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LoRaWAN IoT Industrial Gateway GW300
Product Specification
V1.0

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1 Introduction

This document describes the technical specifications and product features of the GW300 Industrial Gateway.

The GW300 LoRaWAN Gateway is an 8-channel industrial-grade gateway based on the LoRaWAN protocol researched and developed by Shenzhen Friendcom Technology Development Co., Ltd., supporting PoE power supply and external DC power supply.

2 GW300 LoRaWAN Gateway Product Overview

GW300 is an industrial IoT gateway for Lowan-based LPWAN network deployment. It is a PD device conforms to the IEEE802.3 af/at standard, supporting PoE power supply and external DC power supply mode. It can connect to the network server through Ethernet cable and support 4G wireless connection network server. The GW300 supports WiFi wireless function and supports external devices to be configured through the WiFi access gateway. At the same time, the built-in GPS module of the gateway can provide accurate positioning function, which is convenient for users to manage the location information of the terminal device.

The GW300 Industrial Gateway features a high-performance TI Cortex-A8 core and integrates the SX1301+SX1257 LoRa baseband processing chip to support eight multi-SF channels (SF12 to SF7), one single-SF channel and one high-speed GFSK channel. The output power can be up to 26dBm and the sensitivity is -141dBm@SF12. A single gateway can access tens of thousands of nodes under specific transmission periods and data lengths.

2.1 System composition block diagram

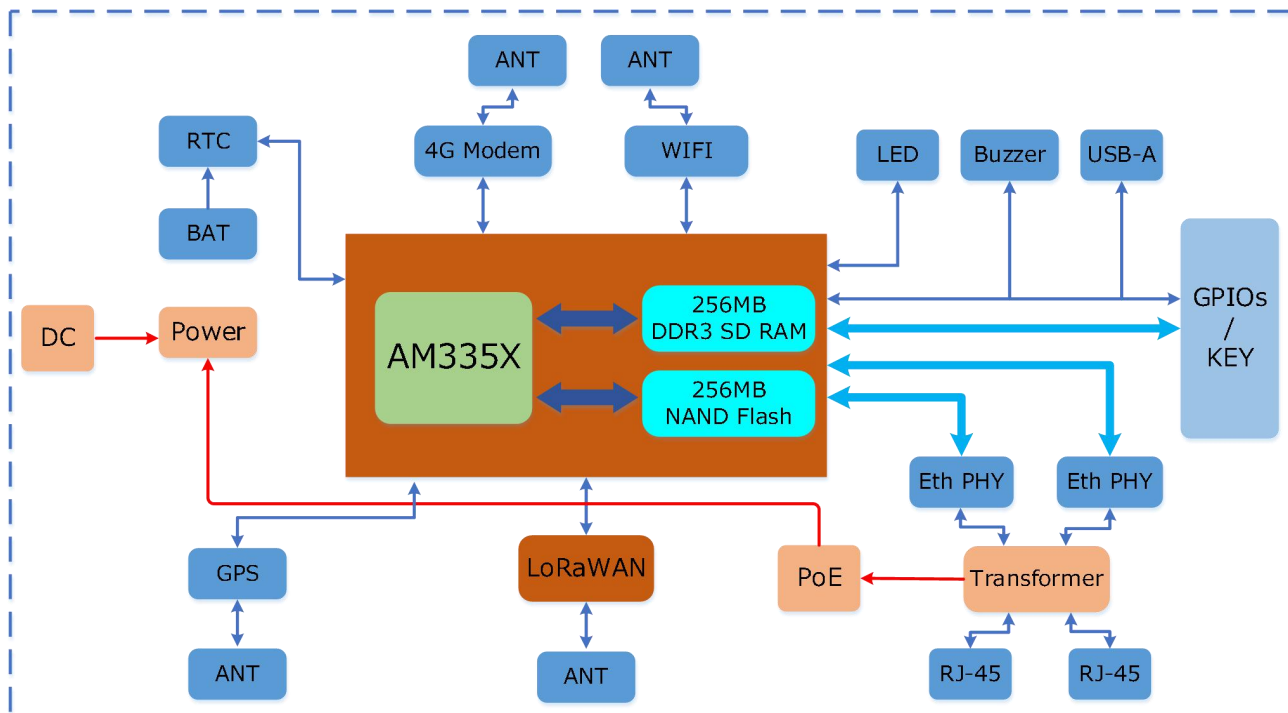The block diagram of the GW300 LoRaWAN gateway system is as follows:

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Figure 2-1 GW300 system block diagram

2.2 Product features and application areas

Features:

➢ LoRaWAN half-duplex communication mode；
➢ Uplink supports 8 parallel Multi-SF LoRa channels, 1 Single-SF LoRa channel, 1 high-speed GFSK channel；
➢ Transmit power up to 26dBm, receiving sensitivity up to -141dBm@SF12；
➢ Support LoRaWAN Class A/Class C operating mode；
➢ Support PoE power supply and external DC power supply mode, comply with PoE IEEE 802.3 af/at standard；
➢ It can support 10/100M Ethernet connection and 2G/3G/4G full Netcom connection at the same time, and can switch seamlessly；
➢ Support WiFi wireless function, comply with IEEE 802.11b/g/n, work in AP mode；
➢ GNSS module supports GPS/QZSS, GLONASS；

➢ High-reliability and high-protection industrial grade equipment with IP67 waterproof rating for easy installation and deployment in outdoor and complex environments；

Application areas：

✓ M2M, IoT, LPWAN
✓ Wireless sensor network
✓ Wireless water meter, electric meter, gas meter, heat meter data remote centralized meter reading
✓ Industry 4.0, Industrial equipment monitoring
✓ Smart agriculture, smart city
✓ Street light control management system
✓ Logistics, port
✓ Wireless alarm and security system

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2.3 Product specifications

Item	Project name	Functional description
System Configuration	Kernel	TI Cortex-A8
	Main frequency	800MHz
	RAM	256MB DDR3 SDRAM
	Flash	256MB NAND Flash
	Operating system	Linux 3.18.91
Communication mode	WAN Port	10/100/1000Mbps Ethernet with PoE
	LAN Port	10/100Mbps Ethernet
	WiFi	2.4~2.4835GHz, the highest rate is 150Mbps
	GPRS/3G/4G	
	Wireless transmission	LoRa
Electrical characteristics	Power supply input	PoE +48V input, IEEE 802.3 af/at
		10~56V DC input
	Average power consumption typical	5W
	Maximum power consumption typical	15W (full load operation)
	LoRa output power	Typ. 14dBm@868MHz
	LoRa receiving sensitivity	-141dBm @ SF12, BW=125KHz
User interface (external interface)	4G antenna interface	Wireless network connection network server
	LoRaWAN antenna interface	LoRaWAN wireless data collection
	GPS antenna interface	Connect external GPS antenna to output GPS position information
	WiFi antenna interface	AP mode supports external device connection gateway
	PoE interface	10/100/1000Mbps Ethernet wired connection network server
	External DC power supply interface	10~56V DC input port
Working environment	Operating temperature	-40°C~+85°C (WiFi -10°C~+50°C)
	Storage humidity	-40°C~+85°C (WiFi -40°C~+70°C)
	Operating humidity	10% to 90% RH non-condensing
General	External dimensions	230(L) x 230(W) x 100(H) mm

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characteristics	Weight	3.05kg
	Installation mode	Pole mounting

2.3.1 Hardware resources

✓ CPU: Based on TI Cortex-A8 core processor;

✓ Master frequency: 800MHz

✓ Memory: 256MB DDR3 SDRAM

✓ Flash: 256MB NAND Flash

✓ Hardware watchdog

✓ PoE power supply module

✓ External DC power supply module;

✓ LoRaWAN unit:

    Eight 125KHz LoRaWAN Multi-SF Receive Channels

    1 configurable bandwidth (125KHz/250KHz/500KHz) LoRa channel

    1 high speed GFSK channel

✓ 4G LTE unit (LTE-FDD/LTE-TDD/WCDMA/TD-SCDMA/CDMA/GSM):

    LTE-FDD: B1/B3/B5/B8, all bands with diversity

    LTE-TDD: B38/B39/B40/B41, all bands with diversity

    WCDMA: B1/B8, all bands with diversity

    TD-SCDMA: B34/B39

    GSM: 900MHz/1800MHzz

✓ WiFi unit:

    2.4~2.4835GHz, support IEEE 802.11b/g/n, highest rate 150Mbps

✓ GNSS unit:

    GPS/QZSS, GLONASS

2.3.2 Software Resources

✓ Based on the Linux kernel;

    ■ Linux kernel version: 3.18.91 (openwrt)

✓ SPI driver;

✓ I2C drive;

✓ USB Host/Device driver;

✓ LoRaWAN module driver;

✓ G modem driver, supporting LTE-FDD/LTE-TDD/WCDMA/TD-SCDMA/CDMA/GSM data transmission;

✓ GPS driver, support GPS precise timing;

✓ Ethernet driver;

✓ Power management driver;

✓ Internal hardware watchdog;

3 Reference standards and specifications

RF Test Executive Standard ETSI EN300 220-1 V2.4.1 (2012-05); ETSI EN300 220-2 V2.4.1 (2012-05);

EMC Test Executive Standard ETSI EN 301 489-1 V1.9.2 (2011-09); ETSI EN301 489-3 V1.6.1 (2013-08);

ETSI EN301 489-17 V2.2.1 (2012-09):

IEC 61000-4-2;

IEC 61000-4-3;

IEC 61000-4-4;

IEC 61000-4-5;

IEC 61000-4-6;

IEC 61000-4-11.

Meet the "Technical Requirements for Micropower (Short Range) Radio Equipment" and the relevant national standard (GB).

Safety Executive Standard EN60950-1:2006 +A11: 2009 +A1: 2010 +A12: 2011+A2:2013

Enclosure IP protection grade executive standard GB 4208-2008

Environmental test executive standards:

JESD22-A1;

GB/T 2423.1-2001 Electric and electronic products environmental test - Part 2: Test method / Test A: Low temperature

GB/T 2423.2-2001 Electric and electronic products environmental test - Part 2: Test method / Test B: High temperature

4 Electrical performance and reliability requirements

4.1 Power supply electrical performance

The GW300 supports PoE power supply and external DC power supply. The PoE power supply complies with the IEEE 802.3af/at standard and can support remote power supply and communication for network cables up to 100 meters.

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Category	802.3 af（PoE）	802.3 at（PoE plus）
Classification	0~3	0~4
Maximum current	350mA	600mA
PSE output voltage	44~57V DC	50~57V DC
PSE output power	≤15.4W	≤30W
PD input voltage (gateway input port voltage)	36~57V DC	42.5~57V DC
PD maximum power	12.95W	25.5W
Cable requirements	Unstructured	CAT-5e or better
Cable length requirements	<100m	<100m

Power consumption：

Item	Value typ/W	Condition
Static power	3	Device transmission and reception are off, 4G networking
Average power consumption	5	4G networking, LoRaWAN is working
Peak power consumption	15	All modules work at full load

4.2 RF performance (LoRaWAN)

1）Conduction receiving sensitivity
Test conditions: 32 byte payload, PER = 10%, normal temperature + 25 ° C.

Part Number	Bandwidth/KHz	Spreading Factor	Sensitivity/dBm
GW300-868	125	12	-141
		7	-126
	250	12	-136
		7	-122
	500	12	-133
		7	-119

2）Conduction transmission power
Test conditions: CW signal emission, normal temperature +25 °C.

Part Number	Parameter	Min	Typ	Max	Unit
GW300-868	Frequency Range （Rx/Tx）	859		871	MHz
	Max Output power			26	dBm

	Output Power Variation	-1.5		+1.5	dB
	TX Power Variation Temperature（-40 to 85℃）	-1.5		+1.5	dB
	TX Frequency Variation Temperature（-40 to 85℃）	-3		+3	ppm

3）Power consumption

Frequency band	Transmit Power/dBm	Power Consumption/mA
868.8MHz	26	441
	24	361
	22	300
	Standby	23

4.3 RF performance（WiFi）

TX Test Item	802.11b(Data Rate 11M CCK)			
	CH1	CH7	CH13	Standard
TX Power/dBm	17.9	16.7	18.1	17±2dBm
TX EVM/dB	-21.2	-21.7	-21.3	≤-20dB
Freq Offset/ppm	-4.5	-4.4	-4.4	≤±10ppm

TX Test Item	802.11g(Data Rate 54M OFDM)			
	CH1	CH7	CH13	Standard
TX Power/dBm	14.3	13.7	14.9	14±2dBm
TX EVM/dB	-29.3	-31.6	-27.8	≤-25dB
Freq Offset/ppm	-4.5	-4.4	-4.6	≤±10ppm

TX Test Item	802.11n(HT20_MCS7)			
	CH1	CH7	CH13	Standard
TX Power/dBm	14.6	13.9	15.4	14±2dBm
TX EVM/dB	-31.6	-32.4	-29.7	≤-28dB
Freq Offset/ppm	-5.1	-4.3	-4.4	≤±10ppm

TX Test Item	802.11n(HT40_MCS7)			
	CH1	CH7	CH13	Standard

TX Power/dBm	14.9	13.8	15.0	13.5±2dBm
TX EVM/dB	-32.1	-32.7	-31.7	≤-28dB
Freq Offset/ppm	-4.6	-4.1	-4.4	≤±10ppm

4.4 Antenna performance

The gateway comes standard with a high-performance FRP antenna with high gain and high efficiency:

❖ Impedance 50Ω

❖ VSWR<2.0

❖ Gain=3dBi@868MHz

❖ Efficiency @868MHz >70%

4.5 Reliability requirements

4.5.1 Environmental test requirements

Item	Test Conditions	Standard	Result
Low temperature operation	Temperature: －40°C Operation mode: working with service connected Test duration: 12 h	JESD22-A1 GB/T 2423	Good appearance；LoRaWAN RF performance is good；Other functions are normal；
High temperature operation	Temperature: +85°C Operation mode: working with service connected Test duration: 12 h	JESD22-A1 GB/T 2423	Good appearance；LoRaWAN RF performance is good；Other functions are normal；
Low temperature storage	Temperature: －40°C Operation mode: no power, no package Test duration: 24 h	JESD22-A1 GB/T 2423	Good appearance；LoRaWAN RF performance is good；Other functions are normal；
High temperature storage	Temperature: +85°C Operation mode: no power, no package Test duration: 24 h	JESD22-A1 GB/T 2423	Good appearance；LoRaWAN RF performance is good；Other functions are normal；

## 4.5.2 EMC and ESD reliability requirements

The GW300 is a high-reliability industrial-grade device that performs ESD protection test, fast burst anti-interference test, surge immunity test, and voltage drop test in accordance with IEC61000-4

Item	Test Standard	Test Conditions
ESD	IEC 61000-4-2	Air Discharge:15kV Contact Discharge:8kV Positive/Negative
Radio Frequency Electromagnetic Field Immunity	IEC 61000-4-3	80MHz to 1000MHz and 1400MHz to 2700MHz; 3V/m;
Electrical Fast Transient/Burst Immunity	IEC 61000-4-4	AC power port:1kV; Positive/Negative
Surge Immunity	IEC 61000-4-5	Common mode: 4kV Differential mode: 3kV Positive/Negative

5 Appearance and mechanical dimension information

5.1 GW300 LoRaWAN Gateway Dimensions

Unit: mm

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5.2 Product figure

PoE power port

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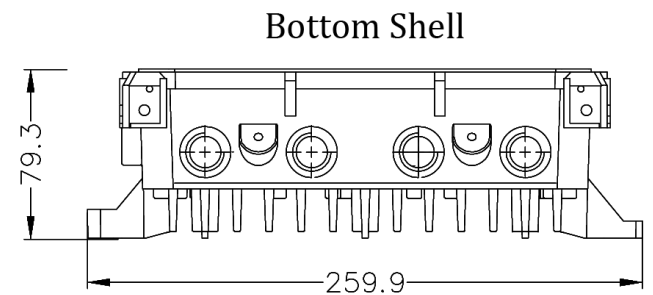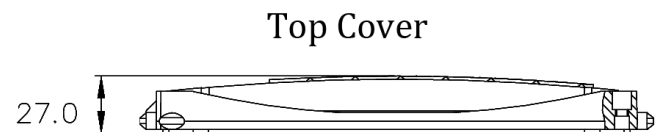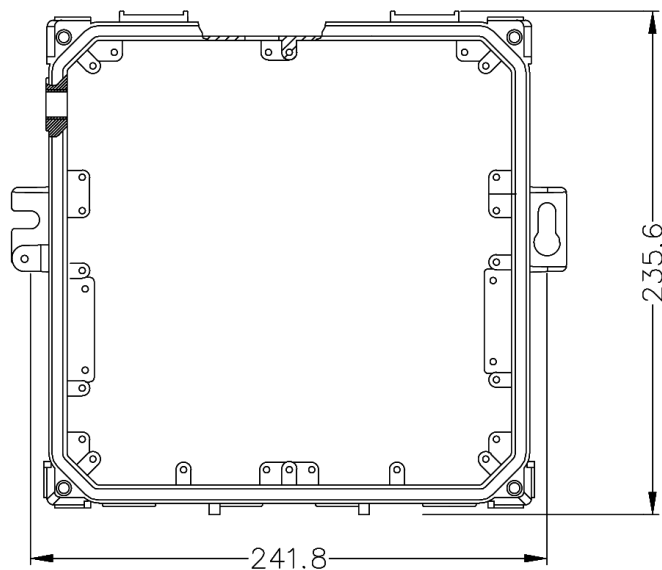
6 Accessories and packaging mode

6.1 Accessories List

Item Name	Specification	Quantity	Unit
GW300 overall unit	GW300-xxx	1	pc
PoE adapter	PoE30G-AT	1	set
LoRaWAN Omnidirectional FRP Antenna	-	1	pc
4G omnidirectional FRP antenna	-	1	pc
WiFi omnidirectional FRP antenna	-	1	pc
GPS omnidirectional FRP antenna	-	1	pc
Mounting brackets	Main bracket + pole bracket	1	set
Main machine fixing screw	M8	2	set
Pole bracket fixing screw	M6	4	set
Pole bracket fixing U-bolt	-	2	set
Pole mounted anti-skid sheet	-	2	pc
RF cable (for connecting LoRaWAN FRP antennas)	N (male)--KSR200 (80cm)--N (male)	1	pc

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