endrich

3 BIG-MOD

endrich 3-Band IoT Gateway
operation & installation manual



Revision Sheet

3 BIG-MOD

RELEASE NO.	DATE	REVISION DESCRIPTION
Rev. 0	11/02/2021	Initial revision (Marc Friebel)
Rev. 1	01/04/2021	Revision Endrich (Jens Kattenbusch)

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Endrich 3-Band IoT Gateway 3BIG-MOD
operation & installation manual

Hardware and software manual for the Endrich
3BIG-MOD IoT Interface Module V1.0

Endrich Bauelemente Vertriebs GmbH
Seligenstadt / Nagold February 11, 2021

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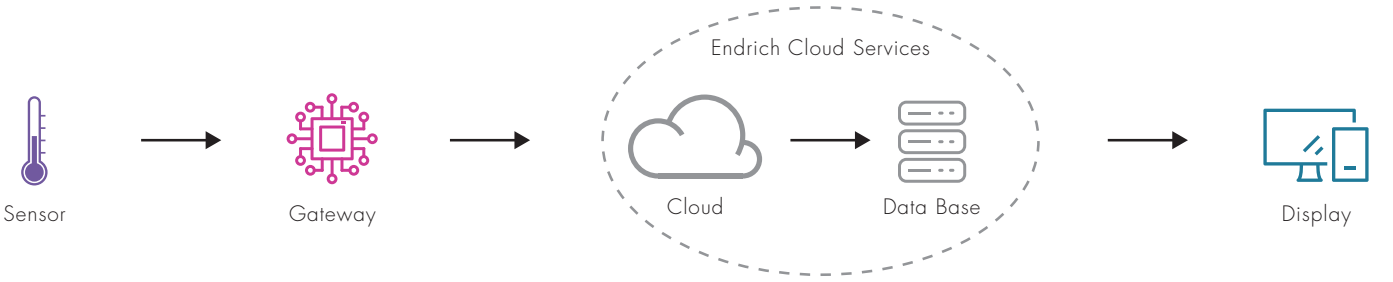
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1.0 GENERAL INFORMATION

1.1 3BIG-MOD IoT Gateway

This document is a user manual to enable customers to integrate the 3BIG-MOD into their environment - mechanically, electrically and logically.

3BIG-MOD is a module that serves as a gateway for customer applications to send data (e.g. sensor, production-data) via LTE/GSM (LTE Cat.M1, LTE Cat.NB1/NB2 and EGPRS) network to appointed endpoints like data visualised cloud servers. It can provide data connections at LTE-FDD, GPRS and EGPRS network. It also supports GNSS (GPS/GLONASS/BeiDou).



Sensor
Customer Hardware
+
Software Development
Supported by Endrich partner: main (embedded)

Gateway
3BIG-MOD using LTE network infrastructure

Endrich Cloud Service
The IoT development can be accelerated by the free Endrich Cloud Database Service.

or ... any 3rd Party Cloud Service

Displays
Network visual representation of data.

2.0 DATASHEET

TECHNICAL SPECIFICATIONS	
Target	Transfer industry application data via worldwide LTE network
OVERVIEW	
Product type	LTE IoT Modem
Product family	3BIG-MOD
Housing	Yes, Bopla/BoLink
Module	Fibocom MA510-GL-00 Tri Mode
Wireless technologies	CAT-NB (NB-IoT), CAT-M1 (eMTC), GPRS, GNSS (GPS)
BAND	
Operating frequency LTE FDD CatM1	B1 / B2 / B3 / B4 / B5 / B8 / B12 / B13 / B14 / B18 / B19 / B20 / B25 / B26 / B 27 / B28 / B66 / B85
Operating frequency LTE FDD CatNB2	B1 / B2 / B3 / B4 / B5 / B8 / B12 / B13 / B18 / B19 / B20 / B25 / B26 / B28 / B 66 / B71 / B85
Operating frequency GSM/GPRS/EGPRS	850 / 900 / 1800 / 1900
POWER CLASS	FDD-LTE: 21 dBm (Power Class 5)
	GSM850/900: 33 dBm DCS1800/PCS1900: 30 dBm
DIMENSIONS	
Dimension	90,2 x 43,2 mm
Weight	3BIG-MOD
INTERFACES	
FW update	USB
AT communication	UART (Male Mini Module 12pin, Wuerth part type 690 357 281 276)
Network access	Micro SIM card holder (push/push)
Antenna connector	1x SMA connector (optional: 1 x SMA connector GPS/GNSS)
Antenna type	BGS-015D (optional: BGS-607C GPS/GNSS) - Manufacturer BGS
FEATURES	
Protocols	PPP / TCP / UDP / SSL / TLS / FTP(S) / HTTP(S) / MQTT / CoAP / LWM2M
AT commands	3GPP TS 27.007 and 27.005 + proprietary Fibocom AT
Initial customer support scripts	C, Python
Initial customer support hardware	Case adapter interface available
Customer integration support on demand	main (embedded) GbR a partner of Endrich Bauelemente Vertriebs GmbH
TRANSMISSION RATE	
Data rate upload	Cat.M1 (1119 kbps), Cat.NB2 (150 kbps), EGPRS (236 kbps), GPRS (85.6 kbps)
Data rate download	Cat.M1 (589 kbps), Cat.NB2 (136 kbps), EGPRS (296 kbps), GPRS (107 kbps)
GENERAL	
Operating temperature	-40 °C to +85 °C
Voltage supply	5 V DC / 3.0 A Peak

CERTIFICATIONS	
Regulatory	CE-RED (Europe) (pending), FCC (USA) (pending), ISED (Canada) (pending)
Industry	GCF, PTCRB
Carrier	DT (pending), Vodafone (pending)

ORDERING CODE		
Part Number	Endrich Part Number	Description
3BIG-MOD-PCB	E0682MAE00001	3BIGMOD PCB only
3BIG-MOD-A	E0682MAE00002	Ready to use 3BIG-MOD PCB + housing + LTE antenna + cable
BGS-607C	E0588BGS00002	GPS antenna
C485GST-006.5MC137-UFL	E0588JSR00036	Adapter cable for GPS antenna
EVAL ADP-3BIG-MOD	E0682MAE00003	Adapter board for 3BIG-MOD

Regulatory approvals for FCC (USA), ISED (Canada), CE (Europe) are pending.
Cellular approvals GCF, PTCRB are already approved by the Fibocom Chip.

3.0 CERTIFICATIONS

EU Regulatory Conformance

Hereby, we, Endrich Bauelemente Vertriebs GmbH declare that the radio equipment type 3BIG-MOD is in compliance with the Directive 2014/53/EU.

In all cases assessment of the final product must be mass against the essential requirements of the Directive 2014/53/EU Articles 3.1(a) and (b), safety and EMC respectively, as well as any relevant Article 3.2 requirements.

The maximum antenna gain for is 5 dBi and the antenna separation distance is 20 cm.

Health	(Article 3.1(a) of Directive 2014/53/EU) Applied Standard(s): EN 62311:2008
Safety	(Article 3.1(a) of Directive 2014/53/EU) Applied Standard(s): EN 60950-1:2006, A11:2009, A1:2010, A12:2011, A2: 2013
Electromagnetic compatibility	(Article 3.1 (b) of Directive 2014/53/EU) Applied Standard(s): Draft EN 301 489-1 V2.1.1 /-52 V1.1.0
Radio frequency spectrum usage	(Article 3.2 of Directive 2014/53/EU) Applied Standard(s): EN 301 908-1 V11.1.1, EN 301 908-13 V13.1.1_11.1.4(Draft), EN 301511 V12.5.1

FCC

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate

radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End user must follow the specific operating instructions for satisfying RF exposure compliance. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. Host manufacturer is responsible for ensuring that the host continues to be compliant with the Part 15 subpart B unintentional radiator requirements after the module is installed and operational.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

IMPORTANT NOTE: FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

IC Statement

This device contains licence-exempt transmitter(s) / receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

(1) This device may not cause interference
(2) This device must accept any interference, including interference that may cause undesired operation of the device

Radiation Exposure Statement: This equipment complies with Canada radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Cet appareil contient des émetteurs / récepteurs exempts de licence qui sont conformes au (x) RSS (s) exemptés de licence d'Innovation, Sciences et Développement économique Canada. L'opération est soumise aux deux conditions suivantes: (1) Cet appareil ne doit pas causer d'interférences (2) Cet appareil doit accepter toute interférence, y compris les interférences pouvant provoquer un fonctionnement indésirable de l'appareil Déclaration d'exposition aux radiations: Cet équipement est conforme Canada limites d'exposition aux radiations dans un environnement non contrôlé. Cet équipement doit être installé et utilisé à distance minimum de 20cm entre le radiateur et votre corps.

PTCRB and GCF Statement

The 3BIG-MOD utilizes the Fibocom MA510-GL modul, as a 'Socket Modem' and is certified by PTCRB and GCF by those current certifications listed below.

PTCRB

- 3BIG-MOD use:

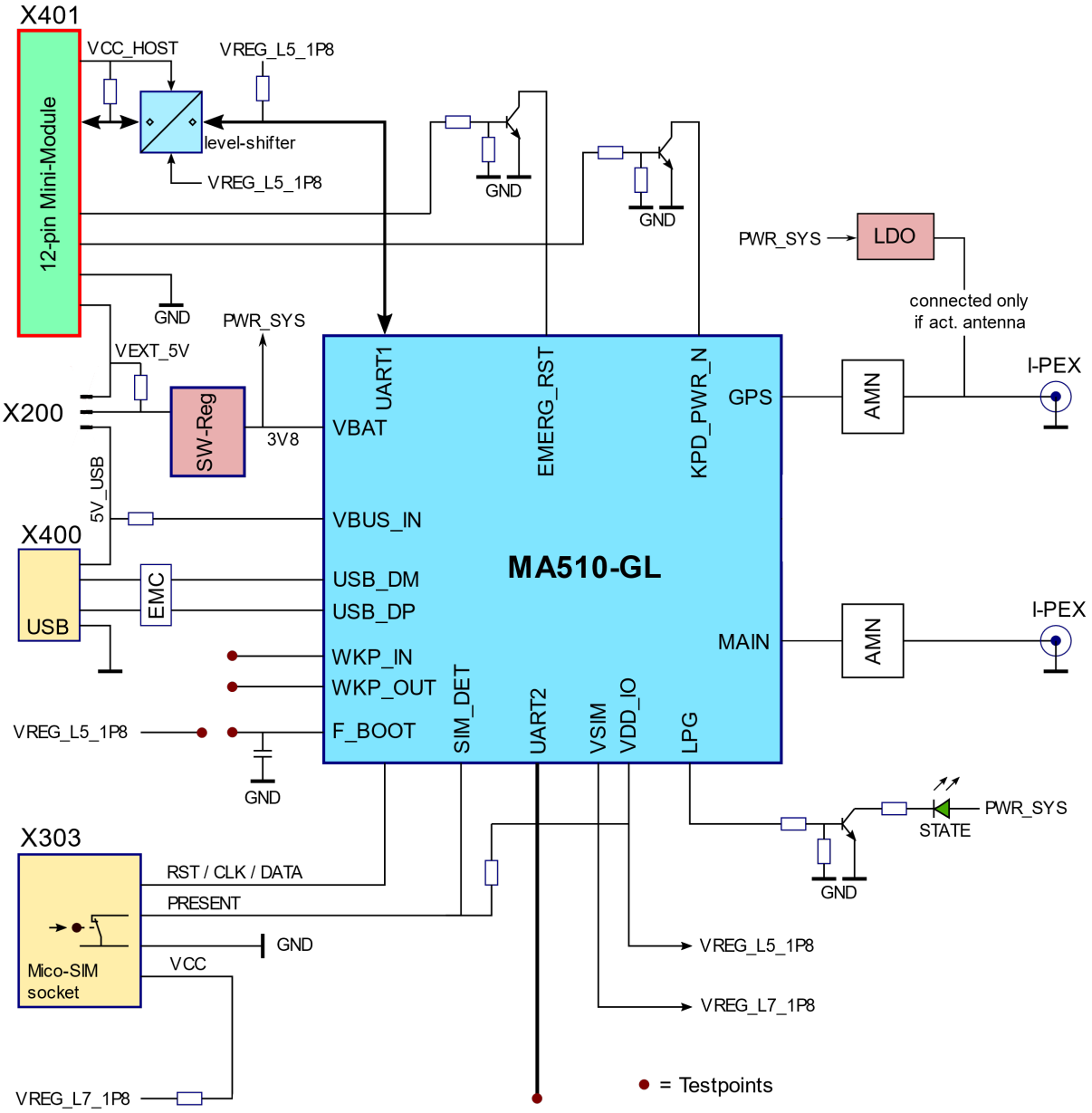
– Fibocom module MA510-GL – External Antenna BGS015 –https://www.ptcrb.com/certified-devices/device-details/?model=43431

GCF

- 3BIG-MOD use:

– Fibocom module MA510-GL – External Antenna BGS015 –https://www.globalcertificationforum.org/pub_product/8555.html

4.0 SYSTEM OVERVIEW



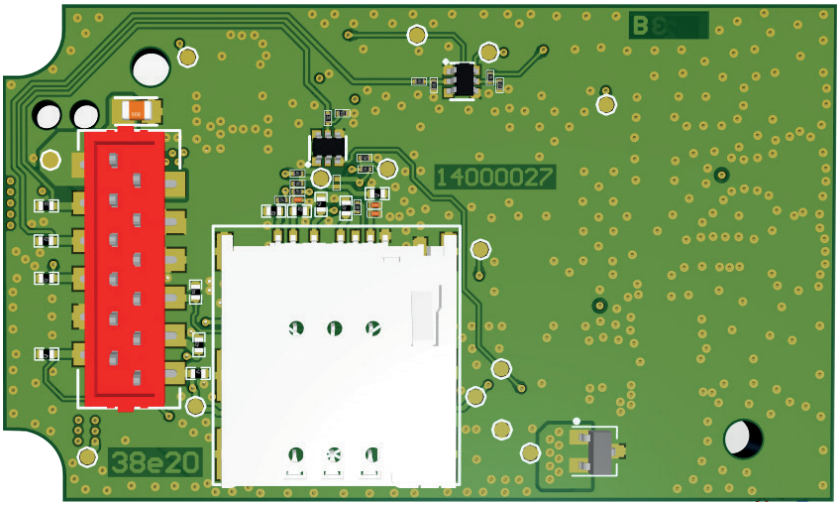
AMN = Antenna Matching Network
LDO = Linear Drop Regulator
SW-Reg = Switching Regulator

UART2 Signals (TxD, RxD, RTS and CTS) are routed to testpoints available on top-layer of PCB.
X200 not assembled, only for development (powering via USB).

5.0 CONNECTION TO HOST-CPU

5.1 Connector Type and Location

The picture below shows the type and location of the connector to the Host-CPU:



The used connector type is "WR-MM_Male Mini Module SMT" 12pin, Wuerth part type 690 357 281 276.

Each contact can carry 1.5A, because of this, 2 contacts are used for the 5V supply to cover the maximum current of up to 3A. For detailed position, please refer to chapter Connector Position.

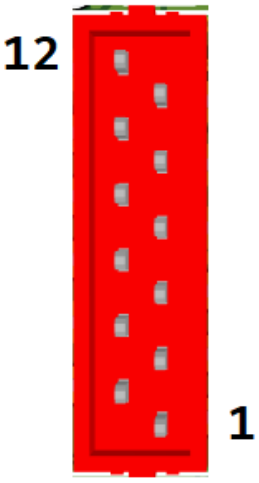
The possible counterpart of this connector – if PCB-to-PCB connection – is
"WR_-MM_Female Mini Module SMT" 12pin, Wuerth part type 690 367 291 276.

For this connection also cable adaptors are available at Endrich.

5.2 Signals at Interface Connector

The table below shows the signals of the connector to the Host-CPU. The view direction is from the bottom side, directly at the connector.

Signal	Dir.	Pin Nr.		Dir.	Signal
VEXT_5V	PWR-SUPP	12	11	PWR-SUPP	VEXT_5V
POWER_ON	Input	10	9	PWR-SUPP	GND
RESET_IN	Input	8	7	PWR-SUPP	GND
HOST_Rx	Output	6	5	Input	HOST_RTS
GND	PWR-SUPP	4	3	Output	HOST_CTS
HOST_Tx	Input	2	1	PWR-SUPP	VCC_HOST



PIN 12, 11 = From external power supply
PIN 9, 7, 4 = Ground (reference potential)
PIN 1 = Supply voltage from Host-CPU to power level shifters
PIN 10, 8, 6, 2 = Signals for controlling and communication
PIN 5, 3 = Handshake signals for communication (if required)

6.0 ANTENNA

6.1 LTE/GSM access

The 3BIG-MOD uses an external antenna from BGS, type BGS-015D. This antenna is the original type that is certified with the Fibocom device. This antenna is connected at the external SMA connector.

The connection between the 3BIG-MOD PCBs UFL-R SMT connector and the SMA antenna connector is done via an internal cable, its length is 6,5 cm.



View at interface connector on bottom side

Side view



LTE Antenna BGS-015D



GPS Antenna BGS-607C

6.2 GNSS receiver

3BIG-MOD also supports GNSS/GLONASS and GPS/BeiDou function and adopts Qualcomm Gen9 technology. An additional antenna and cable can be ordered at Endrich (see ordering number in the Datasheet Chapter).

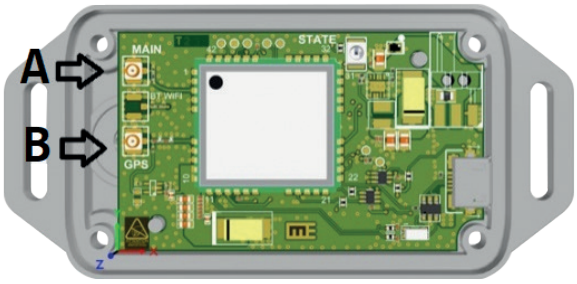
6.2.1 Installation of the GPS antenna

To install a GPS antenna, the following steps are necessary:

1. Remove 4 screws with suitable screw driver
2. Open case carefully as …



3. Internal cable to LTE antenna has to be removed from MAIN
   – see black arrows in picture showing LTE antenna connector MAIN (**A**) and GPS (**B**) connectors
   pay attention on this step!



picture A

4. Remove hole cover from 2nd hole dedicated for GPS antenna.
5. Install GPS antenna cable C485GST-006.5MC137-UFL, tighten screws
6. Internal cable to LTE antenna has to be connected to MAIN (**A**) and GPS (**B**) connector on PCB
   – see black arrows in shown picture A
   pay attention on this step!
7. Close case carefully
8. Place and tighten 4 screws carefully with suitable screw driver.

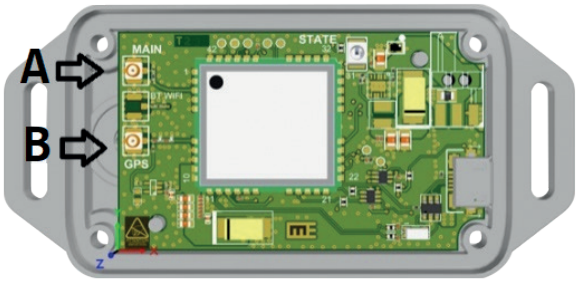
7.0 INSTALLING OR CHANGING MICRO SIM CARD

To install or change a micro-SIM card required to get LTE/GSM network access the following steps are necessary:

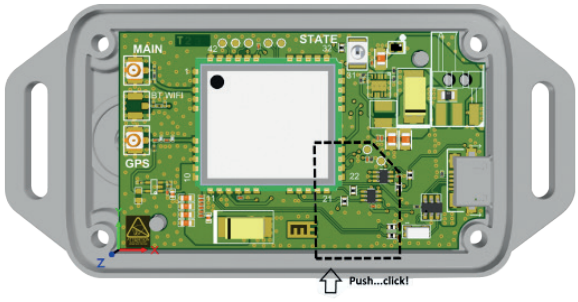
1. Remove 4 screws with suitable screw driver
2. Open case carefully as …



3. Internal cable to antenna has to be removed from MAIN and – if used – GPS connector on PCB – see black arrows in picture showing MAIN (**A**) and GPS (**B**) connectors pay attention on this step! (see picture A)
4. Lift PCB from case bottom
5. (Push on micro-SIM to remove installed card – if a SIM card is installed already)
6. Push new micro-SIM into micro-SIM slot. (see picture B)
7. Place PCB to case bottom (use 2 drill holes of PCB to ensure right position)
8. Internal cable to antenna has to be connected to MAIN and – if used – GPS connector on PCB – see black arrows in shown picture A pay attention on this step!
9. Close case carefully
10. Place and tighten 4 screws carefully with suitable screw driver.



picture A



picture B

8.0 FIRMWARE UPDATE

As firmware update shall only be done when new security requirements must be fixed or new protocol features **must** be fulfilled – they always have to be confirmed by Endrich. Firmware Updates can cause massive problems to the devices if not executed correctly. A documentation and update files will be provided by Endrich if necessary.

9.0 OPERATING CONDITIONS

9.1 Power Supply

The main components of 3BIG-MOD are the MA510-GL chip from Fibocom, the antenna connector and the communication interface. Supply voltage is +5V DC applied to the pins 11 and 12, referenced to GND (pins 9, 7, and 4).
Supply current is 3A max.

9.2 Power Consumption

The power consumption of MA510-GL series module measured at 3.8V power supply is shown as follow:

PARAMETER	MODE	CONDITION	MAXIMUM CURRENT TYP.
Ioff	Power off	Module power off	0.015 mA
Iairplane	Airplane mode	At+cfun=4	0.9 mA
Ipsm	Cat.M1	PSM mode	0.0032 mA
Ipsm	Cat.NB	PSM mode	0.0032 mA
Isleep	Cat.M1	eDRX Cycle Length = 81.92s	0.81 mA
Isleep	Cat.M1	DRX Cycle Length =2.56s	2.61 mA
Isleep	Cat.NB	eDRX Cycle Length = 91.92s	0.85 mA
Isleep	Cat.NB	DRX Cycle Length =2.56s	1.73 mA
IGPRS-RMS CS4	GPRS	GSM850@Gamma=3 (4UL/1DL)	600 mA
IGPRS-RMS CS4	GPRS	GSM900@Gamma=3 (4UL/1DL)	600 mA
IGPRS-RMS CS4	GPRS	DCS1800@Gamma=3 (4UL/1DL)	500 mA
IGPRS-RMS CS4	GPRS	PCS1900@Gamma=3 (4UL/1DL)	470 mA
IEGPRS-RMS	EGPRS	GSM850@Gamma=6 (4UL/1DL)	560 mA
IEGPRS-RMS	EGPRS	GSM900@Gamma=6 (4UL/1DL)	560 mA
IEGPRS-RMS	EGPRS	DCS1800@Gamma=5 (4UL/1DL)	500 mA
IEGPRS-RMS	EGPRS	PCS1900@Gamma=5 (4UL/1DL)	470 mA
ILTE-RMS	LTE FDD	Cat.M1 B1 @+20dBm	200 mA
ILTE-RMS	LTE FDD	Cat.M1 B2 @+20dBm	200 mA
ILTE-RMS	LTE FDD	Cat.M1 B3 @+20dBm	200 mA
ILTE-RMS	LTE FDD	Cat.M1 B4 @+20dBm	200 mA
ILTE-RMS	LTE FDD	Cat.M1 B5 @+20dBm	220 mA
ILTE-RMS	LTE FDD	Cat.M1 B8 @+20dBm	220 mA
ILTE-RMS	LTE FDD	Cat.M1 B12 @+20dBm	220 mA
ILTE-RMS	LTE FDD	Cat.M1 B13 @+20dBm	220 mA
ILTE-RMS	LTE FDD	Cat.M1 B14 @+20dBm	220 mA
ILTE-RMS	LTE FDD	Cat.M1 B18 @+20dBm	220 mA
ILTE-RMS	LTE FDD	Cat.M1 B19 @+20dBm	220 mA

9.2 Power Consumption

PARAMETER	MODE	CONDITION	MAXIMUM CURRENT TYP.
ILTE-RMS	LTE FDD	Cat.M1 B20 @+20dBm	220 mA
ILTE-RMS	LTE FDD	Cat.M1 B25 @+20dBm	170 mA
ILTE-RMS	LTE FDD	Cat.M1 B26 @+20dBm	220 mA
ILTE-RMS	LTE FDD	Cat.M1 B27 @+20dBm	220 mA
ILTE-RMS	LTE FDD	Cat.M1 B28 @+20dBm	220 mA
ILTE-RMS	LTE FDD	Cat.M1 B66 @+20dBm	180 mA
ILTE-RMS	LTE FDD	Cat.M1 B85 @+20dBm	200 mA
ILTE-RMS	LTE FDD	Cat.NB B1 @+20dBm	270 mA
ILTE-RMS	LTE FDD	Cat.NB B2 @+20dBm	260 mA
ILTE-RMS	LTE FDD	Cat.NB B3 @+20dBm	250 mA
ILTE-RMS	LTE FDD	Cat.NB B4 @+20dBm	260 mA
ILTE-RMS	LTE FDD	Cat.NB B5 @+20dBm	290 mA
ILTE-RMS	LTE FDD	Cat.NB B8 @+20dBm	290 mA
ILTE-RMS	LTE FDD	Cat.NB B12 @+20dBm	280 mA
ILTE-RMS	LTE FDD	Cat.NB B13 @+20dBm	290 mA
ILTE-RMS	LTE FDD	Cat.NB B18 @+20dBm	290 mA
ILTE-RMS	LTE FDD	Cat.NB B19 @+20dBm	290 mA
ILTE-RMS	LTE FDD	Cat.NB B20 @+20dBm	290 mA
ILTE-RMS	LTE FDD	Cat.NB B25 @+20dBm	250 mA
ILTE-RMS	LTE FDD	Cat.NB B26 @+20dBm	290 mA
ILTE-RMS	LTE FDD	Cat.NB B28 @+20dBm	280 mA
ILTE-RMS	LTE FDD	Cat.NB B66 @+20dBm	260 mA
ILTE-RMS	LTE FDD	Cat.NB B71 @+20dBm	260 mA
ILTE-RMS	LTE FDD	Cat.NB B85 @+20dBm	270 mA

Note: Instrument configuration is as follows

9.3 Level Shifting

The 3BIG-MOD is equipped with level shifters that convert the signal level of 1.8 V of the MA510-GL to the levels required by the host processor (usually 3.3 V). For this, the pin 1 of X401 (VCC_HOST) has to be supplied with 3.3 V referenced to GND. The used level shifters on 3BIG also allow a VCC_HOST of 5V DC.

9.4 Serial Communication

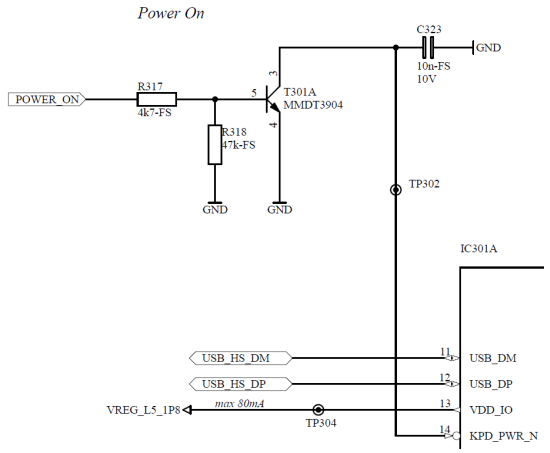
Communication exchange is performed via UART1 (RxD / TxD).
Default serial interface conditions are:

Baud-Rate	auto baud (115200Bd "well known good" setting)
Databits	8
Stop-Bits	1
Handshake	none

For testing reasons or adaptation to customer requirements the Baud-Rate can be reduced.

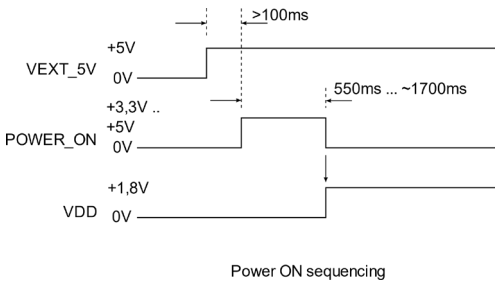
9.5 Power up the board

Providing 5V at the supply pins does not start the MA510-GL device. Additionally, the device has to be started by serving pin POWER_ON (X401 pin 10). At pin 10 there is a transistor stage that applies GND to the KPD_PWR_N pin of the MA510-GL device:



Because of this, the POWER_ON pin of the 3BIG-MOD is an active high input.

According to the datasheet of the MA510-GL device to power on the device, POWER_ON is performed by a (high-) pulse at pin 10 between 550ms and 1700ms.
POWER_ON must be served after VEXT_5V is stable for about 100ms:



Power ON sequencing

9.6 Power off the device

To power off the device there are 3 different ways:

- A (high-) pulse between 3500ms and 7000ms can be applied at POWER_ON.
- Using a software (AT-) command
- Switch power off (VEXT_5V)

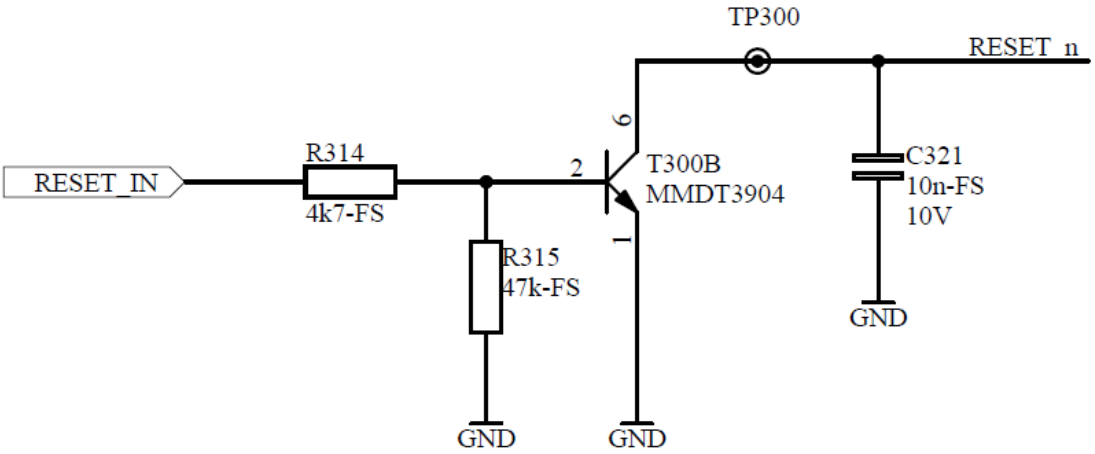
For safe operation it is strongly recommended to shut down the MA510-GL device using the AT-command: **AT+CPWROFF**

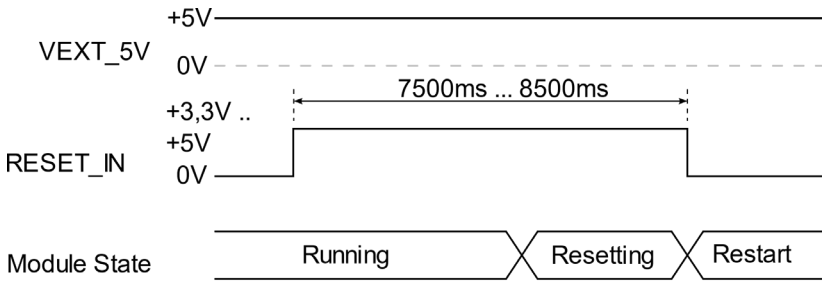
This prevents malfunctions if the MA510-GL device is in internal memory operations and the power down is forced by HW (serving pin 4 high for >3500ms). Hard power down should only be used if the communication interface (via UART1) is blocked.

9.7 Resetting the device

The 3BIG-MOD board also allows to reset the MA510-GL device from an external instance.
For this, connector X401 provides the RESET_IN input at pin 8. This is an active high input that switches a transistor stage.

The output of the transistor stage switches GND to the EMERG_RST pin of the MA510-GL.
For proper reset, a high pulse between 7.5s and 8.5s must be applied to the RESET_IN pin:





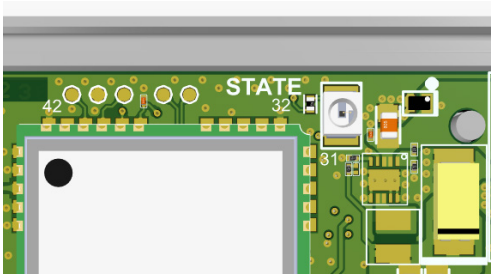
Reset timing

Another way to reset the device is the SW reset by using the AT command: **AT+RESET**

If only one GPIO is present from the Host-CPU to (HW-) control the MA510-GL device of 3BIG-MOD, the POWER_ON mechanism should rather be preferred than the RESET_IN procedure.

10.0 STATUS DISPLAY

The 3BIG-MOD is equipped with a green LED on top of the PCB that signals some status information:



The 3BIG-MOD is equipped with a green LED on top of the PCB that signals some status information:

STATUS	SIGNAL
Shutdown / low power	LED off
Registering network / No SIM card / Register network failed	LED flashes (600ms ON / 600ms OFF)
Note network success and in standby	LED flashes (3000ms ON / 75ms OFF)
Data link is established	LED flashes (70ms ON / 70ms OFF)

11.0 USING 3BIG-MOD AS A DEVELOPMENT BOARD

11.1 RAMP up support

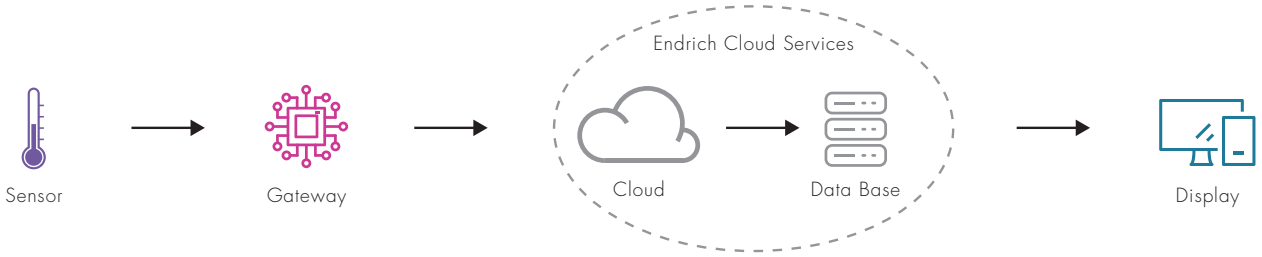
Using 3BIG-MOD as a development board for IoT is an easy way to enable customer environments for industry data collection. Endrich can provide customers with:

- Detailed documentation of getting access to Endrich cloud services
- Sensor boards that can easily be connected to 3BIG-MOD
- Example Python scripts and C-code to start your development and get ready for IoT.
- Support by external partner (Germany) to ramp up your development in software and hardware

11.2 Five steps to access your first IoT data

1. Get your package
   - Login data
   - SW package
   - Sample code
   - IoT SIM card

   via Endrich Support: https://www.endrich.com/cellular/3big-mod or at your local Sales person
2. Connect your host processor board to 3BIG-MOD via serial interface as described at chapter "signals at interface connector"
3. Open a UART connection to 3BIG-MOD and power up via powerup pin as described at chaper "power up the board"
4. Run Endrich example AT command script or include sample C-code module using your input data
5. View your data at the Endrich cloud service web page via a web browser, e.g. smartphone



Sensor
Customer Hardware
+
Software Development
Supported by Endrich partner: main (embedded)

Gateway
3BIG-MOD using LTE network infrastructure

Endrich Cloud Service
The IoT development can be accelerated by the free Endrich Cloud Database Service.

or ... any 3rd Party Cloud Service

Displays
Network visual representation of data.

12.0 SETUP A 3 BIG-MOD COMMUNICATION

12.1 Using a V3rd party communication tool

The easiest way to communicate with the 3BIG-MOD is to use a 3rd party AT-Command tool like "AT Command Tester".
Steps to setup a communication:

1. Install Tool
2. Connect serial cable to a PC
3. Ensure to connect all PINs of the 3BIG-MOD Interface as described
   SIGNALS AT INTERFACE CONNECTOR (without RTS/CTS – no required)
4. Start Tool and configure UART Port to a Baud rate that fits to cable length
   e.g. Baud rate : 19200
   Data : 8 Bit
   Parity : none
   Stop : 1
5. Send AT-Commands …

A description of supported AT commands and protocols can be delivered by endrich.

12.2 Using a serial connection to a host CPU/Microcontrollers

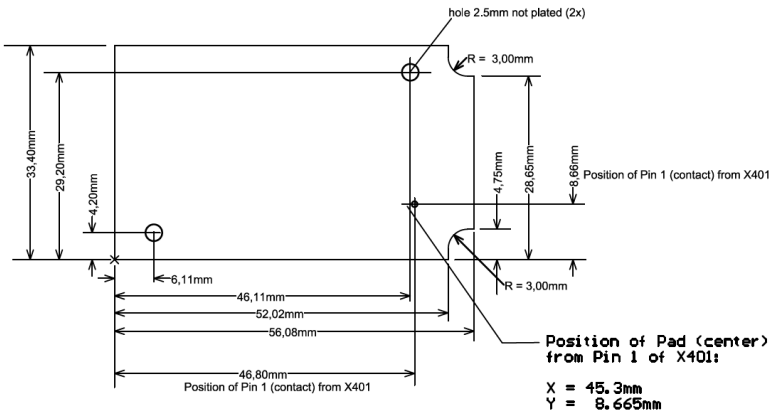
To setup a connection to the serial interface of the 3BIG-MOD the software developer needs to initialize the UART Pins as described at chapter "SERIAL COMMUNICATION". Ensure to connect all PINs of the 3BIG-MOD Interface as described SIGNALS AT INTERFACE CONNECTOR (without RTS/CTS – no required)

A description of supported AT commands and protocols can be delivered by endrich. Additionally, endrich can deliver example code for several Microcontrollers.

13.0 MECHANICAL DIMENSIONS

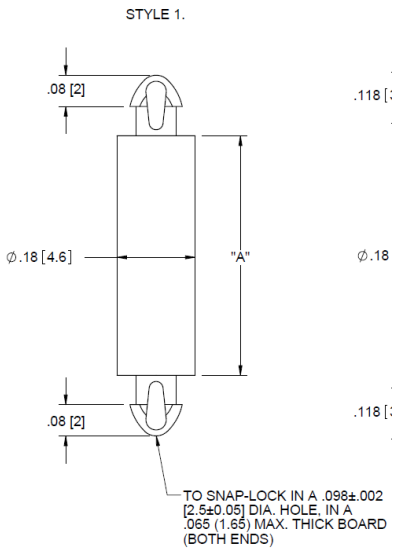
13.1 Board outline and mounting holes

The drawing below shows the 3BIG-MOD PCB from the top view:



The module is intended to be mounted in a separate housing or can be installed on a customer specific board. For this, two holes with 2.5 mm diameter are present.
They fit to the alignment studs that fix the board in the housing. Endrich housing installation, see chapter: "3BIG-MOD as module in housing".

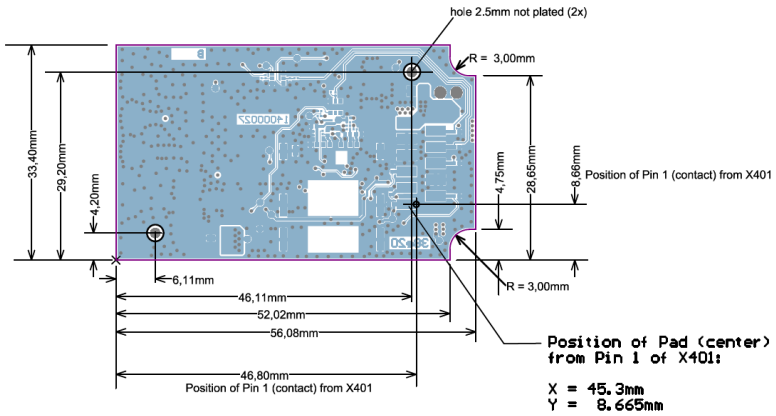
It is also possible to use the module without the defined housing in a customer specific environment. In this case the two holes can be used for spacer that requires 2.5mm hole sizes. Because of different potentials on top- and bottom layer it is not allowed to use metallic spacers. The preferred spacer types are made of nylon, e.g., from Richco Inc.:



PART NO. STYLE 1. .098 [2.5] DIA. HOLE	"A"±.15
MDLSP1-02M-01	.79 [2]
MDLSP1-03M-01	.118 [3]
MDLSP1-04M-01	.156 [4]
MDLSP1-05M-01	.197 [5]
MDLSP1-06M-01	.236 [6]
MDLSP1-07M-01	.276 [7]
MDLSP1-08M-01	.315 [8]
MDLSP1-09M-01	.354 [9]
MDLSP1-10M-01	.394 [10]
MDLSP1-12M-01	.472 [12]
MDLSP1-14M-01	.551 [14]
MDLSP1-16M-01	.630 [16]
MDLSP1-18M-01	.709 [18]
MDLSP1-20M-01	.787 [20]
MDLSP1-22M-01	.866 [22]

13.2 Connector position

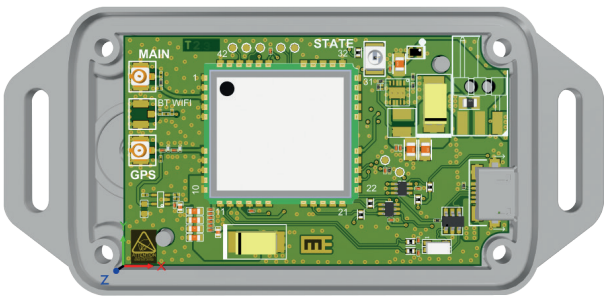
The drawing below shows the position of the connector seen from the top through the PCB.
It's more the position for the socket where the 3BIG-MOD board can be plugged at.

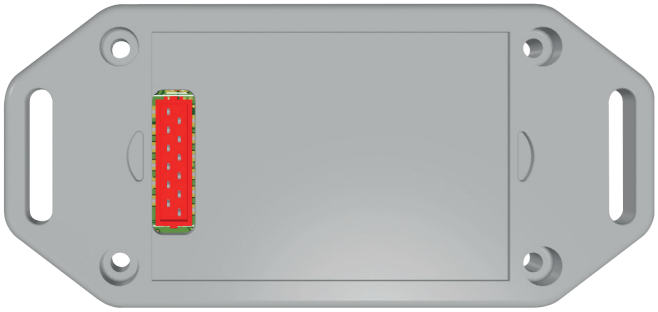


13.3 3BIG-MOD as module in housing

The shape of the PCB is intended to fit in a housing from manufacturer Bopla, series BoLink: (a seperate plug to cover the GPS antenna hole GPS antenna can be ordered at Endrich)

If mounted in the BoLink housing, the signals between the 3BIG-MOD and the host CPU are available on the backside:





13.3 3BIG-MOD as module in housing



Picture of bottom side at the interface connector

13.4 Environmental Requirement

To run the 3BIG-MOD the following environmental requirement have to be fulfilled:

Operating temperature	-40 °C to +85 °C
Voltage supply	5 V DC / 3.0 A Peak
Protection class	IP53
Distance to humans / animals	20 cm minimum required

14.0 REFERENCES

14.1 Links

3BIG-MOD overview	https://www.endrich.com/cellular/3big-mod
Endrich IoT plattform	http://e-iot.info/
Endrich electronics articles	http://www.electronics-articles.com/

14.2 References

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