ASCENT
Communication Technology

ACT AT5100
1 GHz DMOD Optical Transmitter

Quick Reference Guide

Revision E

ACT AT5100 1 GHz Direct Modulation Optical Transmitter

Quick Reference Guide

ACT Document Number: ACT AT5100 DMOD Transmitter

Quick Reference Guide Revision E

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This document is produced to assist professional and properly trained personnel with installation and maintenance issues for the product. The capabilities, system requirements and/or compatibility with third-party products described herein are subject to change without notice.

For more information, contact ACT: support@ascentcomtec.com

Revision History

Revision	Date	Reason for Change
A	04/20/2018	Initial release
B	05/21/2018	Updated formatting
C	11/24/2019	Updated sections 1.3 and 1.4
D	04/27/2020	Added section 7
E	11/10/2023	Update section 4

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Precautions

Warning

Exposure to class 1M laser radiation is possible. Access should be restricted to trained personnel only. Do not view exposed fiber or connector ends when handling optical equipment.

- Ensure adequate cooling and ventilation as specified.
- The installation and operation manual should be read and understood before units are put into use.
- Always replace protective caps on optical connectors when not in use.
- The typical connectors fitted are SC/APC 8°. **Note:** 8° angle polished connectors must be used.

Cleaning

Use only a damp cloth for cleaning the front panel. Use a soft dry cloth to clean the top of the unit.

Do not use spray cleaner of any kind.

Grounding

The Optical Transmitter should have good grounding with grounding resistance **<** 4Ω.

According to the international standard, 220V plug in adopts tri-wire rule and the middle wire is the grounding wire.

Before connecting circuit, please use proper electric wire (#20AWG and more) to connect the grounding screw and the grounding frame. When use DC input power supply, the equipment chassis must be grounded.

Overloading

Overloading wall outlets and extension cords can result in a risk of fire or electric shock.

Use approved electrical cords.

Damage requiring service

Unplug unit and refer servicing only to Ascent Communication Technology qualified service personnel.

Servicing

Do not attempt to service this unit yourself. Refer all servicing only to Ascent Communication Technology qualified service personnel.

1 Introduction

1.1 Overview

ACT AT5100 1RU 1550nm Direct-Modulated (DMOD) Laser Transmitter offers a flexible and scalable optical transmission for high quality video in short, medium distance CATV networks. It was designed with high linearity and low chirp DFB laser, with built-in pre-distortion compensation and AGC close loop control for improved performance.

AT5100 DMOD series transmitters are capable of delivering analog and digital video transmission up to 15km, all Digital loading up to 40km and all QAM overlay up to 70km, with intuitive front panel LCD display to make operator's daily operation easier. The optical transmitter is packaged in a self-contained 19" sub-rack of 1 RU with universal mains power supply and SNMP management.

The optical output power level can be ordered at either 6 dBm, 9dBm or 10dBm with single or dual power supply for redundancy. Combined with ACT AT5100 EDFA optical amplifier, AT5100 DMOD transmitter provides the most cost-effective solution for short, medium FTTX deployment, IPTV, VOD and traditional CATV signal in HFC network.

1.2 Features

- The transmitting modules of this machine adopt the imported DFB laser, the max output power can reach to 16 mW.
- The internal RF driving amplifier and controlling circuit of this machine can ensure the best C/N. The perfect and stable circuit of optical power output and controlling circuit of thermoelectric refrigeration device of laser module assure the user the best quality and stable working for a long time.
- Intelligent fan, it will run when the case temperature reaches 32 °C to 35 °C.
- With AGC/MGC control to ensure the stable output when different RF in.
- The internal micro-processor software has many functions such as laser monitoring, number display, trouble alarm and on-line management. Once the working parameter of the laser is out of the fixed range, there will be a red light glistening to alarm.
- The RS-232 standard connector makes it is possible to manage on line and monitor in another place.
- The machine adopts 19" standard shelf and it can work with the voltage from 90 VAC to 265 VAC or -48 VDC.

1.3 Specifications

AT5100 DMOD 1550nm Direct-Modulated (DMOD) Laser Transmitter - 19" 1RU

RF Specification	
RF Bandwidth	47 MHz to 862 MHz or 1002 or 1218 MHz
RF Flatness	±0.75 dB @ 47 MHz to 862 MHz
RF Input Level	20 dBmV ± 2 dBmV
RF Input Return Loss	≥16 dB
RF Input Impedance	75 Ω
RF Test Point	-20 dB
TV Channel Plan	60 PAL channels, 80 NTSC channels
Link Performance	
CNR	50 dB (60 ch PAL, 15 km fibre, -1 dBm receive)
CTB	-63 dBc
CSO	-57 dBc
MER	39 dB (80 QAM256 channels within 47 MHz to 1002 MHz)
Optical Specifications	
Wavelength	1550 nm ± 5 nm and ITU Channels
Line Width	≤1 MHz
Optical Output Power	Single or Dual 5dBm, 6 dBm, 9 dBm, 10 dBm
Optical Connector	SC/APC
Optical Return Loss	55 dB
General Specifications	
Management Interface	RJ45 Web & SNMP, RS232
Operating Temperature	-5 °C to +65 °C
Storage Temperature	-40 °C to +85 °C
Power Supply	90 to 265 VAC or 36 to 60 VDC
Power Consumption	≤50 W (single power supply)
Operating Relative Humidity	5 % to 95 % RH (non-condensing)
Dimensions (W × D × H)	483 mm × 254 mm × 44 mm
Weight	5 kg
Ship Weight	5.5 kg

Note: Measured in a typical system configuration for the nominated channel numbers and nominated fibre lengths for each model at 25 °C ambient temperature.

1.4 Models and Options

AT 5000 Series Direct Mod 1550nm Optical Transmitter Ordering Information

AT-	5X-DMOD-	XX-	XX-	XX-	XX-	XX-	X

	Gain Type
50	862 MHz
51	1002 MHz
512	1.2 GHz
52	2.6 GHz

	Output Power
6	6 dBm
8	8 dBm
9	9 dBm
10	10 dBm

	Optical Connector
SC	SC/APC
FC	FC/APC

	Power Supply
1	Single PS
2	Dual PS

	Output Wavelength
00	1550+/-5nm
21	ITU CH 21
23	ITU CH 23
25	ITU CH 25
xx	ITU CH XX

	Distance
M	Up to 10 km
L	Up to 15 km

	Power Supply
AC	90 to 265 VAC Australia Plug
DC	30 to 72 VDC
A3	90 to 265 VAC with Continental EU Plug
A4	90 to 265 VAC with North America Plug

2 Installation

2.1 Equipment Inventory

On receiving your new AT5100-DMOD, you should carefully unpack and examine the contents for loss or damage that may have occurred during shipping. Refer to warranty registration if loss or damage has occurred. The AT5026-DMOD should consist of the following:

Qty	Description
1	AT5100-DMOD unit
1	Key for switching laser ON / OFF
1	Test report
1	Power supply cord
1	Product User Manual (Optional)

2.2 Packaging and Transportation

Keep all AT5100-DMOD packing boxes and packaging for future transport.

Use only the original AT5100-DMOD packaging when transporting. This packaging has been specifically designed to protect the equipment.

2.3 Power and Cooling Requirements

The AT5100-DMOD requires a mains input of 90 V_{AC} to 265 V_{AC} at 50 to 60 Hz. The unit will automatically adjust the power conversion for inputs within these ranges, with no switch setting or other user intervention. Power consumption of the unit is 50 W maximum.

The transmitter is designed to operate with an ambient temperature of -5 °C to +65 °C with humidity up to 95 %. Free ambient air should be maintained around all sides of the unit. Care should be taken to ensure that the air flow around the unit is unrestricted.

The AT5100-DMOD should have a minimum ventilation clearance of 1 RU above and below the transmitter.

⚠ **Warning**

DO NOT expose AT5100-DMOD to conditions which would permit condensation to form on the inside of the transmitter.
DO NOT operate AT5100-DMOD outdoors.

2.4 Installation and Adjustment

Warning

Exposure to class 1M laser radiation is possible. Access should be restricted to trained personnel only. Do not view exposed fiber or connector ends when handling optical equipment.

The following steps explain how the AT5100-DMOD is to be installed.

1. Unpack the transmitter and inspect the unit as stated in **Section 3.1**.
2. Locate the transmitter in a 19" cabinet ensuring adequate ventilation and space for accessing the rear ports and front-panel keypad.
3. Before connecting AC power to the unit, make sure that the LASER ON/OFF key is switched **OFF** (front panel).
4. Use the supplied power cord to apply mains power to the transmitter.
5. Switch the AC power ON (switch located on the rear panel).

   The ALARM LED will light red.

   The LCD will light and display "Model: AT5100-DMOD" and "KEY OFF" on start up.
6. Switch on the laser using the key switch.

   Front panel shows "KEY ON…", Laser status LCD turns green from red, the unit enters self-checking, after checking it enters working status, display " Descriptor"

Note

Allow 15 minutes for the transmitter to reach its stable operating temperature. Do not connect the optical ports to the network or start aligning your system until then.

7. Before connecting an RF signal, check that the power input level is within the acceptable range. Refer to **Section 2** for details.
8. Connect a matrix generator or head-end RF signal.

Note

The default control mode is AGC. The modulation control mode displayed in the main menu is RF Mode = AGC.

9. Connect a fiber patch-cord from optical port to an optical power meter and verify the LCD reading matches your power meter reading.

   When the ALARM LED shows green, the transmitter is ready for full operation.

2.5 Front Panel Operation

	Port	Item Description
1	Mounting Points	Holes for securing unit to rack3
2	LASER ON/OFF	Key switch for laser activation
3	LASER	Laser indicator GREEN – Output power is normal RED – Abnormal status
4	RF	RF indicator GREEN – Normal operation RED – RF input is too low or too high
5	Status	Status indicator GREEN – Status is normal RED – Status temperature is too low or too high
6, 7	PWR1/PWR2 (Optional)	Power 1 / Power 2 indicators GREEN – Two-way switch power supply is working YELLOW – One-way power supply is working RED – Abnormal status
8	VFD/LED	VFD/LED display for satellite optical transmitter parameters such as model number and operation status
9, 10	KEYPAD	Keypad used to scroll through menu items on transmitter display
11	ENT	Enter button
12	RF TEST	Input level test (-20 dBm)

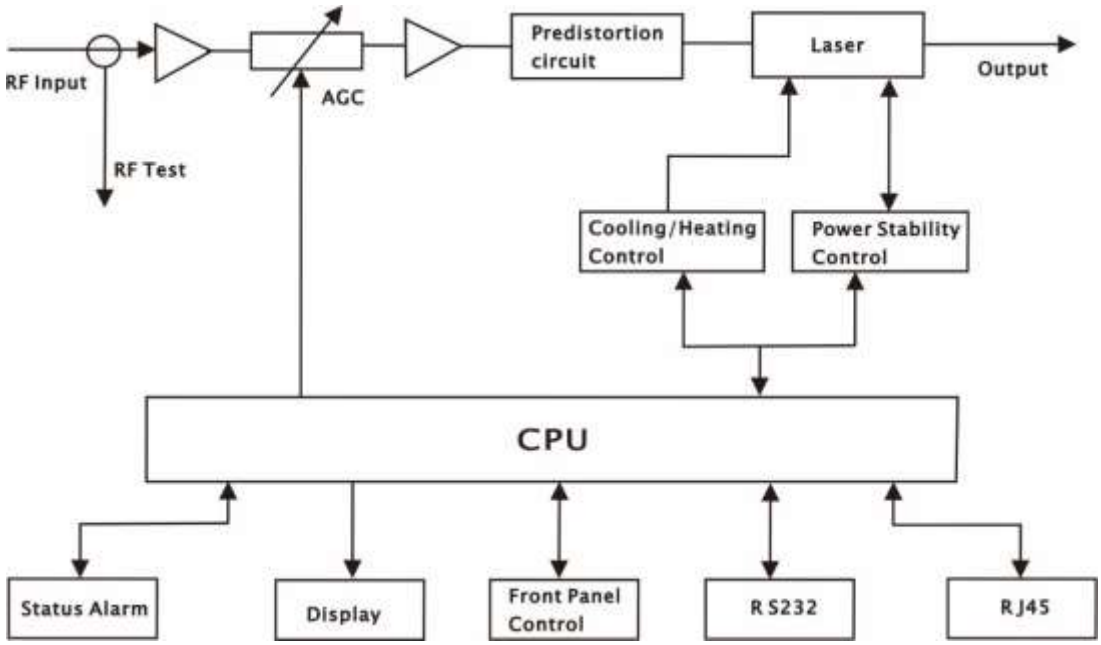
2.6 Rear Panel Operation

Port	Item	Description
1	FAN	Intelligent fan, begins to run when the chassis temperature reaches 32 °C to 35 °C (set by
2	IF/RF IN	IF/RF signal input
3	Power Supply Switch	UP – 12 V_{DC} MIDDLE – Off DOWN – 18 V_{DC}
4	CONSOLE	Console for computer network management
5	ETHERNET	Ethernet port, compliant with CNMP standard interface
6, 7	PS2/PS1	Power supply 2 outlet

Note Product appearance may vary with model options.

3 Technical Description

3.1 Overview



3.2 Physical Description

The unit is housed in a 19" rack, 1 RU height. Status indicators and control keys are located on the front panel along with an RF monitor port. The front panel provides an LCD display for comprehensive status information and user interface. The rear panel contains the optical interconnects, power, and data interface connectors.

The RF test port on the front panel is -20 dB from the modulating signal level. This is just after the internal AGC functional block. This signal is constant when the AGC circuit is functioning normally. Refer to the specification for typical levels. The output impedance of this port is 75 Ω, with an F-type connector.

The rear panel also contains the two optical ports, which are typically SC/APC bulkhead connectors.

The power interface, is a standard 3-prong line cord, with hot, neutral, and chassis ground. The metal chassis of the transmitter is tied to ground.

3.3 AGC Operation

The AT5100-DMOD will be in AGC mode (Automatic Gain Control) when first powered on. To change it to MGC mode (Manual Gain Control), refer to **Section 5.3**.

3.4 ITU Frequency Grid

AT55100-DMOD Wavelength Options: The following table contains the ITU frequency plan with corresponding wavelengths available to the AT5100-DMOD.

Channel Order Code	ITU Freq. (THz)	Avail. ITU Wavelengths (nm)	Channel Order Code	ITU Freq. (THz)	Avail. ITU Wavelengths (nm)
60	196.0	1529.55	40	194.0	1545.32
59	195.9	1530.33	39	193.9	1546.12
58	195.8	1531.12	38	193.8	1546.92
57	195.7	1531.90	37	193.7	1547.72
56	195.6	1532.68	36	193.6	1548.51
55	195.5	1533.47	35	193.5	1549.32
54	195.4	1534.25	34	193.4	1550.12
53	195.3	1535.04	33	193.3	1550.92
52	195.2	1535.82	32	193.2	1551.72
51	195.1	1536.61	31	193.1	1552.52
50	195.0	1537.40	30	193.0	1553.33
49	194.9	1538.19	29	192.9	1554.13
48	194.8	1538.98	28	192.8	1554.94
47	194.7	1539.77	27	192.7	1555.75
46	194.6	1540.56	26	192.6	1556.55
45	194.5	1541.35	25	192.5	1557.36
44	194.4	1542.14	24	192.4	1558.17
43	194.3	1542.94	23	192.3	1558.98
42	194.2	1543.73	22	192.2	1559.79
41	194.1	1544.53	21	192.1	1560.61

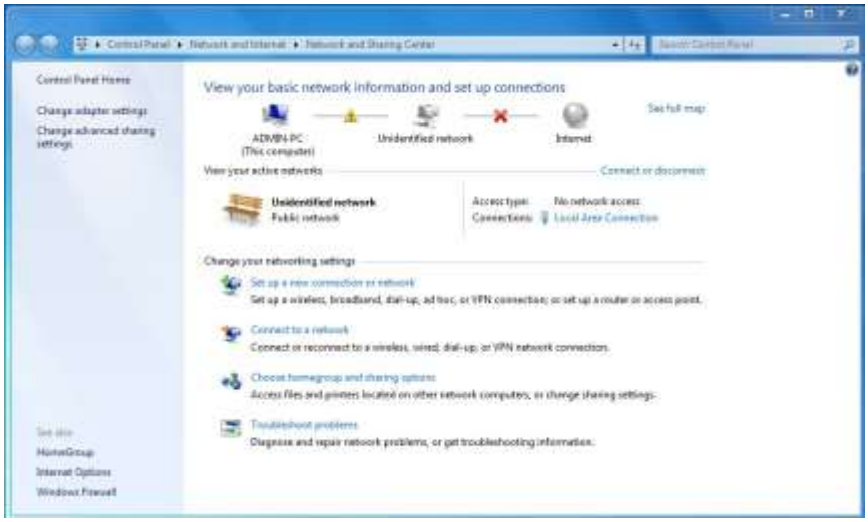
4 Software Description – Operation

4.1 Web Management

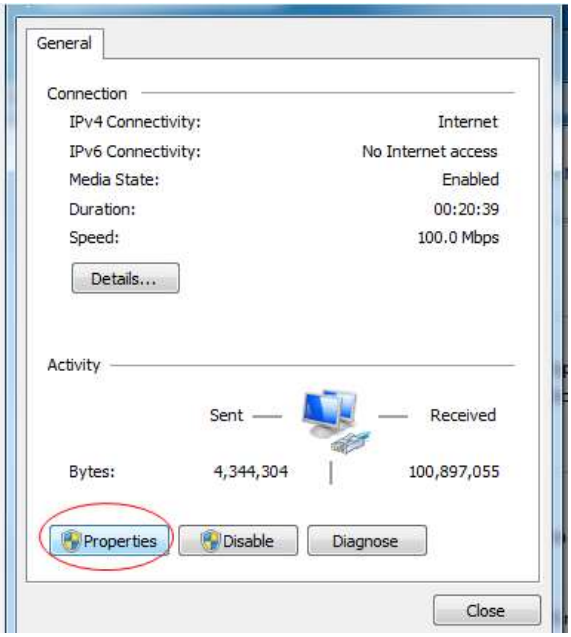
The user can use web browser to check the working condition and basic parameters of the amplifier, it supports IE, Chrome, Firefox, Opera and other main web browser. The following example are based on Opera browser.

1. Find the IP add in the machine, The default IP address is 192.168.0.22, set the IP add of the PC in the same range as following:

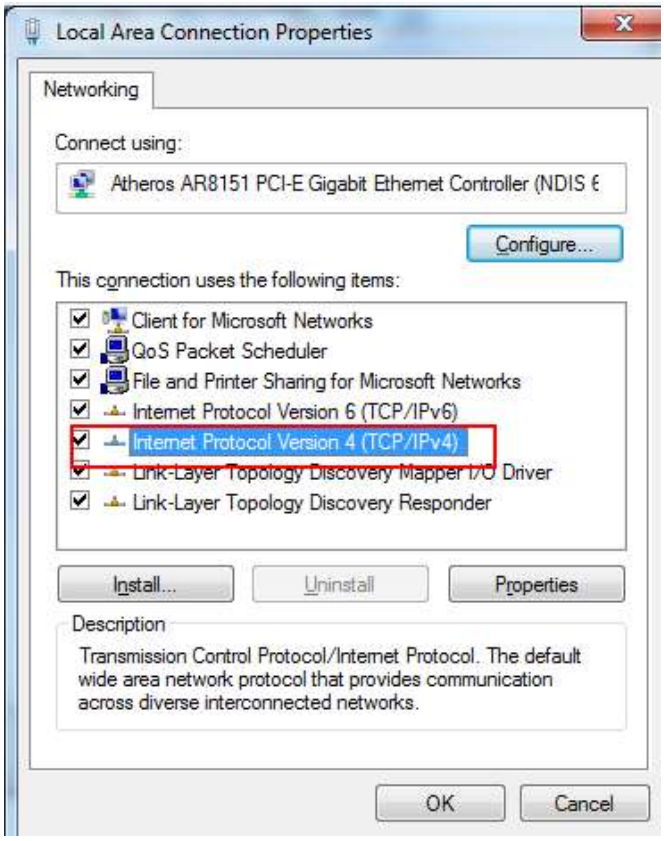
Step 1: Open local Area Connection setting:

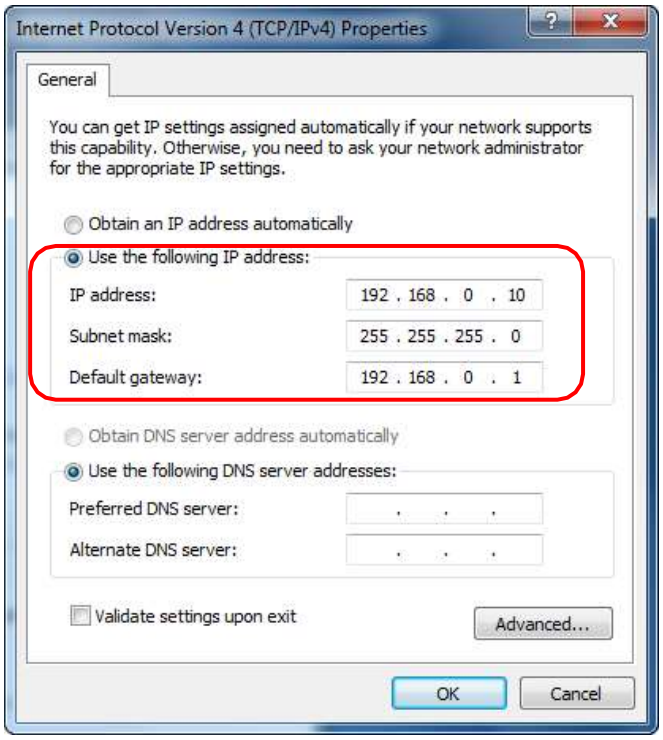


Step 2: Set Properties



Step 3: Set the PC IP address in the same range with device IP address, so that the computer can access the device.

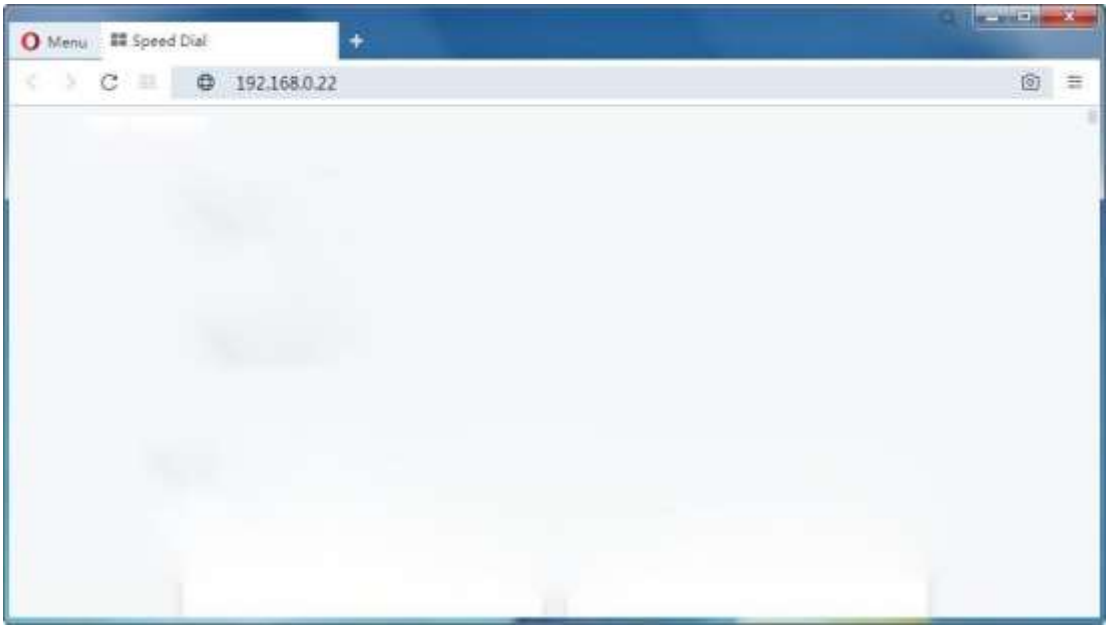


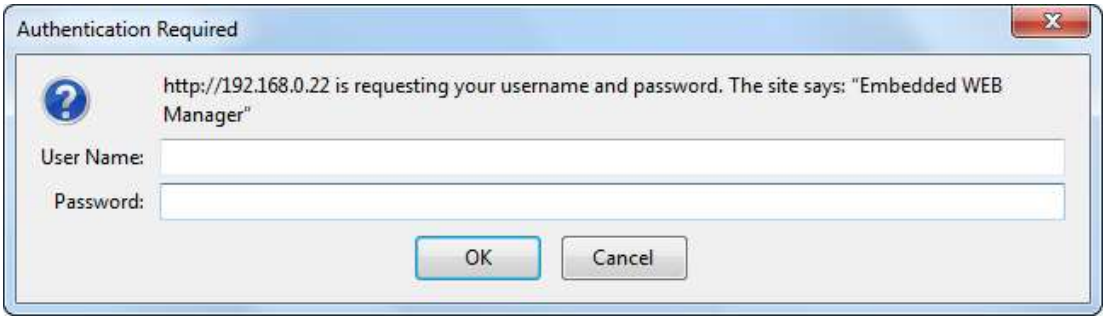


2. Open web browser, input the IP add and login in. The IP factory setting is 192.168.0.22.

User Name: admin

Password: ascent





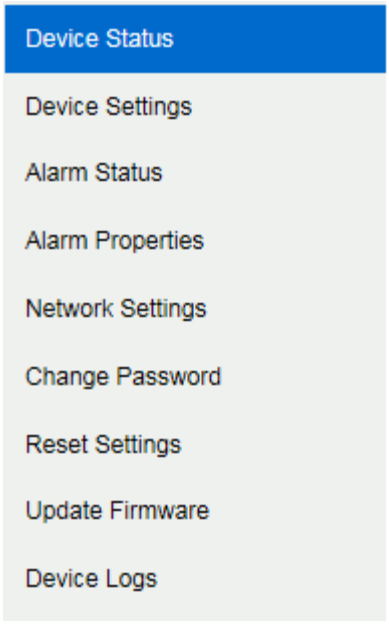
First Time Log-in to WEB Manager

The username/password for the first time log-in to the WEB Manager is **admin/ascent**, we recommend that the customer change the username and password as soon as possible.

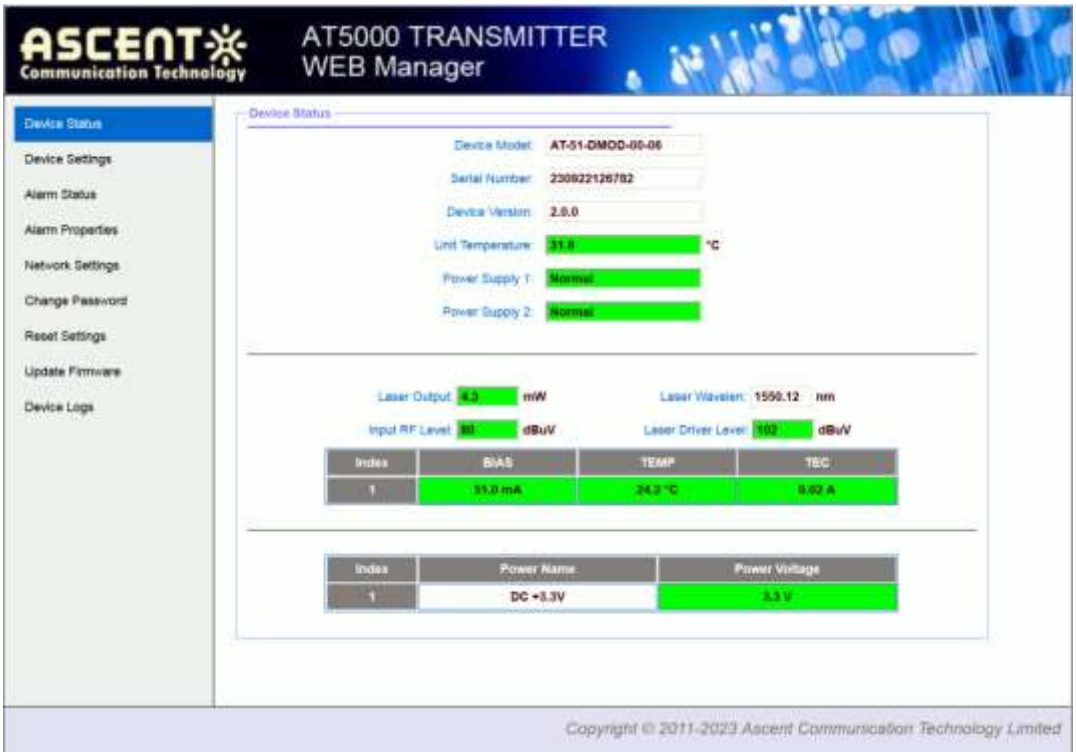
Restore Factory Setting

If in future you forget the user name and password you set up, or for any other reasons in need to change to default, the product can be restored to factory setting, click Reset Settings on the left-bar, then click Restore Factory, the setting will revert to default state, and the username and password will become **admin/123456.**

3. The web management consist of nine submenus. Items guide on the left, click to enter.



Page Navigation Bar



Device Status Page

OMI mode: switch AGC/MGC statuses.

OMI Value: -5 dB to +5 dB adjustable, factory setting is 0 dB.

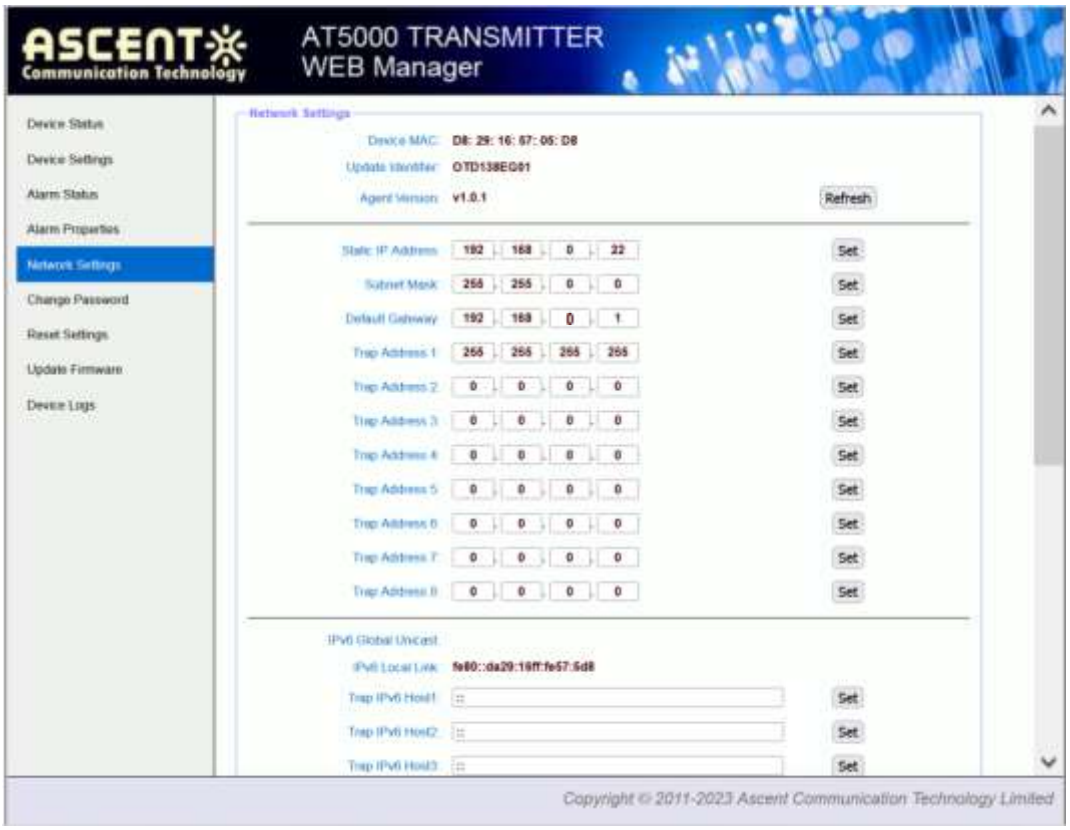
MGC ATT: 0 dB to 15 dB continuously adjust, 0.1 dBm step 0.1 dB.

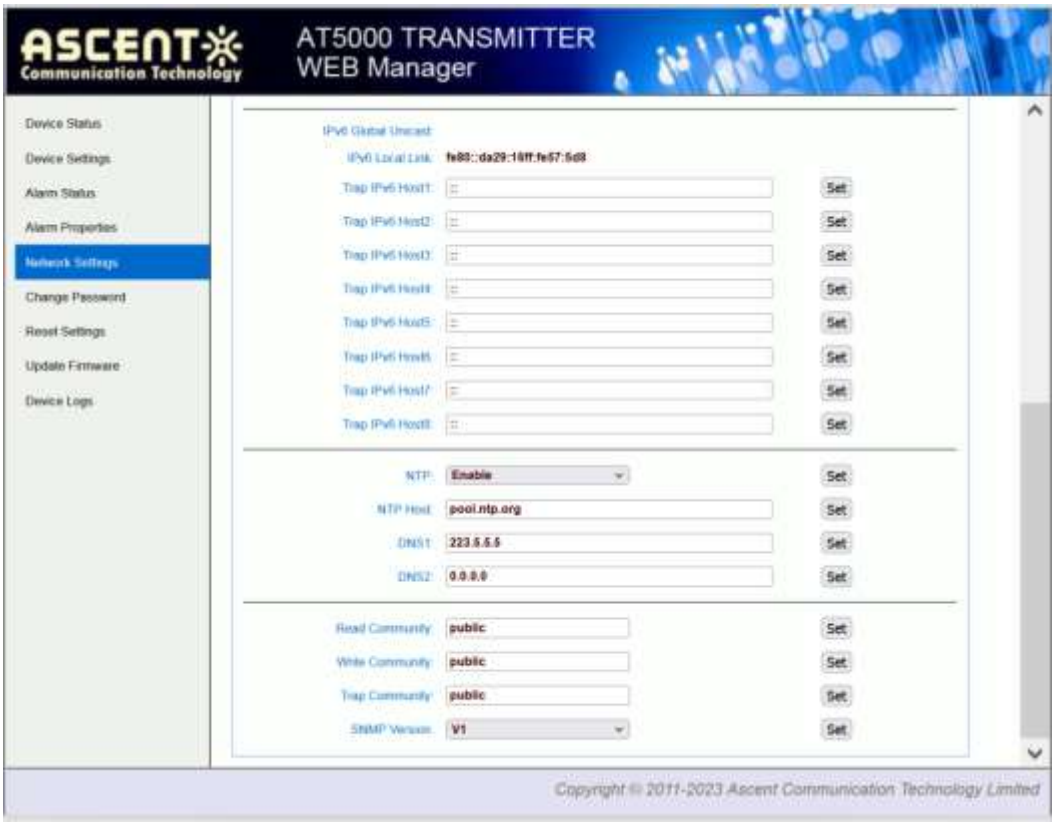
Device Settings Page

Alarm Status Page

Alarm Properties Page

Set MAC Address, IP Address, etc.



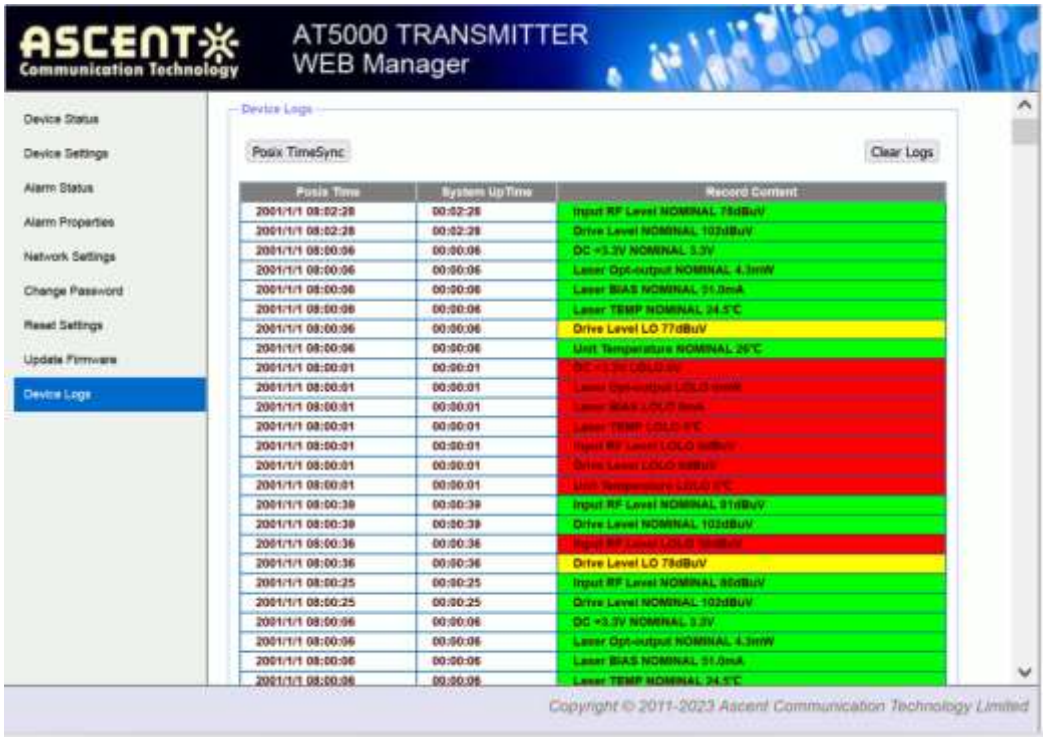


Network Settings Page

Change Password Page

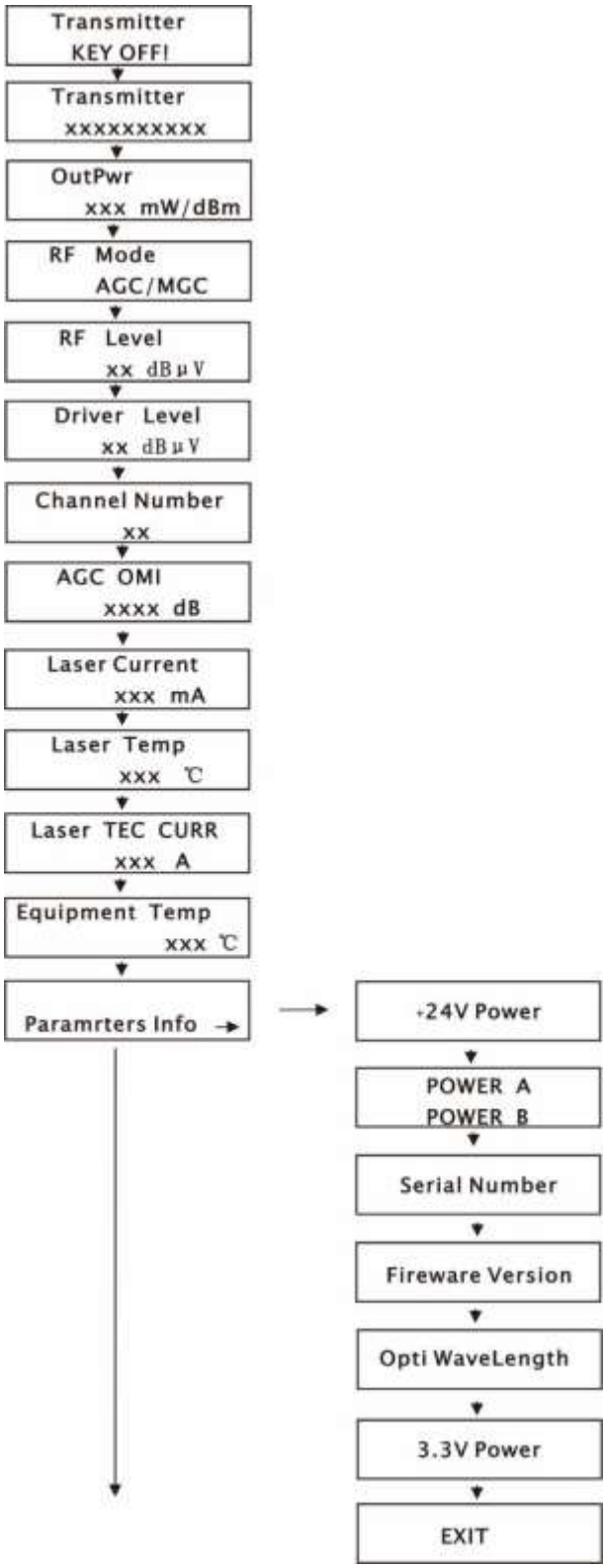
Reset Settings Page

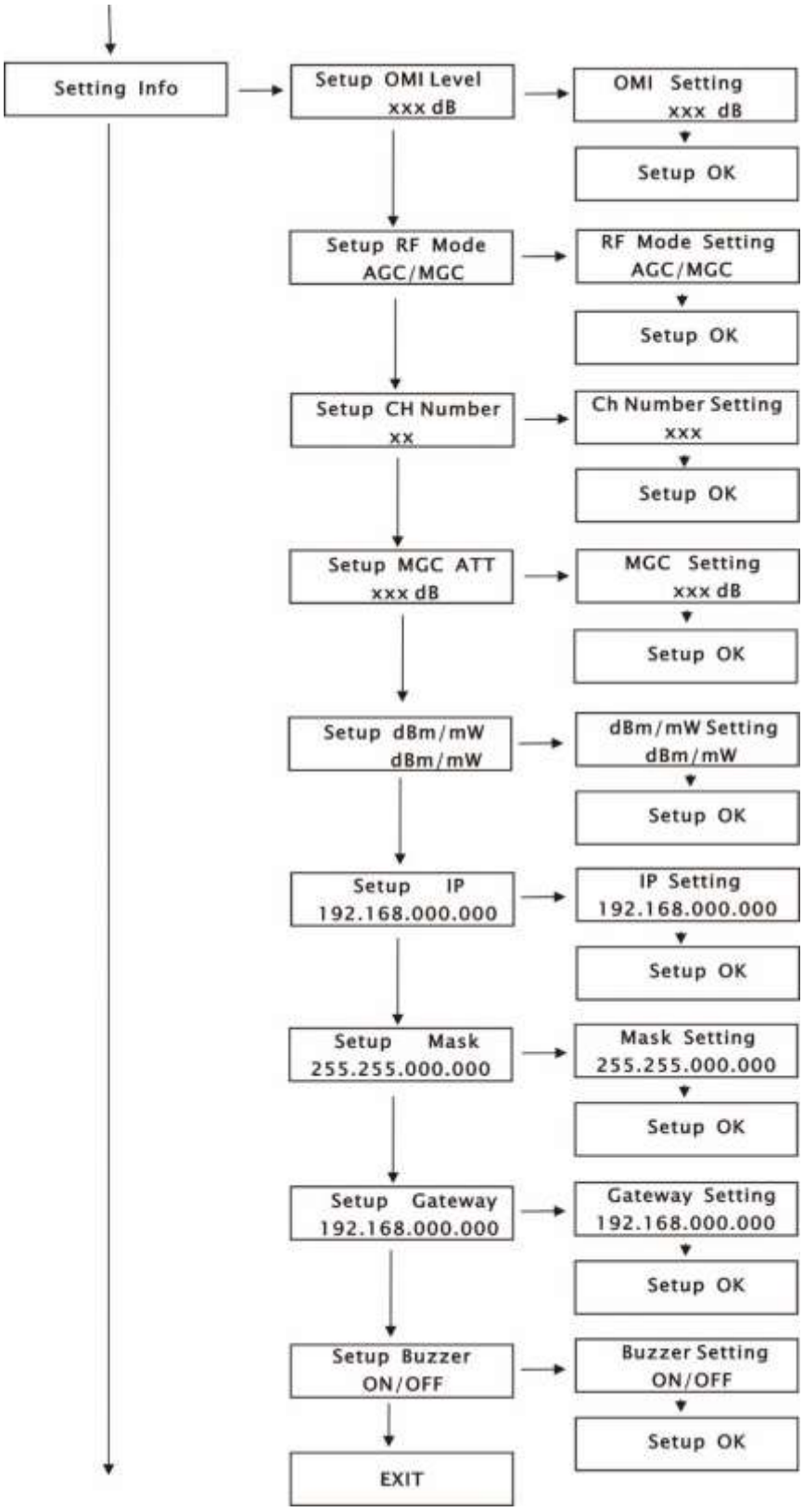
Update Firmware Page

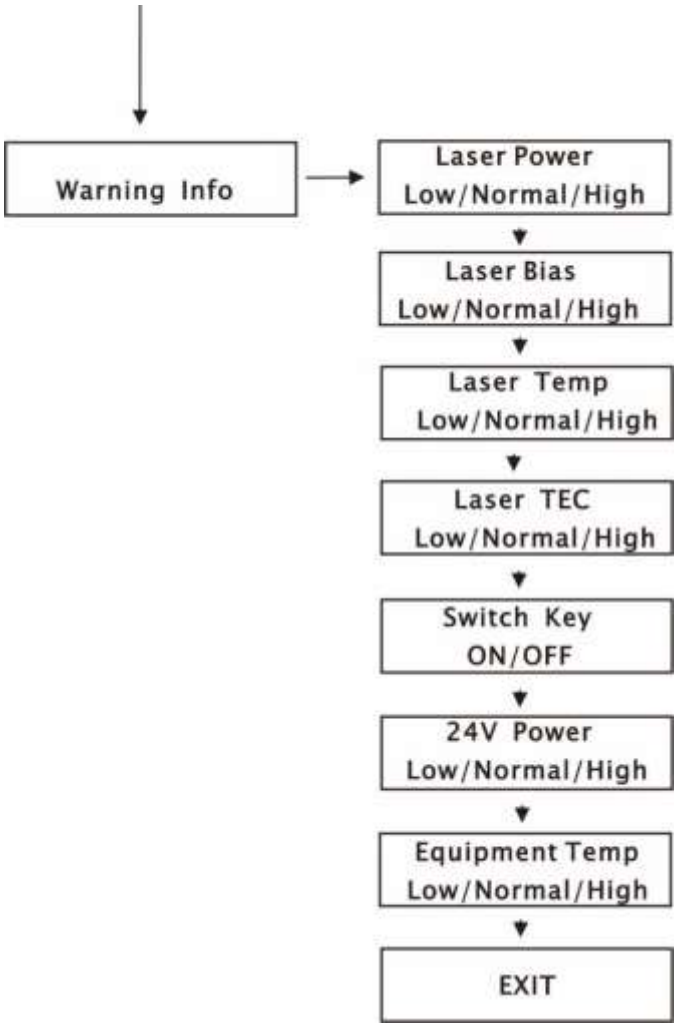


Device Logs Page

5 Setup Menu


Transmitter
KEY OFF!
Transmitter
xxxxxxxxxx
OutPwr
xxx mW/dBm
RF Mode
AGC/MGC
RF Level
xx dBμV
Driver Level
xx dBμV
Channel Number
xx
AGC OMI
xxxx dB
Laser Current
xxx mA
Laser Temp
xxx ℃
Laser TEC CURR
xxx A
Equipment Temp
xxx ℃
Paramrters Info
+24V Power
POWER A
POWER B
Serial Number
Fireware Version
Opti WaveLength
3.3V Power
EXIT


Setting Info
Setup OMI Level xxx dB
OMI Setting xxx dB
Setup OK
Setup RF Mode AGC/MGC
RF Mode Setting AGC/MGC
Setup OK
Setup CH Number xx
Ch Number Setting xxx
Setup OK
Setup MGC ATT xxx dB
MGC Setting xxx dB
Setup OK
Setup dBm/mW dBm/mW
dBm/mW Setting dBm/mW
Setup OK
Setup IP 192.168.000.000
IP Setting 192.168.000.000
Setup OK
Setup Mask 255.255.000.000
Mask Setting 255.255.000.000
Setup OK
Setup Gateway 192.168.000.000
Gateway Setting 192.168.000.000
Setup OK
Setup Buzzer ON/OFF
Buzzer Setting ON/OFF
Setup OK
EXIT


Warning Info
Laser Power
Low/Normal/High
Laser Bias
Low/Normal/High
Laser Temp
Low/Normal/High
Laser TEC
Low/Normal/High
Switch Key
ON/OFF
24V Power
Low/Normal/High
Equipment Temp
Low/Normal/High
EXIT

6 Input Signal Level

The total RF analog input level depends on the number of analog channels in your system and is identical for the type of system (NTSC, PAL, CENELEC) used. Use the following equation to determine the optimum RF input level per channel when the rated channel loading is not being used:

Analog Input Level (dBmV) = A+10log(N/M)+10log(W1/W2)

A: Manufacturer's recommended nominal drive level for optical transmitter/module;

N: The number of channels corresponding to A;

M: Actual number of loaded channels

W1: The bandwidth corresponding to A;

W2: The actual bandwidth

For example, if the product datasheet give the following parameters:

75 dBμv @ 59 PAL channels

If the customer actually has: 40 NTSC channels, the drive level will be:

Actual drive level=75+10log(59/40)+10log(8/7)=75+10*1.69+10*0.06=75+1.7+0.6=77.3(dBμV)

For digital channels, if the digital signal level is 6 dB lower than the analog signal level, then 4 digital channels are equal to 1 analog channel; If the digital signal level is 10 dB lower than the analog signal level, then 10 digital channels are equal to 1 analog channel. In the actual calculation, first calculate the number of digital channels as the number of analog channels, and then use the above formula. For example, with 20 analog channels, 20 digital channels, and with the digital channel being 6 dB lower than the analog channel level, then the total number of channels is:

20 + 20/4 = 25 (channels)

7 Troubleshooting

7.1 Fiber Optic Maintenance

Any time the fiber leads to the amplifier are disconnected, there is the potential for contamination of the ends of the fiber connectors. Dirt or other contaminants on these components can reduce the amplifier's performance and can result in permanent damage to the device. It is recommended that the fiber connectors be cleaned prior to connection, or reconnection, to the system.

7.2 Troubleshooting Conditions

No lights ON	Is the power on? Is the fuse OK?
In LED displays the right optical power, but not enough by test meter	Check optical meter setting Check input optical power within the range (-3 dB to +10 dB) Check loss in the test pigtail Check if there is dust in the connectors
Pout fail ON	Check the optical output power and pump parameters on the LCD. Contact ACT Technical Support.

Appendix 1: Conversion of Optical Power

mW	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
dBm	0.0	3.0	4.8	6.0	7.0	7.8	8.5	9.0	9.5	10.0	10.4	10.8	11.1	11.5	11.8	12.0
mW	**17**	**18**	**19**	**20**	**21**	**22**	**25**	**32**	**40**	**50**	**63**	**80**	**100**	**125**	**160**	**200**
dBm	12.3	12.5	12.8	13.0	13.2	13.4	14	15	16	17	18	19	20	21	22	23

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