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Using This Document

This document is intended for use by the engineer when operating

4E1+100M Optical Multiplexer.Though every effort has been made to assure that this document is current and accurate, more information may have become available subsequent to the production of this guide. In that event, please contact your representative for additional information that may help in the operating process.

General Safety Requirements

Please read the following notes on safety, so as to avoid personal injury, and prevent this product as well as any other products connected with it from damaging. In order to avoid the possible danger, it's only permitted to use the product in specified ranges. Only the technicians authorized by our company can implement the relative maintenance work.

Avoid Fire or Personal Injury

Use appropriate power supply. Check the type of power supply for this product as well as the positive and negative polarity carefully.

Correct connection and disconnection. When the equipment is in power-on condition, do not connect or disconnect the data cable casually.

Product Earthing. In order to avoid electric shock, the earthed conductor must be connected with the ground. Before it is connected with the input or output terminal of this product, please ensure that this product has been earthed correctly.

Correct connection. When connecting, customers should use the accessories equipped with the product when leaving factory. If the customers implement special connection, please pay attention to the distribution requirements for turning corners.

Do not operate when there is no equipment cover. If the cover or panel has been removed, don't operate this product.

Avoid contacting with the exposed circuit. When this product is electrified, do not touch the exposed connection points or components.

When there is questionable failure, do not operate. If you doubt that this product has been damaged, please tell the technicians authorized by our company to do maintenance.

Provide sound ventilation environment.
Do not operate in humid environment.
Do not operate in explosive environment.
Please keep the surface of this product clean and dry.

Table of Contents

Preface

As a communication media, optical fiber experienced stages of library, trial for commerce and small-scale application and has came into large-scale application nowadays. Today, optical fiber has been used popularly within buildings as a communication media to some extent, and also its entering into household isn't only be talked on forum. Such tendency proved that optical fiber has unexampled advantages, which bring out dramatic decrease in making cost. Nowadays optical fiber is no longer a kind of expensive and rare communication material.

Because its easy availability and it could meet people's increasing demands for environment protection, optical fiber go without saying to become the top choice as a communication media.

As a hardcore of the optical multiplexer manufactured by our company, large-scale PLD(programmable logic device) make its updating speed far faster than traditional optical multiplexer on the base of ASIC. So it is especially suitable for many occasions when high reliability and complete additional function are required, such as some special-purpose communication network including mobile, unicom, telecom, power, police, army, highway, avigation , etc. The inner software and hardware are all modularity. The hardware makes use of large-scale FPGA integrating coding, decoding , message insertion and alarm, which makes the circuit simple and improve the reliability of the device.

The main content of this manual includes the installation and user guide of the 4E1+100M Optical Multiplexer.

Please read the manual before the first using and use the device

following the guide to avoid the unnecessary destroy .

We are appreciated for your using our device, and any comments and questions concerning the device would be seen as your great support. Thank you.

1.　Introduction

This chapter is an introduction to 4E1+100M Optical Multiplexer and includes the following sections:

Overview

Features

1.1　Overview

This device apply large-scale integrated circuit developed independently as its hardcore and can multiple 4-channel E1 signal, 2-channel 100M Ethernet and 2-channel RS232 and 1 hot-line port onto a pair of fiber to realize the hybrid transmission.

1.2　Features

High density monolithic design for easy integration

Complete function switches and alarm indications to display the working status, and the local led indications can display the status of remote device

Supports the loop back function on each E1 channel

Supports two Ethernets are 100M switch-mode channels

Supports two RS232 channels or one RS232 and one ex-warning indications channel

Supports console interface according the order of the customer

Supports one hot-line port according the order of the customer

Supports the AC220V and DC48V power supply simultaneously

2. Hardware Description

This chapter is an introduction to the hardware of 4E1+100M Optical Multiplexer and includes the following sections:

The Front Panel Description

The Rear Panel Description

2.1 The Front Panel Description

Figure 2-1 The Front Panel Layout

There are thirty-four LED, one 16-bit DIP switch and on the front panel

2.1.1 LED Indicators

Name	Color	Function	Description	
PWR	Green	Power Status	Active	supply of DC5V Power works normal
			Off	Power off or power error exists
SYS	Yellow	the rulers of device working parameters	Active	Following the network management settings
			Off	Following the DIP switches settings
			Blanking	The DIP control switches is unlock when followed the DIP switches setting
PHO	Yellow	phone calling status	Actiive	Both sides are in through status
			Off	Both sides are in off -hook status
			Fast Blanking	The local is called
			Slow Blanking	The local is calling

RA	Yellow	Remote alarm indicator	Active	alarm event is occurred in the fiber or some E1 channel of remote device
			Off	normal
LOS	Red	Alarm indicator of optical line	Active	Loss of signal at optical interface
			Off	Line is normal
SYL	Red	Alarm indicator of optical frame-lost	Active	Out of frame at optical line
			Off	Optical input is correct.
E3	Red	Received code error ratio ≥10−3	Active	Received code error ratio≥10−3
			Off	normal
E6	Yellow	Received code error ratio ≥10−6	Active	Received code error ratio≥10−6
			Off	normal
SOL (Reserved,Not effect the version)	Yellow	The optical signal los of the not working port	Active	When the optical signal of currentnot working port lost
			Off	Normal
OSB	Yellow	Optical	Active	A port selected

(Reserved,Not effect the version)		port select indicator	Off	B port selected
E1L1~E1L4	Red	Alarm indicator of the 1st-4th E1 channel	Active	The 1st E1 channel is code-breaking
			Off	normal
			FAST Blanking	The local E1 line is in loop back status
			SLOW Blanking	The remote E1 line is in loop back status
E1L5~E1L16	Red	(Reserved,Not effect the version)		
Link 1-2	Green	Ethernet Link status	Active	when linked
			Off	Not Linked
			Blanking	blinking when transmitting or receiving data
DUP 1-2	Green	Ethernet Duplex status	Active	when in Full Duplex operation
			Off	when in Half Duplex operation
SPD 1-2	Green	Ethernet Speed status	Active	when in 100M operation
			Off	when in 10M operation

Note：

1、Every LED indicators can display the remote working status according demand command except the PWR, PHO, RA

2、when SYS displays the remote the status , the flash mode is lack。

3、the display priority from high to low as follows：fast blanking ,slow blanking, on ,off

4、fast blanking period is 0.5 second, the duty factor is 50%

5、fast blanking period is 2 seconds, the duty factor is 50%

6、all indicators would be on if the fiber interface is selected to display the remote status when the fiber interface works not correct

2.1.2 Switches Settings and Explanation:

Note:To make the setting of the DIP switches effective ,please turn on the S1[1] first, then do the setting, and then turn the S1[1] off.

Name		Function	Description		
SW1	[1]	Setting control lock	ON	The setting lock is unlock	
			Off	The setting lock is lock	
	[2]	The alarm buzzer silence	ON	The alarm buzzer is silence	The phone beeper is not controlled by this switches
			Off	The alarm buzzer is on	
	[3]	The status select of the led indicators	ON	The led indicators display the local status	
			Off	The led indicators display the remote status	
	[4]	Ethernet auto	On	Cut-off the local 100M Ethernet port when optical alarms	

		cut-off	Off	Does not cut-off the local 100M Ethernet port when optical alarms	
	[5]	VLAN setting	On	Turn on the Isolate function of two Ethernet ports	
			Off	Turn off the Isolate function of two Ethernet ports	
	[6..7]	Reserved			
	[8]	Mask E1 line pesudo-alarm	ON	mask the loss alarm of E1 line that are line loss when switching from OFF to ON.	Need to turn the switch from OFF to ON again to process the pseudo -alarm
			OFF	Unmask the E1 line loss alarm	
SW2	[1]	Mask the E1 line loop back function	ON	Loop back function is valid	[SW2-2~7] are valid only if the switch is on
			Off	Loop back function is invalid	

[2]	The select of local/remote loop back of E1 line	ON	Set the local device loop back	
		Off	Set the remote device loop back	
[3]	Set all the E1 lines loop back	ON	Set all the E1 lines loop back	[SW2-4~7] are valid only if the switch is off
		Off	Cancel the all E1 line loop back	
[4~7]	The line select of E1 line loop back	[4~7]= [ONOFFOFFOFF]	The 1st E1 line loop back	
		[4~7]= [OFFONOFFOFF]	The 2nd E1 line loop back	The loop back deirection depend on the switch [SW2-2]
		[4~7]= [ONONOFFOFF]	The 3rd E1 line loop back	
		[4~7]= [OFFOFFONOFF]	The 4th E1 line loop back	
[8]	Network management type select	ON	RS-232 Console	
		OFF	invalid	

Tips（loop back figures）：

Local device   Remote device

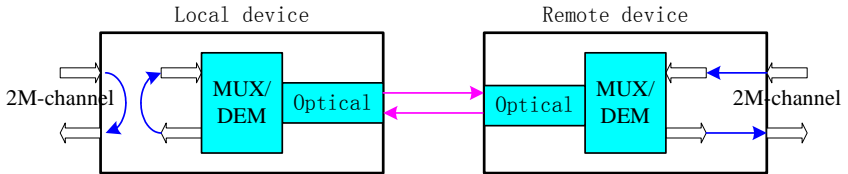2M-channel   MUX/ DEM   Optical   →←   Optical   MUX/ DEM   2M-channel

Figure 2-2 local loop back

Note: the E1 channel will be loop back to the remote device
when set as loop back local.

Local device   remote device

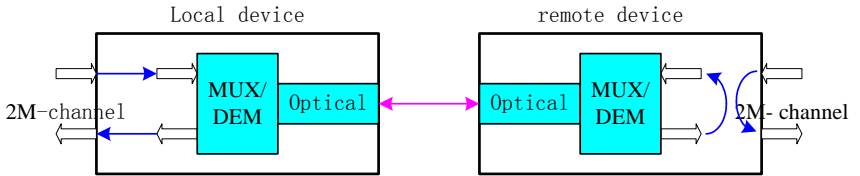2M-channel   MUX/ DEM   Optical   ←→   Optical   MUX/ DEM   2M- channel

Figure 2-3   remote loop back

Note：the remote device will loop back to local when set as the
remote loop back

2.1.3   Hot-line port switch

ON: pick up ,to call remote peer or answer the remote calling

OFF: off -hook

Note: the phone is only controlled by this switch.

2.1.4   Phone physical interface

phone physical interface: RJ11-4

2.1.5   CONSOLE/NM(Network Management)interface

reserved

2.1.6   RS-232/ExAlm

Physical interface :RJ45 jack

Provides two RS-232 channels or one RS-232＋1 ex-alarm
channel

2.1.7 Optical interface

RX : indicators the receiving of optical signal

TX : indicators the sending of optical signal

2.2 The Rear Panel Description

the rear panel layout (matched load resistance of E1 line is 75 ohms)

the rear panel layout (matched load resistance of E1 line is 120 ohms)

2.2.1 Ethernet Interface

There are two Ethernet Ports.

2.2.2 E1 physical interface

E1 physical interface(75Ω) : BNC

E1 physical interface(120Ω) : RJ45

75Ω/RX :   75Ω un-balanced E1 input

75Ω/TX :   75Ω un-balanced E1 output

120ΩE1 :   120Ω balanced E1input and output

2.2.3 Power supply

AC220V/DC-48V is both available , users can select the power supply input according to requirements.

If -48V is needed, push switch on 'DC-48V" ; If AC220V is needed , push switch on "AC220V".

If the power supply is -48V, connect the device + pole with

power GND pole，the device −pole with power −48V.

3. Technical Specifications

3.1 Environmental

Operating Temperature: 0 to 50℃ 95% RH

Storage Temperature: −40 to 70℃ 95% RH

atmospheric pressure: 70 ~ 106 kpa

Non-corrosion and non-solvent gas; Non-dust; Non-magnetic field interference.

3.2 Power Requirements

Power Input: AC220V /DC−48V

Power Range: DC−48V (−36V ~ −72V) or AC220V (165~265V)

Power Consumption: <5 Walt

3.3 Mechanical Specifications

Dimensions: 430mm(Weight)×44mm(height)×203mm(depth)

3.4 Optical Interface Specification

Wave−length：850、1310、1550nm optional

Typical output power：≥−8dBm (single mode、1310nm)

≥−18dBm (multi−mode、850nm)

≥−25dBm (multi−mode、1310nm)

Receiver Sensitivity: ≤−36dBm

Connector Type: FC/SC optional ; single−mode/multi−mode optional ; single optical fiber/double optical fiber optional

3.5 E1 Interface Specification

Electric Characteristics of Interface: compatible with ITU−T G.703 standard

Transfer Characteristics of Interface: compatible with ITU−TG.823 standard

Jitter Characteristics of Interface: compatible with ITU−T G.823 standard

Bit rate: transmission port 2048Mbps±50ppm

Line Code Pattern: HDB3

Interface Impedance: 75Ω/120Ω

Interface Connector: Q9(75Ω), RJ45(120Ω)

3.6 Ethernet Specifications

Supports two Ethernets

Supports auto-negotiation, 10/100M Speed Full/half-duplex

Supports Auto MDI/MDIX function

Fully compliant with IEEE 802.3/802.3u

Physical Interface: RJ45 jack

3.7 RS232 Specifications

Speed : ≤115.2kbps auto-negotiation

Mode : Asynchronous Receiver/Transmitter

Physical Interface: RJ45 jack

4. Getting Started

4.1 Deliverables

The 4E1+100MOptical Multiplexer itself

Four Two BNC connectors

One RJ45 jack

One 220V power line

One -48V power line

Two Rack-mounted panels

Six Rack-mounted screws

One User Guide

4.2 Configuration Straps

Pay attention to distribute fiber reasonably, whose curvature radius must be equal to or bigger than 50mm.

Fiber connector cannot be polluted, and it should be Cleaned with alcohol gently before using, otherwise it would affect the

transmission result. If the fiber connector isn't connected with each other correctly, that may cause high power consumption, so you should adjust it according to the factual situation.

Make sure all of the switches on the front panel are in off state except the S1[1]

Before operating, please do the following test:

When power up, all of the led indicators would be flash once last for 0.5 seconds except the PWR led, and then enter the normal status. At this time, the PWR led、RA led 、LOS、E1L1~4 are on, SYS led is flashing and others are off.

Connect two device back to back with fiber jumper, two indicators LOS are both OFF.

Connect the E1 line or Fiber Optic line、twisted pair line, and the telephone line correctly.

Power on, the device in the normal working state.

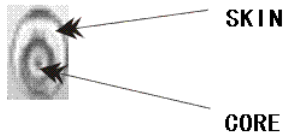If it doesn't work normally, please contact with supplier or the local agent.

5.Appendix

5.1.Method of making lines

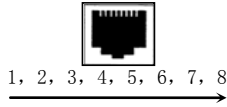### 5.1.1. Method of making E1 lines

Method of making E1 lines for 75ohms：

Connect core to core, skin to skin, but core not to skin.

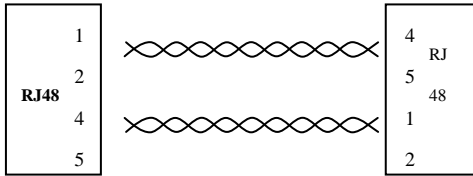

SKIN

CORE

Method of making E1 lines for 120ohms：

Physical interface is RJ48-C for 120 ohms.(Marked with RJ48-C on
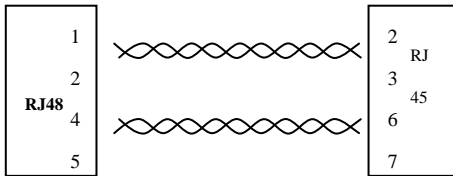
the rear panel)

1，2，3，4，5，6，7，8

4,5 Output 1,2 Input

I/O ports of the two -termination units are accordant, the connection method is as follows:

When connecting RJ48-C port to RJ45 port, Connection method is as follows：


I/O Pin sequence of the other-termination unit is not accordant with those of ours, connect output pins of ours to input pins of the other, input pins of ours to output pins of the other.

In order to ensure transmission distance and reduce interference, two-input and two-output wiring must be made in the same TP.

5.1.2 Making of Ethernet Interface Connecting Cable

Ethernet interface Connecting Cable adopts twisted pair line with its specific making methods divided into two international standards, which are EIA/TIA568A and EIA/TIA568B. Position the tail of crystal head downward (i.e. the flat side upward), determine the lines with figures as 1 2 3 4 5 6 7 8 from left to right, and the distributions of each line are as follows:

Pin 1　Pin 8
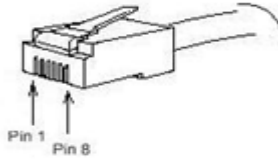
The following tables show two international standards:
EIA/TIA568B Standard

No.	1	2	3	4	5	6	7	8
Definition	TXD+	TXD-	RXD+			RXD-		
Color	White/Orange	Orange	White/Green	Blue	White/Blue	Green	White/Brown	Brown

EIA/TIA568A Standard

No.	1	2	3	4	5	6	7	8
Definition	TXD+	TXD-	RXD+			RXD-		
Color	White/Green	Green	White/Orange	Blue	White/Blue	Orange	White/Brown	Brown

Making of straight-through line:
Both heads are connected as per T568B line sequence standard.
Making method of crossover line:
One head is connected as per T568A line sequence while the other head is connected as per T568B line sequence.

5.1.3. RS232 and alarm output interface

1.The pin definition and connected method when the device provides two RS-232：

RJ45	Definition	DB9（female）	DB9（female）
1	RXD1：the input of the A channel RS232	3	
2	CTS&CSR&DCD	1、6、8	
3	TXD1：the output of the A channel RS232	2	

4	GND	5	
5	RXD2：the input of the B channel RS232		3
6	CTS&CSR&DCD		1、6、8
7	TXD2：the output of the B channel RS232		2
8	GND		5

2.the pin definition and connected method when the device provides 1 RS-232＋1 ex-alarm:

RJ45	definition	DB9 (female)	Alarm output description
1	RXD1：the input of the A channel RS232	3	
2	CTS&CSR&DCD	1、6、8	
3	TXD1：the output of the A channel RS232	2	
4	GND	5	
5	Alarm Close		5 and 6 is connected when there is an alarm output, otherwise 6 and 7 is connected
6	Alarm Comm		
7	Alarm Open		
8	GND		

5.1.4. Phone interface
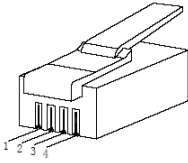
Pin	Definition	Description
1	SPEAKER +	Speaker output positive
2	MIC −	MIC input negative
3	MIC +	MIC input positive
4	SPEAKER −	Speaker output negative

5.1.5. CONSOLE and RS485 network management

pin	definition
1	RS232 input
2	null
3	RS232 output
4	GND
5	RS485 output positive
6	RS485 output negative
7	RS485 input negative
8	RS485 input positive

4E1+100M Optical Multiplexer User Manual

5.2 Trouble Shooting

Symptom	Probable cause	Solutions
Indicator PWR is off	1.Not completely pressed on controlling switch. 2.Incorrect connection in polarity 3.Failing connection in power supply. 4.Short circuit between power supply and ground due to conduct material's drop into cabinet. 5.Failure in Power supply module	1.Completely pressed 2.Exchange their polarities 3.Plug in power supply. 4.Reject the conduct. 5.Contact with supplier
LOS alarm after optical interface connection	1、The receiving and sending terminals of optical interface are connected in reverse. 2、Transmission distance is beyond regulated. 3、Fault in optical interface module.	1、Exchange the receiving and sending terminal. 2、Set the transmission according to requirements. 3、Contact with supplier.
LOS alarm after connecting with E1 interface	1、The receivng and sending terminals of E1 interface are connected in reverse. 2、Wrong hand-making of E1 connecting wires. 3、Transmission distance is beyond standard. 4、Fault in E1 module	1、Exchange the receiving and sending terminal. 2、Correct making E1 wires 3、75Ω：300m 120Ω:500m 4、Contact with suppliers