



# **LorMur – User Manual**

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## REVISION HISTORY:

Revision	Dates	Description
1.0	Feb 19, 2020	Initial version
1.1	March 5, 2020	Add Regulatory Statements FCC/IC

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## 1 Preamble

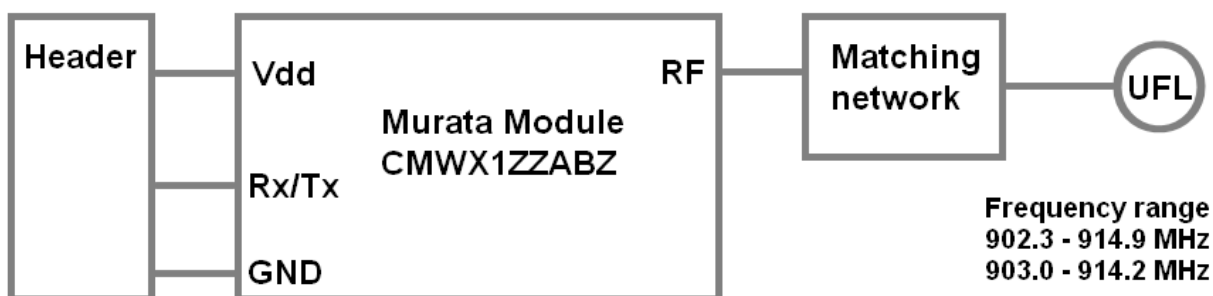
The device LoRMur is an electronic card based on Murata module CMWX1ZZABZ, it only integrates the module as specified by Murata application note. The main change resides in Antenna feed path. So features and electrical specifications are same as Module CMWX1ZZABZ.

The LoRMur device is only intended to be used into Oceasoft products. Furthermore, it must be integrated by qualified Oceasoft engineers.

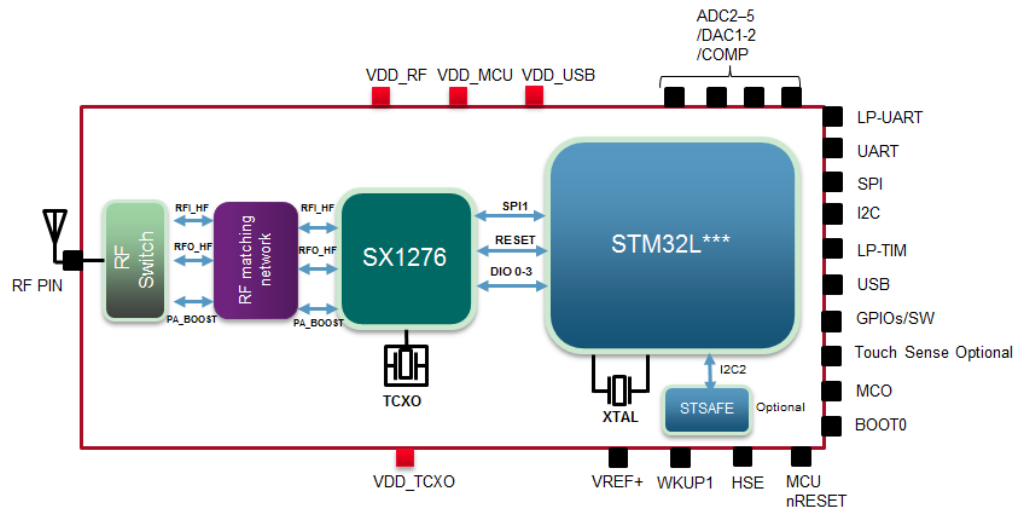
## 2 Features

Interfaces:	UART
Main ICs:	Module LoRaWan Murata CMWX1ZZABZ
Reference Clocks:	Integrated 32MHz clock and 32.768kHz clock
Supported Frequencies:	868MHz, 915MHz
LoRMur Size:	33.4mm x 27.15mm
Package:	Metal Shield (Module Murata)
RoHS, REACH:	LoRMur is compliant with RoHS, and REACH directives

## 3 Block Diagram

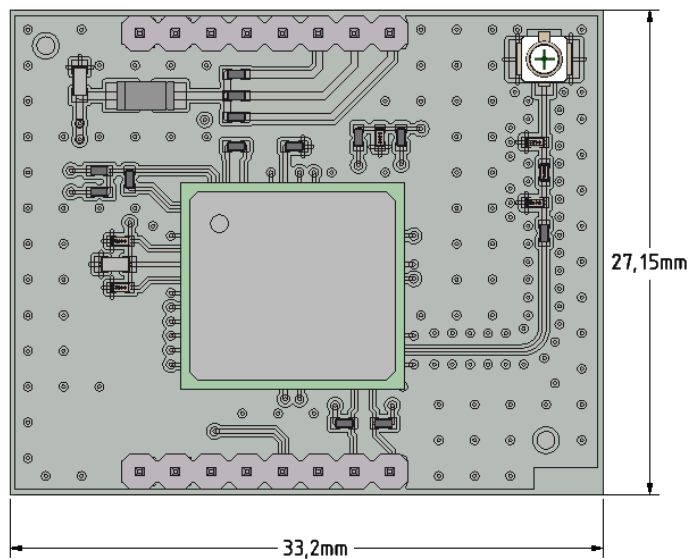
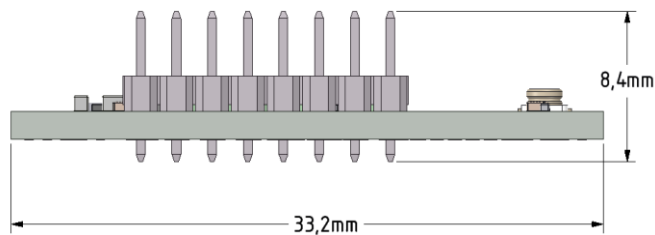


*LoRMur Block Diagram*

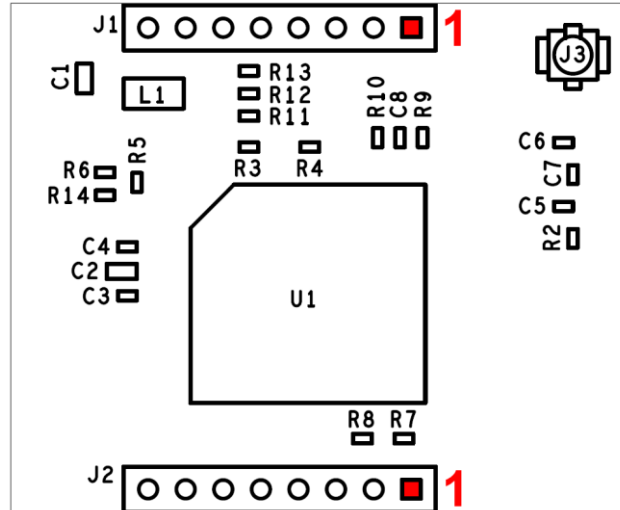


*Murata Module Block diagram*

## 4 Dimensions



## 5 Pinout



Header	1	2	3	4	5	6	7	8
J1	Vdd	Vdd	Vdd	NC	NC	NC	GND	GND
J2	TXD	RXD	NC	Vdd_TCXO	RST	NC	GND	GND

- Vdd: Power supply
- Vdd\_TCXO: Power supply for the Module's TCXO
- GND: Ground
- RST: Reset
- TXD: UART Tx
- RXD: UART Rx

## 6 Absolute maximum Ratings

Parameters	Min	Typ	Max	Unit
Storage Temperature	-40	25	+90	°C
Input RF Level	-	-	10	dBm
Supply Voltage	-0.3		3.9	V

## 7 Operating conditions

Parameters	Min	Typ	Max	Unit
Operating Temperature	-40	25	+70	°C
Supply voltage Vdd	2.2V*	3.0	3.6	V

\* For 20dBm operation (PA Power) Vdd min should be 2.4V

## 8 Electrical characteristics

### 8.1 FSK/OOK Transceiver

#### Conditions :

Vdd=3.3 V, Temp= 25 °C, FXOSC = 32 MHz,

FRF =868/915 MHz

Level FSK modulation without pre-filtering, FDA = 5 kHz, Bit Rate = 4.8 kb/s and terminated in a matched 50Ω impedance.

#### 8.1.1 FSK/OOK Receiver Specifications

Symbol	Description	Conditions	Min	Typ	Max	Unit
RF_S	RF sensitivity	LNA Boost on FDA=5kHz BR=4.8kb/s	-	-117.5	-	dBm
Is	Supply Current in Rx Mode	LNA Boost On (Band 1) LNA Boost Off (Band 1)		23 22		mA mA

## 8.1.2 FSK/OOK Transmitter Specifications

Symbol	Description	Conditions	Min	Typ	Max	Unit
RF_OP	RF output power in 50 ohms on RFO pin (High efficiency PA)	Programmable with 1dB steps Max Min		14 -5		dBm
RF_OP_HE	RF output power in 50Ω on PA_BOOST pin ( Regulated PA)	Programmable with 1dB steps Max Min		18.5 2		dBm
RF_OP_vs_Vdd	RF output power stability on PA_BOOST pin vs Vdd	2.2V<Vdd<3.6V		+/-1		dB
RF_OP_vs_T	RF output power stability on PA_BOOST pin vs Temp.	-40°C < T° < +85°C		+/-1.5		dB
Is	Supply current, in Tx mode/50Ω	RF_OP = +20dBm on PA_BOOST RF_OP = +17dBm on PA_BOOST RF_OP = +14dBm on RFO_HF pin RF_OP = +7dBm on RFO_HF pin		128 106 47 34		mA

## 8.2 LoRa Transceiver Specification

### Conditions:

Vdd = 3.3 V, Temperature = 25° C, FXOSC = 32 MHz,  
 Error Correction Code (EC) = 4/5, Packet Error Rate (PER) = 1%,  
 CRC on payload enabled, Payload length = 10bytes.  
 With 50Ω matched impedances

### 8.2.1 LoRa Receiver Specification

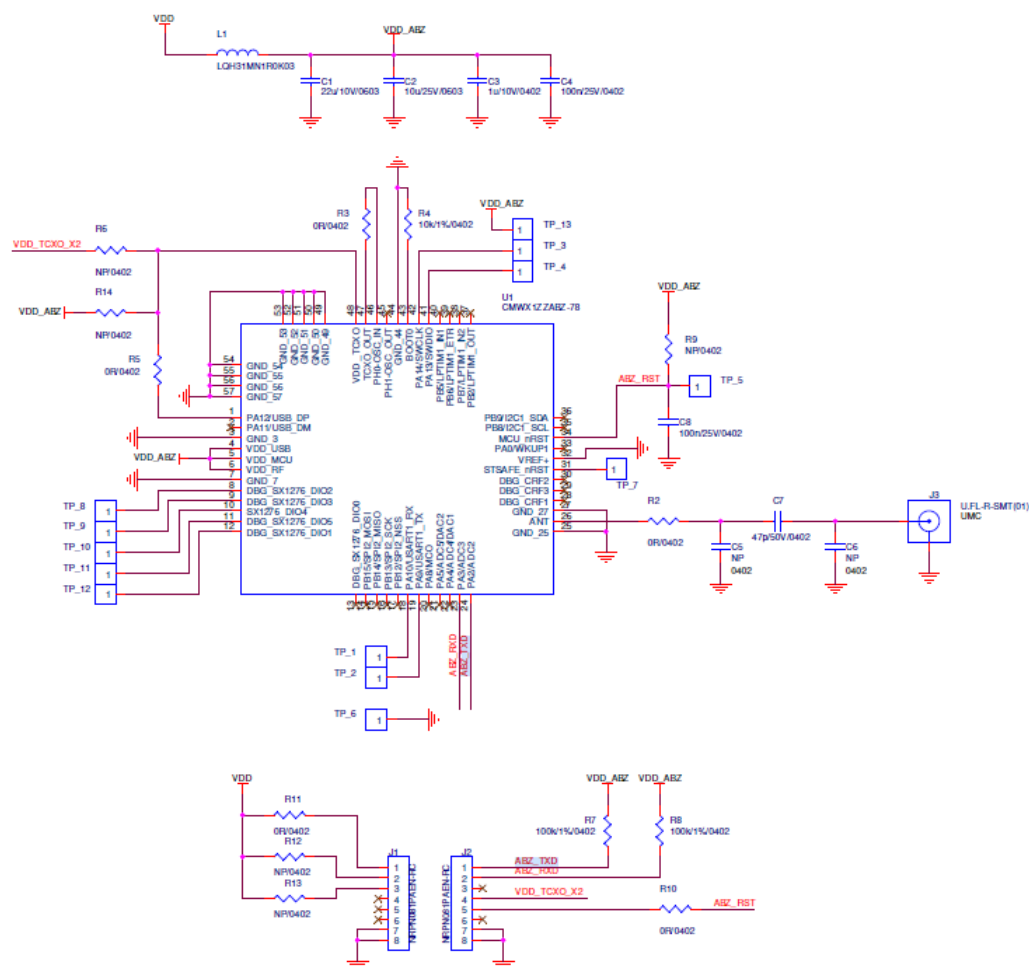
Symbol	Description	Conditions	Min	Typ	Max	Unit
RF_OP	Supply current in Rx LoRa mode LNA Boost off	Band 1, BW = 125 kHz Band 1, BW = 250 kHz Band 1, BW = 500 kHz		21.5 22.2 23.6		mA
RF_S_L125	RF sensitivity, Long-Range Mode, highest LNA gain, Lna Boost for Band 1, using split Rx/Tx path 125 kHz bandwidth	SF=6 SF=7 SF=8 SF=9 SF=10 SF=11 SF=12		-117.5 -122.5 -125.5 -128.5 -131.0 -133.5 -135.5		dBm
RF_S_L250	RF sensitivity, Long-Range Mode, highest LNA gain, Lna Boost for Band 1, using split Rx/Tx path 250 kHz bandwidth	SF=6 SF=7 SF=8 SF=9 SF=10 SF=11 SF=12		-114.0 -119.0 -122.0 -125.0 -127.5 -130.0 -133.0		dBm

### 8.2.2 LoRa Transmitter Specification

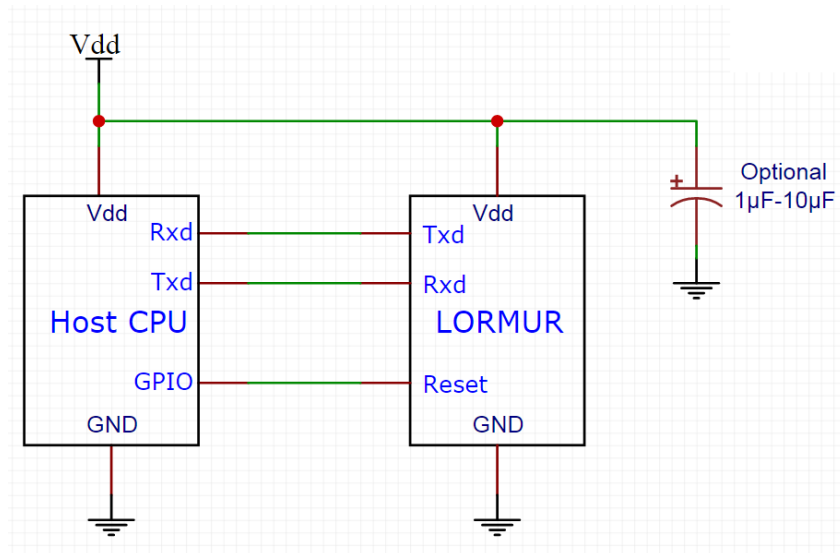
Symbol	Description	Conditions	Min	Typ	Max	Unit
RF_OP	Supply current in Tx mode	RFOP setting = 14 dBm RFOP setting = 10 dBm		47 36		mA
RF_OP_HE	Supply current in Tx mode	Using PA Boost pin @ RFOP setting = 20 dBm		128		mA

## 9 Schematics

### 9.1 Schematics Diagram



## 9.2 Reference Diagram



## 10 Notice

### 10.1 Storage Conditions

- The product shall be stored under the ambient temperature from 5 to 35°C and 20~70%RH.
- The product shall be stored in non corrosive gas (Cl<sub>2</sub>, NH<sub>3</sub>, SO<sub>2</sub>, Nox, etc.).
- Any excess mechanical shock including, but not limited to, sticking the packing materials by sharp object and dropping the product, shall not be applied in order not to damage the packing materials.

### 10.2 Handling Conditions

- Be careful in handling or transporting products because excessive stress or mechanical shock may break products.
- Handle with care if products may have cracks or damages on their terminals, the characteristics of products may change.

### 10.3 Standard PCB Design (Land Pattern and Dimensions)

All the ground terminals should be connected to the ground patterns. Furthermore, the ground pattern should be provided between IN and OUT terminals.

### 10.4 Notice for module Placer :

When placing products on the Motherboard PCB, products may be stressed and broken by uneven forces. For the positioning of module on Motherboard PCB, be aware that mechanical chucking may damage products.

## 11 Regulatory Statements

### 11.1 FCC Statements

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operations.

Note: This product 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 product 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 product 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.

Please take attention that changes or modification not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment should be installed and operated with a minimum distance 20cm between the radiator and your body.

When the FCC ID is not visible when the module is installed inside a device, then the outside of this device will display a label referring to the enclosed module.

### 11.2 IC Statements

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

- this device may not cause interference, and
- This device must accept any interference, including interference that may cause undesired operation of the device.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

ISED RF exposure statement:

This equipment complies with ISED 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.

When the ISED certification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed will also display a label referring to the enclosed module.

### **11.3 General Statements**

The module is limited to Oceasoft installation only, Oceasoft is responsible for ensuring that the end-user has no manual instruction to remove, or install module

Therefore, the final host product must be submitted to [SyChip] for confirmation that the installation for the module into the host is in compliance with regulations of FCC and IC Canada. Specially, if an antenna other than the model documented in the Filing is used, a Class 2 Permissive Change must be filed with the FCC.

Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

The LoRa module is for use with external antenna ONLY, with a gain  $< 2.0\text{dBi}$ .

This module has been approved by FCC to operate with the antenna provided. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.