Product Specifications

LM-533PH EVB

Dual-mode LoRa® Evaluation Board

VER 1.1

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General Information

The LM-533PH EVB is a LoRa® end-node device based on GlobalSat LM-533PH module which is a LoRa® programmable module that can support both LoRaWAN™ and Globalsat proprietary protocol (MOST-Link). The LM-533PH EVB is a standalone node with power management, it includes JTAG connector which can be transmitted either on a regular schedule (can be configured) or initiated by programming. As with all LoRaWAN™ compliant of products, it can also help developers to develop the applications rapidly, including hardware and software design by using high level ASCII command to control the protocol, before the end product is ready.

■ The LM-533PH EVB Contents

1. LM-533PH EVB
2. RPSMA antenna

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Features

- RF ISM band, supports LoRaWAN™ V1.0.2 EU 868/ US 915/ AS 923 MHz bands
- Support Class A/ Class C
- Instant wake up over the air
- Build-in 820mA battery, Micro USB connector for charging
- 25 pin I/O available for programming
- Programmable SDK/ API
- One button for programming.
- 2 LED indicators for programming.
- Dual-mode LoRa® Evaluation Board (LoRaWAN™/ MOST-Link)
- For local LoRaWAN™ compatibility, coverage, payload evaluation

Hardware Specifications

Item	Parameters
LoRa® Module	GlobalSat LoRa® programmable module LM-533PH
Frequency	863-870MHz (EU) 902-928MHz (US) 920-928MHz (ROA)
RF Output Power	Max. 20 dBm
Receiving Sensitivity	-132 dBm @ 980 bps
Dimensions	71 x 55 x 15 mm (not including antenna)
LED Indicator	Power LED x 1 Programmable LED x 2
Operation Conditions	Temperature -20 ~ 60℃; Humidity 5 ~ 95%
Power supply	Standard Micro USB @ DC 5V/ 500mA Built-in battery connector
Battery	Re-chargeable Li-polymer battery 820mAh Over current protection
Button	Push button for programming
Power switch	
JTAG	

LoRaWAN™ Configuration

Activation of an end-device can be achieved in two ways, either via “Over-The-Air Activation (OTAA)” when an end-device is deployed or reset, or via “Activation By Personalization (ABP)” in which the two steps of end-device personalization and activation are done as one step.

- **Over-the-Air Activation**

For over-the-air activation, end-devices must follow a join procedure prior to participating in data exchanges with the network server. An end-device has to go through a new join procedure every time it has lost the session context information.
The join procedure requires the end-device to be personalized with the following information before its starts the join procedure: a globally unique end-device identifier (DevEUI), the application identifier (AppEUI) and an AES-128 key (AppKey).

- **Activation by Personalization**

Under certain circumstances, end-devices can be activated by personalization. Activation by personalization directly ties an end-device to a specific network by-passing the join request join accept procedure.
Activating an end-device by personalization means that the DevAddr and the two session keys NwkSKey and AppSKey are directly stored into the end-device instead of the DevEUI, AppEUI and AppKey. The end-device is equipped with the required information for participating in a specific LoRa network when started. Each device should have a unique set of NwkSKey and AppSKey. Compromising the keys of one device shouldn‘t compromise the security of the communications of other devices.

Operation Mode

- **Bi-directional end-devices (Class A)**: End-devices of Class A allow for bi-directional communications whereby each end-device's uplink transmission is followed by two short downlink receive windows. The transmission slot scheduled by the end-device is based on its own communication needs with a small variation based on a random time basis (ALOHA-type of protocol). This Class A operation is the lowest power end-device system for applications that only require downlink communication from the server shortly after the end-device has sent an uplink transmission. Downlink communications from the server at any other time will have to wait until the next scheduled uplink.

- **Bi-directional end-devices with maximal receive slots (Class C)**: End-devices of Class C have nearly continuously open receive windows, only closed when transmitting.

MOST-Link Configuration

There are three operating modes in MOST-Link configuration state, as below;

1. Normal mode
2. Wake-up mode
3. Power-saving mode

The different operation modes are switched by AT-command.

- **Mode 1: Normal mode**
  UART is opened. Wireless channel is opened. Penetrating transmission.

- **Mode 2: Wake-up mode**
  UART is opened. Wireless channel is opened. The only difference from normal mode is that its preamble is longer than normal mode's, so that it can make sure the receiver could be waked in the power-saving mode.

- **Mode 3: Power-saving mode**
  UART is closed. The wireless channel is in power-saving mode. You can set up an interval from 0.5 to 5 seconds to wake up in power-saving mode to check if there is preamble. If the receiver receives preamble, it will open UART, and wake MCU to process the received data and return data. After that, it will return to the power-saving mode.

Note:

The receiver could be waked no matter it is in normal mode or wake-up mode or power-saving mode. The receiver would automatically add the RSSI.

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