SEOP

Ethernet to the multi-E1 converter

User manual

V1.0

Feb.2010

Document revision history

Edition serial number	Time	The change showed
V1.0	2010-02-16	Documents foundation ；

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1. Introduction

1.1 Overview

SEOP is the IP over TDM converter, which supports the conversion from MAC frames to 1 – 16 E1 lines. The maximum bit rate is 31.68Mbps (16E1 lines). With different LAN card, E1 card and power card, it can meet various requirements. It not only provides alarms and status of the E1 line and Ethernet interface together with advanced management functions, such as, throughput statistic of the Ethernet, but also supports the Unification Network Management via SNMP and GUI .

Compliant to international standards, the device can communicate with products from other manufacturers adopting the same standards.

1.2 Main Features

- E1 interface
  - ➢ Supports automatic removal and recovery of E1 channels that used for carrying payload. The E1 channels that have urgent alarm, such as LOS and LOF, or the Bit Error Rate (BER) exceeds 1E-6, are removed automatically, and during this period, some Ethernet packets may be lost; It will be resumed when the fault dismisses .
  - ➢ Supports the embedded E1 BER Tester function, to detect any E1 channel of 16 channels. When the embedded E1 BER Tester is used via CLI command, the particular E1 channel on testing mode can not convey E1 service, while the other E1 channels are not affected by the BER test.
  - ➢ The differential delay between any two of the 16 E1 can be up to 220ms; when the factual differential delay exceeds 220ms, alarm is generated and Ethernet is cut off.
  - ➢ Jitter tolerance and jitter transfer characteristic compliant to ITU-T G.823.
- Ethernet interface
  - ➢ Provides up to 4 shared Ethernet interfaces.
  - ➢ 1024 MAC address table and 5-minute aging time.
  - ➢ Accepts frames with length between 64 and 1916 bytes (otherwise filtering).
  - ➢ VLAN function based on tags compliant to IEE 802.1Q.

- ➢ Throughout statistic of the Ethernet packets based on port, such as error packets.

- ➢ Configurable pause flow control .

- ➢ Optional optical Ethernet interface compliant to IEEE 802.3u 100BASE-FX standard (can communicate with remote optical transceiver) and electrical Ethernet interface compliant to IEEE 802.3u 100 BASE-TX standard.

■ Management interface

- ➢ GUI via serial RS232 port and telnet.

- ➢ SEOP network management platform based on SNMP.

■ Timing mode

- ➢ Optional local timing mode and tracing E1 line (set by GUI).

- ➢ The source of tracing E1 line can be switched according to the signal quality. For instance, the system is set as tracing the first E1 link, when some malfunction occurs to it (i.e., urgent alarm LOS/AIS/LOF/LOMF or the signal is looped back), the system will automatically change to tracing the second E1 link; when the fault disappear, the system will be re-tracing the first E1 link.

■ Compliant to ITU-T standards

- ➢ GFP-F encapsulation recommendation G.7041.

- ➢ Virtual concatenation(VCAT) and Link Capacity Adjustment Scheme (LCAS) recommendation G.7042.

- ➢ Ethernet to nxE1 mapping recommendation G.7043.

- ➢ Ethernet to single E1 mapping recommendation G.8040.

■ Bandwidth is increased without damaging the Ethernet data, and can be decreased no injury through management.

■ The E1s in the local and remote sides can be arranged arbitrarily, such as, the remote E1 port 1 can communicate with local E1 port 3.

■ Supports bandwidth unbalanced usage – when some E1s cannot work properly (i.e. the bandwidth of the sending and receiving can be 5E1 and 3E1 respectively).

■ Provides the E1 connection-ship between local and remote system (accessed via

GUI).

■ E1 tributary signal loopback automatic detect and cut off; when some E1 signal is detected as looped back, it will be not employed for carrying payload temporarily, and when the loopback is broken, this E1 will resume to be used.

■ Remote/local E1 loopback function will be convenient for E1 line(transmission system included) testing .

■ Complete alarm which is selectable to be shown between local and remote.

■ Single-board design with small dimension, 1 U high and low power consumption.

1.3 Product Options

In order to address the varying needing and requirements of users, SEOP series consist of a diverse range of products:

SEOP4, Ethernet to 4E1 converter with components of 'EOP4 motherboard +4 E1 card + LAN card';

SEOP8, Ethernet to 8E1 converter with components of 'EOP8 motherboard +8 E1 card + LAN card';

SEOP16, Ethernet to 16E1 converter with components of 'EOP16 motherboard +8 E1 card +8E1 card+ LAN card';

Table 1: Product model

Type mode	Connector
SEOP4	SD-LIU4
SEOP8	SD-LIU8
SEOP16	SD-LIU16/SD-LIU16-U

1.4 Ordering information

Table 2: REOP4 ordering information

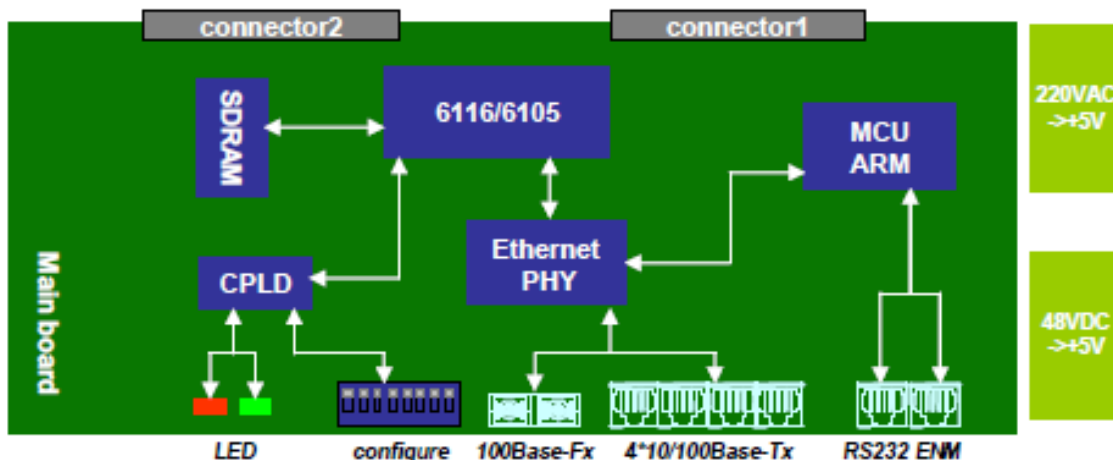| Component	Option	Component Specification		
REOP4				
Motherboard	√	SEOP4		
Network Management Card	√	SDMCU1015		
4E1 Interface card	√	□ SD-LIU4		
LAN Modules		□ SETH4		
	√	□ SETHO	□ SC interface	
			□ FC Interface	
			□ Dual fiber	
			□ Single fiber	
			(note: single fiber does not support ALS function),	
			□ 1310nm	
			□ 1550nm	
			□ 25Km	
			□ 40Km	
			□ 60Km	
			□ 80Km	
			□ 100Km	
			(Note 1: The dual-fiber no 25Km, single fiber can choose 25Km; Note 2: Only the dual-fiber can choose to 100Km and 120Km; Note 3: Only SC fiber interfaces only support 80Km, 100Km and 120Km)	
Power source module	√	□ -48V DC Single power supply module □ 220V AC Single power supply module □ -48V DC +220V AC Dual power supply module		

Table 3: SEOP8 ordering information

Component	Option	Component Specification	
SEOP8			
Motherboard	√	SEOP8	
Network Management Card	√	SDMCU1015	
8E1 Interface card	√	□ SETH4	
LAN Modules	√	□ SETH4	
		□ SETHO	□ SC interface
			□ FC interface
			□ Dual fiber
			□ single fiber
			(Note: single fiber don't support ALS function)
			□ 1310nm
			□ 1550nm
			□ 25Km
			□ 40Km
			□ 60Km
			□ 80Km
			□ 100Km
			□ 120Km
			(Note 1: The dual-fiber no 25Km, single fiber can choose 25Km;
			Note 2: Only the dual-fiber can choose to 100Km and 120Km;
			Note 3: Only SC fiber interfaces only support 80Km, 100Km and 120Km)
Power Modules	√	□ -48V DC Single power supply module	
		□ 220V AC Single power supply module	
		□ -48V DC +220V AC Dual power supply module	

Table 4: SEOP16 ordering information

Component	Option	Component Specification		
SEOP16				
Motherboard	√	SEOP16		
Network Management Card	√	SDMCU1015		
16E1 Interface card		☐ SD-LIU16		
		☐ SD-LIU16-U	☐ BNC	
LAN Modules	√	☐ SETH4		
		☐ SETHO	☐ SC interface	
			☐ FC interface	
			☐ Dual fiber	
			☐ single fiber	
			(Note: single fiber don't support ALS function)	
			☐ 1310nm	
			☐ 1550nm	
			☐ 25Km	
			☐ 40Km	
			☐ 60Km	
			☐ 80Km	
			☐ 100Km	
			☐ 120Km	
			(Note 1: The dual-fiber no 25Km, single fiber can choose 25Km; Note 2: Only the dual-fiber can choose to 100Km and 120Km; Note 3: Only SC fiber interfaces only support 80Km, 100Km and 120Km)	
Power Modules	√	☐ -48V DC Single power supply module		
		☐ 220V AC Single power supply module		
		☐ -48V DC +220V AC Dual power supply module		

2 System structure

2.1 Function diagram

2.2 Components of SEOP

SEOP is designed with many cards, and users can choose appropriate cards to meet their specific requirements.

Table 5: Components of SEOP

type	name	description	remark
Motherboard	SEOP_4	Ethernet to 4e1 converter;	Absolutely necessary
	SEOP_8	Ethernet to 8e1 converter ;	
	SEOP_16	Ethernet to 16e1 converter ;	
MCU card	SDMCU1015	Board of management	Absolutely necessary
E1 interface cards	SD-LIU4	4 E1 interface cards	BNC&RJ48
	SD-LIU8	8 E1 interface cards	BNC&RJ48
	SD-LIU16-U	16E1 unbalanced interface	BNC connector
	SD-LIU16	16E1 balanced interface	RJ48connector
LAN module	SETH4	4 Ethernet the interface	
	SETHO	Three Ethernet interfaces with electric light for Ethernet interfaces	
power module		AC220V->+5V DC-48V->+5V	One is necessary, the other is optional, the two can be backup power for each other

2.2.1 SD-LIU 4/8 card

SD-LIU4/8 the E1 connection card provides 4/8 E1 interface (to be balanced & unbalanced) with a bit rate is 2.048 Mb/s, compliance with ITU-T G.703 standard. The card support RJ48 and BNC physical interface .
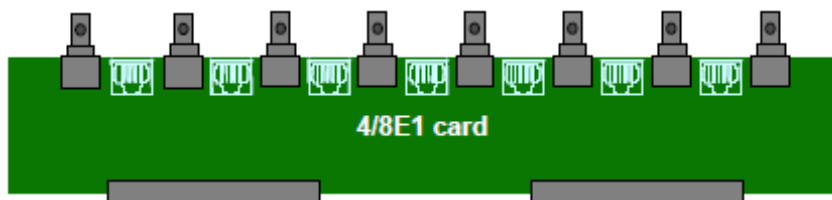

Figure 1 SD-LIU4/8 card
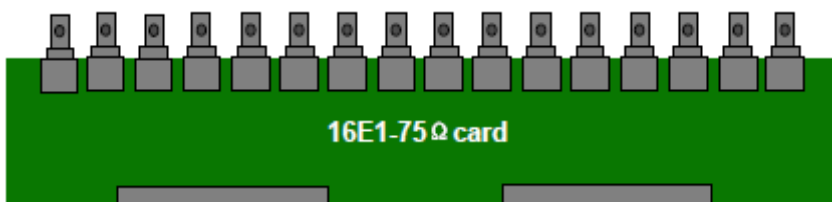
2.2.2 SD-LIU16-U card

Figure2 SD-LIU16-U card

SD-LIU16-U card provides the 16E1 unbalanced interface , with a bit rate is 2.048 Mb/s, compliance with ITU-T G.703 standard. BNC connector is used as the physical interface.

2.2.3 SD-LIU16 card

The SD-LIU16 connection card provides the 16E1 balanced connection, the interface rate is 2.048 Mb/s, conforms to ITU-T the G.703 standard. RJ48 connector is used as the physical interface.

Figure3 SD-LIU16 card

2.2.4 SETH4 card

2.2.4.1 SETH4 Description

SETH4 is a LAN card used for local LAN access and can provide 4 shared electrical Ethernet interfaces compliant to IEEE 802.3u 100 BASE-TX standards. These 4 Ethernet interface share a wan channel, the bandwidth of which can be up to 16×E1.

The 4 fast Ethernet interfaces operate in full or half duplex with flow control, the mode can be set or monitor by management software, refer to ' Network Manager software user manual'.

2.2.4.2 VLAN Mode

SETH4 has a multi-port bridging capability handling up to 5 bridge ports. The Bridge supports two modes of operation: VLAN-Enable and VLAN-Disable mode. In VLAN-Enable mode, it creates sub-groups of bridge ports within the bridge. Each sub-group is associated with a unique VLAN ID (VID). Frames containing a VID can be forwarded only between bridge ports which are members of the specific VLAN, enabling a total separation between different VLAN users within the same bridge;

In VLAN-Disable mode, the bridge forward frames ignoring the VID.

VLAN can be configured via Management software, refer to ' Network Manager software user manual'.

2.2.5 SETHO interface card

2.2.5.1 SETHO Description

SETHO is a LAN card used for Local LAN access and can provide 3 electrical Ethernet interfaces compliant to IEEE 802.3u 100 BASE-TX standards and 1 optical Ethernet interface compliant to IEEE 802.3u 100 BASE-FX standards. These 4 Ethernet interface share a wan channel, the bandwidth of which can be up to 16×E1.The 4 shared fast Ethernet interfaces operate in full or half duplex with flow control, the mode can be set by software, refer to ' Network Manager software user manual'.

2.2.5.2 VLAN Mode

The VLAN mode of SETHO is the same as that of SETH4 card. Refer to '2.2.4.2 VLAN Mode'

2.3 Card slot of SEOP Motherboard

Table 6: The Motherboard slots

name	description	remark
Card_slot1	SARM card slot	
Connector1 Connector2	E1 card slot, supports 4/ 8 /16 E1card	through the software recognized, without any settings
Power_connector0	Power interfaces, ac220v - the - 48v 5v, dc, the two modules 5v power are available to meet the	
Power_connector1	Power interfaces, ac220v - the - 48v 5v, dc, the two modules 5v power are available to meet the	

3. Application Diagram

Figure 4 illustrates a typical application (point-to-point). With SEOP system, the Ethernet is transferred by 16E1. The SEOP complies with international standard so that it can communicate with similar products from other manufacturers. Note that SEOP can only support point-to-point application.
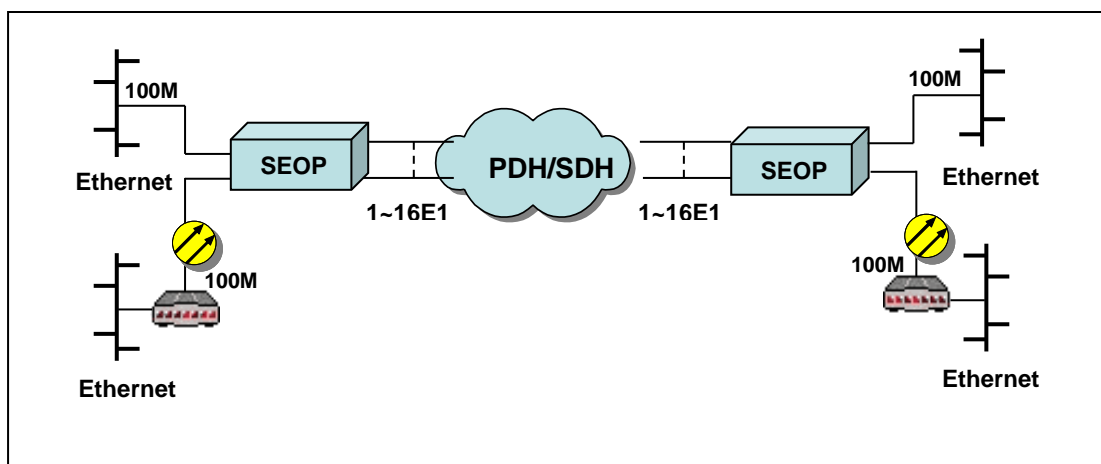

Figure 4 SEOP application diagram
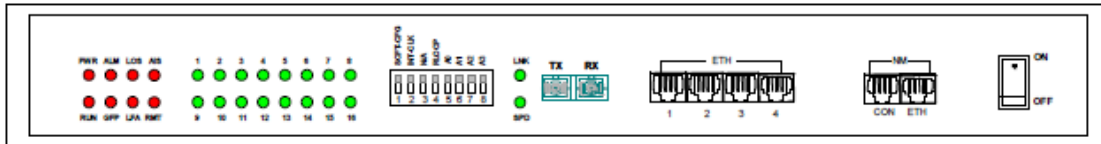
4. Panel Description

4.1 Front Panel

Figure 5 Front panel diagram

The front panel SEOP equipment can be divided into two parts: global indicator lights and state E1 tributary state indicator. E1 branch of reuse is light.

Table 7: Description of global status indicator

Name	Indicator LEDs	Description
PWR	Green	Power is supplied
	Off	Power is cut off.
ALM	Red	Any alarm of global or tributary exist
	Off	No alarm
LOS	Red	Loss of E1 signal of E1 tributary
	Off	NO LOS
LFA	Red	Loss of Frame of E1 tributary
	Off	All the E1 tributary to normal
AIS	Red	Remote device alarm
	Off	All the E1 tributary to normal
RMT	Red	Remote devices E1 tributary alarm
	Off	Remote devices E1 tributary to normal
GFP	Red	LOF of GFP present
	Off	LOF of GFP doesn't exist
E1 channel （1~16）	Off	E1 tributary normal
	Green	The E1 signal is looped back by the transmission system or the remote device
	Red	Loss of E1 signal, Loss of Frame of E1 tributary
	Yellow	AIS alarm，Remote device alarm
Link	Green	Ethernet connections to normal
	Off	Ethernet disconnected

Table 8: Description of "CONFIG" switch

Serial number	Name	Explain
1	SOFT-CFG	Device management software and hardware configuration options.　Software: OFF　Hardware: ON
2	INT-CLK	Clock options.　Internal clock: OFF Line clock: ON
3	RELOOP	E1 tributary remote loopback enabled switch. Enable :ON Note: This button is the loopback control of remote, and is mainly used for E1 line (transmission system included) testing during engineering installation. The loopback should be canceled in normal operation
4	A3-0	E1 tributary selector switch. The use of 8421 encoding option E1 tributary, loopback E1 tributary. Note：A3=8；A2=4；A1=2；A0=1

Table 9: shows the front panel buttons and interface

Serial number	Name	Explain
1	POWER	Power switch. in "on", said on the power supply any ； in "off", means the closure。
2	RS232	interface serial（RJ45）。
3	ENM	Ethernet interfaces（RJ45）。 Alternating to direct

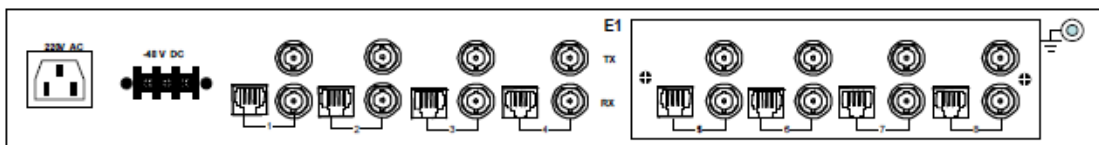## 4.2 Device rear panels

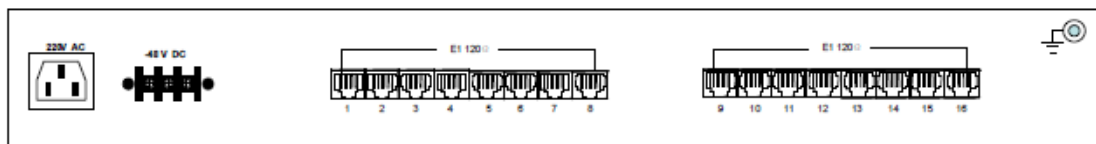Figure 6 4/8E1 SEOP device rear panel diagram

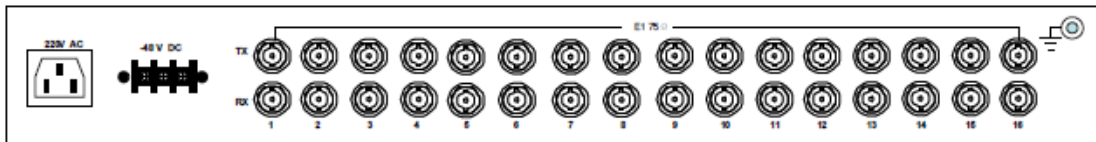Figure 7 16E1-120Ω SEOP device rear panel schematic drawing

Figure 8 16E1-75Ω SEOP device rear panel schematic drawing

Table 10: Rear panel interface description

Serial number	Name	Explain
1	1～16 E1	E1 interfaces optional 120 Ohm / 75 Ohm.
2	⊥	To GND.

Table 11: Power connector

Name	explain
220V	AC 220V power connector; Safety range: 100 ～ 264vAC
FG	FG connector.
─	DC-48V power connector; Safety range: -36 ～ - 72vDC
+	Working ground connector

Note: AC 220V and DC-48V may access simultaneously, but it is not recommend.

5 network management

SEOP support GUI network management software of based on serial RS232 can configure device parameters. The address of local network element should be set manually and should not be identical with Remote NE, Refer to Table 7. The GUI network management software shows how to configure SEOP, to monitor SEOP, and to shoot the trouble by loopback and BERT testing and so on.

6 Device Installation

I Open the package, check out the package contents such as equipment and parts according to the packing list; for any damage, contact with the supplier instantly;

II Mount the unit in a 19-inch rack with screwdriver;

III Connect the interfaces

- ✓ Connect the E1 lines with appropriate adapter to the DB37 connector or RJ45 connector on the rear panel designated to E1

- ✓ Connect the user LAN to the RJ-45 connectors designated 10/100 Base-T Ethernet and to optical Ethernet port (If SETHO card is selected)

- ✓ Connect the control terminal to the front panel RS232 connector or a SNMP management station to the front EMU port.

IV connect the power

- ✓ Always set the power switch at OFF position first and then connect the power.

- ✓ The AC voltage is in the rang of 165V～265V ;The DC voltage is in the range of -36V to -72V. We strongly recommend you to make sure to connect the PGND connector on the back panel to the earth of the telecommunication house in a reliable way. Also be careful of the connector's polarity, reverse connection is forbidden.

Note: If the device does not work, please check the fuse of the power module. If the fuse is melted, please replace it by a new one.

7. Technical parameters

7. Technical Parameters

Table 12: Optical Ethernet interface （Dual-fiber）

Subject	Description
Wavelength	1310nm/1550nm
Bit rate	125Mb/s
Optical power	-4～-12dBm
Receiving sensitivity	Prior to -36dBm
Dynamic range	32dB
Connector	FC/SC
Transmission Distance	40Km is the default configuration
Compliant to IEEE 100Base-Fx Standard	

Table 13: Optical Ethernet interface (single-fiber)

Subject	Description
Wavelength	1310nm/1550nm
Bit rate	125Mb/s
Optical power	-4～-12dBm
Receiving sensitivity	Prior to -36dBm
Dynamic range	32dB
Connector	FC/SC
Transmission Distance	25Km is the default configuration;
Compliant to IEEE 100Base-Fx Standard	

Table 14: Electrical Ethernet Interface

Subject	Description
Connector	RJ-45
Working mode	Auto - negotiation is the default setting
Complies with IEEE 802.3 and 10/100 Base-Tx Ethernet Protocol	

Table 15: E1 interface

Subject	Description
Bit rate	2.048Mb/s±50ppm
Code format	HDB3
Impedance	75 Ohm is default, Optional 120 Ohm
Jitter transfer, Jitter tolerance comply with ITU-T G.703、G.704、G.823 recommendations	

Table 16: Ethernet parameters

Subject	Description	Remark
MAC address table capacity	1K	
MAC aging time	five minutes	
Minimum frame-length	64 bytes	
Maximum frame-length	1916 bytes	
Working mode	Support auto-negotiation compliant to IEEE802.3u. Enabled as default	Configured via GUI network management software
VLAN function	Disabled as default	
Flow control	Enabled as default	
Bandwidth	≈n×E1（n=0～16） Default is 16×E1 ≈31.68Mbps	

Table 17: Dimension, weight and power consumption

Subject	Description
Dimension	434mm×44mm×155mm（width× height× depth）
Weight	2.0 kg
Power consumption	8W±10％

Table 18: Environmental requirements

Subject	Description
Operating temperature	-5℃～45℃
Storage temperature	-40℃～70℃
Humidity	≤95％，free from condensing