Protoss-PG46

RS485/Ethernet to 4G Router

User Manual

V 1.1

Overview of Characteristic

✧ Use MIPS MCU (32MB SRAM) and 16MB Flash, based on Linux OS

✧ Support LTE-TDD, LTE-FDD, WCDMA, TD-SCDMA, cellular network, sub-type to support specific cellular network

✧ Support RS485 to 2G/3G/4G Data Transmission, UART baud rate Up to 460800bps

✧ Support 10/100M Ethernet to 2G/3G/4G Data Transmission

✧ Supports Max 5 Channel TCP/UDP connections, Each Connection Supports 1400 Bytes of Data Cache

✧ Support Multiple Working Modes: Network Transparent Transmission Mode, HTTP Mode, MQTT, WebSocket

✧ Support Modbus Master Function

✧ Support IOTService Tool, Remotely and Dynamically Modify Module Parameters

✧ Support APN

✧ Support VPN(PPTP, L2TP, L2TP+IPSEC)

✧ Supports Registration Packet, Heartbeat Packet Function, and Packet Supports Combination of ICCID, IMEI, IMSI, Software Version, cellular network Connection Status.

✧ Support NTP

✧ Support Modbus TCP to Modbus RTU

✧ Support IOTBridge for Remote Control and Config.

✧ Support IOTBridge working time, for example only works from 10:00 to 10:30 to save the data flow charge.

✧ Support Network OTA Upgrade Firmware.

✧ Multiple Type of Different Power Input：

■ Protoss-PG46-H：100～240VAC@50～60Hz

■ Protoss-PG46-M：9～48VDC@1A

✧ Size: 102.03 x 64.95 x 27.50 mm (L x W x H) ，C45 rail installation

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

HISTORY

V 1.0 05-29-2020. First Version

V 1.1 11-18-2021. Update baudrate range

1. PRODUCT OVERVIER

1.1. General Description

The Protoss-PG46 support LTE-TDD, LTE-FDD, WCDMA, TD-SCDMA, cellular network full network. 4G network support maximum download data rate 150Mbps, upload data rate 50Mbps.

The Protoss-PG46 supports TCPIP protocol, with its RS485 interface, it makes traditional UART device easy connecting to IOT.

Protoss-PG46 include different sub-type, as following table.

Table1.　Protoss-PG46 Series Defination

Model\Function	Main Function (Country)	Input Voltage	4G	3G	2G	Serial	Support Serial Mode	TDD-LTE	FDD-LTE	TD-SCDMA	WCDMA	CDMA2000 1X/EVDO	GSM
Protoss-PG46-H	just China	100~240VAC	√	√	√	1	RS485	B38/39/40/41	B1/3/5/8	B34/39	B1/8	—	B3/8
Protoss-PG46-GL-H	global	100~240VAC	√	√	√	1	RS485	B38/39/40/41	B1/2/3/4/5/7/8/12/13/18/19/20/25/26/28	—	B1/2/4/5/6/8/19	—	B2/3/5/8
Protoss-PG46-CE-H	China	100~240VAC	√	√	√	1	RS485	B34/38/39/40/41	B1/3/5/8	B34/39	B1/8	BC0	B3/8
Protoss-PG46-EU-H	Europe, Israel, South Korea, Southeast Asia India, Russia, Middle East, etc.	100~240VAC	√	√	√	1	RS485	B38/40/41	B1/3/7/8/20/28A	—	B1/8	—	B3/8
Protoss-PG46-EC-H	Europe, Israel, South Korea, Southeast Asia India, Russia, Middle East, etc.	100~240VAC	√	√	√	1	RS485	—	B1/3/7/8/20/28A	—	B1/8	—	B3/8
Protoss-PG46-AF-H	Canada, USA	100~240VAC	√	√	—	1	RS485	—	B2/4/5/12/13/14/66/71	—	B2/4/5	—	—
Protoss-PG46-AU-H	Australia, Latin America, Taiwan(China), New Zealand, etc.	100~240VAC	√	√	√	1	RS485	B40	B1/2/3/4/5/7/8/28	—	B1/2/5/8	—	B2/3/5/8
Protoss-PG46-JP-H	Japan	100~240VAC	√	√	—	1	RS485	B41	B1/3/8/18/19/26	—	B1/6/8/19	—	—
Protoss-PG46-M	just China	9~48VDC	√	√	√	1	RS485	B38/39/40/41	B1/3/5/8	B34/39	B1/8	—	B3/8
Protoss-PG46-GL-M	global	9~48VDC	√	√	√	1	RS485	B38/39/40/41	B1/2/3/4/5/7/8/12/13/18/19/20/25/26/28	—	B1/2/4/5/6/8/19	—	B2/3/5/8
Protoss-PG46-CE-M	China	9~48VDC	√	√	√	1	RS485	B34/38/39/40/41	B1/3/5/8	B34/39	B1/8	BC0	B3/8
Protoss-PG46-EU-M	Europe, Israel, South Korea, Southeast Asia India, Russia, Middle East, etc.	9~48VDC	√	√	√	1	RS485	B38/40/41	B1/3/7/8/20/28A	—	B1/8	—	B3/8
Protoss-PG46-EC-M	Europe, Israel, South Korea, Southeast Asia India, Russia, Middle East, etc.	9~48VDC	√	√	√	1	RS485	—	B1/3/7/8/20/28A	—	B1/8	—	B3/8
Protoss-PG46-AF-M	Canada, USA	9~48VDC	√	√	—	1	RS485	—	B2/4/5/12/13/14/66/71	—	B2/4/5	—	—
Protoss-PG46-AU-M	Australia, Latin America, Taiwan(China), New Zealand, etc.	9~48VDC	√	√	√	1	RS485	B40	B1/2/3/4/5/7/8/28	—	B1/2/5/8	—	B2/3/5/8
Protoss-PG46-JP-M	Japan	9~48VDC	√	√	—	1	RS485	B41	B1/3/8/18/19/26	—	B1/6/8/19	—	—

1.2. Device Parameters

Table2.　Protoss-PG46 Technical Specifications

Item	Parameters
System Information	
Processor/Frequency	320MHz
Flash/SDRAM	16MB/32MB
Operating System	OpenWRT Linux
2G/3G/4G Interface	
Transmit Power	LTE-TDD: Class 3(23dBm+1/-3dB) LTE-FDD: Class 3(23dBm±2dB) WCDMA: Class 3(24dBm+1/-3dB) TD-SCDMA: Class 3(24dBm+1/-3dB) GSM900: Class 4(33dBm±3dB) DCS1800: Class 1(30dBm±3dB) GSM900 8-PSK: Class E2(27dBm±3dB) DCS1800 8-PSK: Class E2(26dBm±3dB)

Receive Sensivity	FDD B1: -96dBm(10M) FDD B3: -96dBm(10M) FDD B5: -96dBm(10M) FDD B8: -96.5dBm(10M) TDD B38: -96dBm(10M) TDD B39: -97dBm(10M) TDD B40: -96.5dBm(10M) TDD B41: -96dBm(10M) WCDMA B1: -110dBm WCDMA B8: -111dBm TDSCDMA B34: -109dBm TDSCDMA B39: -109dBm GSM 900M: -109dBm GSM 1800M: -109dBm
LTE	Maximum Support non-CA CAT4 Support 1.4~20MHz RF Bandwidth Downstream Support Multiple Users MIMO FDD: Maximum Upstream Rate 50Mbpsm Maximum Downstream Rate 150Mbps TDD: Maximum Upstream Rate 35Mbpsm Maximum Downstream Rate 130Mbps
WCDMA	3GPP R8 DC-HSPA+ 16-QAM,64-QAM and QPSK Modulation Maximum Upstream 5.76Mbps Maximum Downstream 42Mbps
TD-SCDMA	CCSA Relese 3 Maximum Upstream 2.2Mbps Maximum Downstream 4.2Mbps
GSM/cellular network	R99： CSD Transmission Rate：9.6Kbps/14.4Kbps cellular network： Support cellular network multi-slot class 12 Code Method：CS-1/CS-2/CS-3/CS-4
Ethernet	
Port Number	1 WAN/LAN switchable
Interface	10/100M Base-T
Transformer	Integrated
Serial Port	
Port Number	1
Interface Standard	RS485
Data Bits	7,8
Stop Bit	1,2
Check Bit	None,Even,Odd
Baud Rate	TTL：2400 bps~460800 bps
Flow Control	No Flow Control Half-Duplex(RS485) Software Flow Contorl
Software	
Configuration	Serial AT Command IOTService Serial Port Configuration Software IOTService Network Configuration Software
Firmware Upgrade	UART or OTA Upgrade
Network Protocol	IP，TCP，UDP，DHCP，DNS，HTTP Server/Client，ARP,

	AutoIP，ICMP，Telnet，NTP，Modbus TCP
Encryption	TLS v1.2 AES 128Bit DES3
Basic Parameter	
SIM Card	Nano SIM card(1.8V/3V)
Size	102.03 x 64.95 x 27.50 mm
Operating Temp.	-40 ~ 70°C
Storage Temp.	-40 ~ 85°C, 5 ~ 95% RH（no condensation）
Input Voltage	Protoss-PG46-H：100～240VAC@50～60Hz Protoss-PG46-M：9～48VDC@1A
Average Working Current	~300mA@9V
Peak Current	2A

1.3. Key Applications

The Protoss-PG46 module connects the serial device to the Internet and conforms to the TCP/IP protocol for transmitting serial data.

- Remote device monitoring
- Production asset tracking and monitoring
- Security field
- Industrial sensors and controllers
- Health medical equipment
- ATM equipment
- Data acquisition equipment
- UPS power management equipment
- Telecommunication equipment
- Data display device
- Hand-held device
- Attendance system and terminal equipment

2. HARDWARE INTRODUCTION

Protoss-PG46 is a cellular network solution for serial device networking. Data transmission via cellular network makes product integration very easy. This product meets EMC Class B security level and can pass relevant certification tests in various countries.

2.1. APPEARANCE

Figure 1.   Protoss-PG46 Appearance

2.2. Interface Definition

Figure 2.   Protoss-PG46 Interface

Figure 3.   Protoss-PG46-H Interface Definition

Pin	Description	Net Name	Signal Type	Comment
1	AC Power Input	L	Power	100～240VAC Input
2	AC Power Input	N	Power	
5		RS485_B-	IO	RS485 B-
6	Signal GND	GND	Power	Used for RS485 GND, usually leave it unconnected
7		RS485_A+	IO	RS485 A+
ANT	Antenna	ANT		2G/3G/4G SMA Antenna
RJ45	Ethernet	RJ45	I/O	10/100M Ethernet Default is LAN function, can be configured to WAN Function, connect to router LAN port for network access.
SIM	SIM Slot	Nano SIM		
Reload	Restore to factory setting button	Reload	I	**Detailed functions see <Notes>**
Reset	Reset button	Reset	I	Hardware reset button
Net	Network status LED	Net	O	Boot On: Bootup is OK. 2s Off -> 2s On: Cellular network Register is OK. 0.1s Off -> 0.1s On: Cellular network data is transferring.

Pin	Description	Net Name	Signal Type	Comment
Active	UART/Ethernet Data Transfer	Active	O	On: Ethernet connection OK Off: No Ethernet connection 0.1s Off -> 0.1s On: UART data transfer
Power	Power LED	Power	O	On: Power input OK Off: Power input NG.
Link	Server connection LED	Link	O	On: SOCK A connection OK. Off: no Socket A connection.

Figure 4. Protoss-PG46-H Interface Definition

Pin	Description	Net Name	Signal Type	Comment
1	DC Power Input	VCC+	Power	9～48VDC@1A Input
2	DC Power Input	GND-	Power	
	Other Pin definition is the same as above			

<Notes>:

I — Input; O — Output; Power—Power Supply

nReload Pin (Button) function:

1.After module is powered up, long press this button ("Low" > 3s) and loose to make the module recover to factory setting.

2.3. RS485 Interface

RS485 use two wire links, A(DATA+), B(DATA-). Connect A(+) to A(+), B(-) to B(-) for communication. Suggest to connect GND together when interference is very severe.

The RS485 interface support maximum 32 485 device, device. The cable maximum length is 1200 meters. Need to add 120Ohm terminal resistor for over 300 meters.

2.4. Mechanical Size

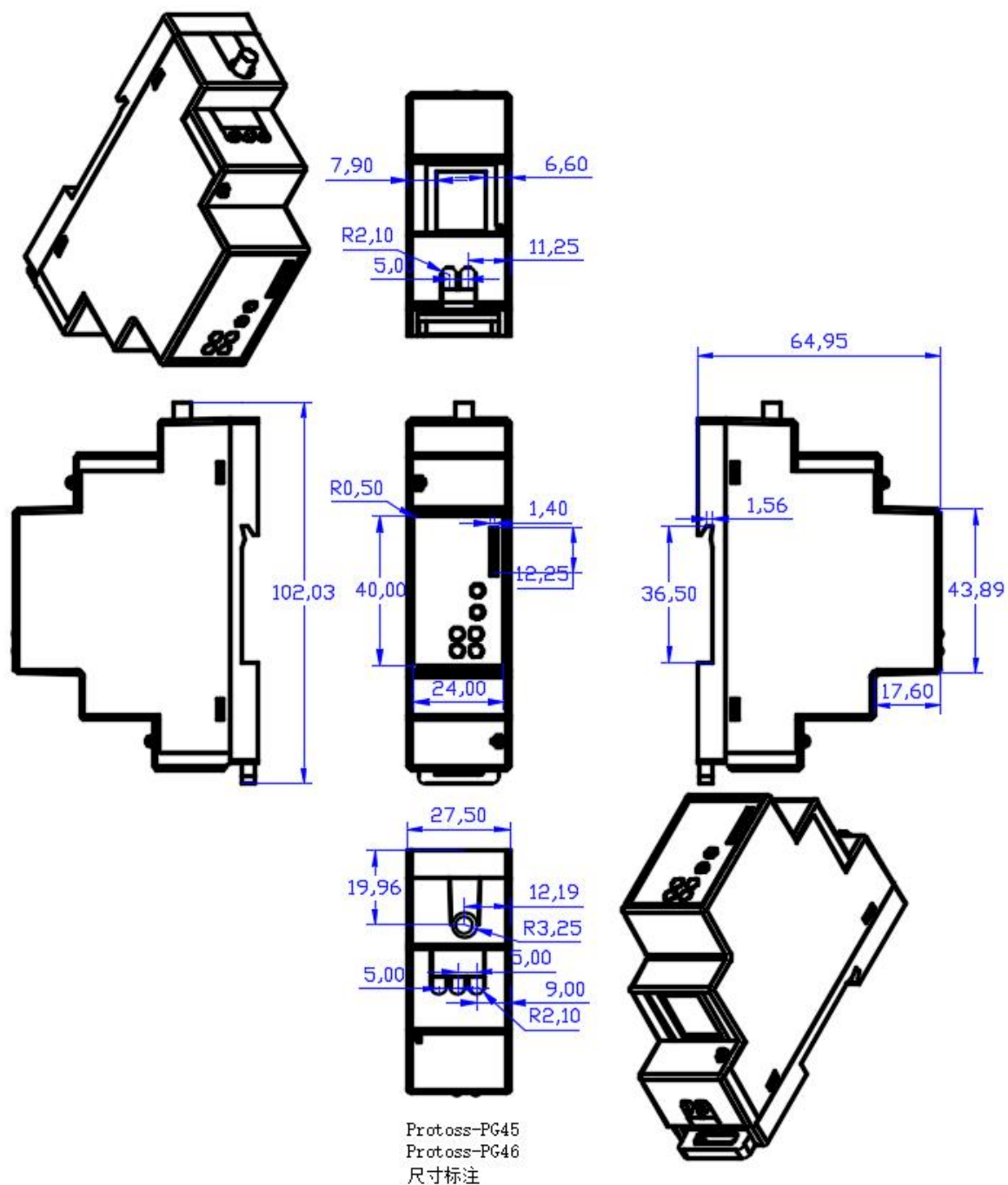The dimensions of Protoss-PG46 are defined as following pictures(mm):

Protoss-PG45
Protoss-PG46
尺寸标注

Figure 5.   Protoss-PG46 Mechanical Size

2.5. Product Installation

Figure 6.   C45 Rail Installation

2.6. Product Order Information

Based on customers detailed requirements, we provide different configuration Protoss-PG11, details as below:

Model \ Function	Main Function		Interface						Band					
		Country	Input Voltage	4G	3G	2G	Serial	Support Serial Mode	TDD-LTE	FDD-LTE	TD-SCDMA	WCDMA	CDMA2000 1X/EVDO	GSM
Protoss-PG46-H	just China		100~240VAC	√	√	√	1	RS485	B38/39/40/41	B1/3/5/8	B34/39	B1/8	—	B3/8
Protoss-PG46-GL-H	global		100~240VAC	√	√	√	1	RS485	B38/39/40/41	B1/2/3/4/5/7/8/12/13/18/19/20/25/26/28	—	B1/2/4/5/6/8/19	—	B2/3/5/8
Protoss-PG46-CE-H	China		100~240VAC	√	√	√	1	RS485	B34/38/39/40/41	B1/3/5/8	B34/39	B1/8	BC0	B3/8
Protoss-PG46-EU-H	Europe, Israel, South Korea, Southeast Asia India, Russia, Middle East, etc.		100~240VAC	√	√	√	1	RS485	B38/40/41	B1/3/7/8/20/28A	—	B1/8	—	B3/8
Protoss-PG46-EC-H	Europe, Israel, South Korea, Southeast Asia India, Russia, Middle East, etc.		100~240VAC	√	√	√	1	RS485	—	B1/3/7/8/20/28A	—	B1/8	—	B3/8
Protoss-PG46-AF-H	Canada, USA		100~240VAC	√	√	—	1	RS485	—	B2/4/5/12/13/14/66/71	—	B2/4/5	—	—
Protoss-PG46-AU-H	Australia, Latin America, Taiwan(China), New Zealand, etc.		100~240VAC	√	√	√	1	RS485	B40	B1/2/3/4/5/7/8/28	—	B1/2/5/8	—	B2/3/5/8
Protoss-PG46-JP-H	Japan		100~240VAC	√	√	—	1	RS485	B41	B1/3/8/18/19/26	—	B1/6/8/19	—	—
Protoss-PG46-M	just China		9~48VDC	√	√	√	1	RS485	B38/39/40/41	B1/3/5/8	B34/39	B1/8	—	B3/8
Protoss-PG46-GL-M	global		9~48VDC	√	√	√	1	RS485	B38/39/40/41	B1/2/3/4/5/7/8/12/13/18/19/20/25/26/28	—	B1/2/4/5/6/8/19	—	B2/3/5/8
Protoss-PG46-CE-M	China		9~48VDC	√	√	√	1	RS485	B34/38/39/40/41	B1/3/5/8	B34/39	B1/8	BC0	B3/8
Protoss-PG46-EU-M	Europe, Israel, South Korea, Southeast Asia India, Russia, Middle East, etc.		9~48VDC	√	√	√	1	RS485	B38/40/41	B1/3/7/8/20/28A	—	B1/8	—	B3/8
Protoss-PG46-EC-M	Europe, Israel, South Korea, Southeast Asia India, Russia, Middle East, etc.		9~48VDC	√	√	√	1	RS485	—	B1/3/7/8/20/28A	—	B1/8	—	B3/8
Protoss-PG46-AF-M	Canada, USA		9~48VDC	√	√	—	1	RS485	—	B2/4/5/12/13/14/66/71	—	B2/4/5	—	—
Protoss-PG46-AU-M	Australia, Latin America, Taiwan(China), New Zealand, etc.		9~48VDC	√	√	√	1	RS485	B40	B1/2/3/4/5/7/8/28	—	B1/2/5/8	—	B2/3/5/8
Protoss-PG46-JP-M	Japan		9~48VDC	√	√	—	1	RS485	B41	B1/3/8/18/19/26	—	B1/6/8/19	—	—

Figure 7.   Protoss-PG46 Product Order Information

3. FUNCTION DESCRIPTION

Refer to "IOT_Device_Series_Software_Funtion" document for more detailed function.

APPENDIX A: CONTACT INFORMATION

Address: Room1002 , #1Building, No.3000 Longdong Avenue, Pudong District, Shanghai, China   201202

Website: www.iotworkshop.com   or   www.hi-flying.com

Contact:

Sales：sales@iotworkshop.com

Support：support@iotworkshop.com

Service：service@iotworkshop.com

Business：business@iotworkshop.com

--- ----------------------------

For more information about us, please visit our website: www.iotworkshop.com

< END OF DOCUMENT >