QUESTTEL
Broadcast Systems

CATV EDFA Optical Amplifier
1550nm 18dBm

User Manual

L-RF-EDFA-18dBm

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Foreword

This manual applies to L-RF-EDFA series **1550nm** EDFA. It mainly describes the performance characteristics, technical parameters, installation and debugging, common troubleshooting, and other related content of the product. In order to ensure that the equipment can be successfully installed and safely operated, please read this manual carefully before installing and debugging the equipment. And the installation and debugging should be strictly according to the specified steps on the manual to avoid unnecessary damage to equipment or accident harm to the operator. Any questions, please contact with us in time.

Special Tips:

1) Er-doped Fiber Amplifier is high end professional equipment, and its installation and debugging must be operated by special technician. Read this manual carefully before operating to avoid damage to equipment caused by fault operation or accident harm to the operator.

2) While the fiber amplifier is working, there is an invisible laser beam from the optical output adapter on the front panel. Avoiding permanent harm to the body and eye, the optical output should not aim at the human body and human should not look directly at the optical output with the naked eye!

3) Please make sure that the ground terminal of the case and power outlet has been reliably grounding before turning on the power (Grounding resistance should be < 4Ω) to prevent the static damage the pump laser device and harm to human because of case charged.

4) To ensure the equipment can work stable over a long time in voltage unsteady or poor voltage wave region, it ́s recommend to the customer that he equips special AC regulated power supply, or even AC uninterrupted power supply (UPS) system for conditional regions. In the region with large temperature variation environment (The equipment's ideal work environment temperature is 25℃) or bad room environment it ́s recommend to the customer that he equips special air-condition

system to improve the work environment.

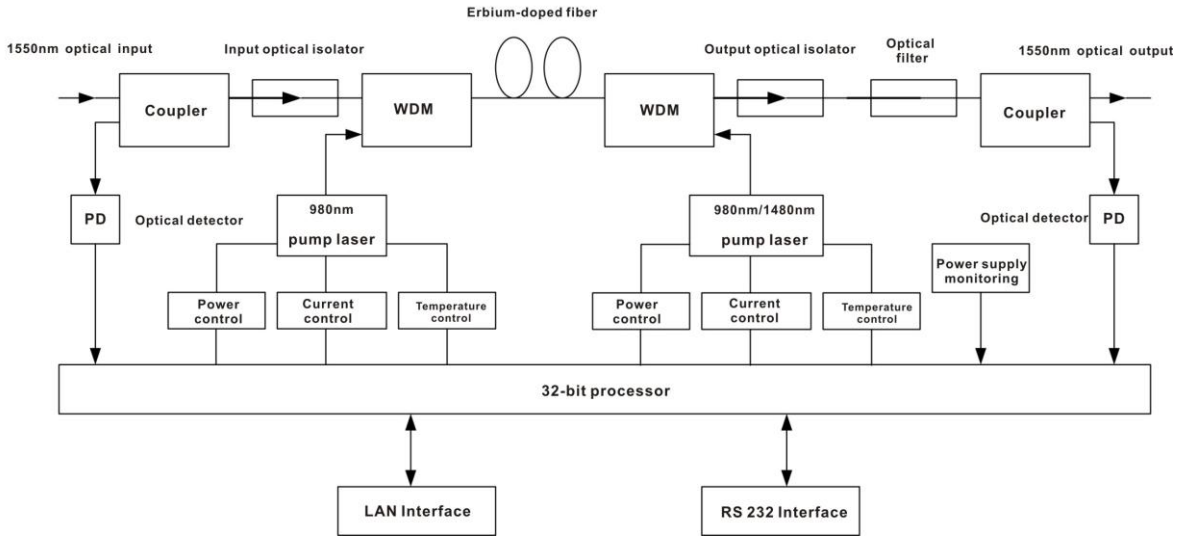
1. Product Summary

L-RF-EDFA series 1550nm optical fiber amplifier is the important optical relay transmission equipment in 1550nm optical fiber communication system. It mainly used for the long distance optical fiber transmission of TV image signal, digital television signal, telephone voice signal and data (or compressed data) signal. This product does use the high-performance erbium doped fiber and low noise pump laser, and built-in perfect embedded automatic monitoring system, to ensure the excellent performance indicators.

2. Performance Characteristics

- Automatic control the output optical power.
- The output optical power is adjustable, attenuation range is 0-3dB.
- Adopt high-performance erbium doped fiber, high efficiency energy conversion.
- Adopt advanced 32 bit processor, coordinate with perfect automatic monitoring systemic circuit. It can timely and accurately monitor optical output power and various work status of the pump laser, ensures the stable optical output power and can effectively extend the working life of the pump laser.
- Built-in blue screen 160×32 dot matrix LCD monitor on the front panel, accurately showing all working status parameters.
- 19″1U height standard rack mount, equipped standard IEEE802.3 10Base-T Ethernet interface and RS232 interface, can expediently realizes network management monitoring.
- Full support <GB/T 20030-2005HFC Network device management system specification>.

3. Block diagram



4. Technique Parameter

4.1 Link test conditions

Special instructions: The performance parameters of this manual according to the measuring method of GY/T 184-2002 < CATV system analog optical fiber amplifier technical requirements and measuring method>, and tested in the following conditions.

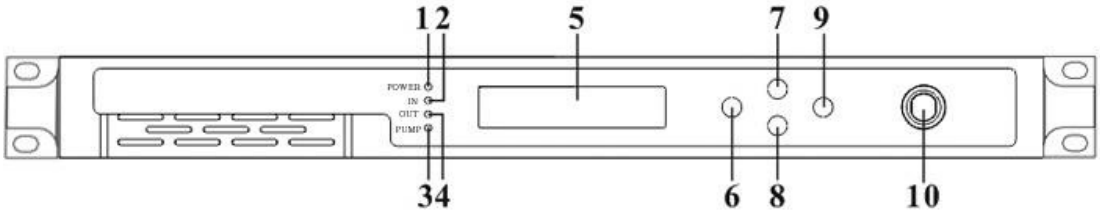
Test condition: With standard optical fiber and standard optical receiver composed the test link. Set 59 PAL-D analog TV channel signal at 550MHz frequency range under the specified link loss. Transmit digital modulation signal at range of 550 MHz ~ 862MHz, the digital modulation signal level (in 8 MHz bandwidth) is 10dB lower than analog signal carrier level. When the input optical power of optical receiver is -1dBm, measure the C/CTB, C/CSO and C/N.

4.2 Technique Parameters

Item		Unit	Technique parameter	Remark
Operating bandwidth		nm	1535 - 1565	
Input optical power range		dBm	-5 - +10	
Output optical power		dBm	13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24	Optional
Output power stability		dBm	±0.2	
Noise figure		dB	≤ 5.0	Input optical power 0dBm
Return loss	Input	dB	≥ 45	
	Output	dB	≥ 45	
Pump leakage power	Input	dBm	≤ -30	
	Output	dBm	≤ -30	
Optical connector type			FC/APC or SC/APC	
Power supply voltage		V	AC160V - 250V（50 Hz）	
Consumption		W	< 30	
Operating Temperature Range		℃	-5 - +55	
Maximum operating relative humidity		%	Max 95% No Condensation	
Storage Temperature Range		℃	-30 - +70	
Maximum storage relative humidity		%	Max 95% No Condensation	
Dimension		mm	483(W)×340(D)×44(H)	

5. External Function Description

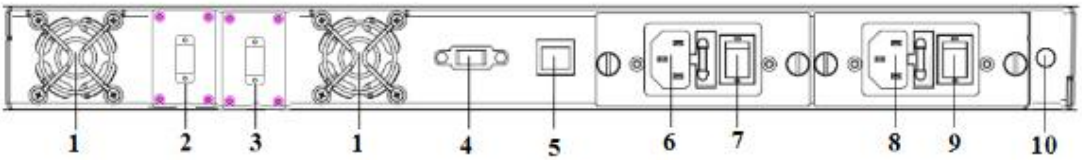
5.1 Front Panel Description



Schematic diagram of the front panel

1) Power indicator: Switching power supply one power working – yellow; dual powers working – green.
2) Input optical power indicator：The input optical power is lower than the given threshold – red; normal – green.
3) Pump working status indicator: Red light means the pump is not working, but the machine parameters are normal; flashing red light means the machine has broken down, related fault reason see the alarm menu of the display menu; Green light means the pump is working normal.
4) Output optical power indicator: This light turns on when the output optical power is large than +10dBm.
5) 160×32 Dot-matrix LCD screen: used to display all the parameters of the machine.
6) Display the exit or cancel key of the setup menu.
7) Display the up or increase key of the setup menu.
8) Display the down or decrease key of the setup menu.
9) Display the enter key of the setup menu.
10) Pump laser switching key: used to control the working status of pump laser. “ON” means the pump laser is open and “OFF” means the pump laser is closed. Ensure the key is on “OFF” position before power on. After passing self-test, rotate the key to “ON” position according to the displayed message.

5.2 Rear Panel Description



Schematic diagram of the rear panel

1) Fan outlet
2) Optical signal input: Two common interface types are FC/APC and SC/APC.
3) Optical signal output: This interface is the optical signal output port of the device. Two common interface types are FC/APC and SC/APC. **Note:** There is an invisible laser beam from this port while working normal. So the port should not be aligned to the human body or the naked eyes to avoid accidental injury.
4) RS232 interface: Used for configuring the network management parameters.
5) LAN interface: correspond to IEEE802.3 10Base-T, used for network management.
6) AC power input of power supply 1.
7) Switch of power supply 1.
8) AC power input of power supply 2.
9) Switch of power supply 2.
10) Ground stud of the chassis: used for the connection of the device and ground wire.

5.3 Displayed Parameter description

Name	display	discription
System Starting	*QuestTel*	Display logo.
	L-RF-EDFA-18dBm	Display model number.
	xxxxxxx	Start countdown / lock status.
Suspend Page	In: *xx.x* out: *xx.x* Unit: dBm	Display the input / output optical power
Main Page	1.Disp Parameters	Entry of parameter display menu
	2.Set Parameters	Entry of parameter setting menu
	3.Alarm Status	Entry of alarm information menu
1.Disp Parameters	Input Power: *xx.x dBm*	Input power, accurate to 0.1 dBm
	Output Power: *xx.x dBm*	Output power, accurate to 0.1 dBm
	Output ATT: *x.x dBm*	Output power ATT, accurate to 0.1 dBm
	Pump1 Bias: *x mA*	Bias current of pump1, accurate to 1mA
	Pump1 Temper: *xx.x* ℃	Temperature of pump1, accurate to 0.1 ℃
	Pump1 Tec: *x.xx A*	Cooling current of pump1, accurate to 0.01 A
	Pump2 Bias: *x mA*	Bias current of pump2, accurate to 1m A
	Pump2 Temper: *xx.x* ℃	Temperature of pump2, accurate to 0.1 ℃
	Pump2 Tec: *x.xx A*	Cooling current of pump2, accurate to 0.01 A
	+5V Read: *x.x V*	+5V power supply voltage , accurate to 0.1 V
	-5V Read: *-x.x V*	-5V power supply voltage , accurate to 0.1 V
	System Temper: *xx.x* ℃	Chassis temperature, accurate to 0.1 ℃
	Serial NO.: *xxxxxxxx*	Device serial number
	IP Addr: *xxx.xxx.xxx.xxx*	IP address
	Mask: *xxx.xxx.xxx.xxx*	Subnet mask
	Gateway: *xxx.xxx.xxx.xxx*	Gateway
	Mac: *xxxxxxxxxxxx*	Physical address
	Trap Addr1: *xxx.xxx.xxx.xxx*	trap1 address
	Trap Addr2: *xxx.xxx.xxx.xxx*	trap2 address
	Firmware Ver: Vx.xx	Firmware Version number

2.Set Parameters	Set Low Input Threshold	Set the input optical power low alarm threshold, range -10.0～9.9dBm
	Set High Input Threshold	Set the input optical power high alarm threshold , range -10.0～10.0dBm
	Set APC MODE	Set the constant optical power output function, on or off
	Set Output ATT	Set the output optical power attenuation,range -4.0～0.5dBm
	IP Addr	Set IP address
	Mask	Set subnet mask
	Gateway	Set gateway
	Trap Addr1	Set trap1
	Trap Addr2	Set trap2
	Buzzer Switch	Set the switch of beeper
	Restore Factory config	Restore the factory configuration，set content as shown above
3.Alarm Status	Input Status: *xxx*	*xxx= LOLOW:* Very low input optical power alarm
		xxx= LOW: Low input optical power alarm
		xxx= HIGH: High input optical power alarm
		Xxx= HIHIGH: Very high input optical power alarm
	Output Status: *xxx*	*xxx= LOLOW:* Very low output optical power alarm
		xxx= LOW: Low output optical power alarm
		xxx= HIGH: High output optical power alarm
		Xxx= HIHIGH: Very High output optical power alarm
	Pump1 Bias: *xxx*	*xxx= LOLOW:* Very low bias current of pump1 alarm
		xxx= LOW: Low bias current of pump1 alarm
		xxx= HIGH: High bias current of pump1 alarm
		Xxx= HIHIGH: Very high bias current of pump1 alarm

3.Alarm Status	Pump1 Temper: *xxx*	*xxx= LOLOW:* Very low temperature of pump1 alarm
		xxx= LOW: Low temperature of pump1 alarm
		xxx= HIGH: High temperature of pump1 alarm
		Xxx= HIHIGH: Very high temperature of pump1 alarm
	Pump1 Tec: *xxx*	*xxx= LOLOW:* Very low cooling current of pump1 alarm
		xxx= LOW: Low cooling current of pump1 alarm
		xxx= HIGH: High cooling current of pump1 alarm
		Xxx= HIHIGH: Very high cooling current of pump1 alarm
	Pump2 Bias: *xxx*	*xxx= LOLOW:* Very low bias current of pump2 alarm
		xxx= LOW: Low bias current of pump2 alarm
		xxx= HIGH: High bias current of pump2 alarm
		Xxx= HIHIGH: Very high bias current of pump2 alarm
	Pump2 Temper: *xxx*	*xxx= LOLOW:* Very low temperature of pump2 alarm
		xxx= LOW: Low temperature of pump2 alarm
		xxx= HIGH: High temperature of pump2 alarm
		Xxx= HIHIGH: Very high temperature of pump2 alarm
	Pump2 Tec: *xxx*	*xxx= LOLOW:* Very low cooling current of pump2 alarm
		xxx= LOW: Low cooling current of pump2 alarm
		xxx= HIGH: High cooling current of pump2 alarm
		Xxx= HIHIGH: Very high cooling current of pump2 alarm
	+5V Status: *xxx*	*xxx= LOLOW:* Very low +5V DC power supply alarm

		xxx= LOW: Low +5V DC power supply alarm
		xxx= HIGH: High +5V DC power supply alarm
		Xxx= HIHIGH: Very high +5V DC power supply alarm
	-5V Status: *xxx*	*xxx= LOLOW:* Very low -5V DC power supply alarm
		xxx= LOW: Low -5V DC power supply alarm
		xxx= HIGH: High -5V DC power supply alarm
		Xxx= HIHIGH: Very high -5V DC power supply alarm
	Device Temper: *xxx*	*xxx= LOLOW:* Very low chassis temperature alarm
		xxx= LOW: Low chassis temperature alarm
		xxx= HIGH: High chassis temperature alarm
		xxx= HIHIGH: Very high chassis temperature alarm

6. Installation debugging

6.1 Unpack and Check

1. Insure the package is not defaced. If it has any damage or water mark, please contact local agency or carrier.
2. After unpacking, check equipments and accessories according to package list. Any question, please contact local agency or our company.
3. If you think the equipment has been damaged, please don't electrify to avoid worse damage. Please contact local agency or our company in time.

6.2 Instruments and Tools

1. An optical power meter;
2. A digital multimeter;
3. A standard optical fiber test jumper (FC/APC or SC/APC);
4. Some absolute alcohol and medical cotton wool.

6.3 Installation Steps

1. Before installing the equipment, please read the <User's manual> carefully and install the equipment according to the <User's manual>. **Note:** For the man-made damage and other all consequence caused by error installation that not according to the <User's manual>, we will not be responsible and will not supply free warranty.
2. Take out the device from the box; fix it to the rack and reliably grounding. (The grounding resistance must be < 4Ω).
3. Use the digital multimeter to check the supply voltage, make sure the supply voltage comply with the requirements and the switch key is on the “OFF” position. Then connect the power supply.
4. Input the optical signal according to the display message. Turn the switch key to the “ON” position and observe the front panel LED status. After the pump working status indicator turn into green, the device is working normal. Then press the menu button on the front panel to check the working parameters.
5. Connect the optical power meter to the optical signal output end by the standard optical fiber test jumper, then measure the optical output power. Affirm the measured optical output power and the displayed power are the same and have reached the nominal value. (Affirm the optical power meter is on 1550nm wavelength test position; the optical fiber test jumper is the matched one and on the connector surface has no pollution.) Remove the standard optical fiber test jumper and optical power meter; connect the device to the network. So far, the device has been completely installed and debugged.

Special notice: If the equipment has been maintained by users, we will not responsible free maintenance. We will ask suitable maintenance cost and material cost.

7. Clean and maintenance method of the optical fiber active connector

In many times, we consider the decline of the optical power as the equipment faults, but actually it may be caused by that the optical fiber connector was polluted by dust or dirt. Inspect the fiber connector, component, or bulkhead with a fiberscope. If the connector is dirty, clean it with a cleaning technique following these steps:

1. Turn off the device power supply and carefully pull off the optical fiber connector from the adapter.
2. Wash carefully with good quality lens wiping paper and medical absorbent alcohol cotton. If use the medical absorbent alcohol cotton, still need to wait 1~2 minutes after wash, let the connector surface dry in the air.
3. Cleaned optical connector should be connected to optical power meter to measure optical output power to affirm whether it has been cleaned up.
4. When connect the cleaned optical connector back to adapter, should notice to make force appropriate to avoid china tube in the adapter crack.
5. If the optical output power is not normal after cleaning, should pull off the adapter and clean the other connector. If the optical power still low after cleaning, the adapter may be polluted, clean it. (Note: Be carefully when pull off the adapter to avoid hurting inside fiber.**)**
6. Use compressed air or degrease alcohol cotton to wash the adapter carefully. When use compressed air, the muzzle aims at china tube of the adapter, clean the china tube with compressed air. When use degrease alcohol cotton, insert directions need be consistent, otherwise can’t reach a good clean effect.

Special notice:

a. In the process of clean the active optical fiber connector, you should avoid direct shining at eye, which will cause permanence burn!!!!

b. Use proper energy to install the active optical connector, or the ceramic tape in the adaptor will lead to break. Once the ceramic tape is broken, the optical output power will decrease rapidly. And turn the active optical fiber connector slightly, the optical output power changes obviously.

c. Please operate the optical fiber under the condition of shut off the pump laser. Or the high output power will lead to burn the joint of the optical output fiber, which will cause the output power decrease.

Equipment changes result in some parts does not match with this manual, without prior notice.

Safety Instructions

Read before operating equipment.

1. Cleaning - Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.
2. Power Sources - Use supplied or equivalent UL/CSA approved low voltage DC plug-in transformer.
3. Outdoor Antenna Grounding - If you connect an outside antenna or cable system to the product, be sure the antenna or cable system is grounded so as to provide some protection against voltage surges and built-up static charges. Section 810 of the National Electrical Code, ANSI/NFPA No. 70, provides information with respect to proper grounding of the mast and supporting structure, grounding of the lead-in wire to an antenna discharge unit, size of grounding conductors, location of antenna discharge unit, connection to grounding electrodes, and requirements for the grounding electrode.
4. Lightning - Avoid installation or reconfiguration of wiring during lightning activity.
5. Power Lines - Do not locate an outside antenna system near overhead power lines or other electric light or power circuits or where it can fall into such power lines or circuits. When installing an outside antenna system, refrain from touching such power lines or circuits, as contact with them might be fatal.
6. Overloading - Do not overload wall outlets and extension cords as this can result in a risk of fire or electric shock.
7. Object and Liquid Entry - Never push objects of any kind into this product through openings as they may touch dangerous voltage points or short out parts, resulting in a fire or electric shock. Never spill liquid of any kind on the product.
8. Servicing - Do not attempt to service this product yourself as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personnel.
9. Damage Requiring Service - Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:
- When the power supply cord or plug is damaged.
- If liquid spills or objects fall into the product.
- If the product is exposed to rain or water.
- If the product does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions. An improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to its normal operation.
- If the video product is dropped or the cabinet is damaged.
- When the video product exhibits a distinct change in performance, this indicates a need for service.