

INSTALLATION MANUAL

1550nm OPTICAL AMPLIFIER

Amplifier: KOA X Series

PRODUCT DESCRIPTION

KOA X Series is a low noise, high performance, fibre to the premises (FTTP) high power, multi-ports optical amplifier with a gain spectrum bandwidth within 1540~1563nm range. The output port for the optical amplifier has a built-in Coarse Wavelength Division Multiplexer to enable multiplexing with corresponding input ports connecting to a carrier OLT PON port should this be required. Each 1550nm (CATV)'s output optical port can optically multiplex with corresponding 1270/1310/1490/1577nm carrier OLT PON input data stream to reduce the number of components and improve the reliability of the system.

The optical amplifiers have a very low noise figure and the units adopt twin-stage amplification. The pre-amplifier uses low noise EDFA, with its output feeding into the high-power Erbium Ytterbium Doped Fibre Amplifier (EYDFA). The noise figure of optical amplifiers are $\leq 5.5\text{dB}$, with input optical power $P_{in}=0\text{dBm}$.

The optical amplifiers uses a high-quality Pump Laser, Auto Output Power stability Control (APC), Automatic Current Control (ACC), and Auto Temperature Control (ATC), combined with excellent ventilation and heat-dissipation from the unit to ensure long life and achieve a highly reliable pump laser performance.

The LCD at the front panel provides a means of quickly checking the key parameters for the equipment and any warning alarms.

The pump laser will switch off automatically if optical power is disconnected, which offers protection for the pump laser.

The optical amplifier supports dual power supply, 1+1 backup and is powered by AC power.

The optical amplifier uses a 19" 1RU chassis, for the 4, 8 and 16 port versions. The 32 port model is in a 19" 2RU chassis.

The equipment is managed via the SNMP network management port which is a RJ45 interface.

PRODUCT FEATURES

- Built-in low noise pre-amplifier
- 1540~1563nm operating bandwidth for optical amplifier
- Optional optical output power range of 200~2500mW (23~34dBm)
- 4~32 uplink optical ports, for OLT
- 4~32 1550nm output optical ports, multiply 1270/1310/1490/1577nm data stream
- Each output optical port includes built-in high performance CWDM, single fibre, to save optical fibre resources
- Compatible with any FTTx PON technology: EPON, GPON, XG(S)-PON
- Carrier level reliability with network management
- SNMP Management interface
- Efficient space, simple and reliable in construction/maintenance
- Dual power supply, 1+1 backup

MAIN APPLICATION

- EPON, GPON, XG(S)-PON
- Triple-play

SAFETY INFORMATION

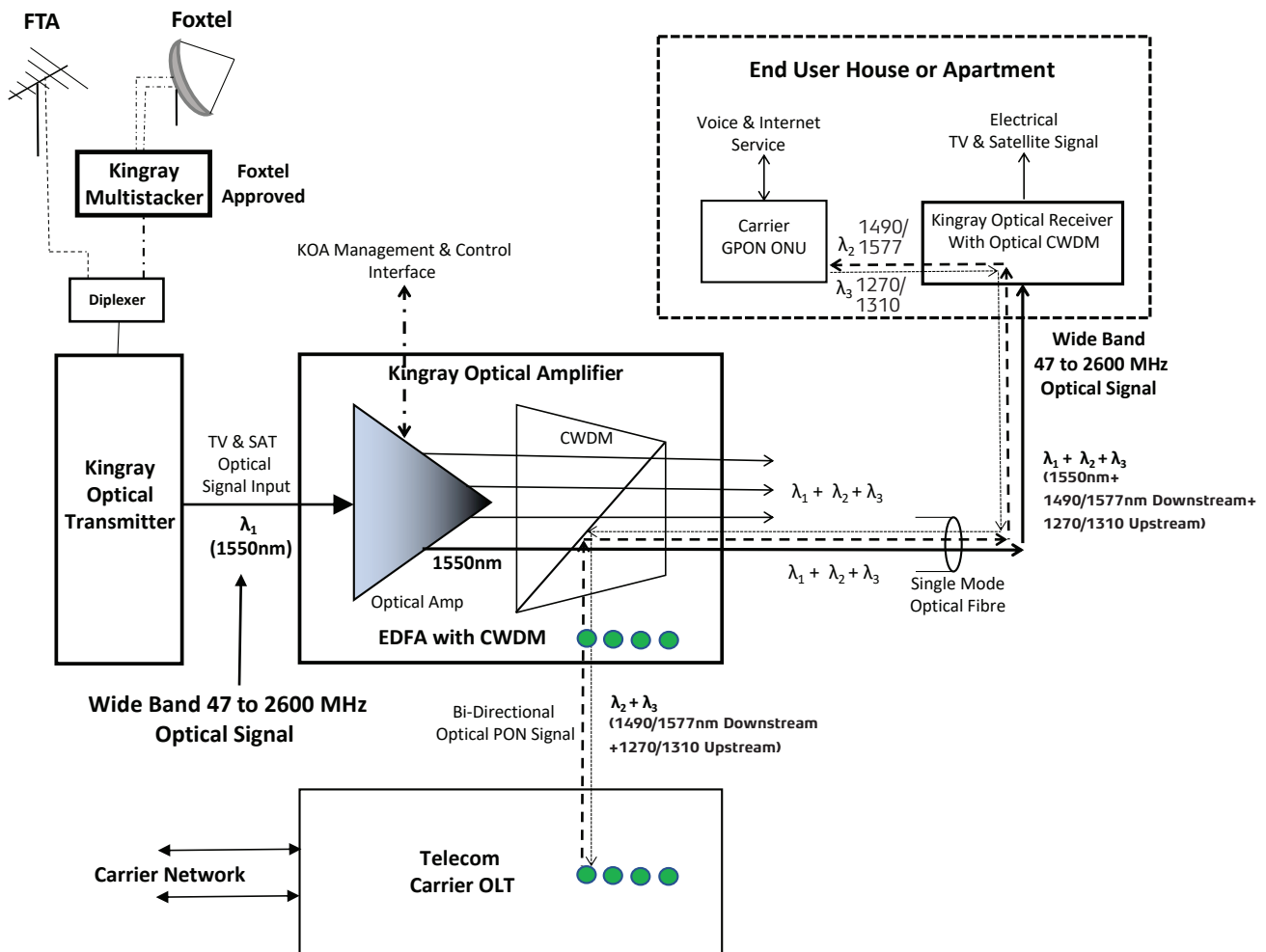
DANGER HIGH POWER LASER PLEASE DO NOT PLUG IN /OUT OUTPUT OPTICAL CONNECTORS WHEN THE UNIT IS UNDER OPERATING STATUS WITH KEY TURNED ON.

UNDER NO CIRCUMSTANCES LOOK AT FIBRE CONNECTORS WITH LASER POWER ON.

HIGH POWER LASER WILL BURN THE FIBRE CORE AT THE CONNECTOR.

IF YOU NEED TO PLUG IN/OUT OR ADJUST THE OUTPUT CONNECTOR, PLEASE TURN THE UNIT OFF WITH THE KEY (KEY OFF).

APPLICATION SCENARIO



CONNECTOR CLEANING GUIDE

Optical fibre connectors require care and careful cleaning. Caps should be left on connectors whenever they are not in use. Do not touch the connector end. Damage to connector end faces caused by improper care is not covered by the warranty.

CLEANING PROCEDURE

WARNING:

After making sure that the KOA optical amplifier is turned off, check the connector ferrule end using the connector inspection microscope. If no dirt, grease or small particles are visible no further cleaning is necessary. Use canned air to remove loose particles.

Either: Use automatic connector cleaner. Be careful with angled connectors (connectors with green boots) to make sure the full surface contacts the cloth. You will need to tilt the connector slightly. Using an automatic cleaner is the preferred technique.

Or: Moisten a clean optical wipe with alcohol and wipe connector. Finish by wiping the connector with a dry part of the wipe. Be careful not to allow oil from fingers to be in contact with the connector.

Allow the connector to dry for 1 minute. Inadequate drying can result in the alcohol residue burning into the connector end when the fibre is lit.

Inspect the connector ferrule under the microscope. Clean again if necessary. The connector can be used to transmit high laser powers (50mW), please take great care when cleaning to make sure the unit is off and mating of these connectors should be kept to a minimum and always replace the connector cap.

CLEANING TROUBLE SHOOTING

- Q: A small black area appears in the middle of the connector which cannot be removed by cleaning.
A: Some material (typically oil from skin contact, residue alcohol or particles from connector cleaning devices) has burnt on the connector surface. Do not use your device and contact your supplier for assistance.
- Q: A small circle of dried droplets are visible on the end of the connector.
A: The connectors were mated when they are still wet (typically from water/alcohol). Repeat cleaning procedure.
- Q: The connector is clean but the loss on mating varies by 10dB or more.
A: Check to see if the bulkhead adapter sleeve is cracked. Be careful not to over-tighten connectors.
- Q: A gray powdery grime continues to appear on the connectors after repeated mating.
A: If the bulkhead adapter sleeve is made from phosphor-bronze, some of the metal is probably rubbing off on the connectors.

INSTALLATION

EDFA MOUNTING AND POWER CONNECTION

1. Place the unit into a 19-inch wide rack or cabinet. Make sure to leave a 1.75-inch (about 4.5cm) space above and below the unit.
2. According to the design specifications, KOA Series 1550nm EDFA can work under 0°C~50°C (32°F~122°F) temperature range. We recommend a 25°C (77°F) environment as the ideal operating temperature.

Humidity should not exceed more than 95%(under non-condensing condition). If necessary, the equipment should be kept in a controlled operating environment free from dust or air pollution.

3. Equipment is powered by AC

Power supply:

AC input: 100-240VAC, 50-60Hz, 0.7A

Power consumption: 1RU: Maximum 50W
2RU: Maximum 84W

4. The equipment should be grounded with, grounding resistance $<4\Omega$.

OPTIC CONNECTION

1. Clean all fibre patch cords before connecting to the transmitter.

CLEANING GUIDELINES:

FIBRE PATCH CORD CONNECTORS

- Remove the fibre connectors dust cap and wipe the fibre connector tip with a dry lint-free cloth. Inspect for scratches or debris on connector surface by using a microscope (ie.100x or 200x).
- If no scratches or debris are found the connector is now clean and ready for connection. If debris or scratches are found then repeat the fibre patch cord connector cleaning guidelines.

FIBRE BULKHEAD CONNECTORS

- Compressed air may be used to clean fibre bulkhead connectors. Use compressed air with at least the following specifications:
 - Non-residue, inert gas for precision dust removal
 - Ultra-filtered to < 0.2 microns
 - Recommended for optical systems
 - Using compressed air as listed above, remove the bulkhead dust cover and hold the can of compressed air about 6 inches from the connector. After spraying a few short bursts into the bulkhead the connector is clean and ready for connection.
- If compressed air is not available, the transmitter fibre bulkhead connector may be cleaned by 2.5 mm cotton swap or connector plate may be removed to clean the internal fibre patch cords.
- To remove the transmitter optical connector plate, remove the screw on the far left of the optical plate and remove the screw on the far right of the optical plate. Do not remove the screws on the optical bulkhead connector.
- Slowly remove the optical connector plate from the rear panel and disconnect each fibre connector from the bulkhead mounted on the plate.
- Clean each fibre connector according to Section A of the fibre cleaning guidelines.

Laser Class: 1M



CAUTION: The use caution when handling fibers.
Do not exceed fiber manufacturer's pulling tension or bend radius specifications when removing fiber bulkhead connector plate.



2. Make sure the laser key switches on the front panel of the transmitter are in the OFF position.
3. Connect two fibre patch cords, one from the output of the transmitter to the EDFA, the other from the output of the EDFA to an optical power meter.
4. First turn the transmitter laser key switch to the ON position, then turn on the EDFA.
5. Using the optical power meter verify the transmitter optical power is within specification.
6. Turn the transmitter laser key switch to the OFF position.

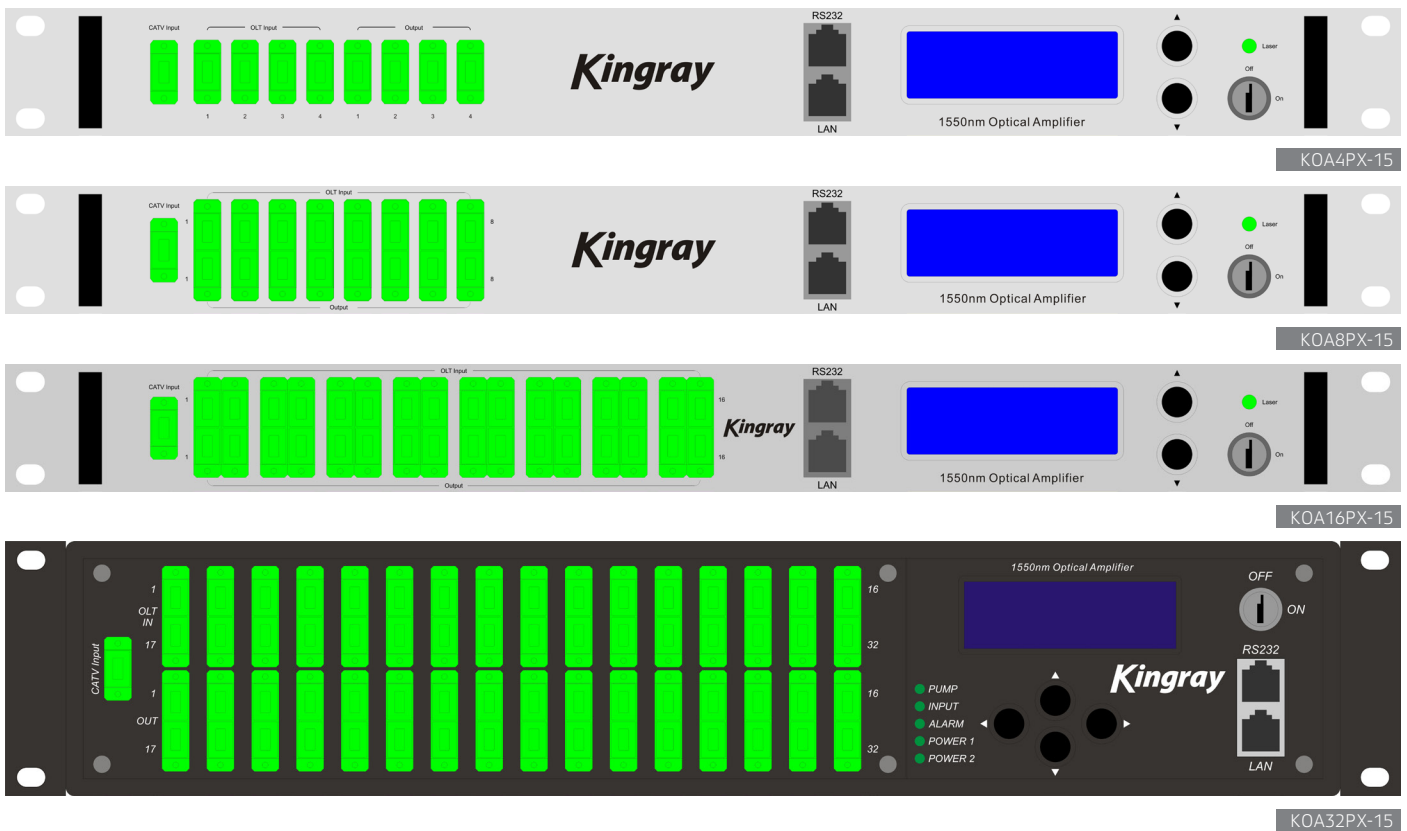
THE OPERATION OF THE PANEL

OPEN MENU

- A. Plug in 100-240VAC power supply
- B. Turn on power switch in the back panel,
Front panel display “**KEY OFF**”
Laser Status lamp **should be Red**
- C. Please measure and make sure there is optical signal present from your input source to be amplified and connect this
to the input port of the unit. With input source connected please turn laser start-up key switch to on position. The Front panel shows “**KEY ON...**”Laser status lamp turns green from red.

EDFA CONTROLS, INDICATORS, AND ALARMS

This section of the manual will give an overview of the available menus in the EDFA and their descriptions. All instructions listed below refer to the representation of the front panel shown in the diagram below. The user scrolls through the menus by pushing the bottoms found on the front panel of the EDFA, just in the right of the LCD screen.



START-UP MAIN MENU (FOR 4, 8 AND 16 PORT MODELS)

Press ▲\▼ button will display below menu in sequence.

Menu #1 - Model

Read-only menu, tells the type of this equipment

Menu #2 - S/N

Read-only menu, tells the serial number of this equipment

Menu #3 - Input

Read-only menu, tells the input optical power of EDFA

Menu #4 - Total Output

Read-only menu, tells the output optical power of EDFA in dBm

Menu #5 - Each Output

Read-only menu, tells the each output of EDFA in dBm

Menu #6 - PA Current

Read-only menu, tells the pre-pump current of EDFA

Menu #7 - PA Temp

Read-only menu, tells the pre-pump temperature of EDFA

Menu #8 - BA Current

Read-only menu, display the multi-mode amplify current of EDFA

Menu #9 - Power1

Read-only menu, tells the status of power1

Menu #10 - Power2

Read-only menu, tells the status of power2

Menu #11 - Unit Temp

Read-only menu, tells the case temperature

Menu #12 - IP

Adjustable list, display the IP address

Menu #13 - SUB

Adjustable list, display the address of net mask

Menu #14 - GW

Adjustable list, display the gateway address

Menu #15 - TR1

Adjustable list, display the TRAP1 address

Menu #16 - TR2

Adjustable list, display the TRAP2 address

Menu #17 - LCD Contrast Level

Adjustable list, display the LCD contrast level adjustment

Menu #18 - Reset Settings

Adjustable list, display the reset settings

START-UP MAIN MENU (FOR 32 PORT MODEL)

Press ▼ button will display below menu in sequence.

Menu #1 - Descriptor

Read-only menu, tells the type of this equipment

Menu #2 - S/N

Read-only menu, tells the serial number of this equipment

Menu #3 - Input

Read-only menu, tells the input optical power in dBm.

Menu #4 - Total Output

Read-only menu, tells the output optical power in dBm.

Menu #5 - Each Output

Read-only menu, tells the each output.

Menu #6 - PA Current

Read-only menu, tells the pre-pump current

Menu #7 - PA Temp

Read-only menu, tells the pre-pump temperature

Menu #8 - BA Current

Read-only menu, tells the multimode amplify current of EDFA

Menu #9 - Unit Temp

Read-only menu, tells the case temperature

Menu #10 - IP

Adjustable list, display the IP address

Menu #11 - Submask

Adjustable list, display the address of net mask

Menu #12 - Gateway

Adjustable list, display the gateway address

Menu #13 - Trap ADDR1

Adjustable list, display the TRAP1 address

Menu #14 - Trap ADDR2

Adjustable list, display the TRAP2 address

Menu #15 - LCD Contrast Level

Adjustable list, displays the LCD contrast level

CONFIGURATION OF IP ADDRESS SUBNET MASK GATEWAY TRAP1 TRAP2 MENU (FOR 4, 8 AND 16 PORT MODELS)

CHOOSE IP, SUBNET MASK, GATEWAY, TRAP1, TRAP2 MENU

Press the arrows ▲▼ to select the menu that you need to modify, press the ▲▼ at the same time to enter into the modify menu screen, press the ▲▼ at same time to select the modify key mapping, press the ▲▼ button to modify the value on this position and then press the ▲▼ at same time to save and exit.

For example, you can modify IP setting address menu, IP: 192.168.000.015, if you need to change 5 to 6, press the ▲▼ at same time to enter into the IP address menu, press the ▲▼ button at same time to select this position of 5 and then press the ▲▼ button to change the 5 to 6, then press the ▲▼ button at same time to save, after amending, the IP : 192.168.000.016.

SET LCD CONTRAST LEVEL MENU

Choose LCD Contrast Level menu, press ▲▼ button at same time to enter modify status, press ▲▼ button to increase or decrease the value, press ▲▼ at same time to save.

ASSISTANT MANUAL (FOR 32 PORT MODEL)

1. Choose the menu which need modification, press ► button enter into modify status, press ► to shift the value. And press ▲▼ button to increase/decrease the value, then shift the value to the last bit, press ► button to save, press ◀ to the very left to exit.
For example, amend IP setup menu, IP: 192.168.000.042; if change 8 to 9, use ► key to choose the place of 8, then press ▲ key to change 8 to 9, then press ► to the very to right save amended IP:192.169.000.042.
2. LCD Contrast Level (Set the LCD contrast level)
Choose the menu which need to modify, press ► button into modify status, press ▲▼ button to increase or decrease the value. At last press ► button to save, and press ◀ button can back to main menu to cancel the operation.

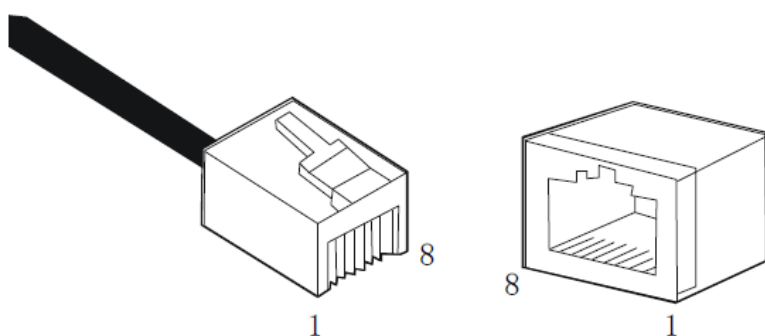
PORT AND CABLE ASSIGNMENTS

KOA Series provide the following management ports:

- RS232 port: is suitable for examining the EDFA parameters and some system configuration by PC
- SNMP: Simple network management protocol can be used for remote management of the unit through the SNMP protocol. Before connecting to either port, please read the following instructions and port connectivity requirements

MANAGEMENT PORT (RJ-45)

PORT DESCRIPTION

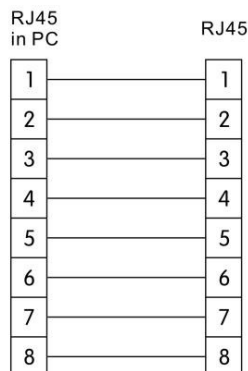


The EDFA Series management port connector type is RJ-45. The management port (RJ-45) can be connected to any device that uses a standard network interface (e.g., a workstation, server, bridge or router). RJ-45 MDI can be connected with other network equipment such as other KOA Series equipment or network Hub. You can use unshielded twisted-pair (UTP) or shielded twisted-pair (STP) cable for RJ-45 connections: 100-Ohm Category 3, 4 or 5 cable for 10 Mbps

connections or 100-ohm Category 5 cable for 100 Mbps connections. Please ensure that the cable length does not exceed 100 meters.

PIN ASSIGNMENT

When network management reticle (RJ-45 connector in each side) connects NMS PC and KOA Series directly, it should use straight reticle. See below.



RJ-45 connector straight through connecting

Pin	Workstation port	MDI
1	Input receive data +	Output transmit data+
2	Input receive data-	Output transmit data-
3	Output transmit data+	Input receive data+
6	Output transmit data-	Input receive data-
4, 5, 7, 8	Noise	Noise

RJ-45 Pin assignment

PORT CONNECTION

The EDFA Series can auto detect the Ethernet cable configuration (Straight-through or Crossover), so either type can be used. An Ethernet twisted pair cable can be connected between the RJ-45 connector (MDI-X) of the EDFA Series and any device with a standard network interface (such as a workstation or server) or to a network interconnection device (such as a bridge or router).

- 1) Ensure that the device to be connected has a 10BASE-T or 100BASE-TX network interface card (NIC).
- 2) Prepare a twisted pair Ethernet cable with RJ-45 plugs on each end. Use Cat 3, 4 or 5 cable for standard 10Mbps Ethernet connections, or Cat 5 cable for 100Mbps, Fast Ethernet connections.
- 3) Plug one end of the cable into the PC's NIC port and plug the other end into any RJ-45 port of the KOA Series.

All the EDFA RJ-45 ports support both 10Mbps and 100Mbps Ethernet connections. Ensure that the plug's locking tab clicks into proper position to make good access.

Caution: Do not plug a phone jack connector (RJ-11) into the RJ-45 port. This may damage the EDFA. Instead, use only twisted-pair cables with RJ-45 connectors.

Note:

- 1) You can connect other compatible KOA Series or network hub, use a direct or crossover cable to connect MDI port in other device.
- 2) Ensure that the twisted pair cable length does not exceed 100 meters.
- 3) Cat 5 cable is recommended for all network connections to avoid confusion or inconvenience, when upgrading to Fast Ethernet devices in the future.
- 4) Cascade length provision: IEEE 802.3 standard prescribes that through twisted pair at most 4 hub (such as repeaters) can be cascaded, and IEEE 802.3u standard has more strict requirements for high-speed Ethernet. So, when cascading a device please follow the above connection regulation. Please note KOA Series divides the connected path into unattached port.

CONNECTION MANAGEMENT (OUT-BAND)

Remote management can be performed through the dedicated management port (10/100BASE-TX port) on the front of the EDFA or any 10/100BASE port of EDFA.

Before the management port can be accessed through LAN port, please configure the IP address and subnet mask by serial port according to network configuration requirement.

POWER CONNECTION

CONNECTION DESCRIPTION

The power module provides stable operating power for the system, to meet the power supply requirements of all the components in the system.

FAULTS

KOA Series FTTP EDFA can monitor system operation and offer brief warnings and can correct the majority of the operational status deviations of the equipment, such as: equipment tolerance, laser aging, RF level changing, and temperature changes. The Pump laser will go on working under certain alarm conditions. The alarm will disappear when system parameter recovers into normal range. Some warnings can be eliminated by restarting the power supply of the equipment.

The major warning alarm will be present when the self-correction capability of the equipment exceeds the permitted range. In most situations, the user cannot modify the parameters and special equipment and facilities are needed. Please return to supplier for support.

WARNING STATUS

When pump laser is showing warning status, the status LED will turn red and the brief note of this status will be displayed on the screen. The warning only shows the relative parameter exceeding to normal scope slightly and the EDFA will continue to operate. If the warning status stops, it shows that the relative parameter has returned permitted scope. The LED screen will return to the normal status and there is no need for user to take action. Alarms should not be ignored, because it is possible there are some serious system faults so please contact your supplier if you are in doubt.

LED

COLOR

Work Status	Status Display	LED Colour	Explanation
Present laser deflection is low	Key Off	Red	The EDFA isnt working. Its shut down
Present case temp	-	Red	Warning when the temp $\geq 60^{\circ}\text{C}$
Input	Input Low	Red	Optical input power is low
Output	Output Low	Red	Optical output power is low

WARNING STATUS LED

ALARM STATUS

When the pump laser sends out warning, it generally stops working. The alarm is generated because some relative parameter is exceeding its safe working scope and in some situations can cause damage to the laser. Some alarms could be eliminated by restarting the power supply or resetting the key switch after you have checked that nothing obvious is affecting the unit and you have made sure that there is optical signal input into the unit for amplification. Please contact your supplier if needed.

FAULT PREVENTION

Some potential problems can be eliminated by the user through reference to the following items;

1. Please operate the equipment in a environment with temperature range 0°C ~ 50°C , other conditions are in accordance with this manual.
2. We suggest placing the EDFA in a low dust environment.
3. Ensure the rear panel fan & front panel sockets have good ventilation.
4. Check the power supply to make sure it is as per power limits within this manual.
5. Keep the optical fibre connectors clean to prevent output optical power decreasing from optical leakage.

TECHNICAL INDEX

Performance			Index			Supplement
			Min.	Typ.	Max.	
Optical Features	CATV Operation Wavelength	(nm)	1540		1563	CATV
	OLT Pass Wavelength	(nm)		1270/1310/1490/1577		
	CATV Pass Wavelength Loss	(dB)			0.8	1550nm
	OLT Pass Wavelength Loss	(dB)			0.8	1270/1310/1490/1577nm
	CATV & OLT Isolation	(dB)	40			
	Number of Uplink Optical Ports (for OLT)	(pcs)			16	1RU
					32	2RU
	CATV Input Power	(dBm)	-10		+10	
	Total Output Power	(dBm)			37	
	Number of Output Ports	(pcs)			16	1RU
					32	2RU
	Each Port Output Power	(dBm)	0		22	
	Difference of each Output Power	(dB)	-0.5		+0.5	
	Noise Figure	(dB)		5.0	6.0	
	Switch Time	(ms)			8.0	
	Polarization Dependence Loss	(dB)			0.3	
	Polarization Dependence Gain	(dB)			0.4	
	Polarization Mode Dispersion	(ps)			0.3	
	Input/Output Isolation	(dB)	30			
Pump Power Leakage	(dBm)			-30		
Echo Loss	(dB)	55			APC	
General Specifications	Network Management Interface		RJ45			SNMP
	Power Supply	(V)	100		240	220VAC (Dual Supply)
	Input Current	(A)			0.7	
	Power Consumption	(W)			50	1RU
					84	2RU
	Operation Temperature	(°C)	-5		+50	
	Storage Temperature	(°C)	-40		+80	
	Relative Humidity	(%)	+5		+95	
Size (W)x(D)x(H)	(")	19 x 14.5 x 1.75			KOA 4, 8 & 16 Port	
		19 x 14.5 x 3.5			KOA 32 Port	

PRODUCT SERIES

Model	Output Ports	Total Output Power	Each Port Output Power	SC/APC Connectors
KOA4PX-15	4	23dBm (200mW)	15.5dBm	Yes
KOA8PX-15	8	27dBm (500mW)	15.5dBm	Yes
KOA16PX-15	16	30dBm (1000mW)	15.5dBm	Yes
KOA32PX-15	32	34dBm (2500mW)	15.5dBm	Yes

This warranty against defects is given by GME Pty Ltd ACN 000 346 814 (We, us, our or GME). Our contact details are set out in clause 2.7. This warranty statement only applies to products purchased in Australia. Please contact your local GME distributor for products sold outside of Australia. Local distributor details at www.gme.net.au/export.

1. Consumer guarantees

- 1.1 Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and for compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.
- 1.2 To the extent we are able, we exclude all other conditions, warranties and obligations which would otherwise be implied.

2. Warranty against defects

- 2.1 This warranty is in addition to and does not limit, exclude or restrict your rights under the Competition and Consumer Act 2010 (Australia) or any other mandatory protection laws that may apply.
- 2.2 We warrant our goods to be free from defects in materials and workmanship for the warranty period (see warranty table) from the date of original sale (or another period we agree to in writing). Subject to our obligations under clause 1.2, we will at our option, either repair or replace goods which we are satisfied are defective. We warrant any replacement parts for the remainder of the period of warranty for the goods into which they are incorporated.
- 2.3 To the extent permitted by law, our sole liability for breach of a condition, warranty or other obligation implied by law is limited
 - a) in the case of goods we supply, to any one of the following as we decide -
 - (i) the replacement of the goods or the supply of equivalent goods;
 - (ii) the repair of the goods;
 - (iii) the cost of repairing the goods or of acquiring equivalent goods;
 - b) in the case of services we supply, to any one of the following as we decide -
 - (i) the supplying of the services again;
 - (ii) the cost of having the services supplied again.
- 2.4 For repairs outside the warranty period, we warrant our repairs to be free from defects in materials and workmanship for three months from the date of the

original repair. We agree to re-repair or replace (at our option) any materials or workmanship which we are satisfied are defective.

- 2.5 We warrant that we will perform services with reasonable care and skill and agree to investigate any complaint regarding our services made in good faith. If we are satisfied that the complaint is justified, and as our sole liability to you under this warranty (to the extent permitted at law), we agree to supply those services again at no extra charge to you.
- 2.6 To make a warranty claim you must before the end of the applicable warranty period (see warranty table), at your own cost, return the goods you allege are defective, provide written details of the defect, and give us an original or copy of the sales invoice or some other evidence showing details of the transaction.
- 2.7 Send your claim to:
GME Pty Ltd.
17 Gibbon Rd, Winston Hills,
NSW 2153 Australia.
Tel: (02) 8867 6000
Fax: (02) 8867 6199
Email: servadmin@gme.net.au
- 2.8 If we determine that your goods are defective, we will pay for the cost of returning the repaired or replaced goods to you, and reimburse you for your reasonable expenses of sending your warranty claim to us.

3. What this warranty does not cover

- 3.1 This warranty will not apply in relation to:
 - (a) goods modified or altered in any way;
 - (b) defects and damage caused by use with non GME products;
 - (c) repairs performed other than by our authorised representative;
 - (d) defects or damage resulting from misuse, accident, impact or neglect;
 - (e) goods improperly installed or used in a manner contrary to the relevant instruction manual; or
 - (f) goods where the serial number has been removed or made illegible.

4. Warranty period

- 4.1 We provide the following warranty on GME and Kingray products. No repair or replacement during the warranty period will renew or extend the warranty period past the period from original date of purchase.

Product Type	Warranty Period
Erbium Doped Fibre Amplifier (EDFA)	1 Year