

# WiMOD Lite Gateway

Data Sheet

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## Document Information

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## Document History

Version	Description
1.0	Released version.
1.1	Added recommendation for power adapter and antenna
1.2	Added recommendation for indoor use, Added IP class
1.3	Updated chapter 4, 0, and 6.
1.4	Added chapter 3.2.1, Updated Table 3-1
1.5	Updated Table 3-1, Table 3-2, and Figure 3-3. Updated chapter 5

## Aim of this Document

The aim of this document is to give a detailed product description including interfaces, features and performance of the WiMOD Lite Gateway (LGW) for LoRa™.

For further information on software, and hardware of iC880A please refer to the corresponding documentation:

WiMOD\_LiteGateway\_QuickStartGuide.pdf, and iC880A\_Datasheet.pdf.

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# 1 Evaluation Kit - Important Notice

The Lite Gateway can be used in combination with the following "5V – 2.5A Switch Adapter" from NEDIS (Article number is: P.SUP.SMP5V2A5) and the antenna CTA868/2/DR/SM/S2 both available on <http://webshop.imst.de/radio-modules/accessories.html>.

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## 2 Introduction

The Lite Gateway is a device that consists of a Raspberry-Pi B+, an iC880A LoRa Concentrator and a sandwich board, built into an aluminum housing. All parts form a LoRaWAN Gateway that can be connected to a LoRaWAN server.

The Lite Gateway is meant to be used as demonstration system for the LoRaWAN network system. It is not designed to be a full featured outdoor gateway.

Please operate the Lite Gateway only indoor and in combination with the delivered power supply and antenna.



Figure 2-1: Lite Gateway

## 2.1 Basic System Concept

Figure 2-2 shows the basic system concept for the LoRaWAN system. The Lite Gateway is the central hardware solution for all LoRa based radio communication. It receives and transmits radio messages. Processing of the radio messages as well as the protocol related tasks is done by the embedded host system (Raspberry Pi). Received and processed radio messages are being sent to a LoRaWAN server. The concrete segmentation of the protocol related tasks is outside the scope of this document.

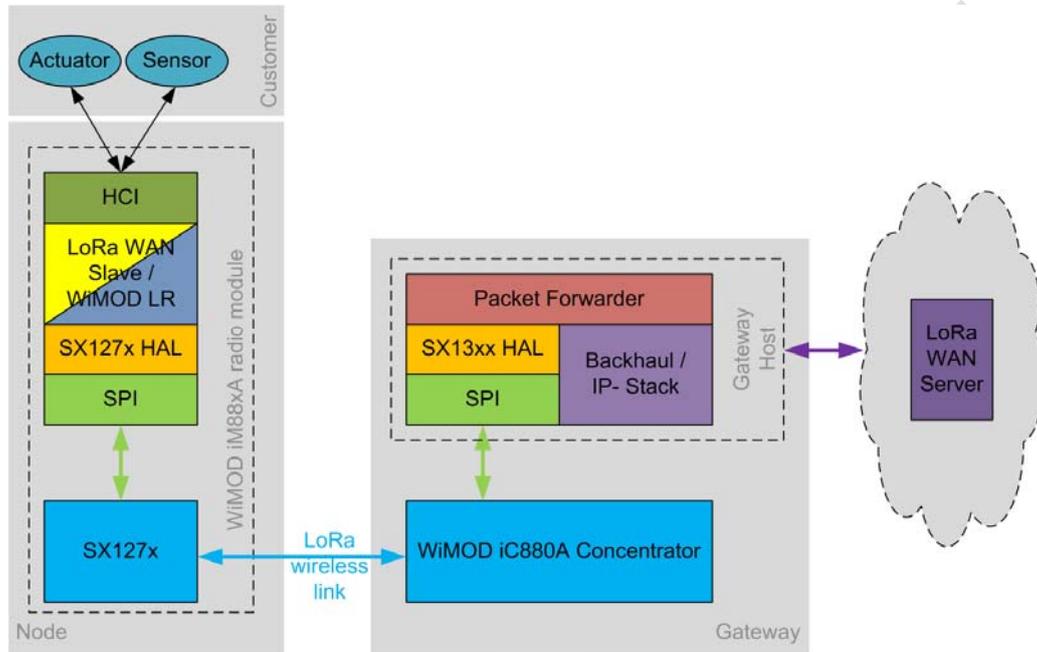


Figure 2-2: Basic System Concept

The pre-installed github repositories are:

- "lora\_gateway" (V5.0.1) ([https://github.com/Lora-net/lora\\_gateway](https://github.com/Lora-net/lora_gateway))
- "packet\_forwarder" (V4.0.1) ([https://github.com/Lora-net/packet\\_forwarder](https://github.com/Lora-net/packet_forwarder))

Both repositories have been installed on the folder /home/pi/github.

### 3 Hardware

#### 3.1 Device Overview

The Lite Gateway consists of a Raspberry-Pi B+, an iC880A LoRa Concentrator and a sandwich board for routing the signals between the Raspberry and the iC880A. For detailed information on iC880A please refer to the iC880A\_Datasheet.pdf

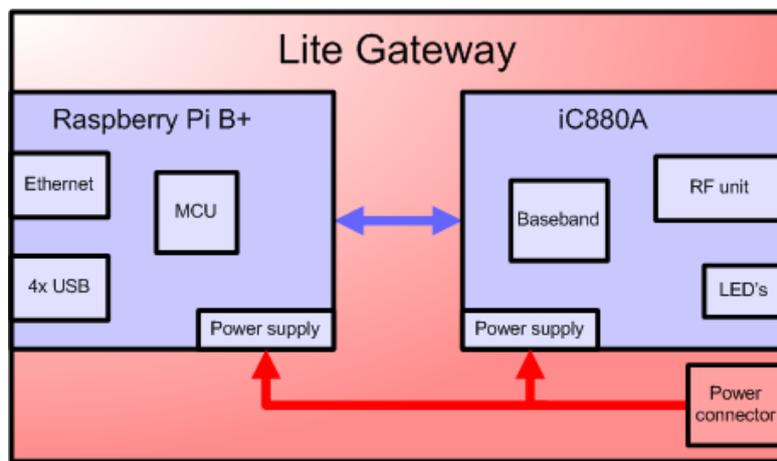


Figure 3-1: Block diagram of the Lite Gateway

The following picture shows the front and back interfaces of the Lite Gateway.

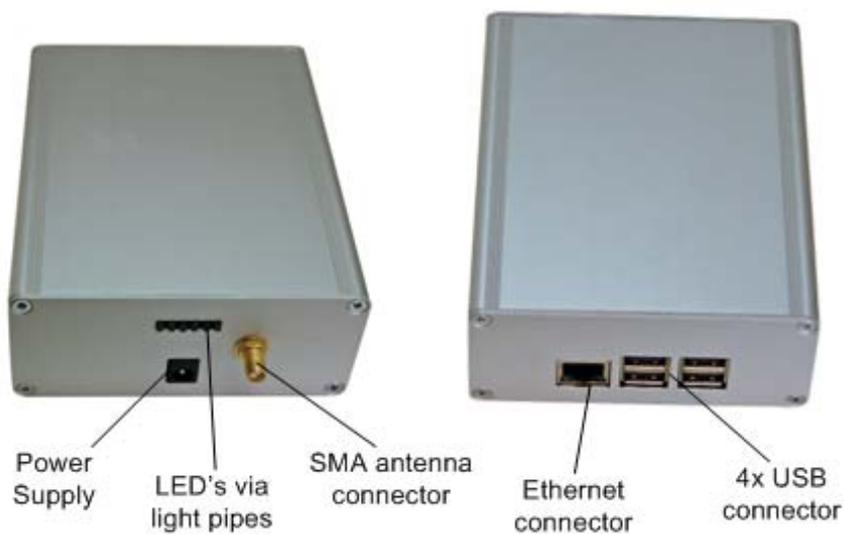


Figure 3-2: Front and back interfaces

## 3.2 Technical Specifications

T = 25°C, VDD = 5 V (typ.) if nothing else stated

Lite Gateway	Description
RF Characteristics	
RF Frequency Range	863MHz to 870MHz
RF Input Power	max. -15 dBm <sup>(1)</sup>
TX Output Power	typ. 20 dBm at setting 20 dBm <sup>(2)</sup>
TX Power Variation initial	typ. $\pm 0.7$ dB
TX Power Variation over operating temperature	typ. $\pm 2.4$ dB (relative to power @ 25°C)
Modulation	LoRa™ / FSK
Electrical Characteristic	
Supply Voltage (VDD)	5 V
Current Consumption	Depending on the operating mode up to 2300mA
Interfaces	
DC Power Connector	Possible switching power supply PSUPSMP5V2A5
Antenna	SMA (female) for antenna CTA868/2/DR/SM/S2
USB	4 x USB 2.0 ports
Ethernet	Ethernet port 10/100 BaseT RJ45
LEDs	LED functions are configured by the corresponding HAL software
General	
Housing	Aluminum case, two half-shells and two panels
Dimensions	46 x 105 x 124 mm <sup>3</sup>
Weight	367 gr.
Environmental Conditions	
Operating Temperature	-5°C to +55°C
Relative Humidity	20% to 75% non condensing
International Protection Code	IP50
Certifications	
Notes	
(1) With RF output power level above +15 dBm a minimum distance to a transmitter should be 1 m for avoiding too large input level.	
(2) Operating with more than +20 dBm can destroy the internal power amplifier of the used iC880A, please refer to the iC880A data sheet.	

Table 3-1: Technical Specifications

### 3.2.1 Transmitter RF Characteristics

The pre-installed github software (see chapter 2.1) has been adapted regarding the power level configuration in the global\_conf.json File with the following configuration settings (see Table 3-2). It is highly recommended to use these optimized settings for the power level configuration. Please note that you have to adapt these settings accordingly after an update of the github software.

PA Gain	DAC Control	MIX Gain	DIG Gain	Nominal RF Power Level [dBm]
0	3	8	2	-6
0	3	11	3	-3
0	3	10	0	0
0	3	14	1	3
2	3	8	3	6
2	3	8	2	10 <sup>Note (2)</sup>
2	3	8	1	11 <sup>Note (2)</sup>
2	3	9	2	12 <sup>Note (2)</sup>
2	3	11	3	13 <sup>Note (2)</sup>
2	3	10	2	14 <sup>Note (2)</sup>
2	3	11	2	16 <sup>Note (2), (3)</sup>
2	3	12	0	20 <sup>Note (2), (3)</sup>

Notes

(1) All configuration parameters and values in this table are determined with "mod=LoRa" of firmware "util\_tx\_continues", based on HAL 4.1.3.

(2) This power level must not be used in EU frequency sub band "L" (865 MHz to 868 MHz, limited to 6.2dBm/100kHz) unless this limitation is overruled in some countries by national law which allow higher output power level.

(3) This power level is only allowed to be used in EU frequency sub band "P" (869.4 MHz to 869.65 MHz).

Table 3-2: Transmitter power level configuration in TX gain table

Output power of the Lite Gateway is limited to +20 dBm. Operating with more than +20 dBm can destroy the internal power amplifier of the iC880A. Therefore the power level above this limit have to be avoided.

Please note that the certification tests for RED-compliance were done with the configuration parameters in Table 3-2 and are only valid with these settings. It is the user's responsibility only to use these settings otherwise the declaration of conformity (RED compliance) become invalid.

**Note:**

Please be aware, that you have to inform the network operator about Adaptation of the power level configuration and Limitation of the power level in some frequency bands.

Maybe you have to clarify these issues via out of band communication.

Figure 3-3 shows the measurements results (output power vs. temperature) of included iC880A for the above mentioned recommended settings.

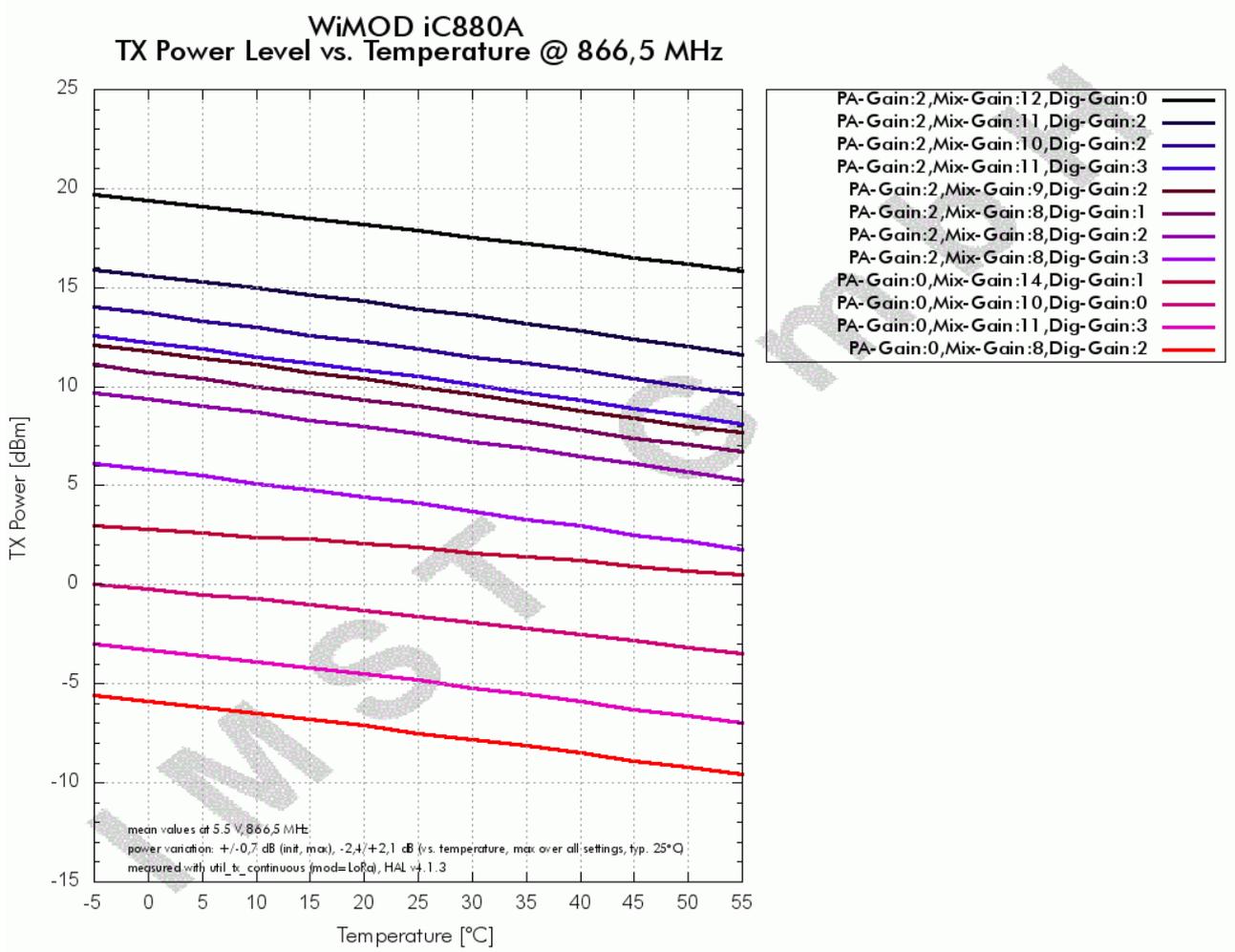


Figure 3-3: Output power vs. temperature for recommended settings



## 4 Appendix

### 4.1 List of Abbreviations

LGW	Lite Gateway

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## 5 Restrictions and Limitations

### 5.1 Hardware Restrictions and Limitations

The characteristic values given by the present document are typically obtained by measurements based on evaluation kits of the entitled module. Using other carrier boards or connected equipment might lead to different characteristics. Subject to given measurement results the characteristic values might show the best performance of the entitled device, independent from any compliancy restriction of final operation purposes.

### 5.2 Software Restrictions and Limitations

The present document is a datasheet of the entitled device which intentional use is to provide information about basic characteristics related to the device hardware. Typically all described characteristic values require software for obtaining them accordingly. All features of the available software are subject to changes without claim to be complete at any time. Characteristically values might also be provided based on datasheets of the appropriate key components unless there are test results available based on the available software. For more information regarding current supported features of the available software refer to [www.wireless-solutions.de](http://www.wireless-solutions.de).

### 5.3 Compliancy Restrictions and Limitations

The entitled device has been designed to comply with the standards namely given in the present document. The intentional operation shall be in so called ISM bands, which can be used free of charge within the European Union and typically licences free all over the world. Nevertheless, restrictions such as maximum allowed radiated RF power or duty cycle may apply which might result in a reduction of these parameters accordingly.

In addition, the use of radio frequencies might be limited by national regulations which requirements also need to be met.

In case the entitled device will be embedded into other products (referred as "final products"), the manufacturer for this final product is responsible to declare the conformity to required standards accordingly. A proof of conformity for the entitled device is available from IMST GmbH on request. Beside the entitled device the conformity also considers software as well as supporting hardware characteristics which might also have an impact accordingly.

The applicable regulation requirements are subject to change. IMST GmbH does not take any responsibility for the correctness and accuracy of the aforementioned information. National laws and regulations, as well as their interpretation can vary with the country. In case of uncertainty, it is recommended to contact either IMST's accredited Test Center or to consult the local authorities of the relevant countries.

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