Product Specifications

Dual-mode LoRa® Module

LM-130H1

VER: 1.2

GlobalSat WorldCom Corporation
16F., No. 186, Jian 1st Rd., Zhonghe Dist.,
New Taipei City 23553, Taiwan
Tel: 886.2.8226.3799/ Fax: 886.2.8226.3899
lora@globalsat.com.tw
www.globalsat.com.tw

USGlobalSat Incorporated
14740 Yorba Court, Chino, CA 91710
Tel: 888.323.8720 / Fax: 909.597.8532
sales@usglobalsat.com

Product Description

The GlobalSat LM-130H1 is a RF module that based on LoRa® technology which provides long-range, low data rate IoT connectivity to sensors, electronic meter reading, geolocation devices, industrial monitoring and control, home and building automation, long range irrigation systems, and all kinds of IoT/ M2M equipments. It can work as the end-node devices in the LoRaWAN™ infrastructure or in GlobalSat proprietary protocol MOST-Link.

Product Feature

- Built-in standard LoRaWAN™ FW and proprietary MOST-Link FW
- Share same PCB/ device design for both LoRaWAN™ and private RF data communication
- For LoRaWAN™ :
  - Standard LoRaWAN™ protocol for EU868/ US915/ AS923 and profile for local settings
- For MOST-Link:
  - MOST-Link: use AT command set to send data over MOST-Link protocol
  - Frequency: 860 - 1,020 MHz
- Ultra-high sensitive receiving ability by LoRa® spread spectrum modulation technology
- Accord FCC, ETSI, Telec standard

Hardware Specifications

LoRa® Chipset	SX1276
Antenna	IPEX RF Connector
MCU	STM32
Frequency	863 - 870 MHz (EU) 902 - 928 MHz (US) 920 - 928 MHz (ROA)
Transmission Power	862-870 MHz (EU) @ 14 dBm 902-928 MHz (US) @ 20 dBm 920-928 MHz (ROA) @ 20 dBm
Transmission Media	UART
Baud Rate	LoRaWAN™：57600 bps, Parity: 8N1 MOST-Link：9600 bps
Operation Voltage	3 ~ 6 V
Current Consumption	Receiving: 21 mA (typical) Transmitting: 125 mA (typical) Sleeping: 5 uA (typical)
Transmission Distance	LoRaWAN™: 1 ~ 10 KM @ 980 bps MOST-Link: 1 ~ 10 KM @ 0.81 Kbps
Receiving Sensitivity	LoRaWAN™: -132 dBm @ 980 bps MOST-Link: -132 dBm @ 0.81 Kbps
Operation Temperature	-40 ~ 85°C
Humidity	5 ~ 95% (Non-condensing)
Dimension	25 x 18 mm (PCBA)

Pin Definition

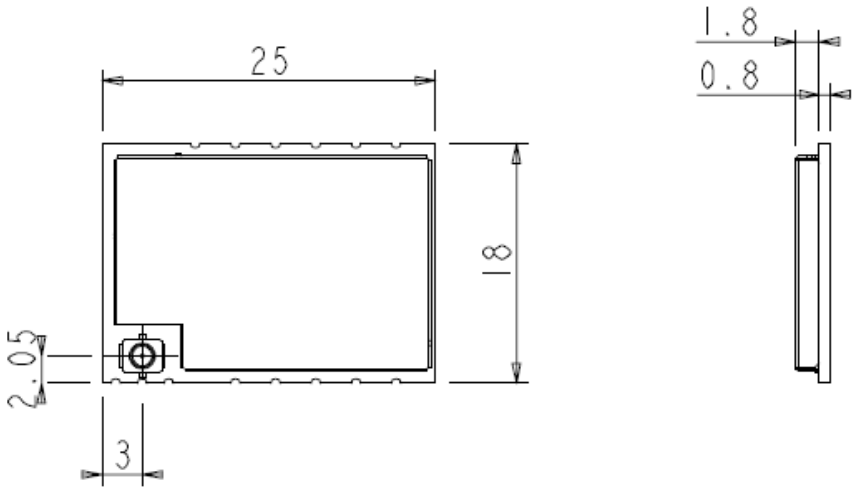
No.	Pin	Definition	Description
1	GND	GND	Ground
2	RF_IO	Input/ Output	RF input / output
3	GND	GND	Ground
4	PIO_9	Reserved	Reserved for extension (I2C_SDA)
5	PIO_10	Reserved	Reserved for extension (I2C_SCL)
6	PIO_2	Reserved	Reserved for extension (UART2_TX)
7	PIO_3	Reserved	Reserved for extension (UART2_RX)
8	PIO_11	Reserved	Reserved for extension (UART3_TX)
9	PIO_12	Reserved	Reserved for extension (UART3_RX)
10	NRST	Input	RESET，LOW ACTIVE
11	LoRa_EN	Input	MODULE POWER ENABLE，HIGH ACTIVE “HI” = 0.91~6 Vdc ,”Low” = 0 ~ 0.38 Vdc
12	VDD	Input	3.0-6.0 Vdc
13	GND	GND	Grand
14	GND	GND	Grand
15	PIO_8	Reserved	Reserved for extension (ADC)
16	PIO_7	Reserved	Reserved for extension (UART3_CTS)
17	PIO_6	Reserved	Reserved for extension (UART3_RTS)
18	PIO_5	Reserved	Reserved for extension
19	PIO_4	Reserved	Reserved
20	JTAG_TMS	Reserved	Reserved for extension (JTAG Interface)
21	JTAG_TCK	Reserved	Reserved for extension (JTAG Interface)
22	UART1_RX	Input	UART Input port
23	UART1_TX	Output	UART Output port
24	PIO_1	Reserved	Reserved for extension
25	PIO_0	Reserved	Reserved for extension

GPIO level except LoRa_EN :

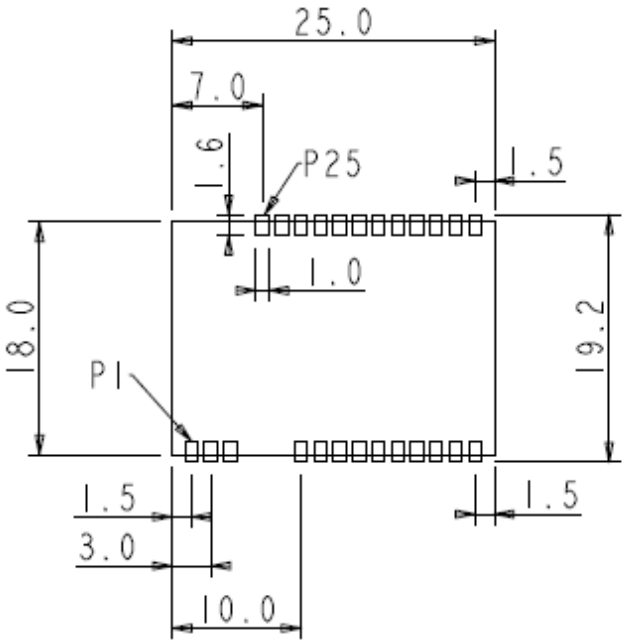
INPUT ”HI” = 1.96~3.1 Vdc, ”Low” = 0~0.84 Vdc

OUTPUT “HI” = 2.1~2.8 Vdc, ”Low” = 0~0.7 Vdc

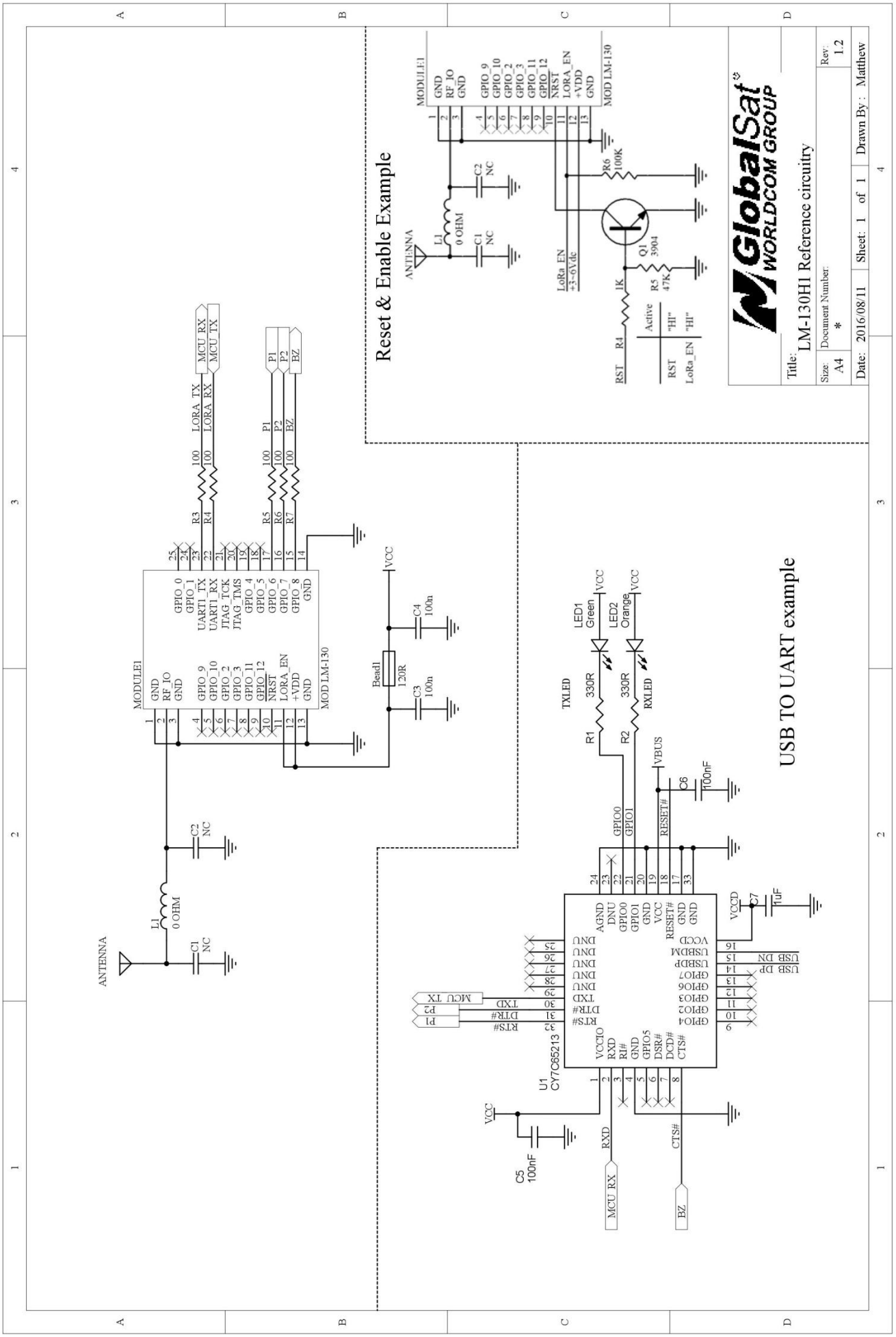
Product Size



Recommend Layout



Reference Design



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 the 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

Please refer to LM-130H1 AT Command Reference Guide for the detail setting.

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.