

WiMOD Lite Gateway

Data Sheet

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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

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™. This document only applies to LGWs with aluminum case, delivered after April 2017.

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

WiMOD_LiteGateway_QuickStartGuide.pdf

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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EXCEPT TO THE EXTENT OF THE INDEMNITY SET FORTH ABOVE NEITHER PARTY SHALL BE LIABLE TO THE OTHER FOR ANY INDIRECT SPECIAL INCIDENTAL OR CONSEQUENTIAL DAMAGES.

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.

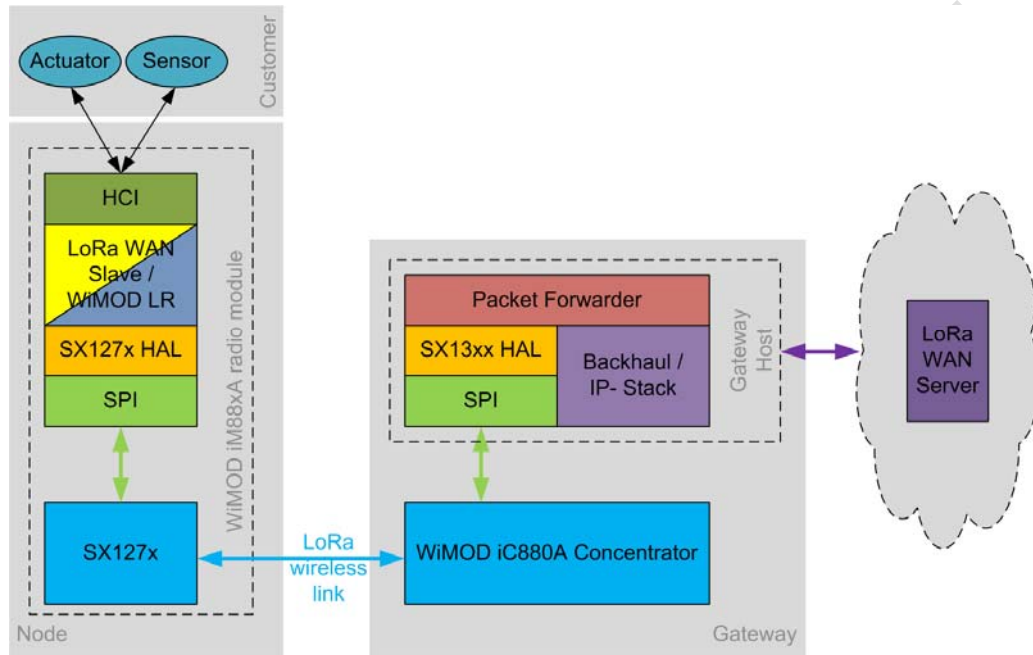


Figure 2-2: Basic System Concept

The pre-installed github repositories are:

- "lora_gateway" (V5.0.1) (https://github.com/Lora-net/lora_gateway)
- "packet_forwarder" (V4.0.1) (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

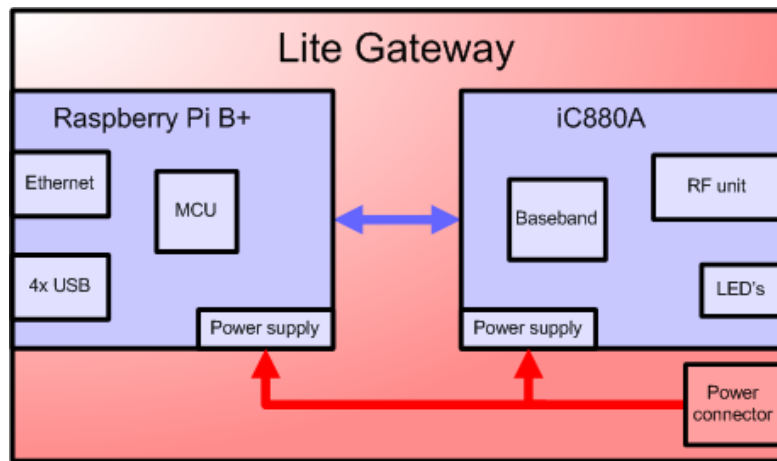


Figure 3-1: Block diagram of the Lite Gateway

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

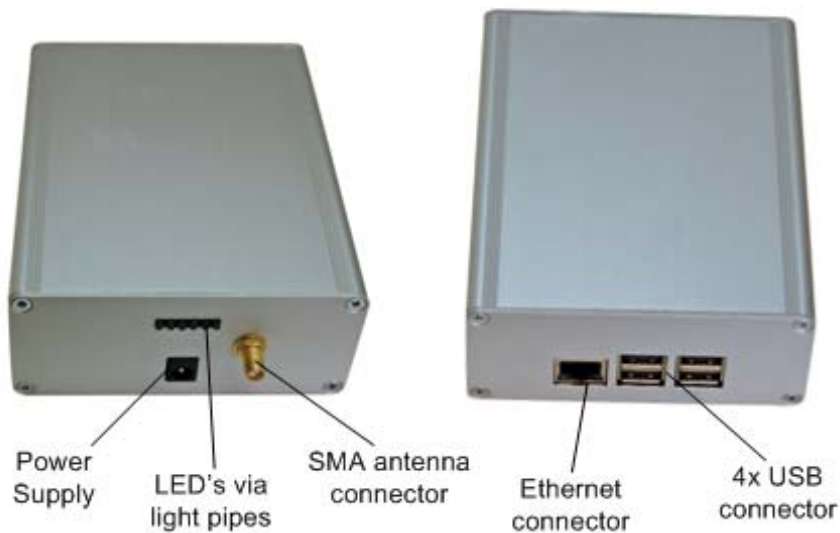


Figure 3-2: Front and back interfaces

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 ⁽¹⁾
TX Output Power	max. 20 dBm at setting 20 dBm ⁽²⁾
TX Power Variation initial	± 1.2 dB
TX Power Variation over operating temperature	± 1.1 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 ³
Weight	367 gr.
Environmental Conditions	
Operating Temperature	+15°C to +35°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	9	3	-6
0	3	8	1	-3
0	3	9	0	0
0	3	15	1	3
1	3	8	1	6
1	3	10	1	10 ^{Note (3)}
2	3	8	2	11 ^{Note (3)}
2	3	10	3	12 ^{Note (3)}
2	3	8	1	13 ^{Note (3)}
2	3	11	3	14 ^{Note (3)}
2	3	12	3	16 ^{Note (3), (3)}
2	3	12	1	20 ^{Note (3), (3)}

Notes

- (1) All configuration parameters and values in this table are determined with "CW mode" of firmware "until_tx_continues", based on pre-installed github repository.
- (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) for the above mentioned recommended settings.

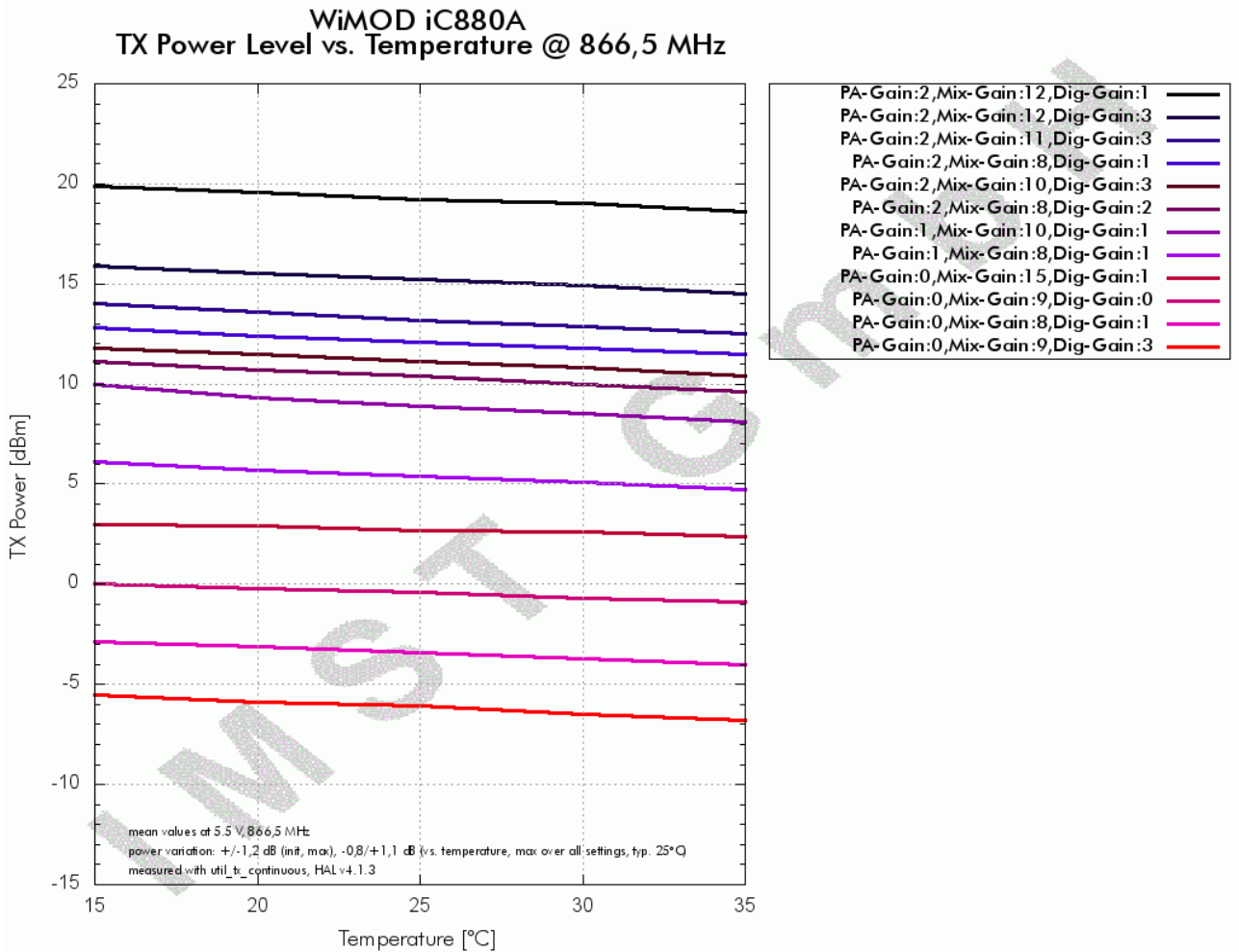


Figure 3-3: Output power vs. temperature for recommended settings



4 Appendix

4.1 List of Abbreviations

LGW	Lite Gateway

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5 Regulatory Compliance Information

The use of radio frequencies is limited by national regulations. This product has been designed to comply with the European Union's Radio Equipment Directive (RED, 2014/53/EC). Nevertheless, restrictions in terms of maximum allowed RF power or duty cycle may apply on a national basis.

The product is compliant to the RoHS II directive (2011/65/EC) and it does not make use of chemical agents or other prohibited materials beyond the limits as given in the REACH-directive (2008/1272/EC) including the candidate materials list (echa.europa.eu/candidate-list-table as of December 2017). Thus, the product fulfils the essential requirements of the CE-directive (2008/765/EC).

A declaration of conformity for this product will be available from IMST GmbH on request.

Please note that the certification tests for RED-compliance were done with parameters and settings (e.g. chapter 3.2) specified in this datasheet 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.

6 Important Notice

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