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USR-EG828-EMS

Industrial EMS Gateway

Industrial IoT Gateways Ranked First in China by Online Sales for Seven Consecutive Years

**Data from China's Industrial IoT Gateways Market Research in 2023 by Frost & Sullivan

Your Trustworthy Smart Industrial IoT Partner

Content

1. Product Overview

1.1. Scope of application

The USR-EG828-EMS gateway is a high-performance embedded control device based on the RK3568 chip, and is applicable to fields such as industrial automation, intelligent transportation, energy management, Internet of Things (IoT), and edge computing. Its rich interfaces and powerful expansion capabilities make it particularly suitable for application scenarios that require multi-channel communication, high reliability and strong anti-interference ability.

1.2. Product introduction

The USR-EG828-EMS gateway adopts Rockchip RK3568 quad-core processor and integrates multiple industrial-grade communication interfaces, including 8 isolated RS485 channels, 16 isolated GPIO channels, 6 relay control channels, 2 CAN buses, etc., and supports 4G wireless communication. The equipment is equipped with a wide voltage input range (12-48V DC), suitable for harsh industrial environments. Meanwhile, it provides dual-band WiFi6 and Gigabit Ethernet to meet diverse network requirements.

◆ Embedded Node-RED graphical design makes development simpler and faster, and more protocol libraries can be loaded for rapid programming.

◆ Built-in WukongEdge edge application service makes usage more convenient and efficient.

◆ Powerful edge gateway function, supporting edge collection, edge computing, and group reporting, capable of collecting 2000 real-time points and supporting point expansion.

◆ Rich collection protocols, supporting standard Modbus and various mainstream PLC protocols, as well as collection of various industry protocols.

◆ Interlinked control, supporting multi-point interlinkage, interlinked SMS alarm, interlinked platform alarm, interlinked point control, and interlinked DO control.

◆ Multiple protocol conversion, integrating Modbus, OPC UA, 104/61850 power protocols, building protocols and other multiple protocol conversions.

1.3. Product features

1.3.1. High-performance processor

◆ CPU: Rockchip RK3568, quad-core Cortex-A55 architecture, up to 2.0GHz

◆ GPU: Mali-G52 2EE, support OpenGL ES 1.1/2.0/3.2, OpenCL 2.0

◆ NPU: 1 TOPS AI power, supports TensorFlow, PyTorch and other AI frameworks.

1.3.2. Rich communication interfaces

◆ Wired network: 4 gigabit adaptive RJ45 network ports, supporting high-speed data transmission.

◆ Wireless network: On-board WiFi6 module (2.4/5G), supporting 802.11a /b/g/n/ac/ax, Bluetooth 5.0, supporting BLE; It is equipped with a built-in PCIE interface and Micro-SIM card slot, and 4G mobile network is optional.

◆ Serial port: 8-channel isolated RS485 (6-channel RS485 or 2-channel RS232 are optional), 2-channel isolated CAN bus (supporting CAN 2.0A/B)

◆ USB interface: 1×USB 3.0 + 1×Type-C (supporting OTG/ burning)

1.3.3. Industrial-grade control and signal acquisition

◆ Optical coupler isolated I/O: 16-channel isolated GPIO input, with strong anti-interference ability.

◆ Relay control: 6-channel isolated relay output (capable of controlling high-power equipment)

◆ Analog input: 4-channel isolated ADC input (4-20mA current signal acquisition)

◆ Power output: 2-channel isolated 12V regulated output, supporting external sensors.

1.3.4. High-reliability design

◆ Power input: Wide voltage DC input of 12 to 48V, adaptable to voltage fluctuations in industrial sites.

◆ Electrical isolation: The serial port, CAN, GPIO, and ADC all adopt isolated design, providing FG terminals and supporting ground wire connection to enhance anti-interference capability.

◆ Key functions: Burn key (upgrade firmware), reset key (system restart), power key (power on/off).

1.3.5. Multimedia and Scalability

◆ Display output: 1×HDMI interface, supports 4K@60Hz video output.

◆ Storage expansion: Supports USB flash drive or eMMC storage (optional)

◆ Support customization for the Android system and provide reference codes for system call interface apis.

1.3.6. Applicable Scenarios

◆ Industrial automation (PLC control, equipment monitoring)

◆ Intelligent transportation (vehicle-mounted terminals, signal control)

◆ Energy management (photovoltaic, power monitoring)

◆ Internet of Things gateway (Data collection, edge Computing)

◆ Intelligent buildings (security, environmental Monitoring)

1.4. Serial port definition

It is standardly equipped with 8 RS485 channels, and 6 RS485 channels and 2 RS232 channels are optional.

The serial port is defined as follows.
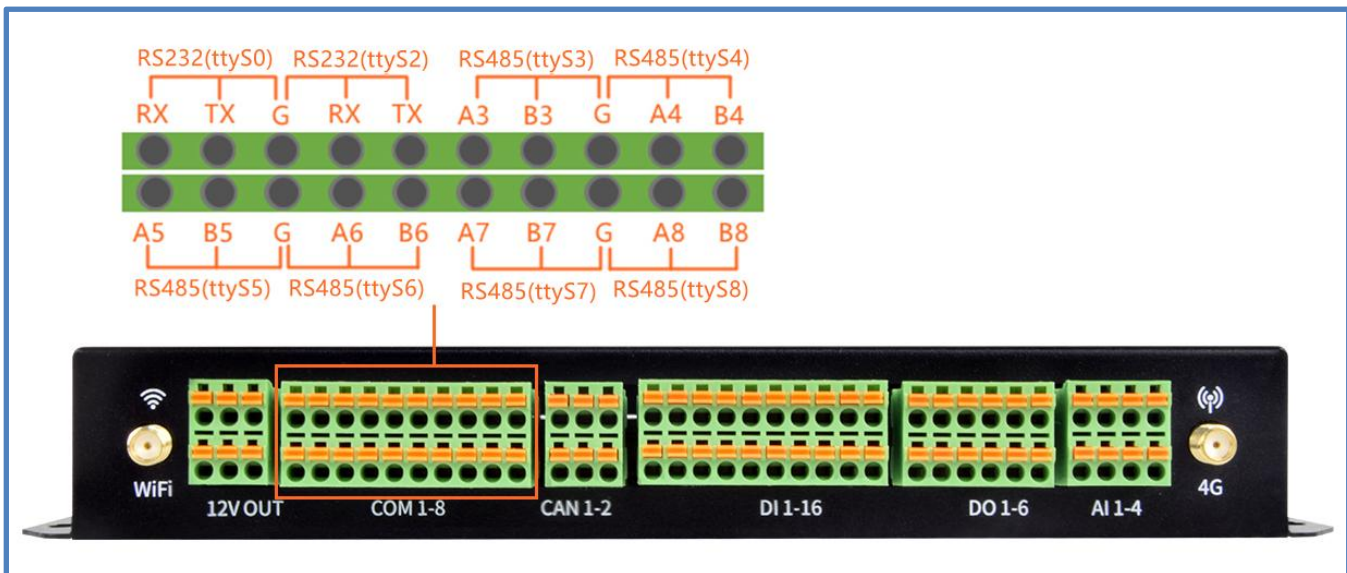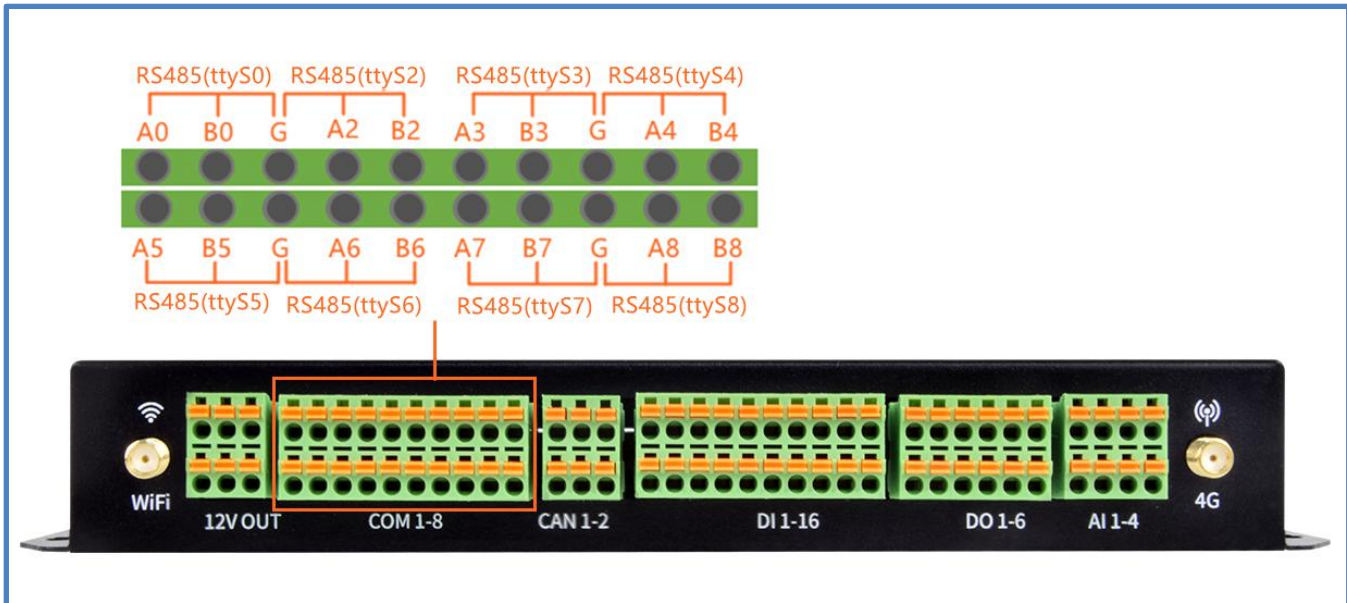
1.5. Terminal block Definition Description
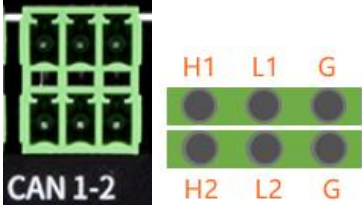
➢**12V OUT Interface Definition Description.**

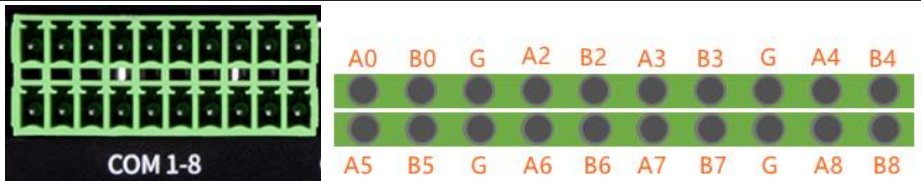| Pin#	Define	Note	Pin#	Define	Note	Interface figure
1	12V	Power output 12V	2	12V	Power output 12V	
3	G	GND	4	G	GND	
5	FG	The earth wire	6	FG	The earth wire	

➢**COM 1-8 Interface Definition Description.**

Pin#	Define	Note	Device Node	Pin#	Define	Note	Device Node
1	A0	RS-485 A+	ttyS0	2	A5	RS-485 A+	ttyS5
3	B0	RS-485 B-		4	B5	RS-485 B-	
5	G-ISO	Isolate GND	/	6	G-ISO	Isolate GND	/
7	A2	RS-485 A+	ttyS2	8	A6	RS-485 A+	ttyS6
9	B2	RS-485 B-		10	B6	RS-485 B-	
11	A3	RS-485 A+	ttyS3	12	A7	RS-485 A+	ttyS7
13	B3	RS-485 B-		14	B7	RS-485 B-	
15	G-ISO	Isolate GND	/	16	G-ISO	Isolate GND	/
17	A4	RS-485 A+	ttyS4	18	A8	RS-485 A+	ttyS8
19	B4	RS-485 B-		20	B8	RS-485 B-	
Interface figure							

➢**CAN 1-2 Interface Definition Description.**

Pin#	Define	Note	Device Node	Pin#	Define	Note	Device Node
1	H1	H1 data	can0	2	H2	H2 data	can1
3	L1	L1 data		4	L2	L2 data	
5	G-ISO	Isolate GND	/	6	G-ISO	Isolate GND	/
Interface figure							

➢**DI 1-16 Interface Definition Description.**

Pin#	Define	IO No.	Pin#	Define	IO No.	Interface figure
1	DI1	124	2	DI9	65	
3	DI2	125	4	DI10	88	
5	DI3	102	6	DI11	89	

7	DI4	103	8	DI12	90	
9	COM	Public side	10	COM	Public side	
11	DI5	104	12	DI13	91	
13	DI6	66	14	DI14	148	
15	DI7	63	16	DI15	154	
17	DI8	64	18	DI16	23	
19	COM	Public side	20	COM	Public side	

➢**DO 1-6 Interface Definition Description.**

Pin#	Define	IO No.	Pin#	Define	IO No.	Interface figure
1	DO1	97	2	DO4	108	
3	COM1	Public side	4	COM4	Public side	
5	DO2	107	6	DO5	109	
7	COM2	Public side	8	COM5	Public side	
9	DO3	19	10	DO6	110	
11	COM3	Public side	12	COM6	Public side	

➢**AI 1-4 Interface Definition Description.**

Pin#	Define	Note	Pin#	Define	Note
1	AI1+	Analog input signal 1+	2	AI3+	Analog input signal 3+
3	AI1-	Analog input signal 1-	4	AI3-	Analog input signal 3-
5	AI2+	Analog input signal 2+	6	AI4+	Analog input signal 4+
7	AI2-	Analog input signal 2-	8	AI4-	Analog input signal 4-
Interface figure					

1.6. Appearance and interface diagram

Front & Side:

Rear:
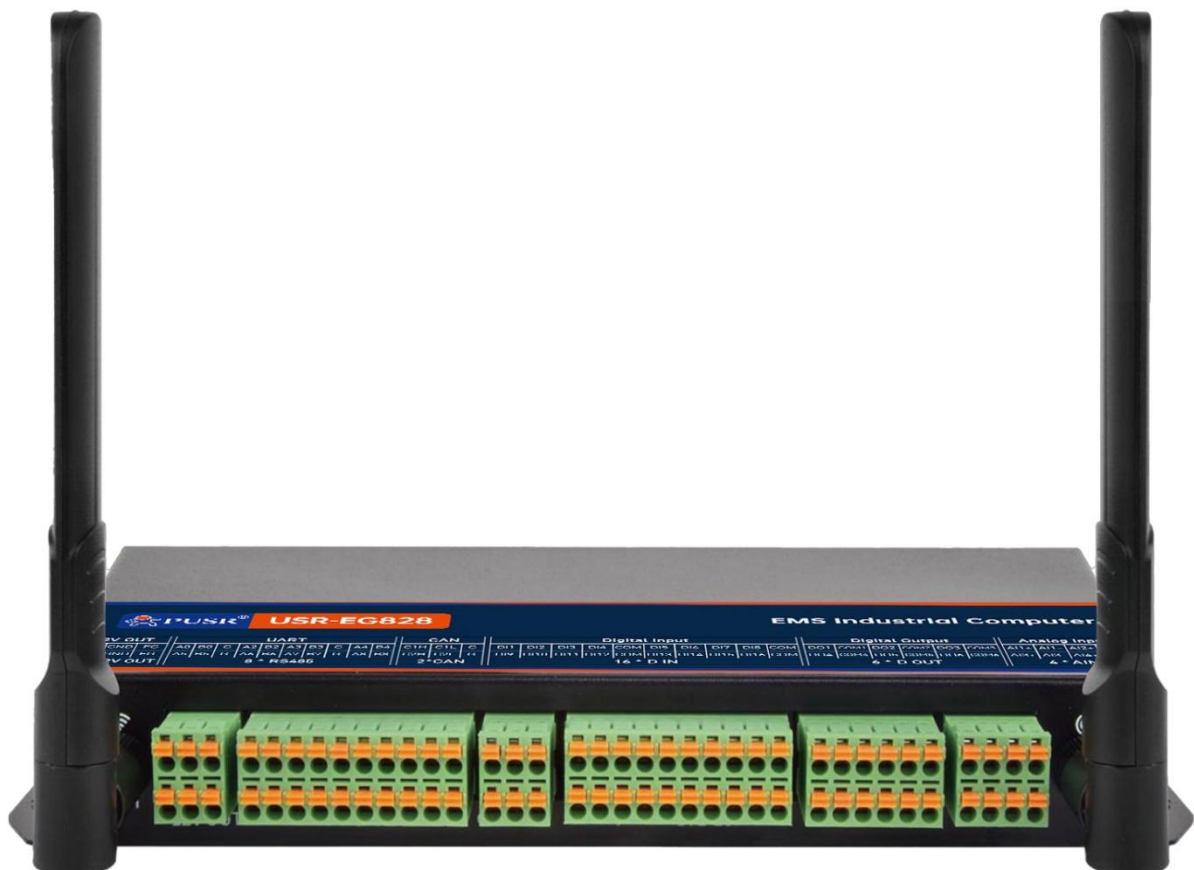
Product size picture:
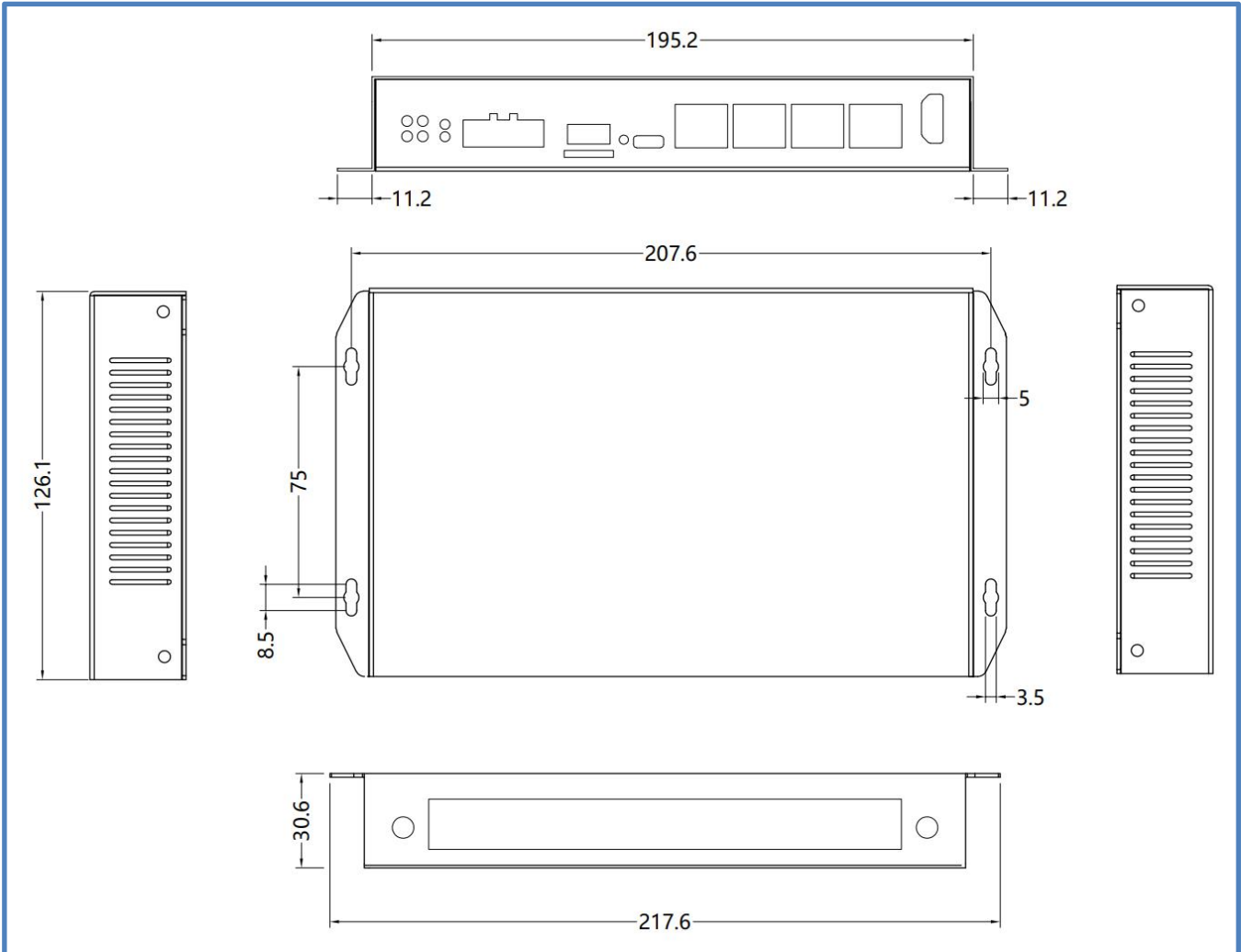
Interface comments:

Front:

Back:

2. Product hardware index

Main Hardware index	
Size	217.6*126.1*30.6mm (with hanging ears)
CPU	Rockchip RK3568, quad-core Cortex-A55, 2.0GHz
GPU	Mali-G52 2EE
NPU	1Tops
DDR	Standard 4GB LPDDR4, 8GB Optional
Flash	Standard 32GB, up to 256GB
HDMI	1, supports up to 4K output
USB Host	1 USB3.0
USB OTG	1 Type-C
Ethernet	4, 10/100/1000M adaptive Ethernet
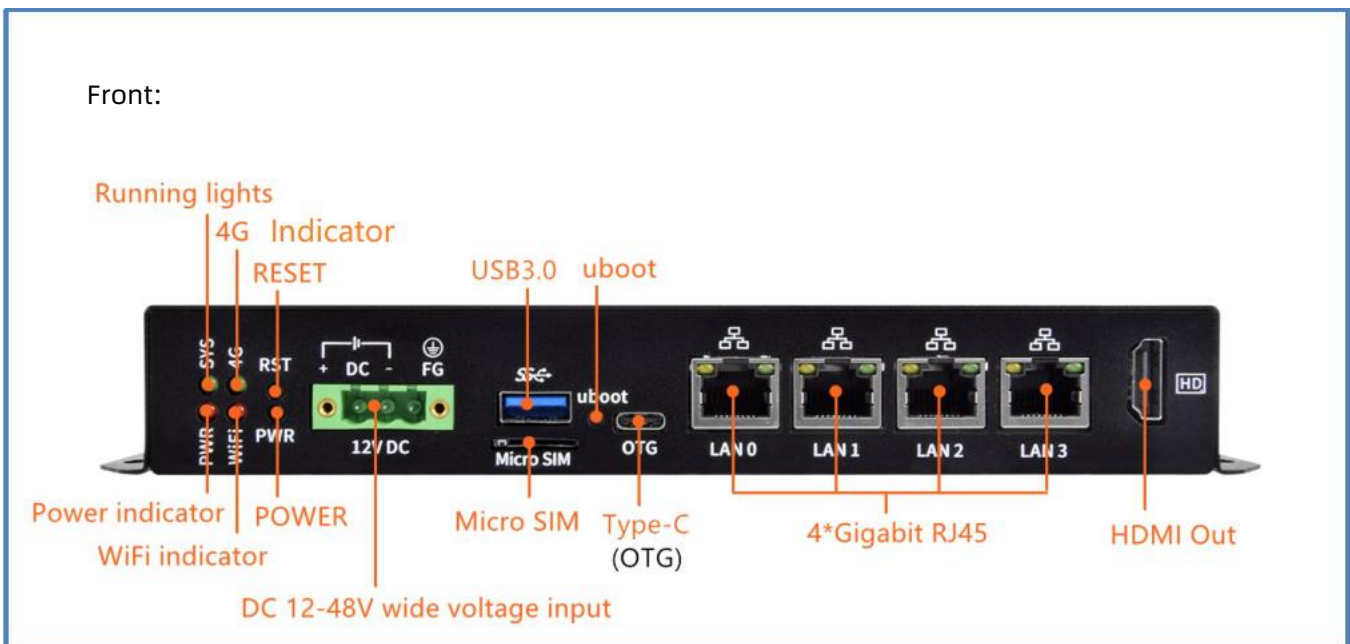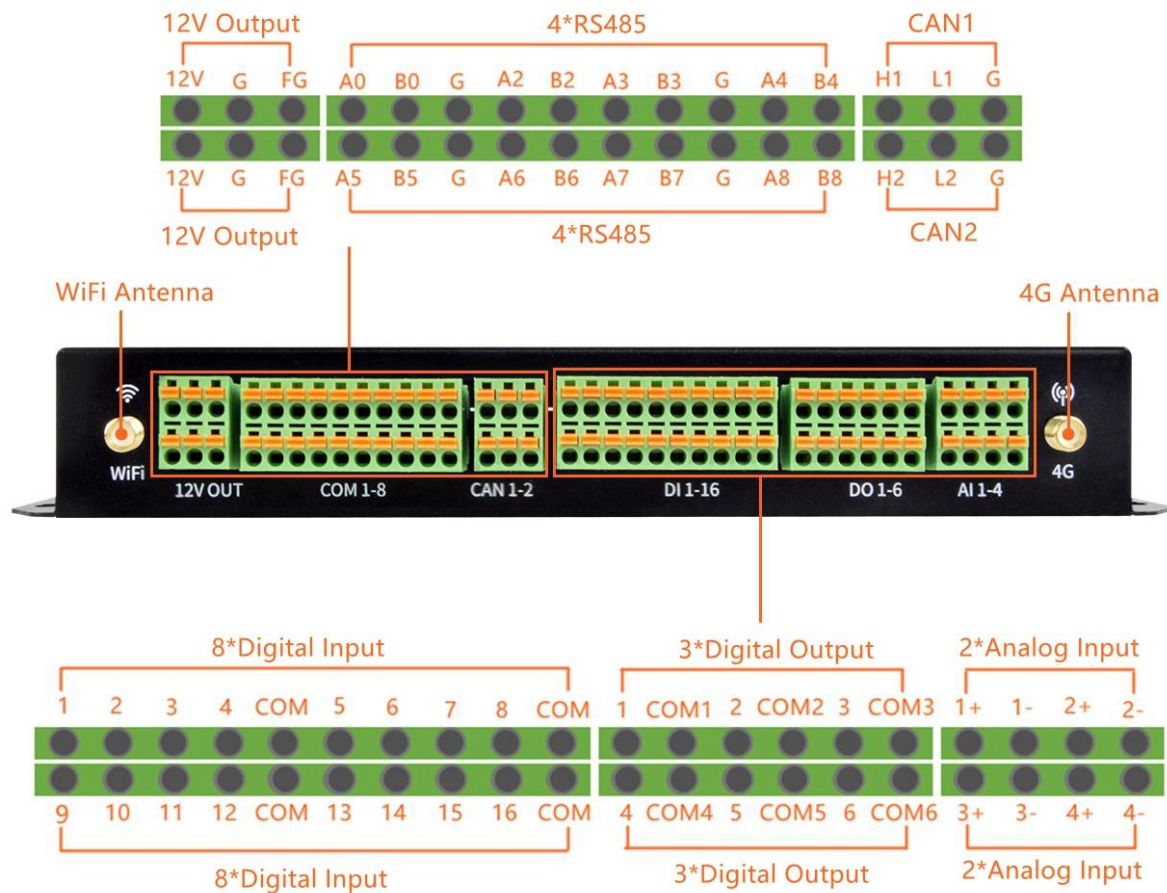
WiFi Frequency	2.4G & 5G dual frequency
WiFi/BT	WiFi6, BT5.0
WiFi ANT	1
4G ANT	1 (Optional)
4G Network	Built-in PCIE 4G interface
SIM Slot	1 way Micro-SIM Slot
UART	8-way isolated RS485(6 RS485 and 2 RS232 optional)
Digital Input (Isolate I/O)	16-channel isolated IO signal input
Digital Output (Relay)	6-way isolated relay interface
CAN Bus	2-way isolated CAN interface
Analog Input	4-channel isolated ADC input voltage signal
Hardware Keys	UBOOT, RESET, POWER
LED lamp	Operation, power, WiFi, 4G indicator lights
RTC Real Time Clock	Support
Timer Switch	Support
Power Output	2 isolated 12V regulated outputs provide FG terminals to connect to ground lines
System Upgrade	Support local USB upgrade
Humidity	0%~95% (no condensation)
Working Temp	-20℃ ~ 70℃
Power Input	12~48V wide voltage supply, providing FG terminal to connect to earth line (typical voltage 12V)

3. Power and product keeper

3.1. Power adapter

For your personal safety and the normal use of this product, please make sure that the AC power you provide can meet the input information marked on the back of the product power adapter; please use a three-core power socket and a reliable grounding terminal. It is recommended to use the original power adapter of this machine. If the original power supply cannot be used under special situations, be sure to use the same power adapter.

3.2. Input characteristics

Input voltage range: from 90Vac-264Vac, one-way input.

Sort	MIN	Rated Value	MAX
Input voltage	90Vac	100Vac-240Vac	264Vac
Input frequency	47Hz	60Hz/50Hz	63Hz

3.3. Output characteristics

Static Output Characteristics <Output & Ripple + Noise>

Output	Rated load		output voltage range	Ripple and Noise	Remark
Rating	Min.	Max.			
+12.0V	0A	2A	+/-5%	50mVp-p	

3.4. Host input characteristics

Input	Rated load		output voltage range	Ripple and Noise	Remark
Ratin	Min.	Max.			
+12.0	0A	2A	+/-15%	50mVp-p	

4. Assemble precautions

Please read the instructions and safety items in this guide carefully, and strictly implement them during use. This will help prevent damage to the computer host, prolong the service life, ensure your normal use and computer maintenance, and ensure your personal safety.

1. Please read and understand the relevant documents attached to the package first. If there are folders, please read them first.

2. Follow all safety warnings and signs on this product.

3. Please use the original power adapter or only use the product according to the power type marked on the product.

4. In thunderstorm weather, please do not plug or unplug network cables, power cables etc. and other conductors that may be connected to the outside world.

5. Please unplug the power before cleaning this product, do not use liquids, sprays or wet rags for cleaning.

6. Please do not disassemble the machine without permission, and do not try to repair this product by yourself, please ask authorized professionals to do this work.

7. Do not put the computer near a heat source.

8. Pay attention to moisture-proof, do not spill water or other liquids on the computer, if have the following

situations occur, please unplug the host power immediately. The following special circumstances require professional maintenance personnel to repair.

1> The power cord or plug is damaged.

2> Conductive liquid has been spilled into the product.

3> The product has been dropped or the case of the product has been severely damaged.

4> Unexplained errors or obvious performance changes in the product cannot be ruled out after fault guidance.

5. Common Fault Elimination

USR-EG828-EMS gateway mainframe factory have been rigorously tested, the product is durable, the use of the problems encountered may be caused by your use of the process of encountering the settings and operations. Or encountered some equipment compatibility and other issues. This common troubleshooting information will help you solve some simple operational problems in a timely manner, or identify the cause of a problem that requires repair.

1	The host does not respond after booting	Please confirm that the power supply of the host computer and display is normal, and whether the host adapter is powered on.
2	The host automatically shuts down for no reason	Please check whether the power supply is cut off and whether the power adapter is loose.
3	The host automatically restarts for no reason	Please check whether the programming button is on the side close to the outside of the board (normally it should be close to the inside of the board).
4	Display Image but no sound when playing video	Check that the audio output settings match (Codec/HDMI), and that the audio is muted.
5	network can't connect	Check whether the network connection or router is normal, and whether the network parameter settings are normal.
6	External USB device not recognized	If the external device is connected to the OTG port, please go to "Settings" > "More Settings", and then check "OTG Host"
Note: 1) If the host accidentally enters water or conductive liquid, please cut off the power immediately, dry the liquid with a paper towel, and do not blow it with a hot hair dryer. If the situation is extremely serious, it is recommended to contact the after-sales service immediately for consultation or send back Test and repair		

> 2) If the main unit accidentally slips and causes deformation and damage to the shell, and the motherboard is damaged, please contact the after-sales service immediately for repair.

6. Contact Us

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