Data Sheet

EM-800 Product Datasheet

Microgrid Controller

DS01010101 V1.01 Date:2026/6/9

Overview

The EM-800 Microgrid Controller is an economical, multi-interface, high-performance microgrid controller designed and upgraded by ZLG ZHIYUAN Electronics specifically for economical integrated cabinets and microgrid integrated systems. The EM-800 industrial gateway uses a 1.2GHz dual-core Cortex®-A55+200MHz single-core Cortex®-M33 processor,on-board 1GB DDR4 memory,8GB eMMC storage,integrated 2-channel gigabit network port,6-channel RS485 serial port, 2-channel CAN-FD and other rich interfaces,which can widely meet the application needs of micronet comprehensive systems.

Product Features

- 1.2GHz main frequency dual-core processor;
- 1GB DDR4, 8GB EMMC;
- Onboard independent watchdog;
- Multi-channel hardware interface
  - 2-channel 10/100/1000Mbps Ethernet interface;
  - 6-channel isolated RS485 interface;
  - 2-channel isolated CAN-FD interface;
  - 2-channel RS232 interface (one of which is debugging);
  - 2-channel USB-Host interface;
  - 1-channel SD card interface;
  - 1-channel DVI (LVDS signal) interface;
  - 1-channel MiniPCIe interface;
  - 1-channel Mini-SIM card interface;
  - 1-channel built-in WiFi interface;
  - 8-channel DI interface;
  - 12-channel DO interface;

Product Application

- Industrial control;
- Industrial gateway;
- Microgrid controller.

Ordering Information

Model	Temperature range
EM-800	-40°C~+70°C
EM-800-4G	-40°C~+70°C

Product pictures

ZLG 致远电子

Revision history

Version	Date	Reason
V1.00	2025/09/23	Create document
V1.01	2026/06/09	Product name standardized as Microgrid Controller; added battery safety warning; added long-term storage instructions; updated LVDS parameters for 10.1-inch screen; updated RS85 parameters; modified WiFi module parameters; removed BT function; added currently supported accessories; updated packing list.

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1. Product Introduction

1.1 Product pictures

Figure 1 EM-800 product appearance is the appearance of the EM-800 and the rear panel of the machine shown as Figure 2 EM-800 rear panel diagram.

Figure 1 EM-800 product appearance

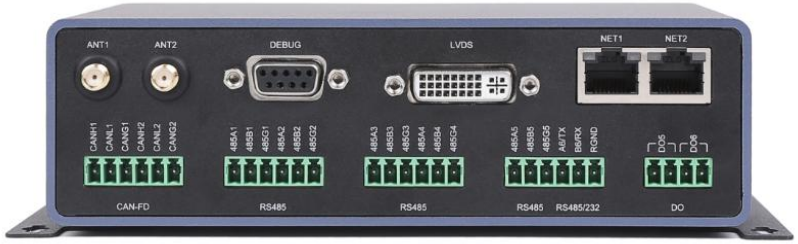

Figure 2 EM-800 rear panel diagram

Note: The final product is subject to physical sales. This document is for illustration only.

1.2 Product selection

Table1 EM-800 product selection table

Main parameters	EM-800	EM-800-4G
Processor	1.2GHz dual-core Cortex®-A55+ 200MHz single-core Cortex®-M33 processor	1.2GHz dual-core Cortex®-A55+ 200MHz single-core Cortex®-M33 processor
Memory	1GB DDR4	1GB DDR4
Storage	8GB eMMC	8GB eMMC
RS232	2-channel, 1 debug serial port, 1 multiplexed with RS485	2-channel, 1 debug serial port, 1 multiplexed with RS485
RS485	6-channel, 1 multiplexed with RS232	6-channel, 1 multiplexed with RS232
CAN-FD	2-channel	2-channel
Ethernet	2-channel	2-channel
4G module	Built-in MiniPCIe interface	EG912UGLAC-I05-SNNSA

		Full network access, global certification, LTE Cat.1
WiFi Module	FCU760K-NL 802.11 b/g/n Wi-Fi	FCU760K-NL 802.11 b/g/n Wi-Fi
Operating Temperature	-40 ~ +70℃	-40 ~ +70℃
Main Parameters	EM-800	EM-800-4G
Storage Temperature	-40 ~ +70℃	-40 ~ +70℃
Operating Humidity	5% ~ 95%	5% ~ 95%
Operating Altitude	<5000 meters	<5000 meters
Product Weight	Approximately 955 grams	Approximately 963 grams

Note: Product weight includes mounting brackets and does not include terminals and guide rail brackets.

The standard operating temperature range for the FCU760K-NL is -20℃ to 70℃. The extended operating temperature range is -40℃ to 70℃, under which the FCU760K-NL will not suffer irreversible damage.

1.3 Hardware Resources

Table2 EM-800 Hardware Resources

Hardware Interface	Resources	Description
Ethernet	2-channel	10/100/1000Mbps
RS485	6-channel	Isolated, RS485-6 multiplexed with 1 RS232 channel
CAN-bus	2-channel	5kV isolation, supports CAN-FD
SD card	1-channel	Standard Micro SD card holder
USB	2-way	Host, USB 2.0
MiniPCIe socket	1-way	Supports wireless modules that extend the USB interface, such as 4G modules
SIM card	1-way	Standard Mini SIM card holder
LVDS	1-way	Physical interface: DVI (including a USB 2.0 signal for touch)
WiFi	1-way	Onboard 2.4G/5G WiFi
RS232	2-channel	1 debug port, 1 standard serial port (reused as RS485-6)
DI	4-channel	Optocoupler isolation, dry contact
DI	4-channel	Optocoupler isolation, wet nodes
DO	4 routes	Relay isolation, mechanical relay
DO	2 routes	Relay isolation, solid state relay
DO	4 routes	High side drive
DO	2 routes	Low side drive
LED indicator light	4 routes	Power/run/error/wireless communication indicator

1.4 Software Resources

- Linux kernel;
- Ubuntu system;

- eMMC driver;
- ext4 file system;
- LVDS display driver, LCD backlight driver, touch screen driver;
- USB Host driver, supports USB keyboard, USB mouse and USB disk;
- Gigabit Ethernet driver;
- CAN-Bus driver;
- RS485/RS232 driver;
- SD card driver, supports hot plugging;
- RTC drivers, etc.;
- LED indicator driver;
- 4G module driver;
- General-purpose digital I/O driver;
- Buzzer driver;
- Watchdog and reset driver;
- WIFI module driver.

1.5 Application scope

- Industrial Control
- Industrial Gateway
- Micronet controller

2. Electrical characteristics

2.1 Working conditions

Table3 Work environment

name	Working environment
Input Voltage	DC 9-36V
Operating Temperature	-40℃~+70℃
Operating Humidity	5%-95%RH
Operating Altitude	<5000 meters

Note :①The EM-800's input voltage must be at least 9V and no more than 40V. A 24V±10% power supply is recommended.

②If the product is left powered off for an extended period (six months or more), data errors may occur due to electron drift within the eMMC. Please reflash the firmware before using it again.

CAUTION: ①Risk of Incorrect Battery Replacement: Risk of fire or explosion if the battery is replaced with an incorrect type. Use only the specified 3V 210mAh -40˚C~+125˚C battery.**②Environmental and Operational Prohibitions:**Do not expose the battery to excessive heat, very low air pressure, or water.Do not charge, short-circuit, heat, disassemble, or solder directly on the battery.

2.2 Power Supply and Power Consumption Characteristics

Table4 EM-800 Power Supply Specifications

Parameters	Name	Minimum	Typical	Maximum	Unit	Notes
Operating Voltage	VPower	9.0	24.0	36.0	V	At room temperature
PPower	PPower	3	10	15	W	At room temperature

2.3 Interface Performance

2.3.1 System Frequency

Name	Minimum	Typical	Maximum	Unit	Description
System Main Frequency	-	1.2	-	GHz	-
System Main Crystal Oscillator	-	24	-	MHz	-
System RTC Crystal Oscillator	-	32.768	-	KHz	-
Ethernet Clock	-	125	-	MHz	-
SD Card Clock	-	400	-	KHz	Identification Mode
SD Card Clock	-	50	-	MHz	High-Speed Mode
LVDS Clock	-	78.9	154	MHz	7-inch LCD Screen

2.3.2 Ethernet Interface Performance Parameters

Parameters	Test conditions	Minimum	Typical	Maximum	Unit	Description
Sending rate	One-way delivery	-	-	106.4	MB/s	
Receive rate	One-way collection	-	-	91.8	MB/s	

2.3.3 RS485 interface performance parameters

Parameters	Test conditions	Minimum	Typical	Maximum	Unit	Description
Baud rate	RS485 1~2	2400	9600	115200	bps	The combined data rate of RS485-1 and RS485-2 must not exceed 115200 bps
Baud rate	RS485 4~6	2400	115200	460800	bps	-
Sending rate	115200 baud rate		11.4		KB/s	115 bytes, 10000us
Receive rate	115200 baud rate		11.4		KB/s	115 bytes, 10000us
Communication distance	-	-	1200	-	m	-

2.3.4 CAN interface performance parameters

Parameters	Test conditions	Minimum	Typical	Maximum	Unit	Description
Baud rate	-	40	1000	4000	kbps	-
Sending rate			6752		fps	-
Receive rate			5745		fps	-
Communication distance	-	-	10	40	m	-

2.3.5 SD card storage performance parameters

Parameters	Test conditions	Minimum	typical	maximum	unit	Test TF card model
Writing speed	Write 10/100/1000MB of data	8.4	10.8	12	MB/s	SanDisk 32GB
Reading speed	Read 10/100/1000MB of data	16.0	21.5	22.8	MB/s	SanDisk 32GB

2.3.6 USB storage performance parameters

parameter	Test conditions	Minimum	typical	maximum	unit	Test USB drive model
Writing	Write 10/100/1000MB of data	13.4	16.5	17.4	MB/s	SanDisk 32GB

speed						
Reading speed	Read 10/100/1000MB of data	28.4	30.2	32	MB/s	SanDisk 32GB

Note: When the USB interface is externally connected to the load, the current of a single interface shall not exceed 500mA.

2.3.7 LVDS interface performance parameters

parameter	Test conditions	Minimum	typical	maximum	unit	illustrate
Display clock	-	25	78.9	154	MHz	
Resolution	-	-	1200*800	1920*1200	Pixel	
Supports color	-	-	24	24	Bit	

2.3.8 DI interface performance parameters

Interface silk screen name	Signal type	Input active high voltage	Input low level invalid voltage	Description
HDI1-HDI4	Wet Contact	9-24V	0-7V	
LDI1-LDI4	Dry Contact	-	-	For external use with a passive switch

2.3.9 DO Interface Performance Parameters

Interface Silkscreen Name	Interface Type	Continuous Current (Loaded)	Description
HSD1~HSD4	High-side driver	2A/36V	For use with VCC and GND
LSD1~LSD2	Low-side driver	2A/36V	For use with VCC and GND
DO1~DO4	Mechanical relay	4A/24V DC, 1A/250V AC	Under a 4A load, the relay on/off interval must be no less than 15 seconds.
DO5~DO6	Solid-state relay	0.25A/24V	Connect to resistive loads

Note: External power supply is required for the high-side and low-side drivers.

2.3.10 Hardware Watchdog Parameters

Name	Parameter	Minimum	Typical	Maximum	Unit	Description
Hardware Watchdog	Overflow Period	0.9	1.6	2.0	s	-
Hardware Watchdog	Reset Pulse Width	-	200	-	ms	-

2.3.11WiFi Performance Parameters

Name	Parameter	Test Conditions	Minimum	Typical	Maximum	Unit	Description
2.4G WiFi	Communication distance	Open Area	-	-	100	m	
	Transmission rate	Station Mode	-	10.82	-	MB/S	
	Reception rate	Station Mode	-	10.51	-	MB/S	

Name	Parameter	Test Conditions	Minimum	Typical	Maximum	Unit	Description
	Transmission rate	AP Mode	-	2.25	-	MB/S	
	Reception rate	AP Mode	-	2.81	-	MB/S	
	Transmitting Power	-	-	-	18	dBm	Tolerance: ±2dB
5G WiFi	Communication distance	Open Area	-	5	-	m	
	Transmission rate	Station Mode	-	17.82	-	MB/S	
	Reception rate	Station Mode	-	14.63	-	MB/S	
	Transmitting Power	-	-	-	17	dBm	Tolerance: ±2dB

Note: The above table lists the WiFi performance parameters of the FCU760K-NL.

2.3.12 Debug Serial Port Performance Parameters

Parameters	Test Conditions	Minimum	Typical	Maximum	Unit	Description
Baud Rate	-	-	115200	-	bps	RS232
Communication Distance	-	-	10	-	m	RS232

2.4 Electromagnetic Compatibility

Test Item Name	Test Standard	Test Interface	Test Level	Description
Electrostatic Discharge Immunity Test	GB/T 17626.2-2018 / IEC61000-4-2:2008	Contact Discharge 4kV: Power Interface (CANH/CANL), LDI/DO (LDI1-LDI4, DO1-DO8), RS485 Interface, HDI/LSD/HSD, DEBUG Interface, Antenna Interface, Ethernet Port, USB Port, LVDS Interface, CANA/CANG, Air Discharge 8kV: SIM Card Slot, TF Card Slot, Indicator Light, Reset Port	Level 3	
Electrical Fast Transient/Burst Immunity Test	GB/T 17626.4-2018 / IEC61000-4-4:2012	Power supply, RS485, CAN, and Ethernet ports	Level 3	
Lightning (surge) immunity test	GB/T 17626.5-2019 / IEC61000-4-5:2014	Power supply, RS485, CAN, and Ethernet ports	Level 3	EM-800 power supply voltage: 24V@1A
Radio frequency field-induced	GB/T 17626.6-2017 / IEC61000-4-6:2013	RS485 interface, CAN interface, Ethernet port	10V	

Test Item Name	Test Standard	Test Interface	Test Level	Description
conducted disturbance immunity test				
Conducted disturbance test	GB/T 6113.201-2018 / CISPR 16-2-1:2017	Power supply and signal ports	CLASS A	

Note: EFT testing is not performed on DI/DO interfaces.

2.5 Environmental Adaptability

Test Item Name	Test Standard	Test Conditions	Test Results
Low-Temperature Startup and Operation Test	GBT 2423.1-2008	-42℃	Pass
High-Temperature Startup and Operation Test	GBT 2423.2-2008	+72℃	Pass
Constant humidity and heat test	GB/T 2423.3-2016	+42℃/95%RH	Pass
Temperature change test	GB/T 2423.22-2012	-42℃～+72℃	Pass

3. Mechanical dimensions

3.1 Overall machine size

Figure 3 is the dimension drawing of the EM-800 machine.

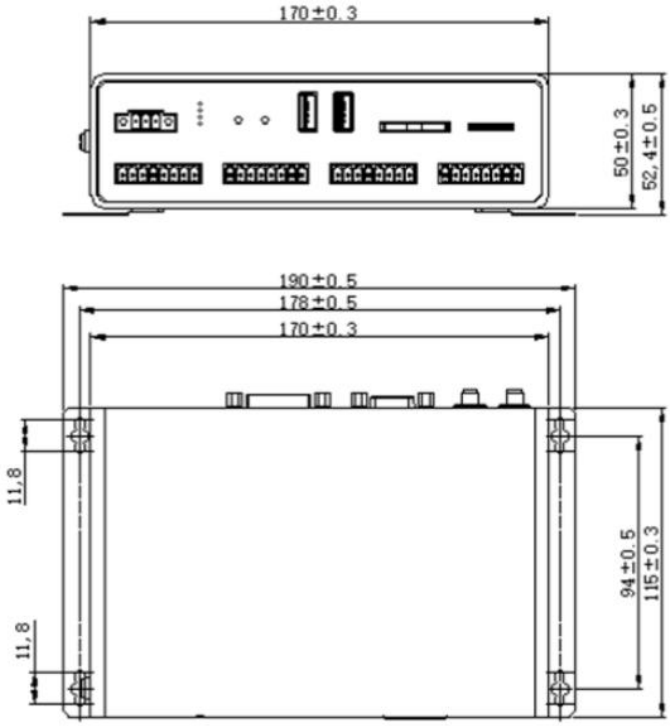

Figure 3 EM-800 appearance dimensions

4. Supported accessories

The EM-800 supports accessories are as follows:

Table5 EM-800 product accessories

Serial number	name	model	Manufacturer	illustrate
1	Hardware stand	DIN rail bracket, 48*37*9.5mm, aluminum	ZLG Zhiyuan Electronics	DIN rail bracket
2	LCD display	ZPM-101RTW-01	ZLG Zhiyuan Electronics	10.1 inch, 1024*600, resistive touch, JEIDA format
3	LCD display	ZPM-101RTW-02	ZLG Zhiyuan Electronics	10.1 inch, 1280*800, resistive touch, highlight screen, JEIDA format
4	LCD display	LMT070DICFWD-AKA	TOPWAY	7-inch, 800*480, resistive touch
5	LCD Display	LMK104DNEFWU-AKA	TOPWAY	10.4-inch, 800 *600, resistive touch screen
6	LCD Kit	LCD-1280800W101TC	ZLG Zhiyuan Electronics	10.1-inch, 1280*800
7	DVI Cable	DVI-I24+5, SIGE	TOPWAY	Connecting to LCD Display
8	DVI Cable	SAMZHE 1.5m 25-pin DVI Male to Male	SAMZHE	Use a dual-channel cable
9	4G Antenna	AB0727-2603BSM, 3G/4G Suction Cup Antenna, 2m, Conjie, Black	CORTEC	Connect to ANT1
10	WIFI Antenna	SMA-ZK-2.4G-2DBl Black Rubber Antenna, 112mm, IPD	IPD	Connect to ANT2
11	WIFI Antenna	AB2450-29H01BSM-01,CORTEC, 2400~2500MHz;5150~5850MHz	CORTEC	Connect to ANT2

5. Packing List

The EM-800 product packing list is as follows:

Table6 EM-800 Packing List

Serial Number	Name	Model	Quantity	Description
1	ARM Industrial Computer	EM-800	1	Host
2	Connection Terminals	3.81-03P	1	Power Connection Terminals, Packed in Bags
3	Connection Terminals	3.81-04P	1	DO Connection Terminals, Packed in Bags
4	Connection Terminals	3.81-06P	4	RS485/CAN Connection Terminals, Packed in Bags
5	Connection Terminals	3.81-08P	4	DI/DO terminal block, in a bag
6	Hardware bracket	DIN rail bracket, 48*37*9.5mm, aluminum	1	DIN rail mounting accessories
7	Metric screws	M3*8, countersunk head	4	DIN rail bracket fixing screws
8	Combination screws	M3*8 triple combination flat washers	4	Unit Mounting via Ear Brackets
9	Metric screws	PM2*5, D=3.5, round head	2	Fixing the wireless module
10	Certificate of conformity	Certificate of conformity	1	Certificate of conformity

The EM-800-4G product packing list is as follows:

Table7 EM-800-4G Packing List

Serial Number	Name	Model	Quantity	Description
1	ARM Industrial Computer	EM-800-4G	1	Host
2	Connection Terminals	3.81-03P	1	Power Connection Terminals, Packed in Bags
3	Connection Terminals	3.81-04P	1	DO Connection Terminals, Packed in Bags
4	Connection	3.81-06P	4	RS485/CAN Connection Terminals,

Serial Number	Name	Model	Quantity	Description
	Terminals			Packed in Bags
5	Connection Terminals	3.81-08P	4	DI/DO terminal block, packaged in a bag
6	Hardware bracket	DIN rail bracket, 48*37*9.5mm, aluminum	1	DIN rail mounting accessories
7	Metric screws	M3*8, countersunk head	4	DIN rail bracket fixing screws
8	Combination screws	M3*8 triple combination flat washers	4	Unit Mounting via Ear Brackets
9	Certificate of Conformity	Certificate of Conformity	1	Certificate of Conformity

6. Disclaimer

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