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contact@lansitec.com

General Description

Lansitec precision platinum temperature sensor is based on the advanced LoRa modulation and powered by lithium battery with 6-year operation time. It is cost effective LoRaWAN end device for a variety of application. Its long operation time offers low maintenance and is ideal for industry use. Sensor work mode can be adjusted via LoRa network.

Lansitec sensors family is fully compatible and plug & play for LoRaWAN network operation.

Lansitec sensors can also work with Lansitec Wireless Data Transfer Unit (P/N: 100-00175) for low cost deployment. Please contact us for further information.

Applications

- Busway temperature monitor
- Weather station
- Heating
- Ventilation & air conditioning systems
- Smart Agriculture
- Building automation

Key features

- Powered by lithium thionyl chloride battery: 5 years of operation for 1 uplink 5 minutes.
- Extended industrial operating temperature:
 - -40°C to +85°C.
- Accuracy:
 - ±1°C typically from -200°C to +200°C.
- LoRaWAN compatible:
 - Class A, uplink rate programmable from 30 seconds to 24 hours.
- Change uplink cycle via wireless, configurable by server via downlink command
- Operating frequency bands (Option at order):
 - 470MHz, < 50mW radiated power
 - 868MHz, < 25mW radiated power
 - 920MHz, < 25mW radiated power



1. Product specifications

The tables below give the electrical specifications and performance of the temperature and humidity measurement.

Table 1 General electrical characteristic

Protocol	LoRaWan1.0.2
Frequency	CN470, EU868, US915, AS923, CLAA
Sensitivity	SF=7 ≤ -126dBm SF=10 ≤ -136dBm SF=12 ≤ -142dBm
Operating Current	20uA@sleep mode Max 138mA@17dBm
Temperature Range	-200~200°C
Accuracy	±1.5°C
Standby Time	5 years @25°C 17dBm 5 minutes per transmission
Operating Temperature	-40 ~ +85°C
Storage Temperature	-55 ~ +85°C
Operating Humidity	5% ~ 95%
On/Off	Support
Sensor Quantity	4, external, cable length is optional
Antenna	External
Dimension	Aluminum, 76x46x110mm
Battery	Non-chargeable lithium battery 19Ah
Communication Distance	> 1km in urban area

2. Application Information

2.1 Function

The sensor supports both OTAA and ABP mode, works in Class A mode. DevEUI, AppEUI and AppKey, or DevAddr, NwkSKey and AppSKey are stored in the tracker and are necessary for joining a network. DevEUI or DevAddr is labeled at the back of the device. Lansitec will help to configure this before shipping.

After power on and join the Lora network, sensor will send registration message to Application Server(AS). If AS doesn't reply, sensor will retry for 3 times before switching to default mode (periodically report mode). Configuration information of the sensor is included in this registration message for AS to validate.

Sensor starts to work after receiving acceptance response or no AS reply after 3 times registration trial. Temperature will be reported to AS periodically. The duty cycle is configurable by commands from AS. Temperature acquisition and report period is 5 minutes by default.

According to LoRaWAN specification, downlink response time is decided by uplink duty cycle, user should refer the needed response time to choose uplink duty cycle. Detailed downlink and uplink definition are described below.

2.2 Uplink Message

2.2.1 Register

Bytes	1	1	1	1	2	2
Item	TYPE	SMODE	POWER	CFG	TH	CRC

TYPE field

Bit	Name	Value	Description
7~4	TYPE	0x1	Message type. AS can use it to identify different uplink messages.
3	ADR	0: OFF	ADR (Adaptive Date Rate) status

		1: ON	
2~0	MODE	0x01~0x07	Current working scheme which should be one of SMODE. 0x1: AU920 0x2: CLAA 0x3: CN470 0x4: AS923 0x5: EU433 0x6: EU868 0x7: US915

SMODE field

Bit	Name	Value	Description
7~0	SMODE	0x01: AU920 0x02: CLAA 0x04: CN470 0x08: AS923 0x10: EU433 0x20: EU868 0x40: US915	Data scheme supported by tracker. This field is preserved by Lansitec and will be configured before shipping.

POWER field

Bit	Name	Value	Description
7~3	POWER	0~31	Configured transmit power (dBm)
2~0	Reserved	0x0	Reserved for future use. If MODE is CLAA, it indicates the frequency sweep mode of the tracker: 1: A mode 2: B mode 3: C mode 4: D mode 5: E mode 6: All frequency sweep

CFG field

Bit	Name	Value	Description
7~4	DR	0~15	Data Rate(DR0~DR15).
3	REPTIND	0~1	Indicates whether report the temperature if the value is the same with before. Default value is 0, means always report.
2~0	Reserved	0x0	Reserved for future use.

TH field

Bit	Name	Value	Description
15~0	TH	1~65535	The period of temperature report, unit 10s, the default value is 30, i.e. 5 minutes.

CRC field

Bit	Name	Value	Description
15~0	CRC		CRC16 of previous fields with TYPE bits set to 0, the polynomial is $x^{16} + x^{15} + x^2 + 1$. AS only need to compare this data field with the AS stored one to judge whether configuration changed.

2.2.2 Periodical temperature and humidity

Bytes	1	1	1	2	2	...	2
Item	TYPE	VOL	RSSI	TEMP1	TEMP2	...	CRC

TYPE field

Bit	Name	Value	Description
7~4	TYPE	0x3	Message type, AS can use it to identify different uplink messages.
3~0	TNUM	0x1~0x4	Number of sensor. For example, if TNUM is 0x3, there should be TEMP1, TEMP2 and TEMP3, the whole message length should be 11 bytes.

VOL field

Bit	Name	Value	Description
7~0	VOL	0~100	Battery left(unit:percentage)

RSSI field

Bit	Name	Value	Description
7~0	RSSI	0~160	Received Signal Strength Indication (unit: -1dBm)

TEMP1 field

Bit	Name	Value	Description
short	TEMP1	-20000~20000	(unit: 0.01°C)

TEMP2 field

Bit	Name	Value	Description
short	TEMP2	-20000~20000	(unit: 0.01°C)

TEMP number is decided by field TNUM.

CRC field

Bit	Name	Value	Description
15~0	CRC		Same CRC16 as calculated in register message. This can be used for server to check if any configuration mismatch.

2.2.3 Acknowledge

Bytes	1	1
Item	TYPE	MSGID

TYPE field

Bit	Name	Value	Description
7~4	TYPE	0xF	Message type, AS can use it to identify different uplink messages.
3~0	RESULT	0: success 1: failure	Process result of any downlink message that need acknowledge

MSGID field

Bit	Name	Value	Description
7~0	MSGID	0~255	The MSGID field of corresponding downlink message

2.3 Downlink

2.3.1 Register acceptance

Bytes	1
Item	TYPE

TYPE field

Bit	Name	Value	Description
7~4	TYPE	0x1	Message type, tracker can use it to

			identify different downlink messages.
3~0	RESULT	0: success 1: failure	Register result, currently the device doesn't distinguish the result, device always take it as success if response received.

2.3.2 LoRa configuration

Bytes	1	1	1
Item	TYPE	DR	MODE

TYPE field

Bit	Name	Value	Description
7~4	TYPE	0x8	Message type, tracker can use it to identify different downlink messages.
3	ADR	0: OFF 1: ON	ADR (Adaptive Date Rate) status
2~0	Reserved	0x0	Reserved for future use. If MODE is CLAA, it indicates the frequency sweep mode of tracker: 1: A mode 2: B mode 3: C mode 4: D mode 5: E mode 6: all frequency sweep

DR field

Bit	Name	Value	Description
7~4	DR	0~15	Data Rate(DR0~DR15), if ADR is disabled, the device will work on this data rate.
3	REPTIND	0~1	Indicates whether report the temperature if the value is the same with before. Default value is 0, means always report.
2~0	Reserved	0	Reserved for future use

MODE field

Bit	Name	Value	Description
7~5	MODE	0x1:AU920 0x2:CLAA 0x3:CN470	Configure mode. Currently the mode can't be changed. It should be always the same with the value reported by the

		0x4:AS923 0x5:EU434 0x6:EU868 0x7:US915	device.
4~0	POWER	0~31	Configure transmit power (unit dBm)

2.3.3 Sensor configuration

Bytes	1	2
Item	TYPE	TH

TYPE field

Bit	Name	Value	Description
7~4	TYPE	0x9	Message type, tracker can use it to identify different downlink messages.
3~0	Reserved	0x0	Reserved for future use.

TH field

Bit	Name	Value	Description
15~0	TH	1~65535	The period of temperature report, unit 10s.

2.3.4 Command request

Bytes	1	1
Item	TYPE	MSGID

TYPE field

Bit	Name	Value	Description
7~4	TYPE	0xA	Message type, tracker can use it to identify different downlink messages.
3~0	COMMAND	0x1: register request 0x2: device reset	Requested command. 0x1 used to request the device to send register message. 0x2 used to reset the device.

MSGID field

Bit	Name	Value	Description
7~0	MSGID	0~255	Server generated sequence number of downlink messages that need MSGID. Tracker will respond ACK with this number, otherwise AS should resend the message.

3. Mechanical structure and Assembly

3.1 Dimension

3.2 Battery installation

Battery holder is inside the sensor. Just insert the 3.6V battery to the holder, the sensor will start work with a default cycle. Please follow steps below when install a new battery.

Step1: Remove the cover.

Step2: Install the battery.

Step3: Reset the device.

Step4: Close and fix the cover again.

Note: Don't inverse the polarity of the battery when insert the holder!!!

3.3 Sensor Fixation

On the back of the housing, there are 4 screw mounting holes which are isolated from inside of the device.

3.4 Battery information

Lithium/thionyl chloride battery with PN ER34615 is used in the sensor, which could operate in -55 to +85°C.

4. Ordering Information

LoRa Platinum Temperature Sensor, US915, 1 sensor, 38Ah	100-00159
LoRa Platinum Temperature Sensor, US915 2 sensors, 38Ah	100-00158
LoRa Platinum Temperature Sensor, US915, 4 sensors, 38Ah	100-00182
LoRa Platinum Temperature Sensor, EU868, 1 sensor, 38Ah	100-00169
LoRa Platinum Temperature Sensor, EU868, 2 sensors, 38Ah	100-00168
LoRa Platinum Temperature Sensor, EU868, 4 sensors, 38Ah	100-00176
LoRa Platinum Temperature Sensor, CN470, 1 sensor, 38Ah	100-00178
LoRa Platinum Temperature Sensor, CN470, 2 sensors, 38Ah	100-00177
LoRa Platinum Temperature Sensor, CN470, 4 sensors, 38Ah	100-00179
LoRa Platinum Temperature Sensor, AS923, 1 sensor, 38Ah	100-00181
LoRa Platinum Temperature Sensor, AS923, 2 sensors, 38Ah	100-00180
LoRa Platinum Temperature Sensor, AS923, 4 sensors, 38Ah	100-00162
LoRa Platinum Temperature Sensor, CLAA, 1 sensor, 38Ah	100-01158
LoRa Platinum Temperature Sensor, CLAA, 2 sensors, 38Ah	100-01159
LoRa Platinum Temperature Sensor, CLAA, 4 sensors, 38Ah	100-01160

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