LONG RANGE MODEM TRX EVALUATION KIT

Code: 33000158M

INTRODUCTION:

This kit has been developed to test the functionality and radio parameters of Mipot Long Range transceivers 32001345M.

Module's microcontroller has a **standard firmware**.

The units interface with the PC via USB cable, and can be configured using a GUI.

Two 2.54mm pitch strips connected directly to the pins of the module allow a fast hardware connection with external devices.

1. KIT CONTENT

- 1 x demo board 32001382 with 32001345M (Long Range Modem transceiver)
- 1 x Long Range Modem USB dongle 32001388M
- 1 x 868 MHz antenna with 90° connector
- 1 x USB cable

2. ABSOLUTE MAXIMUM RATINGS

External power supply (M1)	+ 3.7 V
RF input (SMA connector)	+10 dBm
Storage temperature	-10 ÷ +30
Operating temperature	-10 ÷ +50

3. ELECTRICAL CHARACTERISTICS

Parameter	*Min.*	*Typ.*	*Max.*	*Unit*	*Notes*
External supply voltage (M1)	2.1	3.3	3.7	Volt	

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Mipot S.p.A. reserve the right to modify the specifications without notice

Cormòns, October 9, 2018

4. DEMOBOARD INTERFACE DESCRIPTION

Interface	*Description*	*Notes*
M1	External supply terminal block	
USB	USB connector (standard type B)	
RF	RF input/output (standard SMA female)	Connect a 50 ohm antenna or RF load.
S1	Power supply ON OFF switch	
S2	Direct / Regulated voltage switch	
DSW	Dip-Switch	Functions vary according to application FW
RESET	Reset button	Reset button for the demoboard microcontroller
LED LD1	RED	Functions vary according to application FW
LED LD2	GREEN	Functions vary according to application FW
LED LD3	ORANGE	Functions vary according to application FW
SW4, SW5	Buttons	Functions vary according to application FW
VRF	Module supply jumper	Connect an ammeter for module current measurements.
PIN STRIP	2.54 mm pitch	Pins for direct connection to the module For module pin characteristics refer to module datasheet.
Env. Sens.	Environmental sensors	Temperature Relative Humidity Light Ultaviolet Index
MKBUS	MikroBUS socket	
I2C	I2C socket	
W1	Programming pads/connector	

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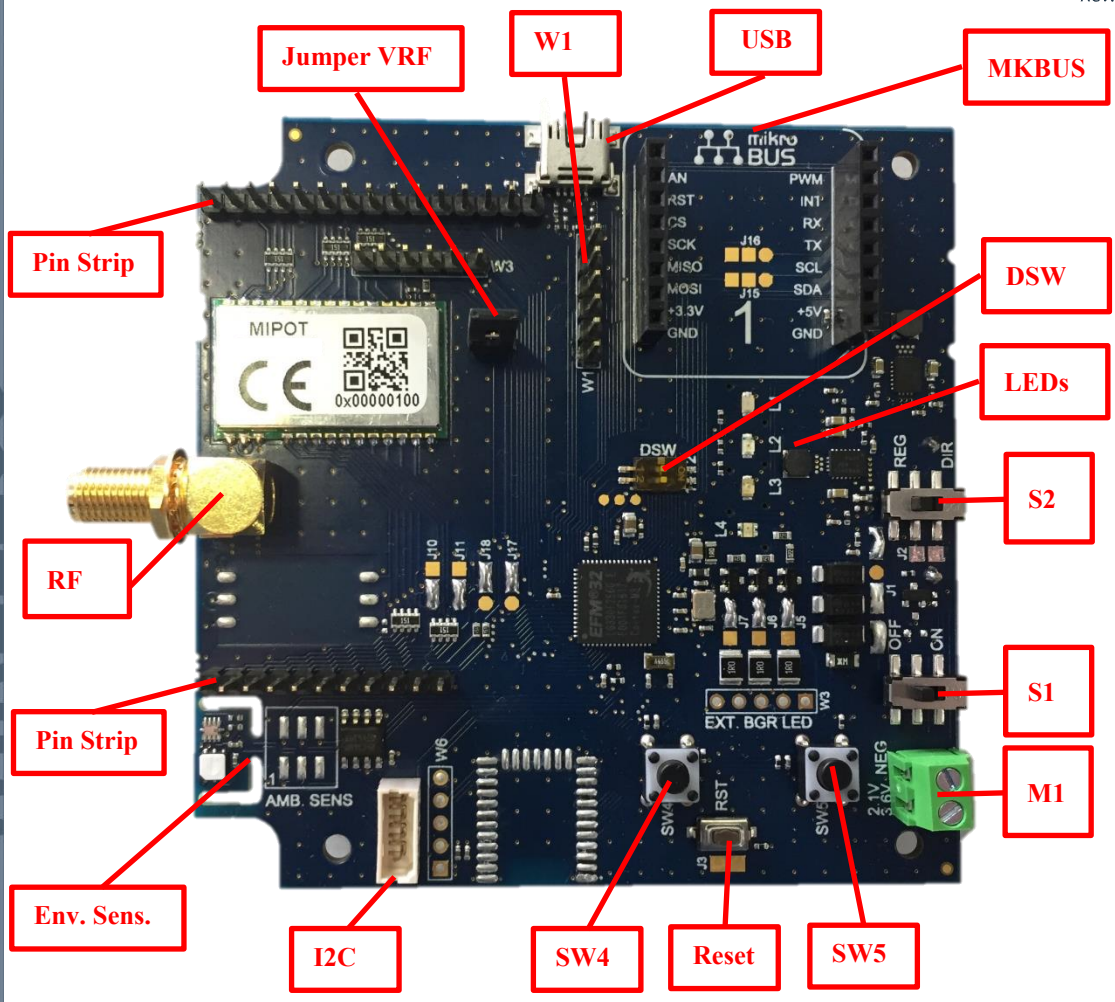

5. POWER

5.1 DEVICE POWER SUPPLY

Switch S1 on "ON" to turn on the demoboard.

The board can be power-supplied in 3 ways:

a) by **2 x AA batteries** 1.5V (battery holder on the back of the board)
b) via **external power terminal board M1**:
   - **Neg.**: is the power supply common negative
   - **2.1-3.6V**: connect this input to a 2.1 to 3.7V stabilized power supply
c) Via **USB connector**

Notes:

- due to low voltages involved, supply paths are separated by **near-ideal diode circuitry**: **different power supplies** (USB, battery and M1) **can coexist**, the input with highest voltage has priority. Hysteresis is provided during transitions between different inputs.
- device is protected against polarity inversion

5.2 SUPPLY OPTIONS

The demoboard has two embedded switching regulators that provide stabilized +3.3V (for the logic, sensors, module and Mikrobus socket) and +5 volt (for the RGB LED and Mikrobus socket), regardless of input voltage.

a) **Regulated supply**
if **S2** is in **REG** position, 3.3 volt regulator is **enabled**.

b) **Direct supply**
if **S2** is in **DIR** position, 3.3 volt regulator is **disabled** (bypassed).
In this way all the board is supplied directly by the selected supply source (the 32001353 can be tested at extreme voltage limits).
➔ To select the unregulated power supply source place a solder jumper on J1 according to the following table:

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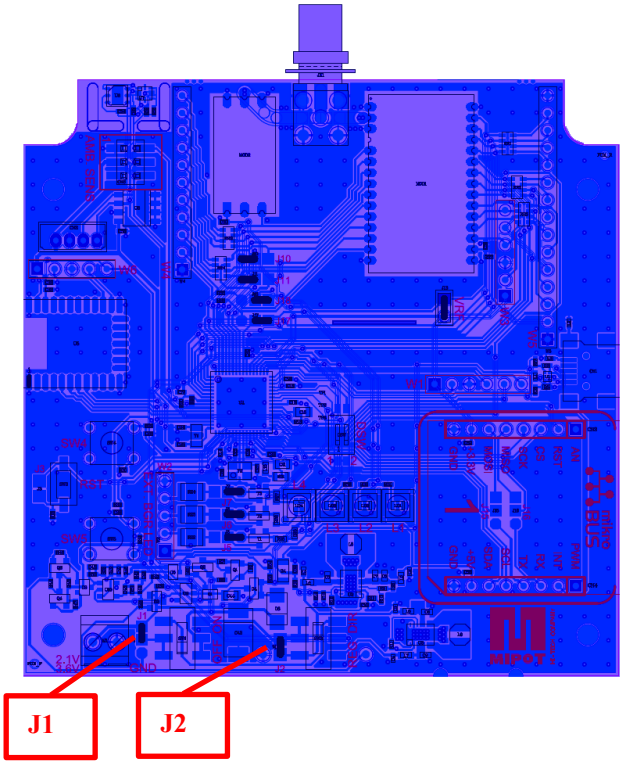
Supply source:	Place a solder joint between:	Notes
Battery	1-2	
External (M1)	2-3	Default

NOTE: since USB is a 5 volt power supply, in this configuration it is not connected to the logic, but remains connected to the voltage regulators in order to supply the RGB LED and the Mikrobus socket.

c) **Minimize consumptions**
In order to minimize the power consumption (for instance if you want to use the board as an environmental sensor), it is possible to disconnect the regulators by **removing the solder joint on J2 and use the direct power supply as indicated in 5.2.2.**



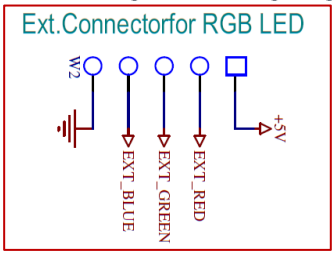
d) **Measure 32001345M consumption**
Remove RF jumper and connect an ammeter.

6. LEDs

6.1 EMBEDDED RGB LED
Board has an embedded RGB LED, PWM driven by the microcontroller through open collector BJT.

6.2 EXTERNAL RGB LEDs
It is also possible to drive external LEDs by connecting their cathodes to the **EXT BGR LED** pads:

- external load resistor required
- max 12V power supply if external
- +5volts and ground available according to following diagram:



Solder joints on **J5, J6** and **J7** according to the following table:

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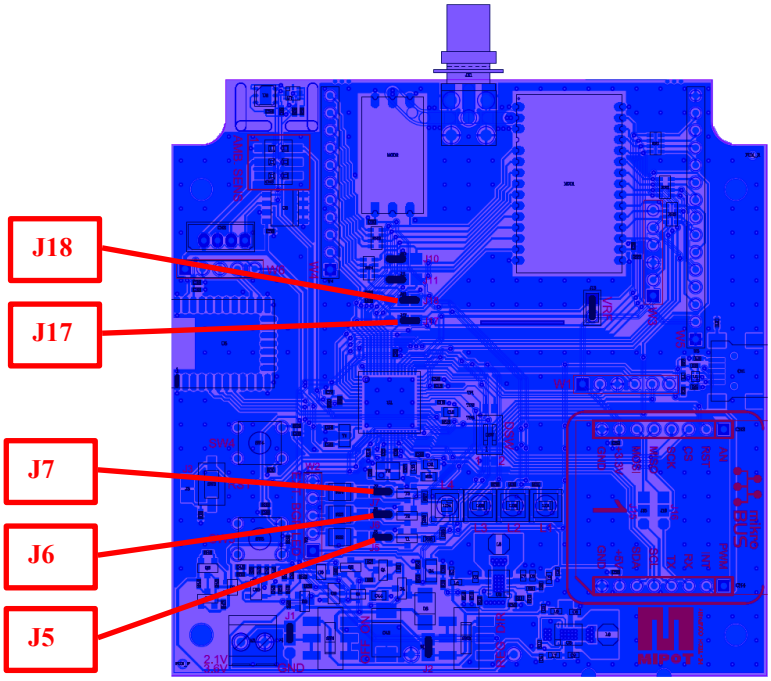
	Place a solder joint between:	Notes
On board LED	1-2	Default
External LED	2-3	

6.3 OTHER LEDs

L1 (red), L2 (orange) and L3 (green) LEDs are supplied. LED functions depend on firmware.

L1 and L2 can be connected either to the demoboard microcontroller or to the pin strips for external connection by setting solder joints on **J17, J18** according to the following table:

	Place a solder joint between:	Notes
Connection to 32001345M	1-2	
Connection to internal uC	2-3	Default



7. PIN STRIPS

7.1 **W4 and W5** pin strips with 2.54 mm pitch are provided to directly interface with the pins of the 32001345M module. Resistors are provided in series with the lines in order to protect input pins from misconnections.
For direct connection with module, internal microcontroller must be put in reset by placing a solder joint on J3 according to the following table:

	Solder joint on J3 (embedded uC in reset):	Notes
Connection to external (pin strips)	Yes	
Connection to internal uC	No	Default

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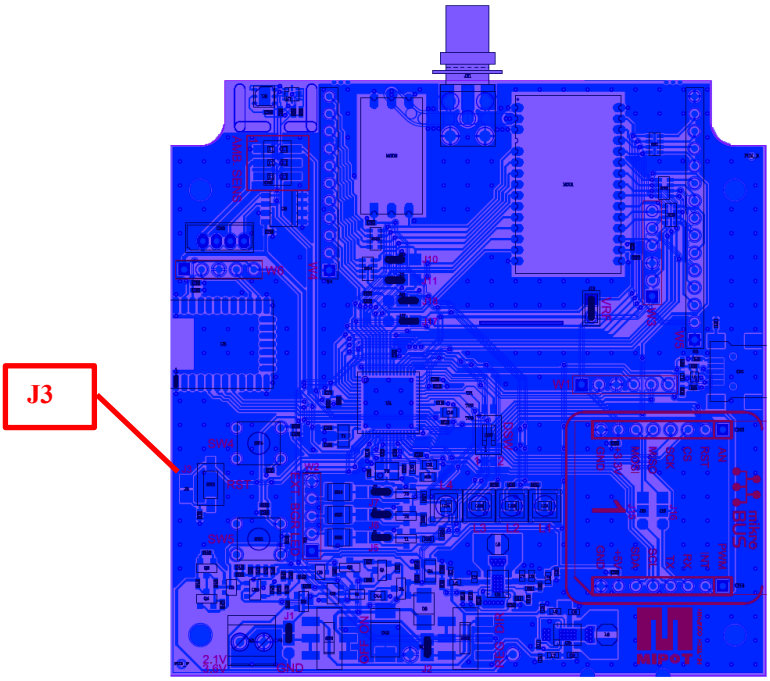


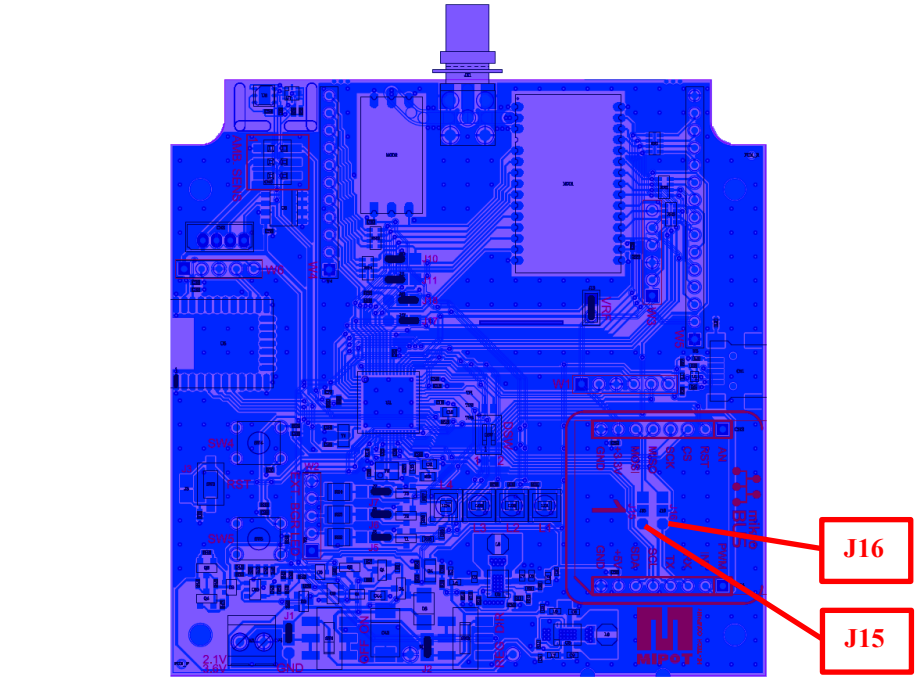
8. I2C CONNECTOR

I2C connector is provided for connection with external devices (e.g. sensors).

9. MIKROBUS SOCKET

A socket compatible with **Mikrobus** standard specification (see https://www.mikroe.com/mikrobus/) is provided in order to connect add-on modules compatible with this standard. 3.3V and 5V are provided together with standard signals. UART or SPI devices can be connected for communication with embedded microcontroller, and communication interface can be selected connection by setting solder joints on **J15, J16** according to the following table:

	Place a solder joint between:
UART	1-2
SPI	2-3



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10. MICROCONTROLLER PROGRAMMING PADS

Embedded microcontroller can be programmed through W1 programming pads. Signal sequence is:

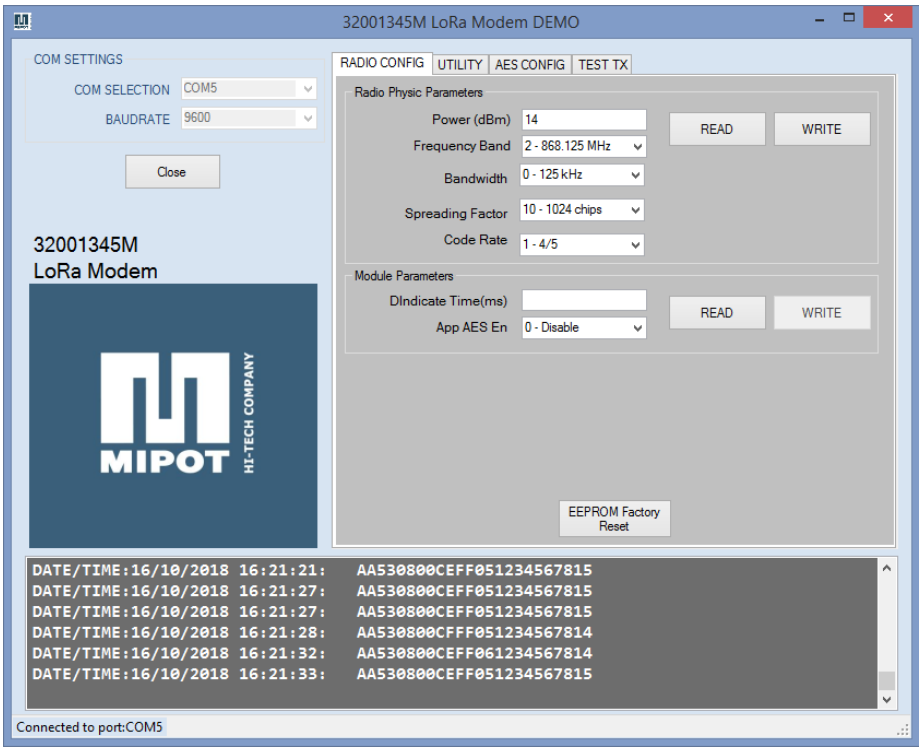
Vcc
SWCLK
GND
SWDIO
NRST
SWO

11. DIRECTIONS FOR USE

Warning: before connecting the demoboard or the USB dongle to the host PC via USB cable, **download and install Silabs CDC Virtual COM driver** and **CP210x USB to UART Bridge VCP Drivers.**

Upon startup application firmware on embedded **microcontroller detects if a USB host is connected to the board (both USB dongle and demoboard)**: both devices must be connected to USB host to operate as a bridge between host PC and 32001345M module.

a) Connect the USB dongle to the PC, open the GUI and select the proper COM port, then click "OPEN":



NOTE: to check if a device is connected, verify that each input command has an answer in the petrol green box below.

Click "read" on each button to check the 32001345M module parameters. **For details regarding module's parameters refer to 32001345M Command Reference Specification.**

b) On "RADIO CONFIG" tab set the wanted RF parameters;
c) Connect the 32001382 demoboard on another USB port, open the GUI and select the proper COM port then click "OPEN";
d) On the "RADIO CONFIG" tab select proper RF parameters aligned with the ones set for the USB dongle
e) Open "TEST TX" tab on one side (dongle or demoboard)

At this point user can enter the desired payload in hex format in the DATA field or otherwise generate a random Data sequence of N bytes setting the required number of bytes N in the "Generate N bytes" field and clicking on "Generate". Clicking on "TX Test Message" will transmit the DATA payload on air. A message feedback of the transmission will be presented in the petrol box in the low section

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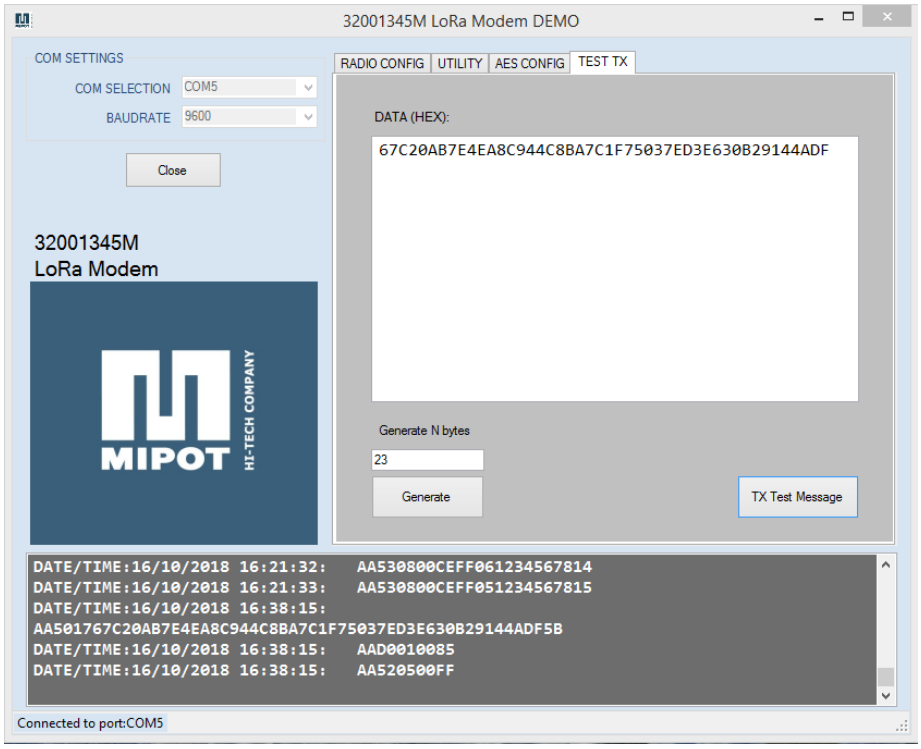
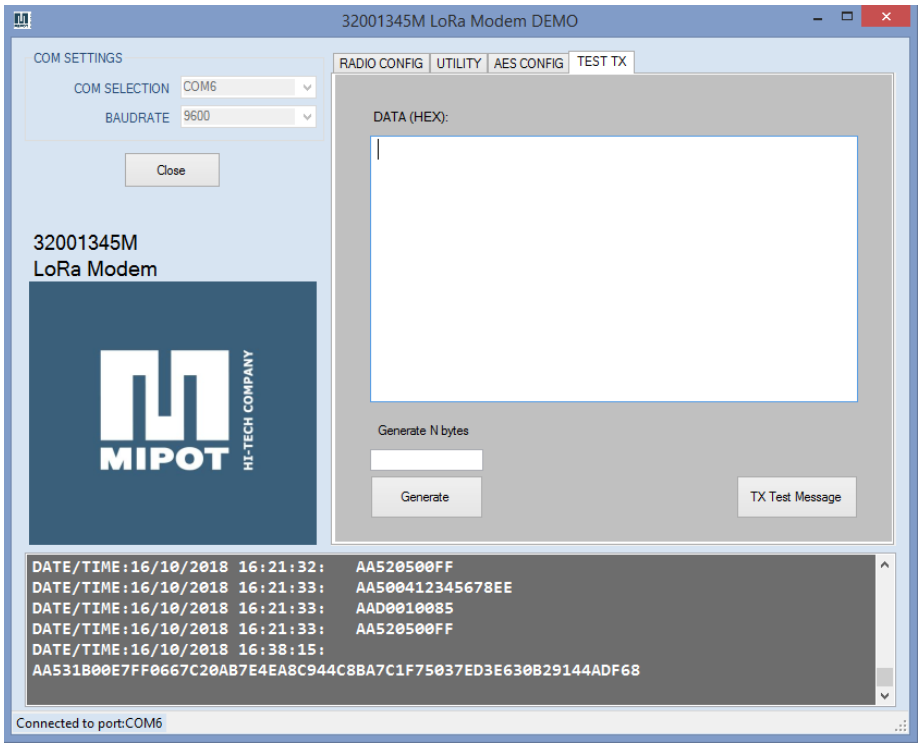
of the interface.



f) On the other side (on the GUI of the device that is going to receive the above message) the received message will be displayed on the lower petrol box. The same process could be done on opposite direction using the first GUI as receiving and the second as transmitting device.



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