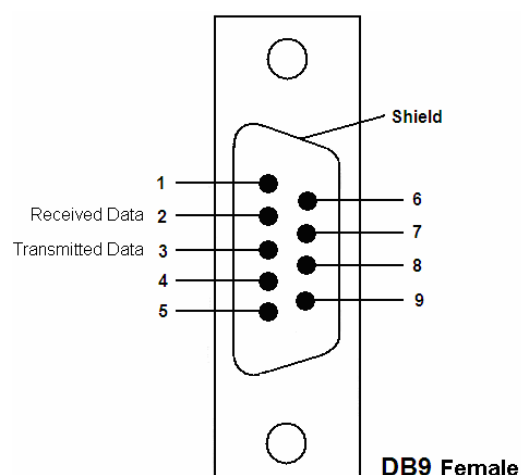
Pin.Nr.	I/O type	Function	Description
36	CMOS 3.3V compatible	Keypad interface /GPIO	Keypad output pin 3 /GPIO02
37	CMOS 3.3V compatible	Digital Audio Interface	DAI Reset
38	CMOS 3.3V compatible	Keypad interface /GPIO	Keypad output pin 4 /GPIO03
39	CMOS 3.3V compatible	External reset	External HW reset
40	CMOS 3.3V compatible	Keypad interface / GPIO	Keypad output pin 5 /GPIO04
41	Analog	Audio Interface	Handset microphone reference
42	CMOS 3.3V compatible	Keypad interface / GPIO	Keypad input pin 0 /GPIO05
43	Analog	Audio Interface	Handset microphone bias
44	CMOS 3.3V compatible	Keypad interface / GPIO	Keypad input pin 1 /GPIO06
45	Analog	Audio Interface	Balanced audio out
46	CMOS 3.3V compatible	Keypad interface / Power on	Keypad input pin 2 / Power on button /GPIO 07
47	Analog	Audio Interface	Balanced audio out
48	CMOS 3.3V compatible	Keypad interface / GPIO	Keypad input pin 3 / GPIO08
49	Analog	Audio Interface	Handset microphone reference
50	CMOS 3.3V compatible	Capture Compare / GPIO	Capture Compare 19 / PIO47
51	Analog	Audio Interface	Handset microphone bias
52	CMOS 3.3V compatible	Capture Compare / GPIO	Capture Compare 02/ GPIO57
53	Analog	Audio Interface	Balanced power audio out
54	CMOS 3.3V compatible	Capture Compare / GPIO	Capture Compare 05/ GPIO28
55	Analog	Audio Interface	Balanced power audio out
56	CMOS 3.3V compatible	Capture Compare / GPIO	Capture Compare 06/ GPIO30
57	ADC 12bits 0-2.5V	Measurement interface	Analog to Digital Converter
58	CMOS 3.3V compatible	Capture Compare / GPIO / External Interrupt	Capture Compare 00 / GPIO 30 / Ext Int 5B
59	ADC 12bits 0-2.5V	Measurement interface	Analog to Digital Converter
60	CMOS 3.3V compatible	Capture Compare / GPIO / External Interrupt	Capture Compare 22 / GPIO 55 / Ext Int 3

Connectors J1 (BL09) and J2 (BL09)

There are two J1 (BL09) (6.6.1 pic.) and J2 (BL09) (6.6.2 pic.) connectors integrated in test board. Pictures show port numeration and incoming/outgoing signal names.



4.1 Pic. General view of J2 connector



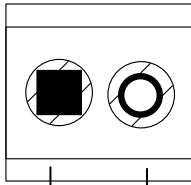
4.2 Pic. General view of J1 connector



4.3 Outlets

Power supply outlet - J10

Outlet ports are numbered from left to right. The first port is marked by a square port.

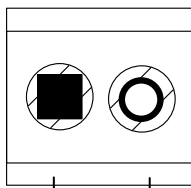


The power supply providing $\approx 0 - 12\text{V}$ (nominal: 9V) 300 mA current and voltage is connected to J10 power supply outlet.

1 Negative voltage power supply wire (-) (GND) is connected to the first power supply outlet port.

2 Positive voltage power supply wire (+) is connected to the second power supply outlet port.

Power supply outlet - J11

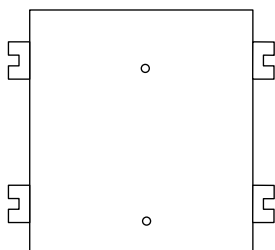


The power supply providing $\approx 3.3 - 4.3\text{ V}$ (Nominal: 3.8 V) voltage is connected to J11 power supply outlet.

1 Negative voltage power supply wire (-) (GND) is connected to the first power supply outlet port.

2 Positive voltage power supply wire (+) is connected to the second power supply outlet port.

Power supply outlet - J3



The power supply providing 6 – 15 V DC voltage is connected to J3 power supply outlet.



4.4 Buttons

Button - S1

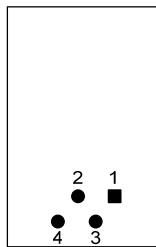
Button - S1 (Reset) – is a TM2 module reset button.

Button – S2

Button – S2 (Power ON) – is a TM2 module power on button. To turn TM2 module on, push S2 button and hold for approximately 2 seconds. To check the modem status – send an AT command. If TM2 module replies, then it is on.

4.5 Audio

Audio 1



Port description:

- 1 – Handset microphone reference.
- 2 – Balanced power audio out.
- 3 – Balanced power audio out.
- 4 – Handset microphone bias.

Audio 2



Port description:

- 1 – Handset microphone reference.
- 2 – Balanced audio out.
- 3 – Balanced audio out.
- 4 – Handset microphone bias

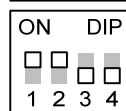
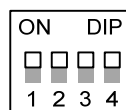


5. How to Start?

5.1 Setting the device to work

Before connecting “Development KIT for TM2 GPRS modem” to PC, make next steps:

1. Set SW1 to 1111
2. Set SW2 to 1100
3. Set SW3 to 00000000
4. Store jumper TC 1-2
5. Store jumper TD (don't store TE)



Connecting to PC

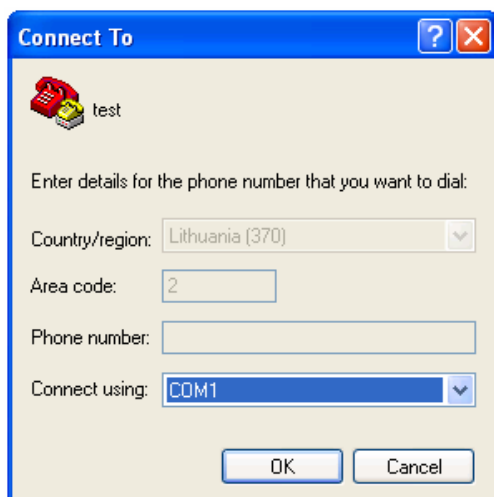
- 1) Turn off your PC;
- 2) Insert the SIM card into modem. Follow the instructions on the device sticker. Make sure, the SIM card is pushed inside till it fixes;
- 3) Insert TM2 GPRS module to the board
- 4) Plug GSM antenna to module
- 5) Plug DB9 connector of the serial (RS232) cable into the board;
- 6) Plug another end of the serial cable to one of the COM ports of PC;
- 7) Plug in the AC/DC adapter to power supply socket of „Development KIT for TM2 GPRS modem“;
- 8) Plug in the AC/DC adapter to power supply network;
- 9) Turn on your PC.

Hyper terminal settings

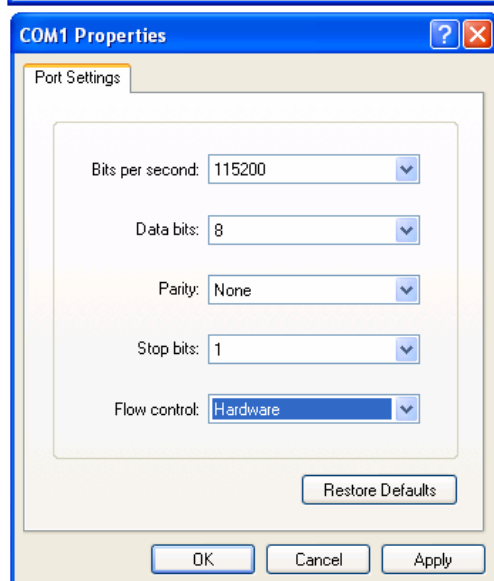
Start Windows Hyper Terminal.



Enter any connection name



Choose communication port to which development board is connected. (COM1, COM2, etc.)



Set the setting

Bits per second= 115200

Data bits= 8

Parity= None

Stop bits= 1

Flow control= **Hardware**

If flow control is set to None, then modem will not wake up immediately.

5.2 AT Commands examples

Registering on the network

AT
OK

AT+CPIN?
+CPIN: READY
or
+CPIN: SIM PIN

Check PIN status
When CPIN: READY you don't need to write PIN number.
When CPIN: SIM PIN, please use next command to write PIN number.

AT+CPIN="xxxx"
OK

Insert the PIN number xxxx ()
To check PIN type "AT+CPIN?"

AT+COPS=0
OK

Register the phone on the network



AT+CREG? +CREG: 0, 1 OK	Verify registration
AT+CSQ +CSQ: 15,95 OK	Check signal intensity
AT+COPS? +COPS: 0, 0, " OPERATOR" OK	Read operator name

Incoming and outgoing calls

ATD(telephone number); OK	After ATD write telephone number without brackets, at the end of the command there must be semicolon.
ATH OK	Hang up
AT+CLIP=1 OK	Activation of caller line ID
RING RING RING	Incoming Call
ATA OK	Answer to Voice Call
ATH OK	Hang up

Incoming and outgoing SMS

AT+CMGS="Telephone number" >SMS text message 12345<CTRL+Z> +CMGS:0 OK	Enter to the text mode
AT+CMGL +CMGL:302,"REC UNREAD", "Telephone number", "06/10/19, 15:45:25+08" SMS text message 12345	List all incoming SMS

6. Technical Support

Troubleshooting

Problem	Solution
TM2 module is not answering after approximately 23s.	This means that Flow Control is set to NONE. Set Flow Control to Hardware (RTS/CTS), in other case only after pressing RESET button (S1) module will response.
TM2 module is not responding to AT commands	Check module power jumper, TD jumper must be stored.

Final notice



The label on the package indicates that before using the product the User's Guide contained in the package must be read and understood.



The label on the package indicates that used electronic and electric equipment should be disposed separately.

If you encounter any problems while using the device and you are not able to solve them yourself, then you are always welcome to contact our technical support department by e-mail support@teltonika.lt. We will be glad to help you.