PREVAIL

WR1002RJ
Optical Receiver Manual

1. Product Summary

WR1002RJ is our latest high-end two-way output CATV network optical receiver. The pre-amp adopts full GaAs MMIC amplify module and the post-amp adopts GaAs amplify module. Optimization circuit designs, coupled with the company 10 years professional design experience, make the equipment achieve high performance index. The parameters will be displayed by singlechip to make the engineering debug more convenient. It is the best choice for CATV network.

2. Performance Characteristics

- High response PIN photoelectric conversion tube.
- Optimizing circuit design, SMT production process, optimizing the whole signal path, makes the photoelectronic signal transmission more fluent.
- Professional RF attenuation chips, good RF attenuation and equilibrium linear, high precision.
- GaAs amplifier device, power doubly output, high gain and low distortion.
- Singlechip controls the whole work, digital display the parameters, easy and intuitive operation, and stable performance.
- Excellent AGC characteristic, when the input optical power range is －9～＋2dBm, the output lever remain unchanged, CTB and CSO basically unchanged.
- Reserved the data communication interface, can connect the Ethernet transponder, access to the network management system.

3. Technical Parameters

3.1 Link testing conditions

The performance 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.

Test 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 modulation signal at range of **550MHz～862/1003MHz**, 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 **-2dBm**, the RF output level is **108dBμV**, with **9dB** 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 **-2dBm**, 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.

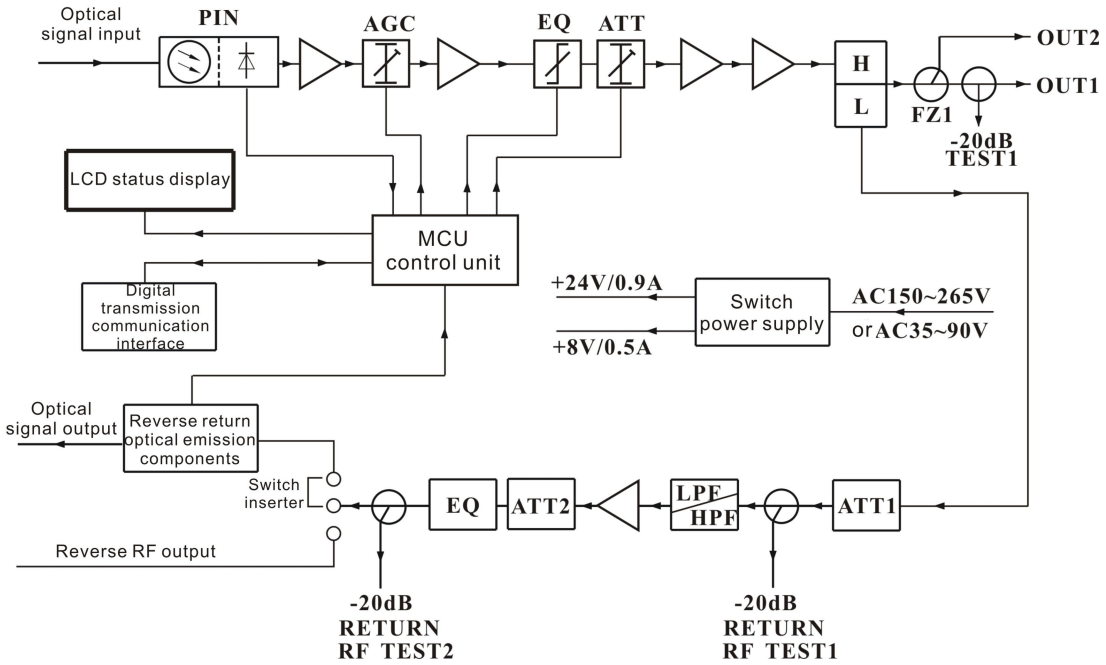
Friendly Notice: Suggest you setting the RF signal to **6~9dB** slope output in the practical engineering application to improve the nonlinear index (under the node) of the cable system.

3.2 Technical Parameters

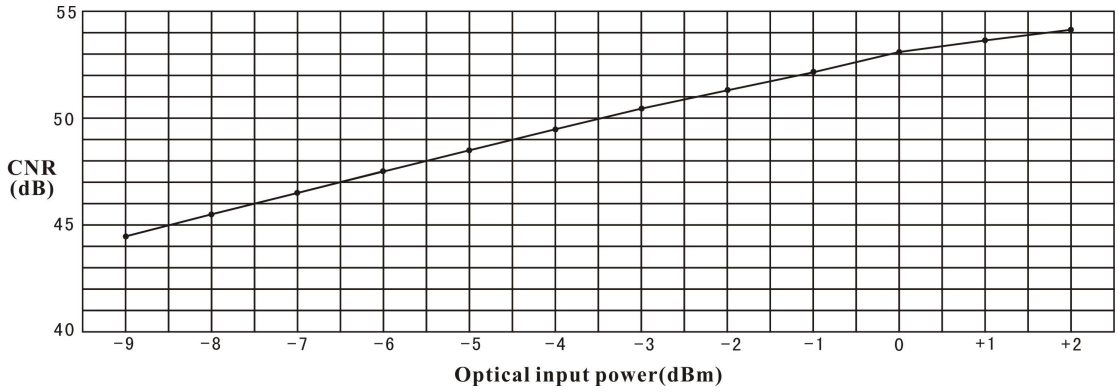
Item	Unit	Technical Parameters	
Forward optical receiving part			
Optical Parameters			
Receive Optical Power	dBm	-9 ~ +2	
Optical Return Loss	dB	>45	
Optical Receiving Wavelength	nm	1100 ~ 1600	
Optical Connector Type		FC/APC, SC/APC or specified by the user	
Fiber Type		Single Mode	
Link Parameters			
C/N	dB	≥ 51（-2dBm Input）	
C/CTB	dB	≥ 65	Output level 108 dBμV
C/CSO	dB	≥ 60	Equilibrium 6dB
RF parameters			
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	≥14	
Output Impedance	Ω	75	
Electrical control EQ range	dB	0～10	
Electrical control ATT range	dB	0～20	
Reverse Optical Transmit Part			
Optical Parameters			
Optical Emission 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	
RF Parameters			
Frequency Range	MHz	5 ~ 65（or specified by the user）	
Flatness In Band	dB	±1	
Input Level	dBμV	72 ~85	
Output Impedance	Ω	75	
General Performance			
Power Voltage	V	A: AC(150~265)V; B: AC(35~90)V; C: DC48V	
Operating Temperature	℃	-40~60	
Storage Temperature	℃	-40~65	
Relative Humidity	%	Max 95% no condensation	
Consumption	VA	≤ 30	
Dimension	mm	483（L）╳ 345（W）╳ 44（H）	

Note：Forward RF index given above is measured when the final stage using the GaAs 25dB power doubly module. Different modules, different parameters.

4. Block diagram



5. Relation Table of Input Optical Power and CNR



6. Function Display and Operating Instruction

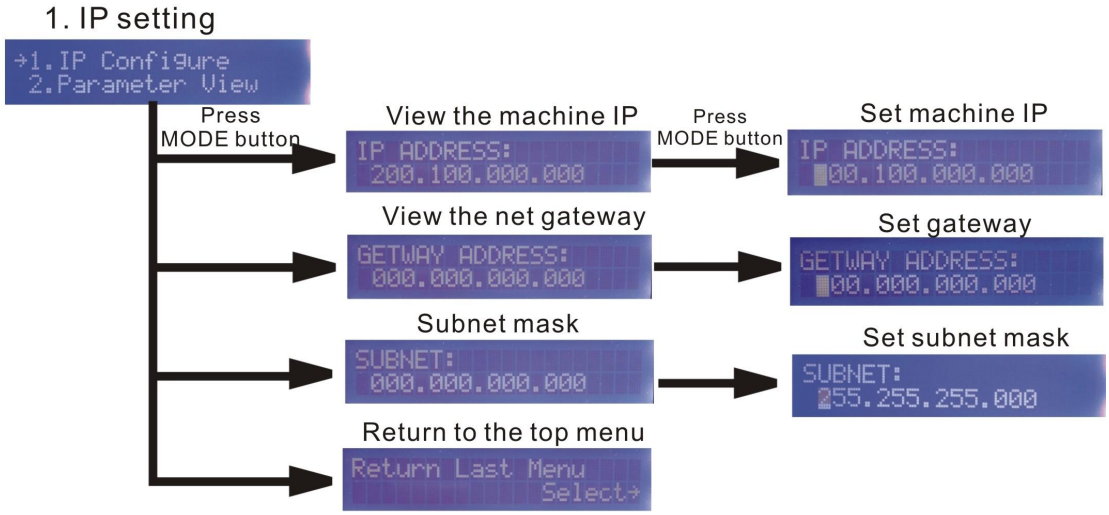
Mode: Mode selection button.

▲ ： up button, increase the value of parameters.

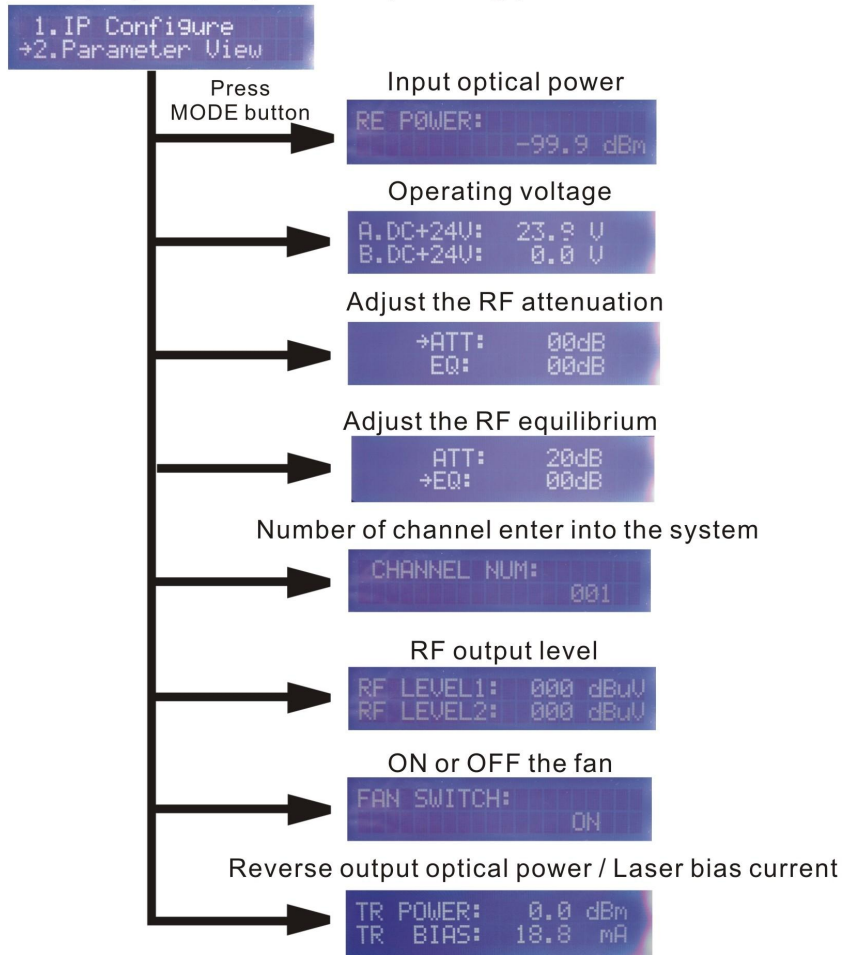
▼ ： down button, decrease the value of parameters.

The following is the detailed instructions：

1. IP setting

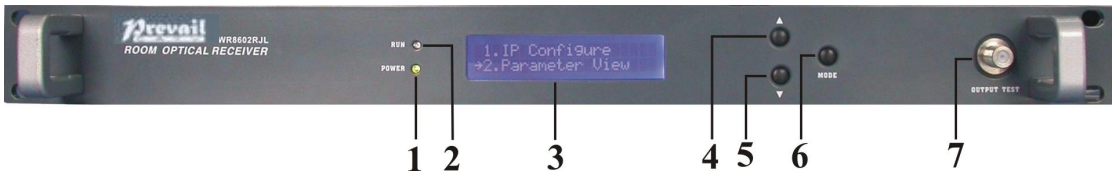


2. Display and adjust the operating parameters

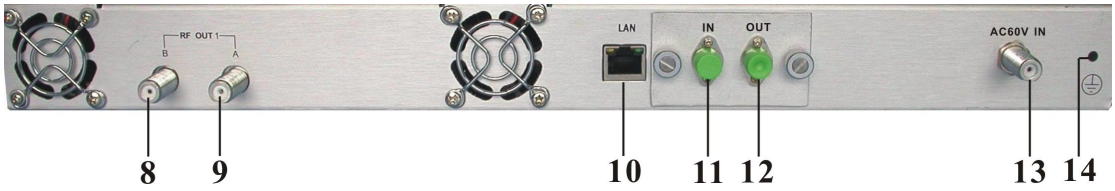


7. Product Schematic Diagram

FRONT



BACK



1. Power indicator
2. Running indicator
3. LCD status display screen
4. Up button
5. Down button
6. Mode display and control mode selection button
7. RF test port
8. RF Output B (branch road)
9. RF Output A (main road)
10. LAN network management communication port
11. Forward optical signal input
12. Reverse optical signal output
13. AC 60V power supply input
14. Grounding terminal

Note： This equipment can connect the Ethernet transponder, access to the network management system. With the network management transponder or not, it is up to users.

8. 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.	1. The input optical power of the optical receiver is too high, make the output level of the optical receiver module too high and RF signal index deteriorate. 2. The RF signal (input the optical transmitter) index is poor.	1. Check the input optical 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. 2. Check the front end machine room optical transmitter RF signal index and make appropriate adjustments.
After connecting the network, the image of the optical contact point has obvious noises.	1. The input optical power of the optical receiver is not high enough, results in the decrease of C/N. 2. The optical fiber active connector or adapter of the optical receiver has been polluted. 3. The RF signal level input the optical transmitter is too low, make modulation degree of the laser is not enough. 4. The C/N index of system link signal is too low.	1. Check the received optical power of the optical contact point and make appropriate adjustments to make it in the specified range. 2. Recover the received optical 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 active connector”. 3. Check the RF signal level input the optical transmitter and adjust to the required input range. (When the input channels number less

		than 15, should higher than nominal value.) 4. Use a spectrum analyzer to check the system link C/N and make appropriate adjustments. Make sure the system link signal C/N > 51dB.
After connecting the network, the images of several optical contact points randomly appear obvious noises or bright traces.	The optical contact point has open circuit signal interference or strong interference signal intrusion.	1. Check if there is strong interference signal source; change the optical contact point location if possible to avoid the influence of strong interference signal source. 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. 3. Tightly closed the equipment enclosure to ensure the shielding effect; if possible add shielding cover to the optical contact point and reliable grounding.
After connecting the network, the images of several optical contact points appear one or two horizontal bright traces.	Power supply AC ripple interference because of the bad earth of equipment or power supply.	Check grounding situation of the equipment, make sure that every equipment in the line has been reliably grounding and the grounding resistance must be < 4Ω.
After connecting the network, the received optical power of the optical contact point is unstable and has large continuous change. The output RF signal is unstable, too. But the detected output optical power of the optical transmitter is normal.	The optical fiber active connector types do not match, maybe the APC type connect to PC type, make the optical signal cannot normal transmission. The optical fiber active connector or adapter may be polluted seriously or the adapter has been damaged.	1. Check the type of optical fiber active connector and adopt the APC type optical fiber active connector to ensure the normal transmission of optical signal. 2. Clean the polluted optical fiber active connector or adapter. Specific operation methods see “Clean and maintenance method of the optical fiber active connector”. 3. Replace the damaged adapter.

9. 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.