ASCENT
Communication Technology

ACT AT5000 1310 nm F3CT Optical Transmitter

Quick Reference Guide

Revision C

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ACT Document Number: ACT AT51 F3CT Transmitter

Quick Reference Guide Revision C

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	03/18/2019	Draft
B	03/18/2019	Initial release
C	04/05/2024	Update F3CT related content

Contents

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

AT5000 1RU 1310 Forward Transmitter offers a flexible, 1RU, high performance platform for high quality forward path CATV video and data services distribution, especially for the sub headend and hubs in CATV networks. Together with ACT 1RU AT5000 ARQR return receiver provides an ideal standalone MDU solution in traditional HFC network and also high density FTTX networks to bring back the data signal from business and subscriber home premises.

AT5000 1RU 1310 Direct Mod forward transmitter is designed with a high performance 1310nm DFB laser transmitter module and ideal for both broadcast and narrowcast application in one pizza box platform. AT5000 F3CT can provide a wide range of optical output power to deliver both analog and digital signals. Advanced pre-distortion circuitry achieves superior CSO and CTB performance. Good link performance enables DOCSIS 3.0 downstream bonding on HFC architectures.

AT5000 F3CT forward transmitter is equipped with intuitive front panel LCD display to make operator's life easier. The optical transmitter is packaged in a self-contained 19" sub-rack of 1 RU with universal mains power supply and SNMP management.

1.2 Features

- High performance distributed feedback (DFB) laser with pre-distortion circuit
- Suitable for CTAV sub headend or hub standalone application
- Bandwidth 47 MHz to 1218 MHz
- Automatic/manual gain control (AGC/MGC)
- Single input for both broadband and narrowband signal
- RF input test point
- Short circuit protection
- Dual redundant hot-swappable AC or DC power supplies
- Front-panel LCD for local monitoring of transmitter status
- Local or remote monitoring and configuration
- SNMP/HTTP monitoring, management and control.

1.3 Specifications

AT5000 Direct Mod 1310 nm Single Forward Transmitter, F3CT

Items	Unit	Index Min.	Typ.	Max.	Remarks
Operating Wavelength Range	nm	1300	1310	1320	
No. of Output Ports			1		
Output Power per Port	dBm	2		36	2mW interval
Optical Return Loss	dB	50			
Fiber Connector		SC/APC			FC/APC、LC/APC
Operating Bandwidth	MHz	47		1218	
Input Level	dBμV	75	80	85	AGC
Flatness	dB	-0.75		+0.75	47 to 1002MHz
		-1.0		+1.0	1002 to 1218MHz
Return Loss	dB	16			47 to 1218MHz
Input Impedance	Ω		75		
RF connector		F Metric/Imperial			Specified by user
No. of Test Channels		PAL-D/59CH(NTSC/80CH)			
CNR	dB	51.0			Tx to Rx Rx -1dBm
CTB	dB	65.0			
CSO	dB	60.0			
Network Management Interface		SNMP,WEB supported			
Power Supply	V	90		265	AC
		-72		-36	DC
Power Consumption	W			20	Dual Power Supply, 1+1 standby
Operating Temp	℃	-5		+65	Auto case temp control
Storage Temp	℃	-40		+85	
Operating Relative Humidity	%	5		95	
Dimension	mm	370×483×44			D、W、H
Weight	Kg	4.1			

1.4 Models and Options

AT5000 F3CT Series	Description
AT-51-F3CT-DM-08-SC-AC2	AT5000 1310nm F3CT Direct Mod TX 1RU, 8dBm output, 1218MHz, SC/APC, Dual AC Power
AT-51-F3CT-DM-10-SC-AC2	AT5000 1310nm F3CT Direct Mod TX 1RU, 10dBm output, 1218MHZ, SC/APC, Dual AC Power
AT-51-F3CT-DM-12-SC-AC2	AT5000 1310nm F3CT Direct Mod TX 1RU, 12dBm output, 1218MHz, SC/APC, Dual AC Power
AT-51-F3CT-DM-13-SC-AC2	AT5000 1310nm F3CT Direct Mod TX 1RU, 13dBm output, 1218MHz, SC/APC, Dual AC Power
AT-51-F3CT-DM-14-SC-AC2	AT5000 1310nm F3CT Direct Mod TX 1RU, 14dBm output, 1218MHz, SC/APC, Dual AC Power
AT-51-F3CT-DM-15-SC-AC2	AT5000 1310nm F3CT Direct Mod TX 1RU, 15dBm output, 1218MHz, SC/APC, Dual AC Power

2 Installation

2.1 Equipment Inventory

On receiving your new AT51-F3CT, 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 AT51-F3CT should consist of the following:

Qty	Description
1	AT51-F3CT 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 AT51-F3CT packing boxes and packaging for future transport.

Use only the original AT51-F3CT packaging when transporting. This packaging has been specifically designed to protect the equipment.

2.3 Power and Cooling Requirements

The AT51-F3CT requires a mains input of 90 VAC to 265 VAC 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 AT51-F3CT should have a minimum ventilation clearance of 1RU above and below the transmitter.

Warning DO NOT expose AT51-F3CT to conditions which would permit condensation to form on the inside of the transmitter. DO NOT operate AT51-F3CT 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 AT51-F3CT is to be installed.

1. Unpack the transmitter and inspect the unit as stated in **Section 2.1**.
2. Locate the transmitter in a 19” cabinet ensuring adequate ventilation and space about 4.5cm 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: AT51-F3CT” 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.

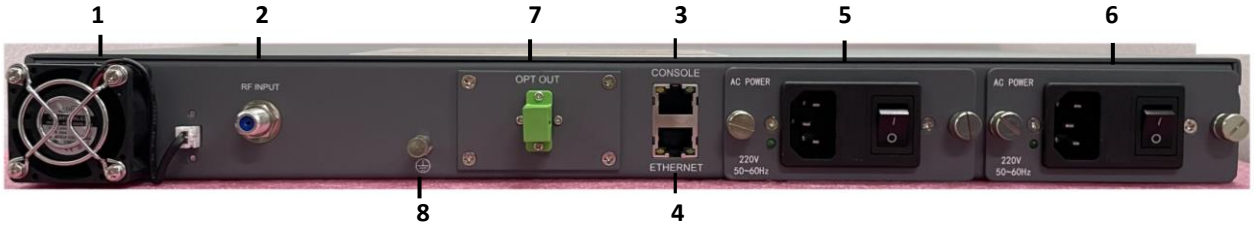
9. Connect a fiber patch-cord from optical port to an optical power meter and verify the LCD reading matches your power meter reading.

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

2.5 Front Panel Instructions

Port	Item	Description
1	Mounting Points	Holes for securing unit to rack3
2	LASER ON/OFF	Key switch for laser activation
3	Status	Status indicator GREEN – Status is normal RED – Status temperature is too low or too high
4	LASER	Laser indicator GREEN – Output power is normal RED – Abnormal status
5	RF	RF indicator GREEN – Normal operation RED – RF input 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 Instructions

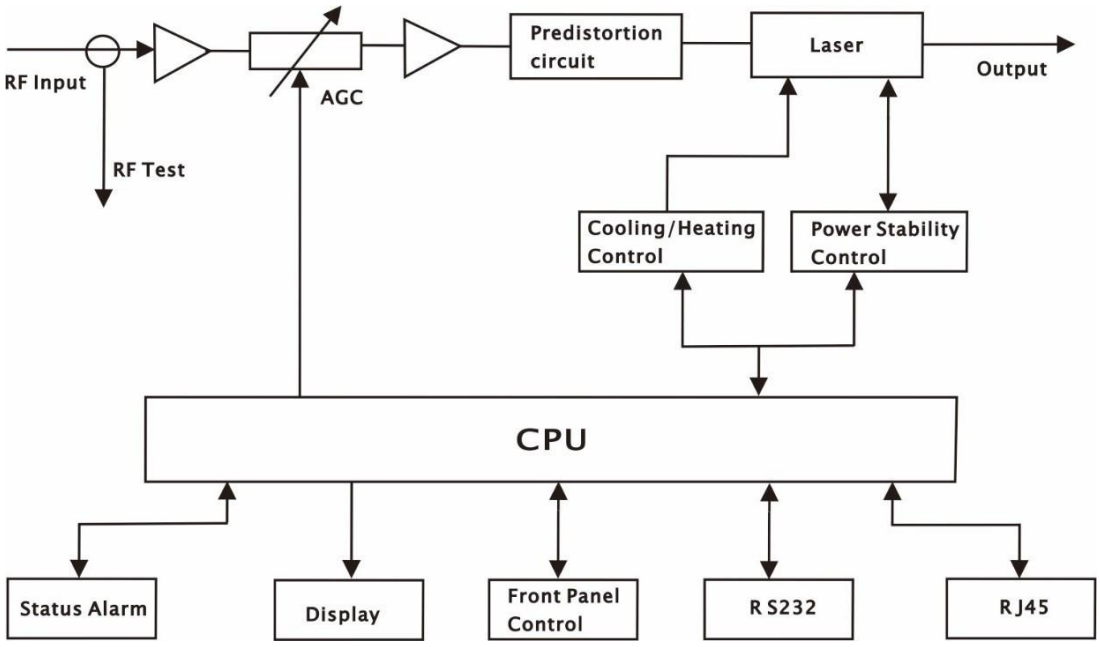


Port	Item	Description
1	FAN	Intelligent fan, begins to run when the chassis temperature reaches 32 °C to 35 °C (set by
2	RF INPUT	RF signal input
3	CONSOLE	Console for computer network management
4	ETHERNET	Ethernet port, compliant with CNMP standard interface
5, 6	PS1/PS2	Power supply 2 outlet
7	OPT OUT	Optical Output
8	Grounding port	For Grounding

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

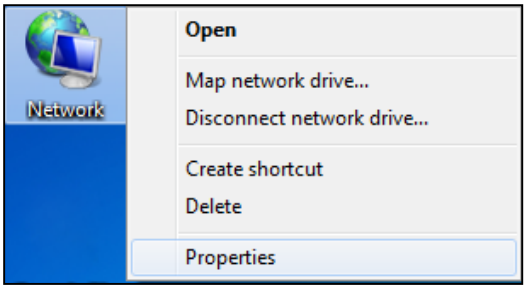
The AT51-F3CT will be in AGC mode (Automatic Gain Control) when first powered on. To change it to MGC mode (Manual Gain Control), refer to **Section 5.3**.

4 Software Description - Operation

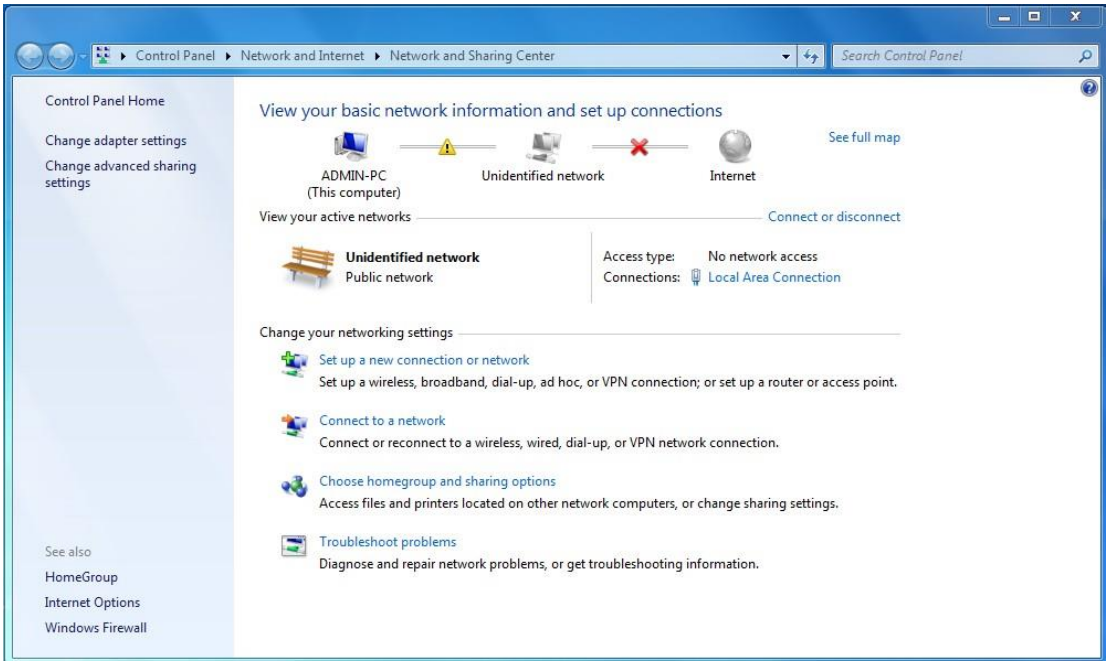
4.1 Web Management

Web server is built in SNMP module. Users can directly view the basic operating parameters and network parameters of the device through the web browser. Popular web browsers include IE of Microsoft, Chrome of Google, Firefox of Mozilla, Opera of software ASA's, etc. The built-in web server of SNMP supports these popular browsers very well. The following diagrams are illustrated by opera browser.

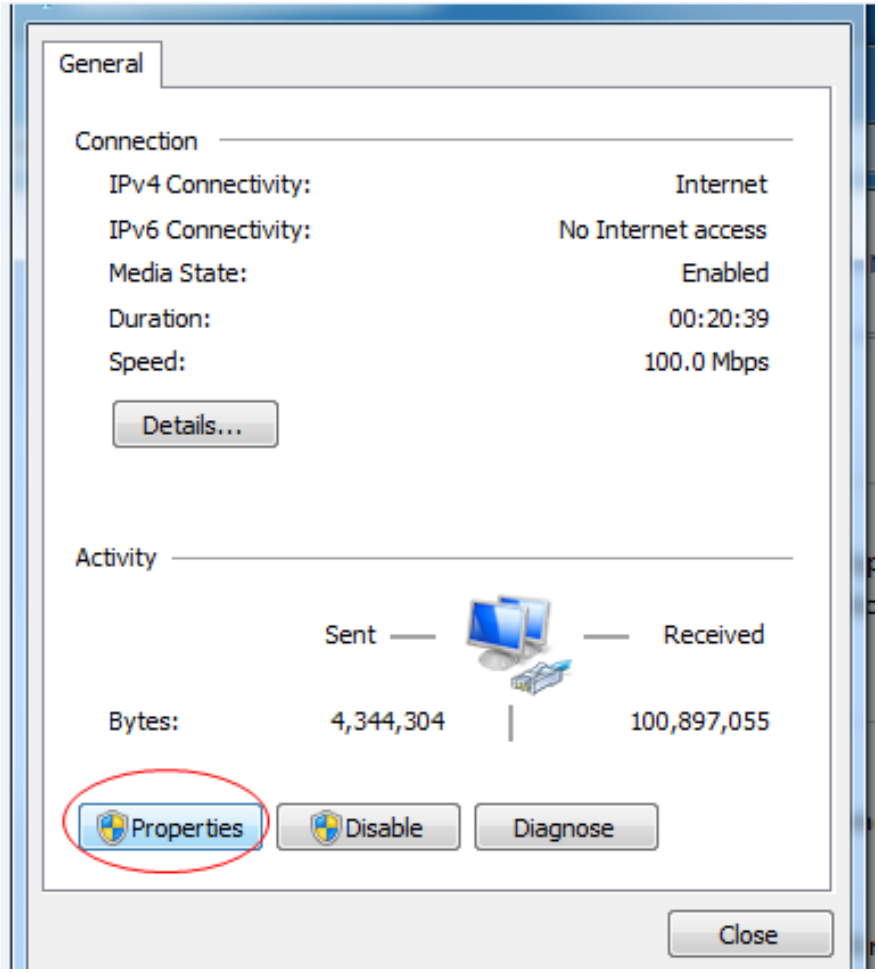
1. Please find the IP address of the device in the LCD panel menu. The default IP address is 192.168.0.22. Set the IP address of the computer to the same network segment as the device, find the "network" icon on the desktop of windows system, select the icon, right-click the mouse, and select "properties" in the pop-up menu.



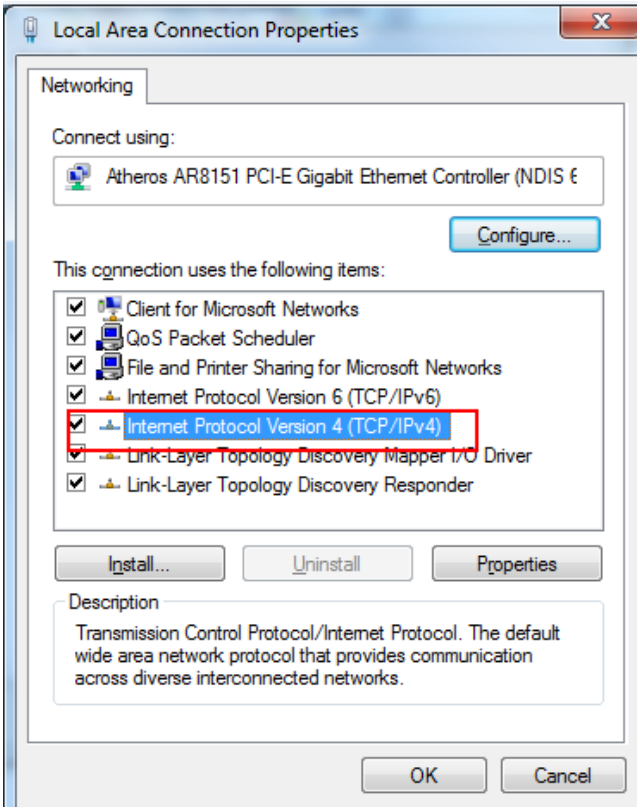
Step 1: Open local Area Connection setting:

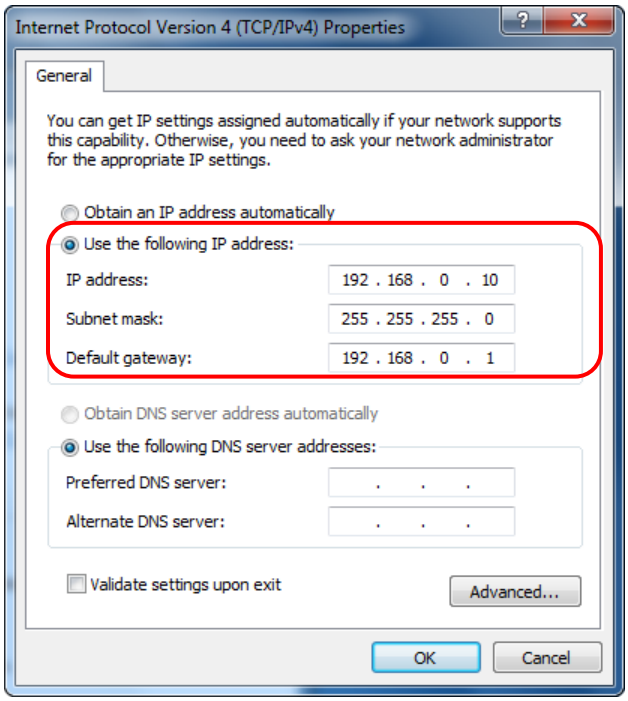


Step 2: Set Properties



Step 3: Set the PC IP address in the same range with device IP address. For example the device IP address is 192.168.0.22, pls set PC IP address to 192.168.0.X (X different from 22).

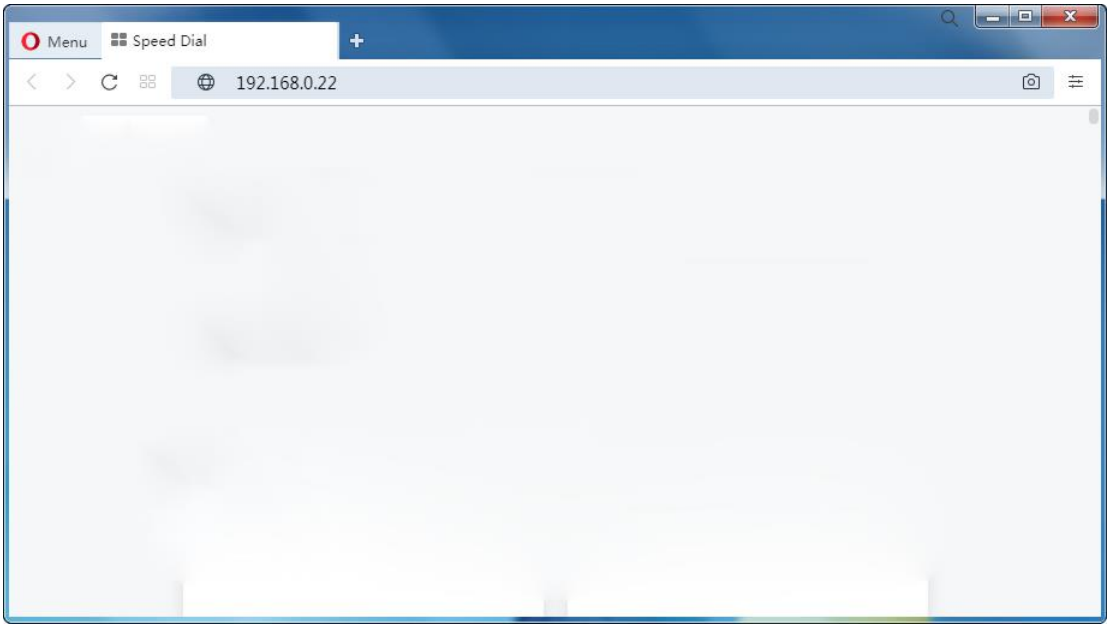


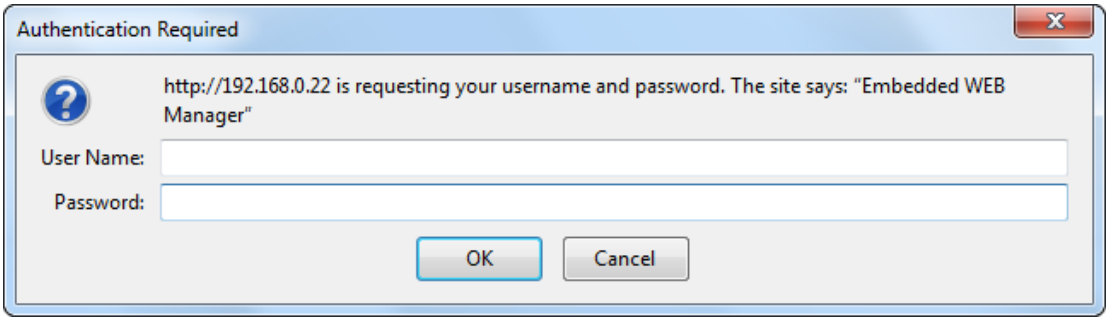


2. Open web browser, input the IP add and login in. The IP factory setting is 192.168.0.22.

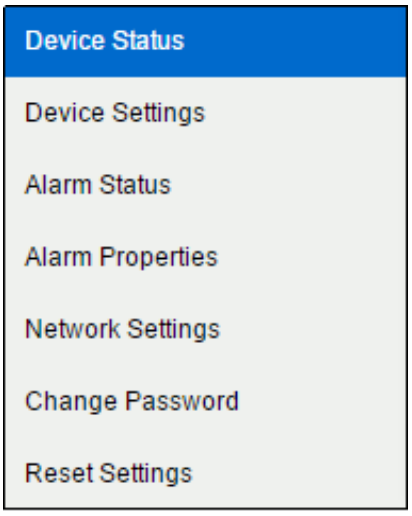
   User Name: admin

   Password: ascent

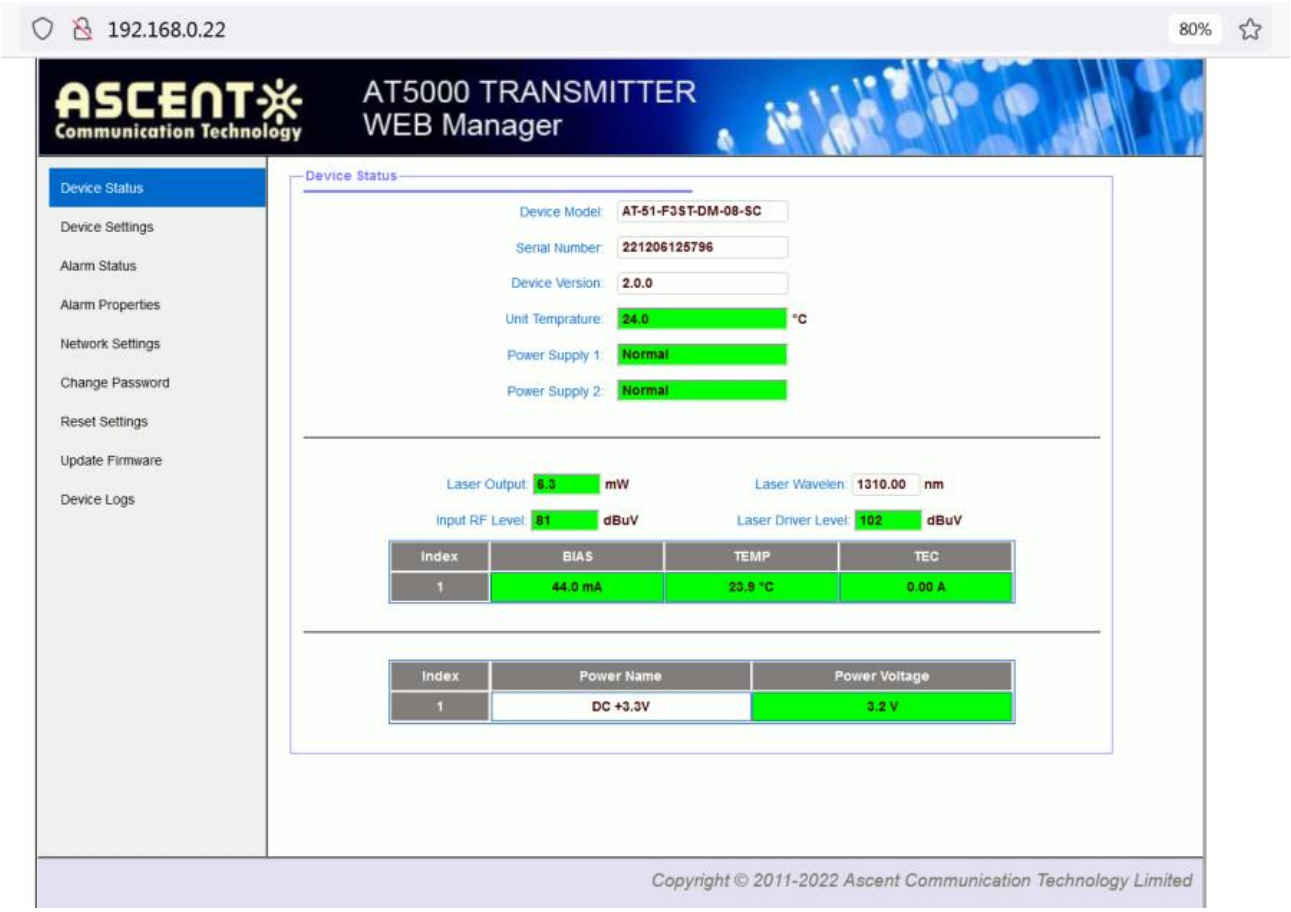




3. The web management consist of five submenus. Items guide on the left, click to enter.



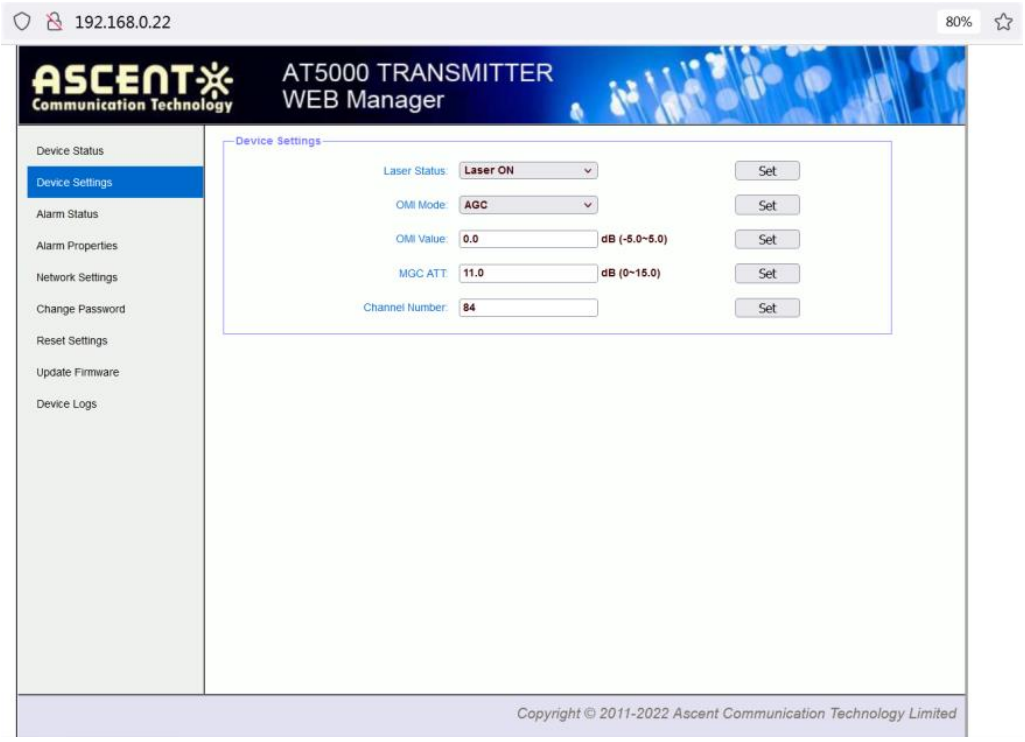
4.2 Device Status Menu



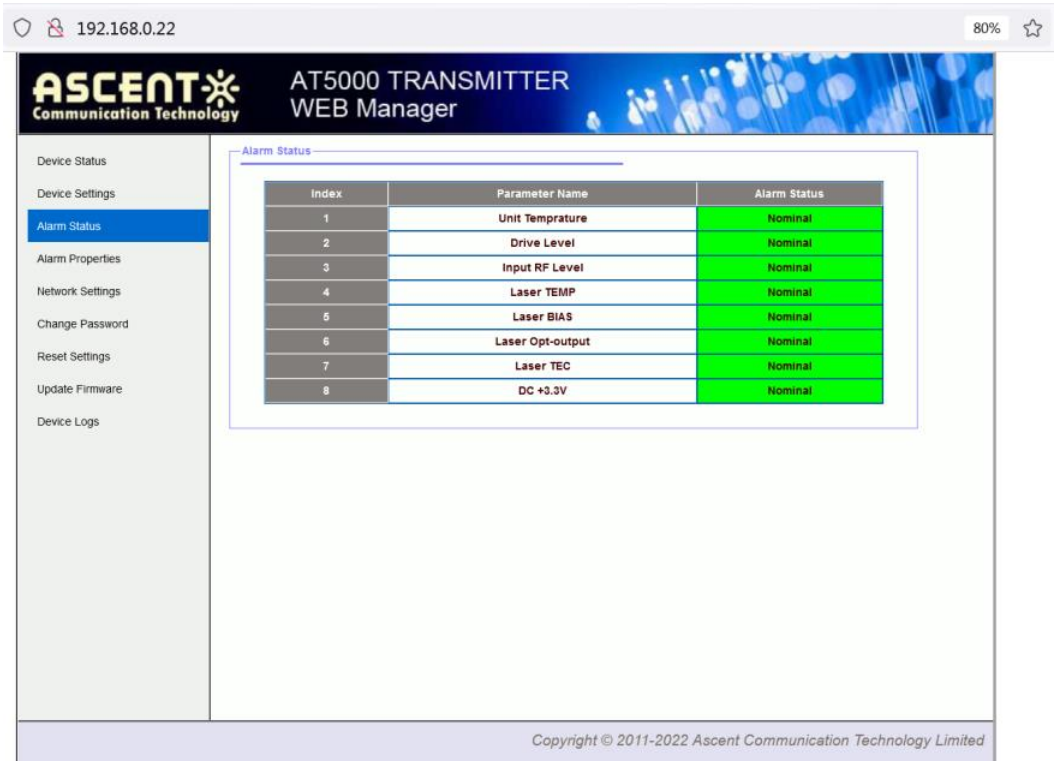
4.3 Device Settings Submenu

OMI mode: switch AGC/MGC statuses.

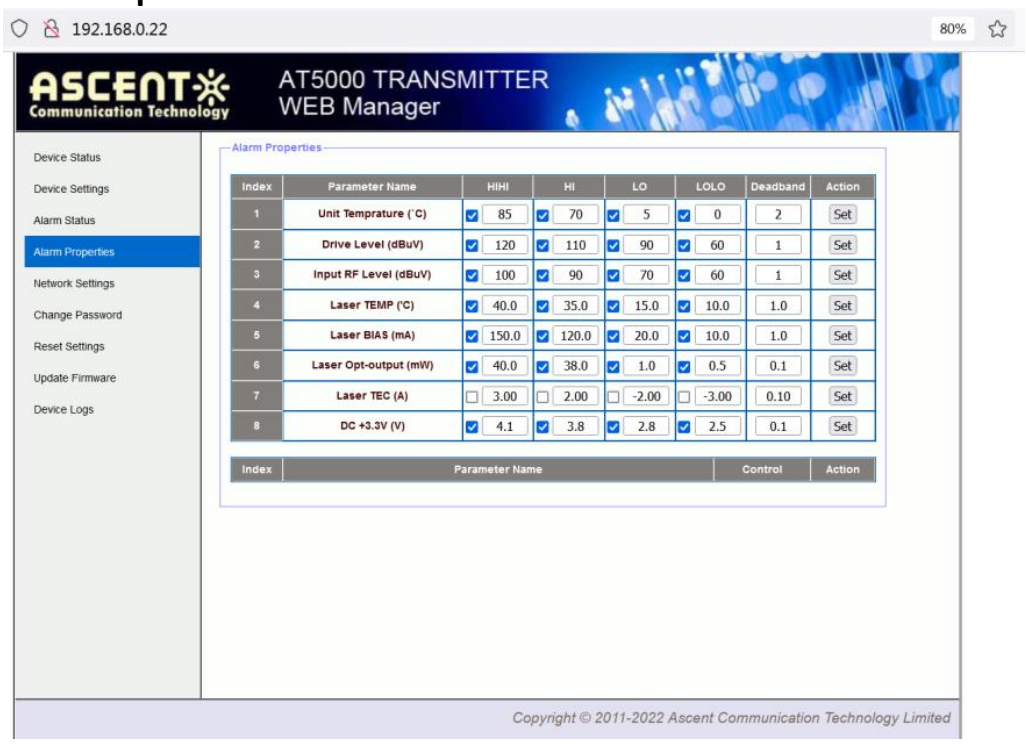
OMI Value: -5 dB to +5 dB adjustable, factory setting is 0 dB.



4.4 Alarm Status

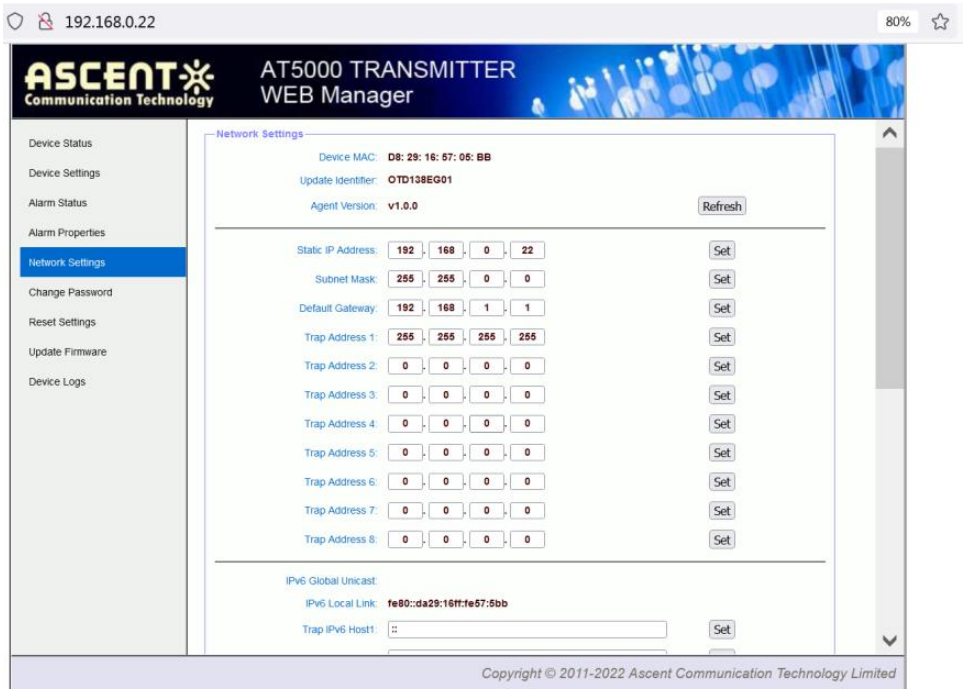


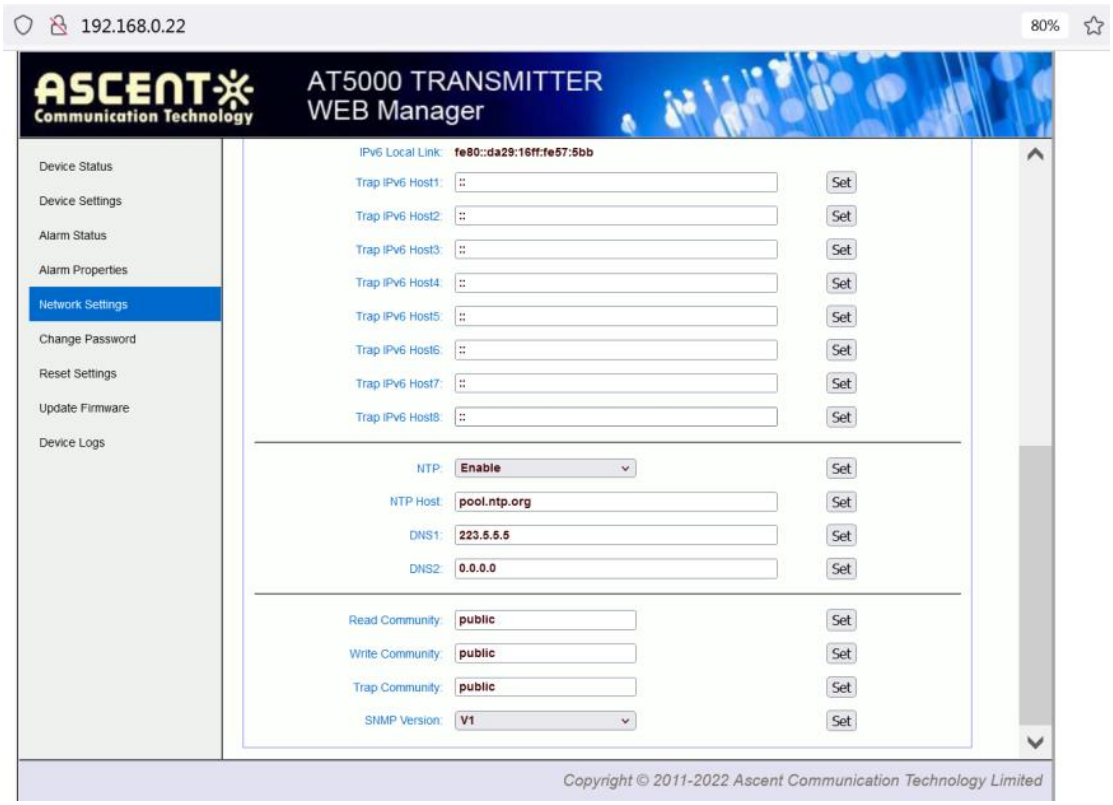
4.5 Alarm Properties



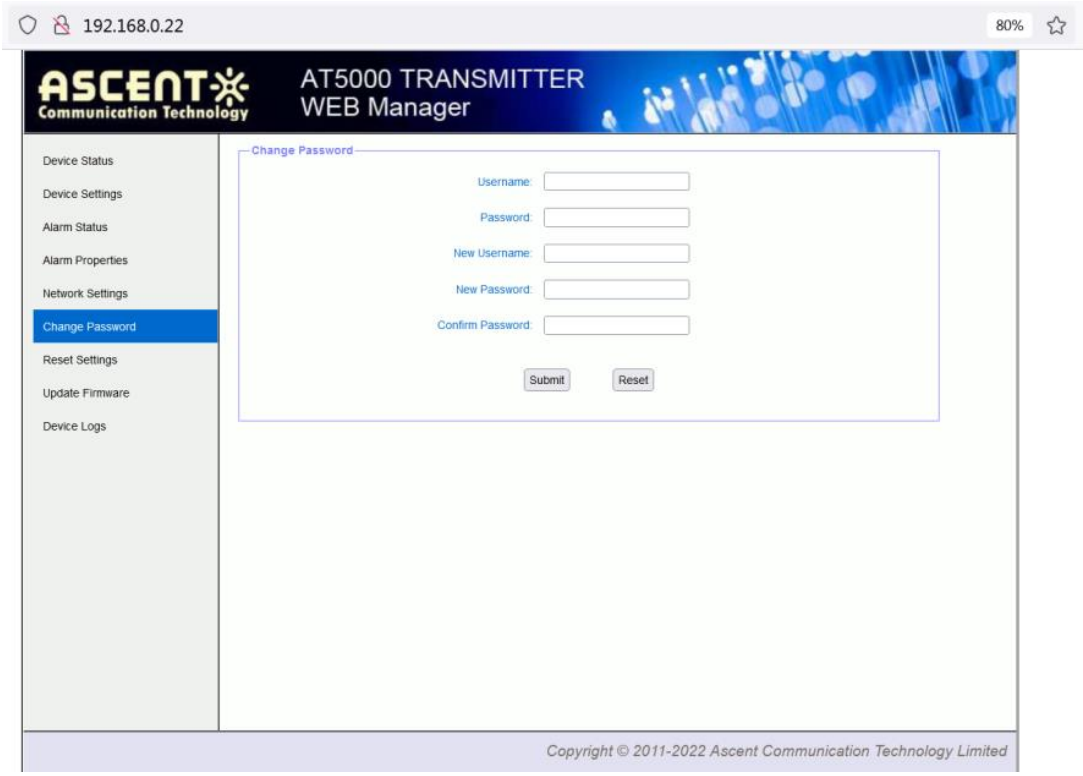
4.6 Network Settings

Set IP Address, etc.

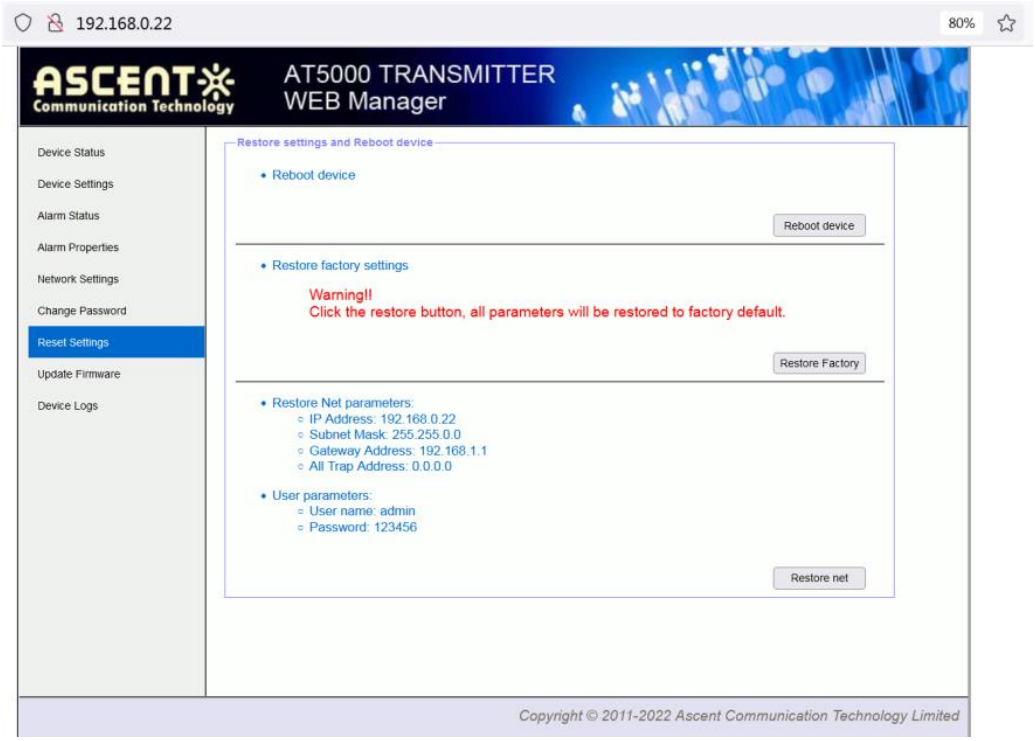




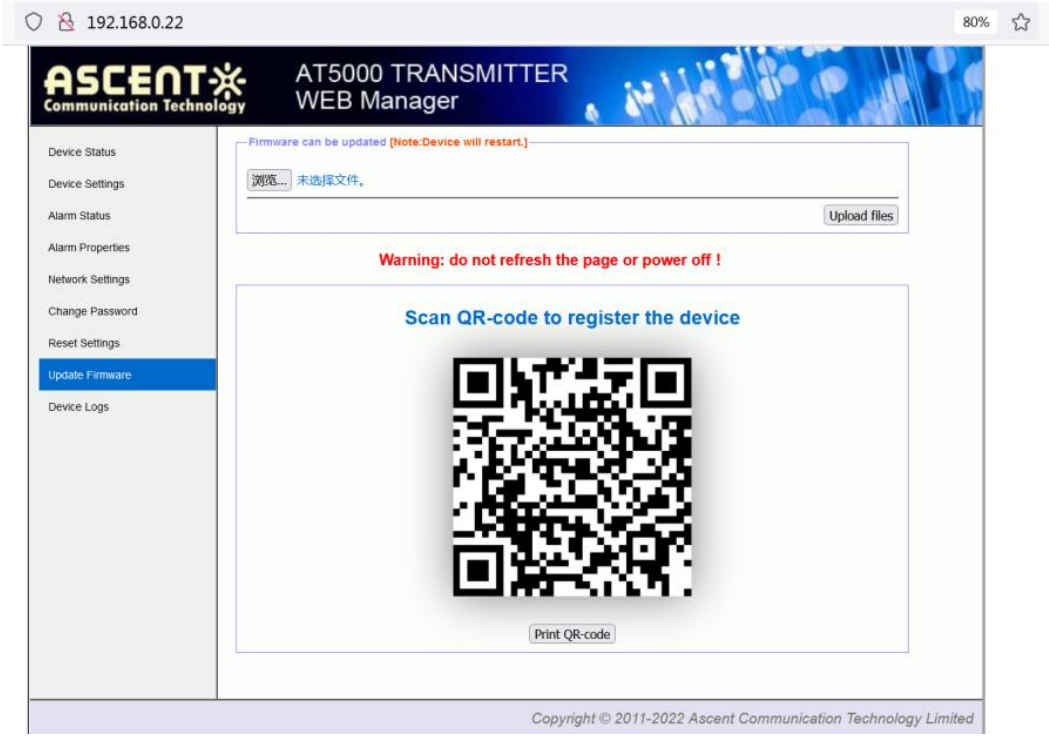
4.7 Change Password



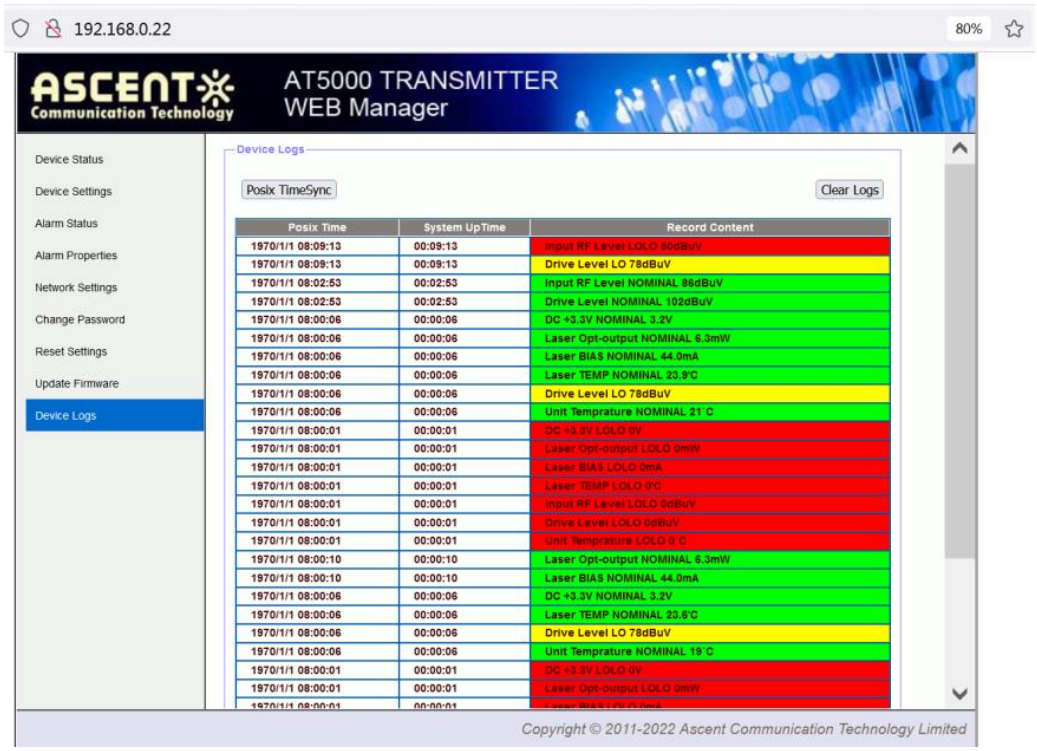
4.8 Reset Settings



4.9 Update Firmware

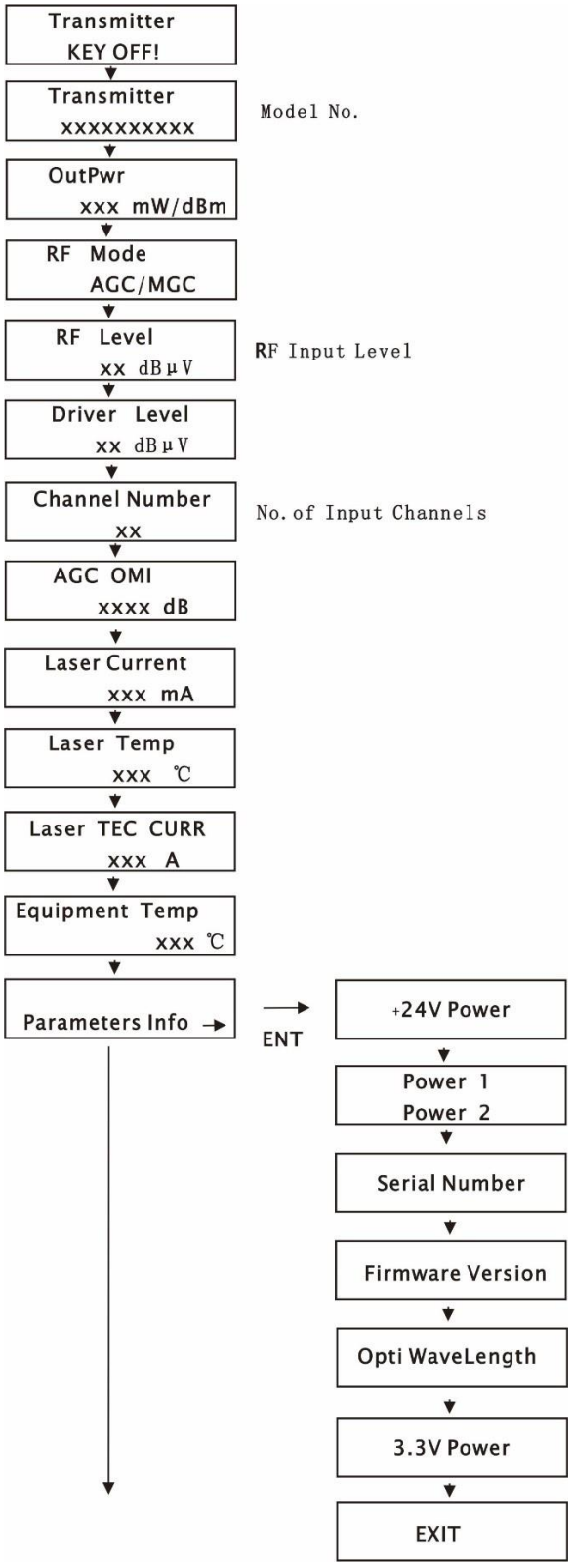


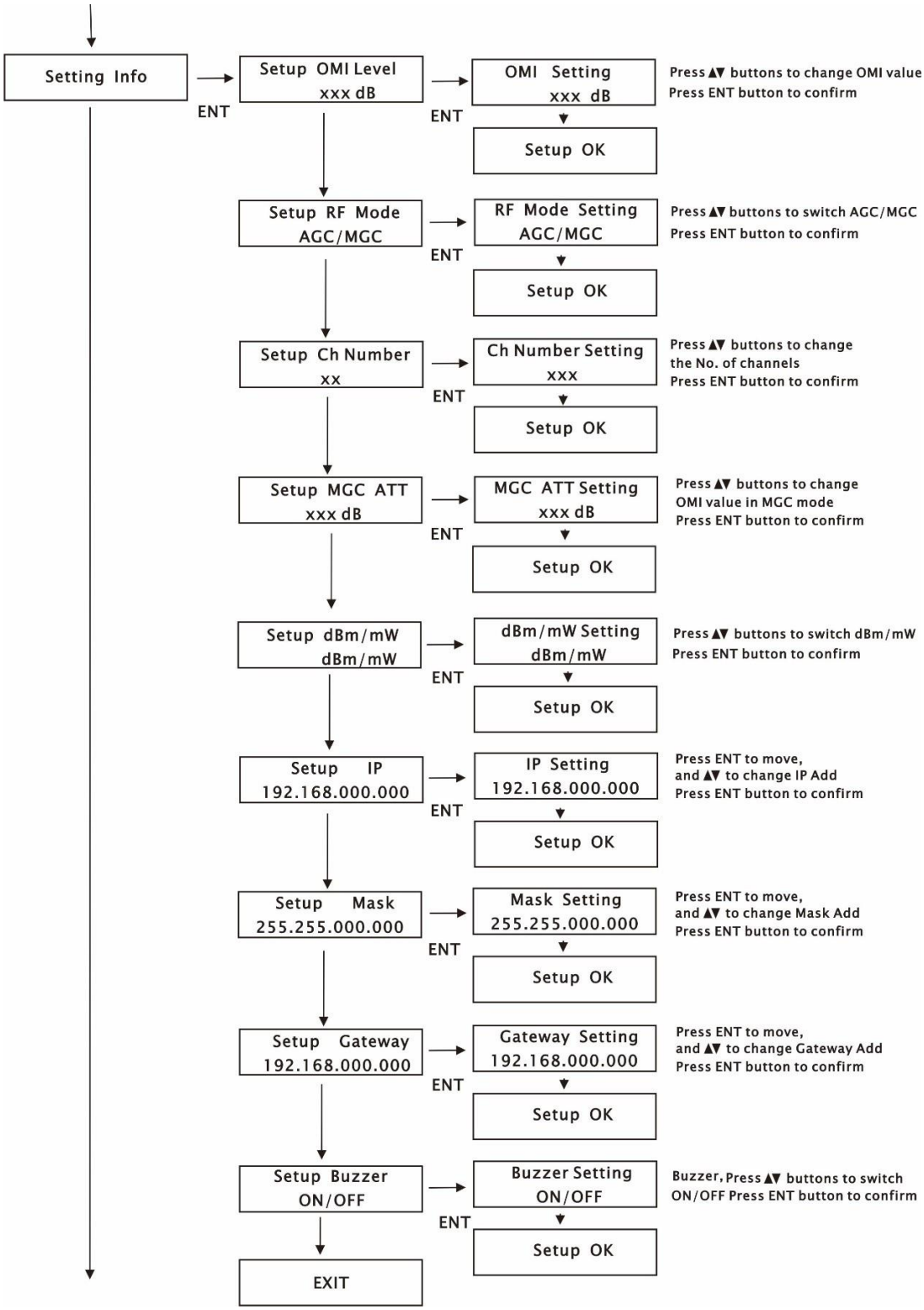
4.10 Device Logs

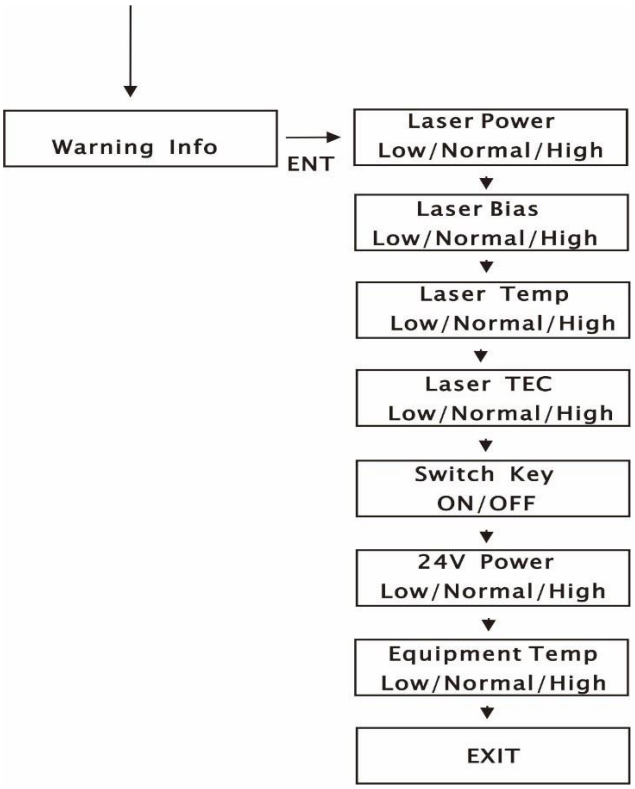


5 Setup Menu

Press the ▼ to display the following menus in turn, and press the ▲ to reverse the cycle.




Setting Info
ENT
Setup OMI Level xxx dB
OMI Setting xxx dB
ENT
Setup OK
Press ▲▼ buttons to change OMI value
Press ENT button to confirm
Setup RF Mode AGC/MGC
RF Mode Setting AGC/MGC
ENT
Setup OK
Press ▲▼ buttons to switch AGC/MGC
Press ENT button to confirm
Setup Ch Number xx
Ch Number Setting xxx
ENT
Setup OK
Press ▲▼ buttons to change the No. of channels
Press ENT button to confirm
Setup MGC ATT xxx dB
MGC ATT Setting xxx dB
ENT
Setup OK
Press ▲▼ buttons to change OMI value in MGC mode
Press ENT button to confirm
Setup dBm/mW dBm/mW
dBm/mW Setting dBm/mW
ENT
Setup OK
Press ▲▼ buttons to switch dBm/mW
Press ENT button to confirm
Setup IP 192.168.000.000
IP Setting 192.168.000.000
ENT
Setup OK
Press ENT to move, and ▲▼ to change IP Add
Press ENT button to confirm
Setup Mask 255.255.000.000
Mask Setting 255.255.000.000
ENT
Setup OK
Press ENT to move, and ▲▼ to change Mask Add
Press ENT button to confirm
Setup Gateway 192.168.000.000
Gateway Setting 192.168.000.000
ENT
Setup OK
Press ENT to move, and ▲▼ to change Gateway Add
Press ENT button to confirm
Setup Buzzer ON/OFF
Buzzer Setting ON/OFF
ENT
Setup OK
Buzzer, Press ▲▼ buttons to switch ON/OFF Press ENT button to confirm
EXIT


Warning Info
ENT
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

Error Status	Possible Reason	Solution	Notes
POWER Yellow	Single power supply working	Connect another power supply	
STATUS Red LASER Red RF Red POWER Yellow	No RF input	Connect RF Input	
STATUS Red LASER Red RF Red LCD Display “KEY OFF”	The key turned to OFF	Turn the key to ON	
Output power LCD displays normal value, but low value by power meter	Output interface or patch cord is dirty.	Clean the output interface with industrial anhydrous alcohol or dust-free paper	
	Power meter error	Change power meter	Top brand power meter is advised

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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