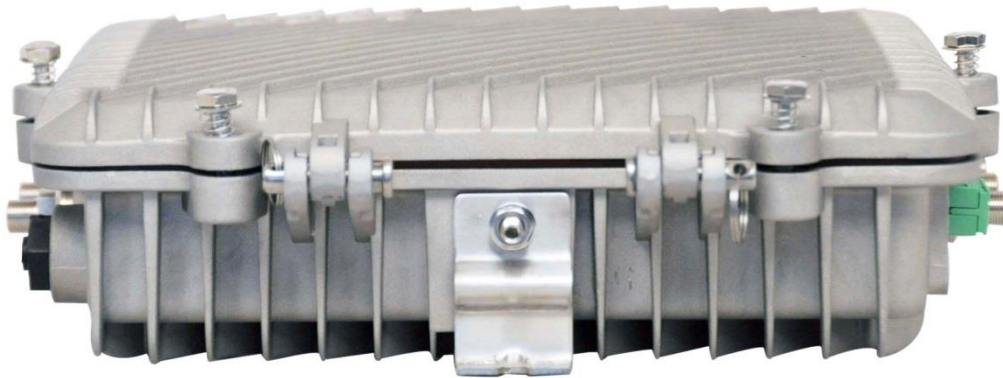




## Optical Receiver Manual

**OP-OR212JLED**



**Shenzhen Optostar Optoelectronics Co., Ltd**

**2016. 7 (Version 1)**

## 1. Summary

OP-OR212JLED is a new modular two-output CATV network optical receiver. It adopts modular design, use more flexible. Microprocessor control, digital display the parameters, the engineering debug is especially easy. It is the main equipment to build the CATV network.

## 2. Features

- High response PIN photoelectric conversion tube.
- Optimized circuit design, SMT process production, optimized signal path, make the photoelectric signal transmission more smooth.
- Specialized RF attenuation chip, with good RF attenuation and equilibrium linear, high accuracy.
- GaAs amplifier device, power doubler output, with high gain and low distortion.
- Single Chip Microcomputer (SCM) control equipment working, LCD display the parameters, convenience and intuitive operation, and stable performance.
- Excellent AGC performance, when the input optical power range is  $-9\sim+2$ dBm, the output level keep unchanged, CTB and CSO basically unchanged.
- Reserved data communication interface, can connect with the Ethernet transponder, access to network management system.
- Return emission can select burst mode to sharply decrease the noise convergence and reduce the forepart receiver number.
- ONU module optional.

## 3. Technique Parameter

### 3.1 Link testing conditions

The technique parameters of this manual according to the measuring method of GY/T 194-2003 <Specifications and methods of measurement on optical node used in CATV systems>, and tested in the following conditions.

#### Testing conditions:

1. Forward optical receive part: with 10km standard optical fiber, passive optical attenuator and standard optical transmitter composed the testing link. Set **59 PAL-D** analog TV channel signal at range of **45/87MHz~550MHz** under the specified link loss. Transmit digital modulated signal at the range of **550MHz~862/1003MHz**, the digital modulated signal level (in **8 MHz** bandwidth) is **10dB** lower than analog signal carrier level. When the input optical power of optical receiver is **-1dBm**, the RF output level is **108dB $\mu$ V**, with **8dB** output tilt, measure the **C/CTB**, **C/CSO** and **C/N**.
2. Backward optical transmit part: Link flatness and **NPR** dynamic range are the link indexes which is composed of backward optical transmitter and backward optical receiver.

**Note:** When the rated output level is the system full configuration and the receiving optical power is **-1dBm**, equipment meets the maximum output level of link index. When the system configuration reduce (that is, actual transmission channels reduce), the output level of equipment will be increased.

**Friendly Notice:** Suggest you setting the RF signal to **6~9dB** tilt output in the practical engineering application to improve the nonlinear index (behind the node) of the cable system.

### 3.2 Technique Parameters

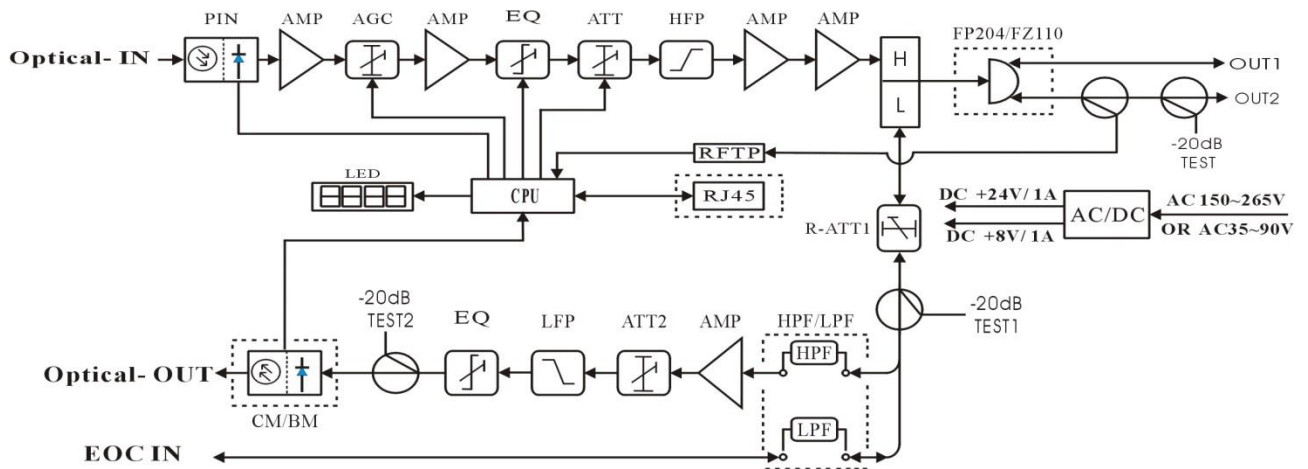
Item	Unit	Technical Parameters	
<b>Optical Parameters</b>			
Receiving Optical Power	dBm	-9 ~ +2	
Optical Return Loss	dB	>45	
Optical Receiving Wavelength	nm	1100 ~ 1600	
Optical Connector Type		FC/APC, SC/APC or specified by the user	
Fiber Type		Single Mode	
<b>Link Performance</b>			
C/N	dB	≥ 51 (-1dBm input)	
C/CTB	dB	≥ 65	Output Level 108dBμV EQ 8dB
C/CSO	dB	≥ 60	
<b>RF Parameters</b>			
Frequency Range	MHz	45 ~862/1003	
Flatness in Band	dB	±0.75	
Rated Output Level	dBμV	≥ 108	
Max Output Level	dBμV	≥ 114	
Output Return Loss	dB	(45 ~550MHz)≥16/(550~1003MHz)≥14	
Output Impedance	Ω	75	75
Electronic Control EQ Range	dB	0~15	0~15
Electronic Control ATT Range	dBμV	0~15	0~15
<b>Return Optical Emission Part</b>			
<b>Optical Parameters</b>			
Optical Transmit Wavelength	nm	1310±10, 1550±10 or specified by the user	
Output Optical Power	mW	0.5, 1, 2	
Optical Connector Type		FC/APC, SC/APC or specified by the user	
<b>RF Parameters</b>			
Frequency Range	MHz	5 ~ 65 (or specified by the user)	
Flatness in Band	dB	±1	
Input Level	dBμV	72 ~ 85	
Output Impedance	Ω	75	
NPR Dynamic Range	dB	≥15 (NPR≥30 dB) Use DFB laser	≥10(NPR≥30 dB) Use FP laser

General Performance		
Supply Voltage	V	A: AC (150~265)V; B: AC (35~90)V
Operating Temperature	°C	-40~60
Storage Temperature	°C	-40~65
Relative Humidity	%	Max 95% no condensation
Consumption	VA	≤ 30
Dimension	mm	280 (L) *260 (W) *70 (H)

**Note:** The forward RF parameters are tested under the condition of using GaAs 25dB power doubler module in the last stage. Use other module, the parameters will be slightly different.

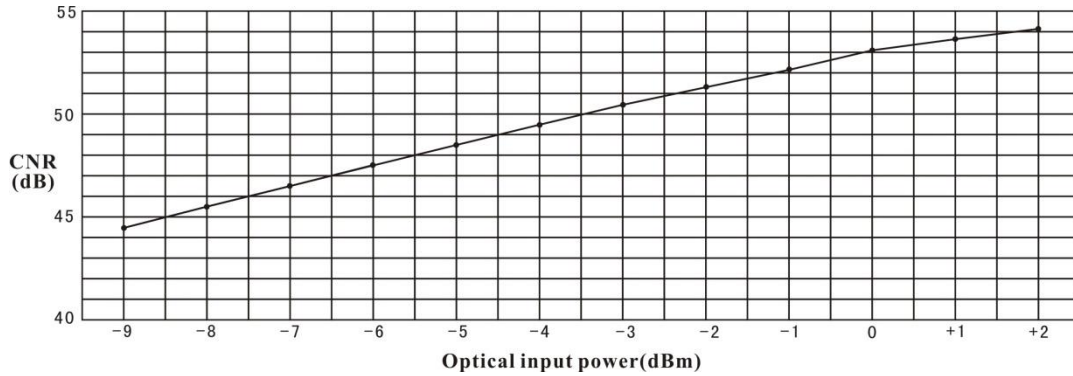
Burst Mode (Select this mode, see below)		
Optical Output Power (Close the burst mode)	dBm	-30
Laser Turn On Threshold	dBμV	≥70
Laser Turn Off Threshold	dBμV	≤62
Laser Turn On Time (t1)	us	0.5 ≤ t1 ≤ 1
Laser Turn Off Time (t2)	us	0.5 ≤ t2 ≤ 1.5

### 4. Block Diagram



Note: The accessories in the dashed box are optional.

### 5. Relation Table of Input Optical Power and CNR



## 6. Function Display and Operating Instruction

Mode: Mode selection button, total seven operating modes.

▲: up button. Increase the attenuation or equilibrium in the ATT or EQ mode.

▼: down button. Decrease the attenuation or equilibrium in the ATT or EQ mode.

The following is the detailed instructions:

Mode1:



Input optical power (unit dBm)

Lo: Means that the optical power is low or none

! : Means that the displayed data is the input optical power

Mode2:



The actual value of +8V working voltage

2: Means that the displayed data is the actual voltage of +8V

Mode3:



The actual value of +24V working voltage

3: Means that the displayed data is the actual voltage of +24V

ModeE1:



RF equilibrium, press “▲” or “▼” button for a few seconds until the data flicker. Then adjust and press “Mode” to confirm. The maximum adjustment range is 15dB.

E! : EQ mode, means that the controlled and displayed data is the RF channel equilibrium.

ModeA1:



RF attenuation, press “▲” or “▼” button for a few seconds until the data flicker. Then adjust and press “Mode” to confirm. The maximum adjustment range is 15dB.







A! : ATT mode, means that the controlled and displayed data is the RF channel attenuation.

Mode C:

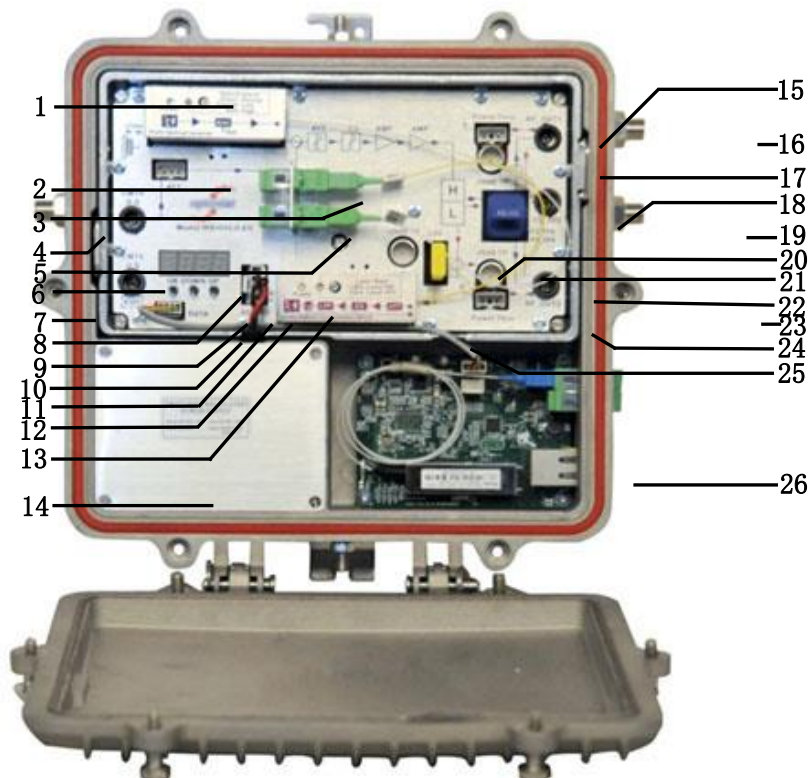


The actual number of channels enters into the current network system. Press “▲” or “▼” button for a few seconds until the data flicker. Then adjust and press “Mode” to confirm. The maximum number is 200.

C: The menu is used to display the actual number of channels enters into the current network system, in order to calculate the RF output level more accurately.

- Mode5:**  RF output level (unit dBμV)  
**5:** Means that the displayed data is the RF output level under the current system.
- ModeAG:**  AGC adjustment range (adjustment range -7~-9dBm)  
 Means that the AGC range under the current system is +2~-9dBm  
 Press “▲” or “▼” button for a few seconds until the data flicker.  
 Then adjust and press “Mode” to confirm.  
 If the displayed data is -7, means that the AGC range is +2~-7dBm  
 If the displayed data is -8, means that the AGC range is +2~-8dBm  
 Note: AGC range per reduce 1dBm, the output level is raised by 2dBμV
- ModeE2:**  Return path RF equilibrium, press “▲” or “▼” button for a few seconds until the data flicker. Then adjust and press “Mode” to confirm.  
 The maximum adjustment range is 15dB.  
**E2:** EQ mode, means that the controlled and displayed data is the return path RF channel equilibrium.
- ModeA2:**  Return path RF attenuation, press “▲” or “▼” button for a few seconds until the data flicker. Then adjust and press “Mode” to confirm.  
 The maximum adjustment range is 15dB.  
**A2:** ATT mode, means that the controlled and displayed data is the return path RF channel attenuation.
- Mode6:**  The actual value of return path optical power (now is 0dBm)  
**6:** Means that the displayed data is the return path optical power
- Mode7:**  The actual value of return path bias current (now is 18mA)  
**7:** Means that the displayed data is the return path laser bias current

## 7. Structure Diagram



- |                                      |  |
|--------------------------------------|--|
| 1. Optical receiving module          | 2. DS ATT insert port                    |
| 3. Optical emission port             | 4. CMTS DS port                          |
| 5. Optical receiving port            | 6. Handle                                |
| 7. CMTS US port /EOC signal in       | 8. Status display digital tube           |
| 9. Control mode selection button OK  | 10. Mainboard NMS interface              |
| 11. Parameter adjustment button Down | 12. Parameter adjustment button Up       |
| 13. Mainboard power access port      | 14. Switching power supply               |
| 15. Power pass inserter              | 16. Output 1                             |
| 17. -20dB output RF test port        | 18. Output tap or splitter               |
| 19. AC60V input                      | 20. -20dB laser test port                |
| 21. LPF/HPF/ATT                      | 22. -20dB return path RF input test port |
| 23. Output 2                         | 24. Power pass inserter                  |
| 25. Optical transmitter module       | 26. ONU unit or transponder              |

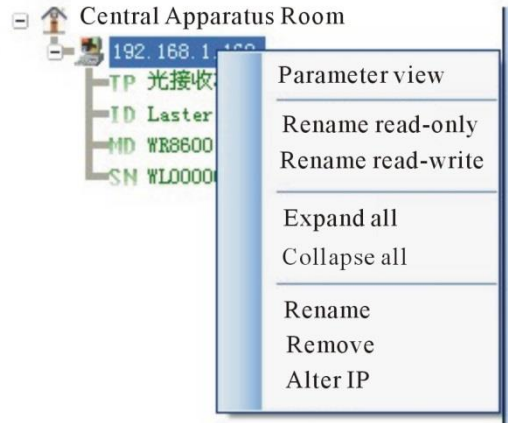
## 8. Set and Use the Network Management Transponder

**Note:** This equipment can connect the Ethernet transponder, access to the network management system. The network management transponder is optional, users decide whether use according to actual requirement.

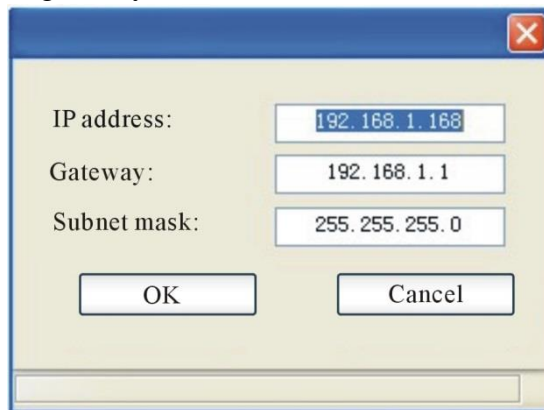
**If Network Management Transponder is needed, please set it as follows:**

### Transponder IP setup

1. Default IP is 192.168.1.168, default gateway is 192.168.1.1, default subnet mask is 255.255.255.0
2. Connect the computer and transponder (directly), and change IP to 192.168.1.XXX (XXX is any number from 0 to 255 except 168 ); Start host computer Network Management software, then search the device and log in.
3. Right-click this icon and choose alter IP.



4. Enter new IP address, gateway and Subnet Mask.



5. Click OK, then exit, it is done. There is new IP address and gateway on operational logbook.

No.	Type	Content	Date
1752	Change IP Address	Change IP address192.168.1.168 new IP:192.168.1.167 newgateway:192.168.1.1	2009-9-9 02:39:03

6. Reboot the transponder, the new IP become effective (Click reboot button in the network management software or power on again).





### 9. Common Failure Analysis and Troubleshooting

Failure phenomenon	Failure cause	Solution
After connecting the network, the image of the optical contact point has obvious netlike curve or large particles highlights but the image background is clean.	<ol style="list-style-type: none"> <li>The optical input power of the optical receiver is too high, make the output level of the optical receiver module too high and RF signal index deteriorate.</li> <li>The RF signal (input the optical transmitter) index is poor.</li> </ol>	<ol style="list-style-type: none"> <li>Check the optical input power and make appropriate adjustments to make it in the specified range; or adjust the attenuation of optical receiver to reduce the output level and improve index.</li> <li>Check the front end machine room optical transmitter RF signal index and make appropriate adjustments.</li> </ol>
After connecting the network, the image of the optical contact point has obvious noises.	<ol style="list-style-type: none"> <li>The optical input power of the optical receiver is not high enough, results in the decrease of C/N.</li> <li>The optical fiber connector or adapter of the optical receiver has been polluted.</li> <li>The RF input signal level of the optical transmitter is too low, make the modulation degree of the laser is not enough.</li> <li>The C/N index of system link signal is too low.</li> </ol>	<ol style="list-style-type: none"> <li>Check the received optical power of the optical contact point and make appropriate adjustments to make it in the specified range.</li> <li>Improve the optical received power of the optical contact point by cleaning the optical fiber connector or adapter etc methods. Specific operation methods see “Clean and maintenance method of the optical fiber connector”.</li> <li>Check the RF input signal level of the optical transmitter and adjust to the required input range. (When the input channels number less than 15, should be higher than the nominal value.)</li> <li>Use a spectrum analyzer to check the system link C/N and make appropriate adjustments. Make sure the system link signal <math>C/N &gt; 51dB</math>.</li> </ol>

<p>After connecting the network, the images of several optical contact points randomly appear obvious noises or bright traces.</p>	<p><b>The optical contact point has open circuit signal interference or strong interference signal intrusion.</b></p>	<ol style="list-style-type: none"> <li>1. Check if there is a strong interference signal source; change the optical contact point location if possible to avoid the influence of the strong interference signal source.</li> <li>2. Check the cable lines of the optical contact point, if there is shielding net or situation that the RF connector shielding effect is not good.</li> <li>3. Tightly closed the equipment enclosure to ensure the shielding effect; if possible add shielding cover to the optical contact point and reliable grounding.</li> </ol>
<p>After connecting the network, the images of several optical contact points appear one or two horizontal bright traces.</p>	<p><b>Power supply AC ripple interference because of the bad earth of equipment or power supply.</b></p>	<p>Check grounding situation of the equipment, make sure that every equipment in the line has been reliably grounding and the grounding resistance must be <math>&lt; 4\Omega</math>.</p>
<p>After connecting the network, the received optical power of the optical contact point is unstable and changes continuously. The output RF signal is also unstable. But the detected optical output power of the optical transmitter is normal.</p>	<p><b>The optical fiber connector types do not match, maybe the APC type connect to PC type.</b></p> <p><b>The optical fiber connector or adapter may be polluted seriously or the adapter has been damaged.</b></p>	<ol style="list-style-type: none"> <li>1. Check the type of optical fiber connector and adopt the APC type optical fiber connector to ensure the normal transmission of optical signal.</li> <li>2. Clean the polluted optical fiber connector or adapter. Specific operation methods see “Clean and maintenance method of the optical fiber connector”.</li> <li>3. Replace the damaged adapter.</li> </ol>

## 10. 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 output optical 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. The optical fiber connector should be cleaned in pairs. If optical power is on the low side after clean, the adapter may be polluted, clean it. (Note: Adapter should be carefully operated, so as 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.

## 11. After-sales service description

1. We promise: Free warranty for thirteen months (Leave factory time on product qualification certificate as the start date). The extended warranty term based on the supply agreement. We responsible for lifetime maintenance. If the equipment fault is resulted from the users' improperly operation or unavoidable environment reasons, we will responsible maintenance but ask suitable material cost.
2. When the equipment breaks down, immediately contact local distributor or directly call our technical support hotline 86-0755-26400198
3. The site maintenance of the fault equipment must be operated by professional technicians to avoid worse damage.

**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.

We reserve the right to change products described herein without notice.

## Contact OPTOSTAR

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