ASCENT
Communication Technology

AT5000 XMOD2

Externally Modulated 1550nm Transmitter

Quick Reference Guide

Revision C

ACT AT5000 Externally Modulated 1550nm Transmitter Equipment

Quick Reference Guide

ACT Document Control: AT5000XMOD2-QRG

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

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Revision History

Revision	Date	Reason for Change
A	11/01/2011	Initial Release
B	02/01/2012	ACT Documentation Control and Formatting
C	06/01/2012	ACT Front Panel Design Update

Contents

1 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.

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.

2 Introduction

2.1 Overview

AT5000 1RU Dual Output 1550nm Externally-Modulated (XMOD) Laser Transmitter offers a flexible, medium and long distance and scalable optical transmission for high quality analog and digital video in CATV networks.

AT5000 XMOD 1550nm series transmitters are designed with two optical output ports with power from 3dBm, 6dBm, 9dBm to 10dBm. These transmitters are equipped with field adjustable Stimulated Brillouin Scattering (SBS) suppression from 13 to 18dBm. AT5000 XMOD series simplifies the application by offering chirp-free operation with confined optical line width and maintain excellent distortion performance CNR, CSO and CTB across the entire network.

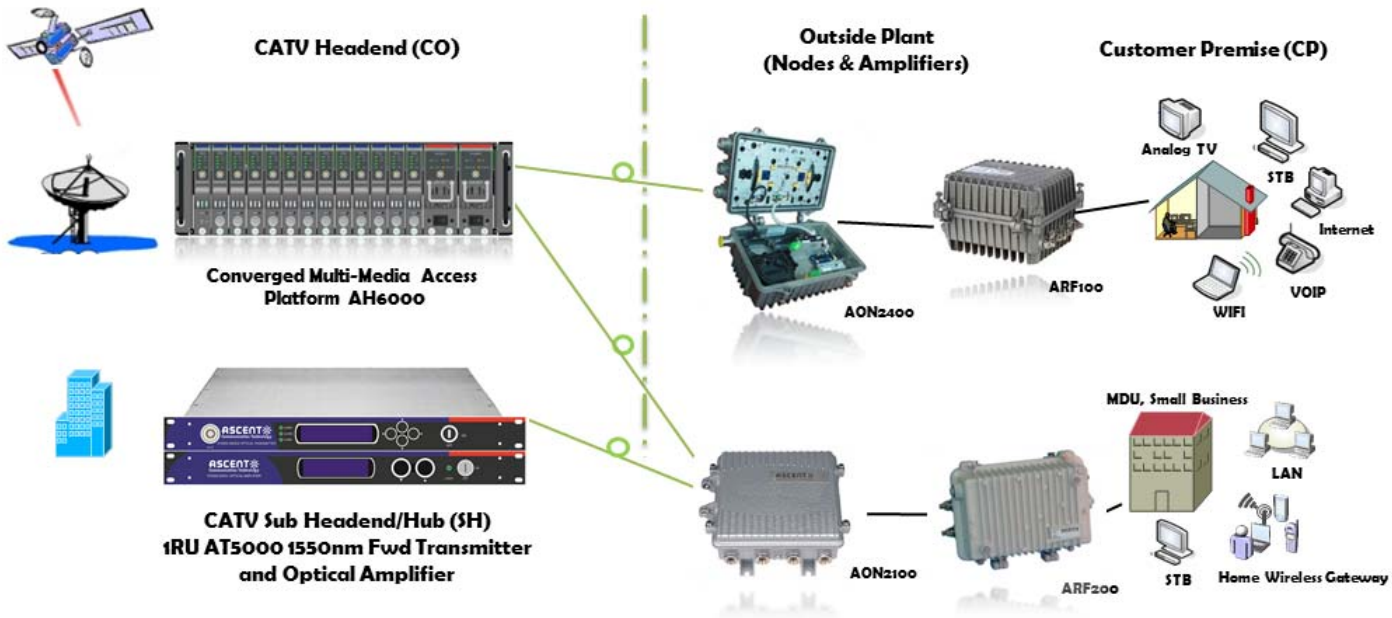
AT5000 XMOD transmitter provides low dispersion transmission with intuitive front panel LCD display to make operator's life easier. The optical transmitter is packaged in a self-contained 19" sub-rack of 1 RU with dual main power supplies and SNMP management.

Together with ACT 1RU EDFA optical amplifiers, the AT5000 XMOD provides an ideal long distance video and short, medium video overlay solution in high density FTTX networks to bring the CATV services to business and home premises.

2.2 Features

- High performance on CSO, CTB with RF pre-distortion circuit
- Dual optical output power up to 10dBm
- Suitable for long distance 1550 nm DWDM Video transmission applications
- Suitable for short, medium distance FTTH applications
- Low noise DFB continuous wave laser, reduce the dispersion effect
- Optimized models for 60 PAL or 89 PAL channels, 80 NTSC channels or 110 NTSC channels
- Dual redundant hot-swappable AC or DC power supplies
- Field-adjustable Stimulated Brillouin Scattering (SBS) suppression for optimized CSO
- Front-panel LCD for local monitoring of transmitter status
- Local or remote monitoring and configuration
- SNMP/HTTP monitoring, management and control

Application Diagram



2.3 Specifications

AT5000 XMOD2 1550nm Externally-Modulated (XMOD) Laser Transmitter - 19" 1RU

RF Specification

RF bandwidth:	47~862MHz or 47~1002 MHz
RF flatness:	+/-0.75 dB @ 47~862MHz, +/-1.5dB@47~1003 MHz
RF Input Level:	18~28dBmV
RF input return loss:	≥ 16 dB (47-550MHz), ≥ 14 (550MHz-862MHz)
RF input impedance:	75 Ω
RF test point:	-20 dB
TV channel plan:	60 or 89 PAL channels 80 or 110 NTSC channels

Link Performance

CNR	53dB (59ch PAL-D, TX to RX, 0dBm receive) 51.5dB (59ch PAL-D, 65km fibre, TX with 16dBm EDFA to RX, 0dBm receive)
CTB	-65dBc
CSO	-65dBc

Optical Specifications

Wavelength:	1550+/-5nm and ITU Ch 21, 23, 25, etc.
Line Width:	0.65 MHz typical
Optical Output Power, Port 1 & 2:	2×6dBm, 2×9dBm (2x10dBm upon request)
Optical Connector	SC/APC
Optical Return Loss	50dB
SBS Suppression	13-18dBm Field Adjustable

General Specifications

Operating Temp, °C	0 to 50
Storage Temp, °C	-40 to 85
Power Supply	90 to 265 VAC or 30 to 72 VDC
Operating relative humidity, %	5 to 95
Power Consumption, W	<50
Dimensions (W x D x H)	483x368x44 mm, 19x14.5x1.75 inch
Weight, kg	5 kg

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

2.4 Models and Options

AT-5000 XMOD2 Series	Description
AT-50-XMOD2-00-06-SC-AC	AT5000 XMOD TX Dual Output TX, 870MHz, 1RU 1550+/-5, 2x6dBm optical output, SC/APC, Dual AC
AT-50-XMOD2-00-09-SC-AC	AT5000 XMOD TX Dual Output TX, 870MHz, 1RU 1550+/-5, 2x9dBm optical output, SC/APC, Dual AC
AT-50-XMOD2-21-06-SC-AC	AT5000 XMOD TX Output TX, 870MHz, 1RU ITU Ch 21, 2x6dBm optical output, SC/APC, Dual AC
AT-50-XMOD2-21-09-SC-AC	AT5000 XMOD TX Output TX, 870MHz, 1RU ITU Ch 21, 2x9dBm optical output, SC/APC, Dual AC
AT-51-XMOD2-00-06-SC-AC	AT5000 XMOD TX Dual Output TX, 1002MHz, 1RU 1550+/-5, 2x6dBm optical output, SC/APC, Dual AC
AT-51-XMOD2-00-09-SC-AC	AT5000 XMOD TX Dual Output TX, 1002MHz, 1RU 1550+/-5, 2x9dBm optical output, SC/APC, Dual AC
AT-51-XMOD2-00-10-SC-AC	AT5000 XMOD TX Dual Output TX, 1002MHz, 1RU 1550+/-5, 2x10dBm optical output, SC/APC, Dual AC

Note: Contact ACT for additional product variations on output power, 1GHz, specific ITU channels, optical connectors etc.

3 Installation

3.1 Equipment Inventory

On receiving your new AT5000-XMOD2, 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 AT5000-XMOD2 should consist of the following:

Qty	Description
1	AT5000-XMOD2 Unit
1	Key for switching laser ON / OFF
1	Power supply cord
1	Optional Product User Manual (includes individual test sheet)

3.2 Packaging and Transportation

Keep all AT5000-XMOD2 packing boxes and packaging for future transport.

Use only the original AT5000-XMOD2 packaging when transporting. This packaging has been specifically designed to protect the equipment.

3.3 Power and Cooling Requirements

The AT5000-XMOD2 requires a mains input of 90~265 Vac at 50~60 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 watts maximum.

The transmitter is designed to operate with an ambient temperature of 0~50 °C with humidity up to 85%. 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 AT5000-XMOD2 should have a minimum ventilation clearance of 1 RU above and below the transmitter.

CAUTION:

DO NOT expose AT5000-XMOD2 to conditions which would permit condensation to form on the inside of the transmitter.

DO NOT operate AT5000-XMOD2 outdoors.

3.4 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 AT5000-XMOD2 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: AT5000-XMOD2" 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.

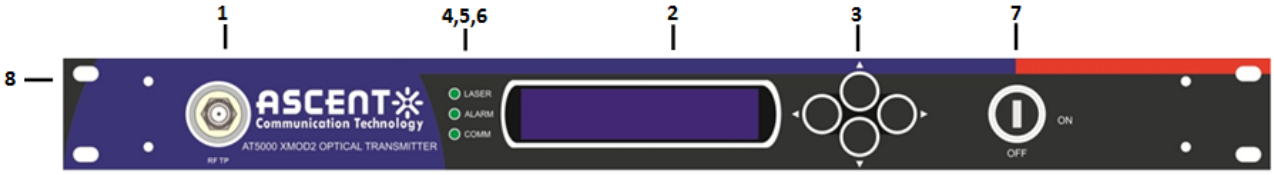
Note:

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 **OPT. OUT 1** to an optical power meter and verify the LCD reading matches your power meter reading.

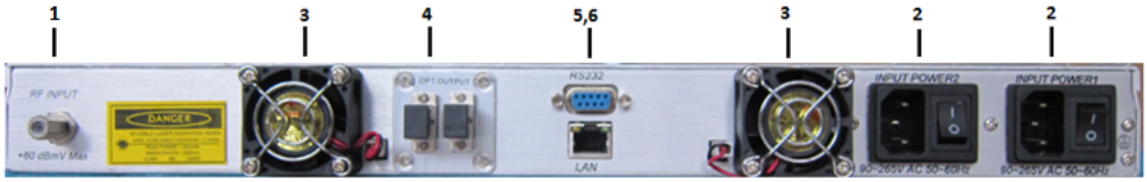
   When the ALARM LED shows green, the transmitter is ready for full operation.

3.5 Front Panel Operation



Port	Item	Description
1	RF TEST	-20 dB RF test point.
2	LCD	2-line, back-lit LCD for user interface.
3	KEY PAD	Keypad used to scroll through menu items on transmitter display.
4	COMM	Communication indicator. FLASHING – Transmitter is communicating with external terminal. OFF – No communication.
5	ALARM	Transmitter summary alarm indicator. GREEN – System parameters are all OK. RED – There is at least one alarm in the system.
6	LASER	Laser operating indicator. OFF – Laser transmitter is OFF. GREEN – Laser transmitter is ON.
7	LASER ON/OFF	Key switch for laser activation.
8	Mounting points	Holes for securing unit to rack.

3.6 Rear Panel Operation



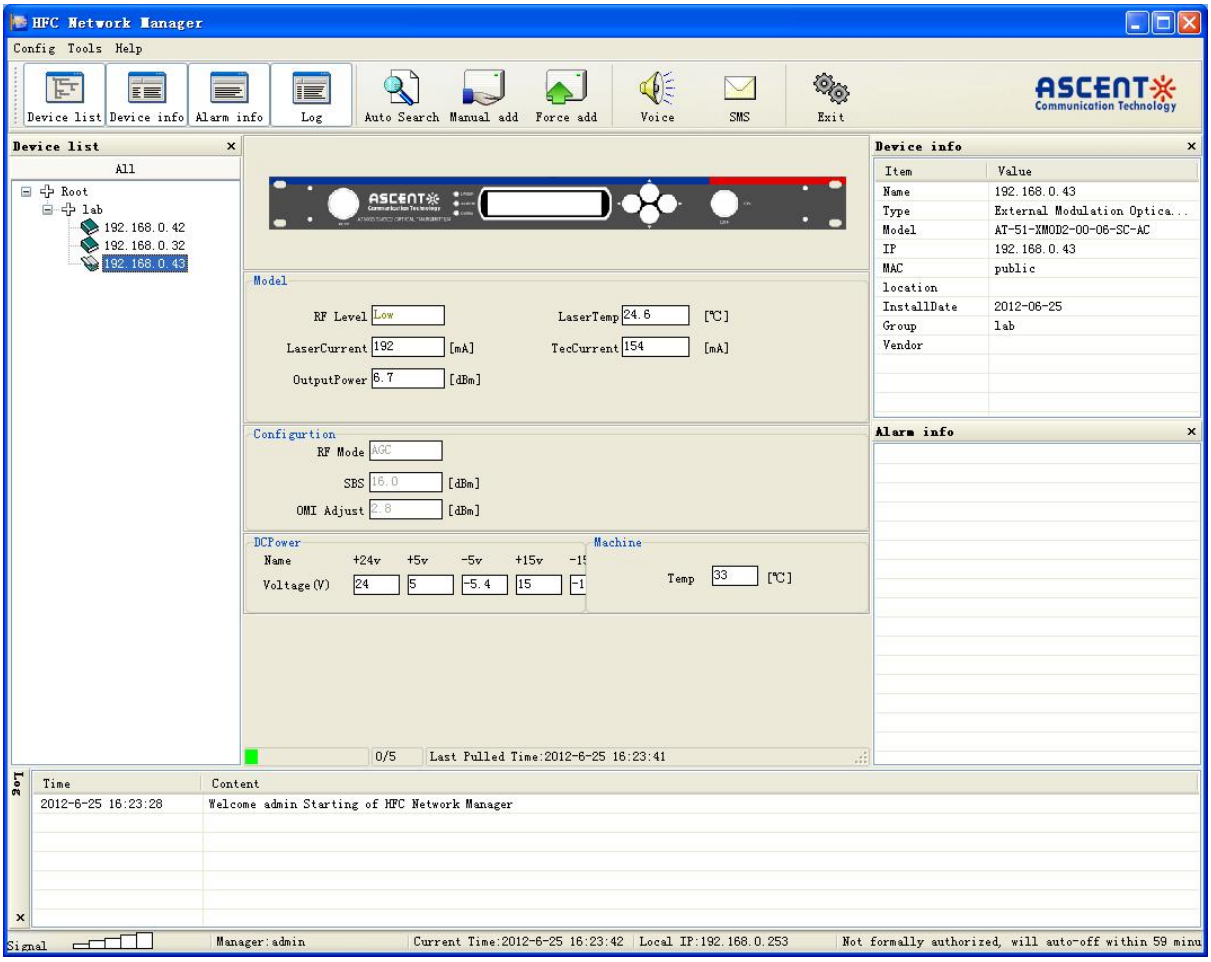
Port	Description	
1	RF Input	RF input port, 75Ω, F-type female RF connector.
2	IEC Main Input Power 1 & 2	Mains input power, 90~265 Vac, 50 / 60 Hz, fused IEC input, includes spare fuse. Inlets 1 to 2 for power redundancy.
3	Fan Outlets	Fan forced air flow for enhanced heat dissipation.
4	OPT. OUT (optical 1 & 2)	Optical out interface, optical 1& 2.
5	RS232	RS232 Serial Port
6	LAN Network Management	Fast Ethernet port (10/100) for SNMP network management and HTTP interface.

Note:

Product appearance may vary with model options.

3.7 Local Ethernet Communication Ports

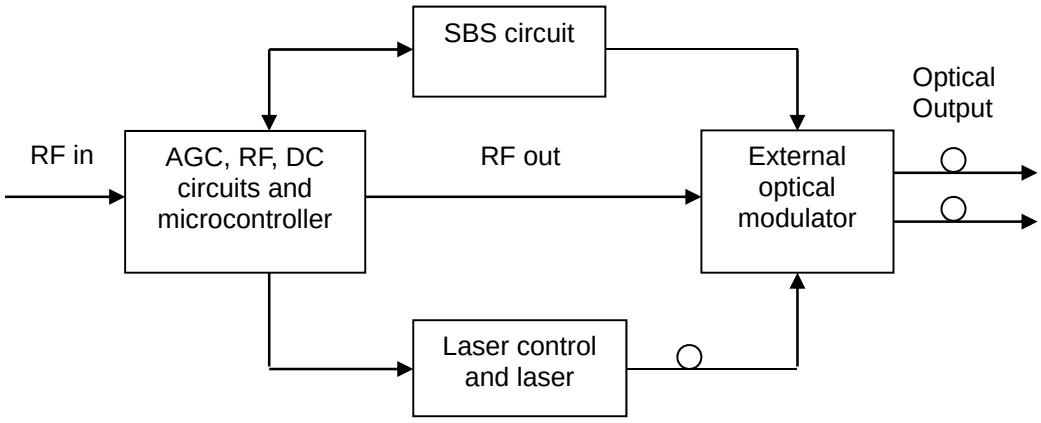
The AT5000-XMOD2 allows the monitoring of its status parameters from a laptop or local PC via its RJ45 LAN and SNMP Port. Refer to the section 5.2.7 for default IP address. GUI interface as follows:



4 Technical Description

4.1 Overview

The following block diagram outlines the essential elements of the transmitter.



The RF signal enters the transmitter through the F-type connector on the rear panel, which feeds the AGC and RF sections of the transmitter. The RF section minimizes the CTB by producing CTB products of the same amplitude, but 180° out of phase with the CTB produced later in the modulator.

The RF signal then is input to the external optical modulator and modulated onto the light passing through the modulator.

Controlling the operating point of the modulator minimizes CSO. The light source is a DFB laser spliced to the optical modulator.

The SBS circuit is also connected to the modulator. This circuit compensates for any non-linear effects due to Stimulated Brillouin Scattering (SBS), which occur in optical fibers carrying optical signals launched at high powers.

A microprocessor controls and monitors the operation of the transmitter's internal circuits.

4.2 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.

4.3 AGC Operation

The AT5000-XMOD2 will be in AGC mode (Automatic Gain Control) when first powered on. To change it to MGC mode (Manual Gain Control), refer to **Section 5.2.5**.

4.4 SBS Suppression

The SBS suppression circuitry is based on industry techniques for line-width broadening the source. All of these schemes involve spreading out the optical power so that the optical power in any one region of the optical spectrum does not exceed the threshold at which SBS effects start to become evident.

The SBS suppression of the externally modulated laser transmitter needs to be optimized for the best possible CSO performance. The selected value needs to match the maximum optical drive level in the fiber lines. For short lines this level can be a bit higher than for very long lines. A reduced line drive level together with a reduced SBS suppression threshold in the transmitter increases the maximum achievable system range. The AT5000-XMOD2 incorporates field-selectable SBS thresholds. Ensure that the selected level will match the fiber line drive level as close as practical for best performance.

Follow the steps below to determine the correct SBS value for your optical network.

1. Look at the network design that the TX will be used in and determine the highest optical power launched into the actual transmission fiber. Keep in mind this is not necessarily the launch power out of the EDFA or the power into the passive devices that may be placed ahead of the fiber. If possible, measure the actual power that will be launched into the transmission fiber.
2. After determining the highest value of optical launch power in the network record this value.
3. Now, using the SBS adjust menu on the front panel, set the SBS threshold to this value you have recorded in step 2. Your system is now at its optimized operating point for both CNR (low frequencies) and CSO (high frequencies).
4. If this value is higher than +18 dBm then you will have to add loss to your optical network at this point, the transmitter does not support a SBS level higher than this.
5. If this value is lower than +14 dBm then set the TX to this minimum setting and your network will be at its optimized operating point.
6. To verify that you are not beyond the SBS threshold or that the TX SBS setting is correct, you can measure the CNR at the lowest frequency channel in your system. If the CNR is within specification then you do not have any SBS setting issues.

4.5 ITU Frequency Grid – AT5000-XMOD2 Wavelength Options

The following table contains the ITU frequency plan with corresponding wavelengths available to the AT5000-XMOD2.

Channel Order Code	ITU Freq. (THz)	Avail. ITU W'lengths (nm)	Channel Order Code	ITU Freq. (THz)	Avail. ITU W'lengths (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

5 Software Description – Operation

5.1 AT5000-XMOD2 Program Structure

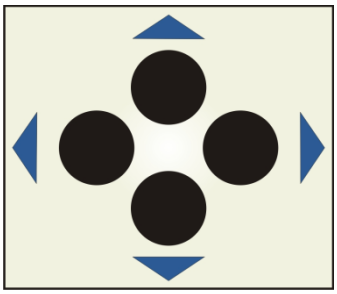
The basic control function allows for status monitoring and control of the transmitter either locally via the keypad and LCD, or remotely via the RJ45 communications port.

User set levels are all saved in the EEPROM or microcontroller so that setup and commissioning of the transmitter is required only once, even after power down.

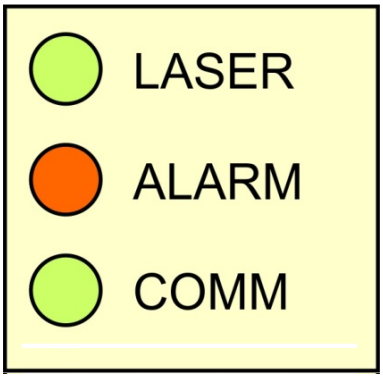
The program reports any conditions outside pre-set limits by operating the module's front-panel ALARM LED.

LINE LCD

KEY PAD



STATUS LEDs



5.2 Programming Sequence for AT5000-XMOD2

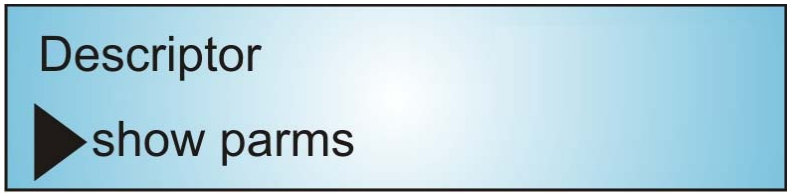
5.2.1 Overview

The user has the ability to perform the following functions on the AT5000-XMOD2 laser transmitter via the LCD and keypad:

- Read the status parameters of the transmitter, such as RF level, laser current, laser temperature, SBS state, optical output power and system temperature.
- Set ITU.T wavelength level.
- Adjust OMI level.
- Select RF mode.
- Adjust SBS suppression.
- Set IP address.
- Set Submask address.
- Set Gateway address.
- Set TRAP1 address.
- Set TRAP2 address.

5.2.2 Read the Status Parameters of the Transmitter

For a full list and explanation of the parameters used in the AT5000-XMOD2 refer to **Section 5.3 - AT5000-XMOD2 Status Monitoring**.



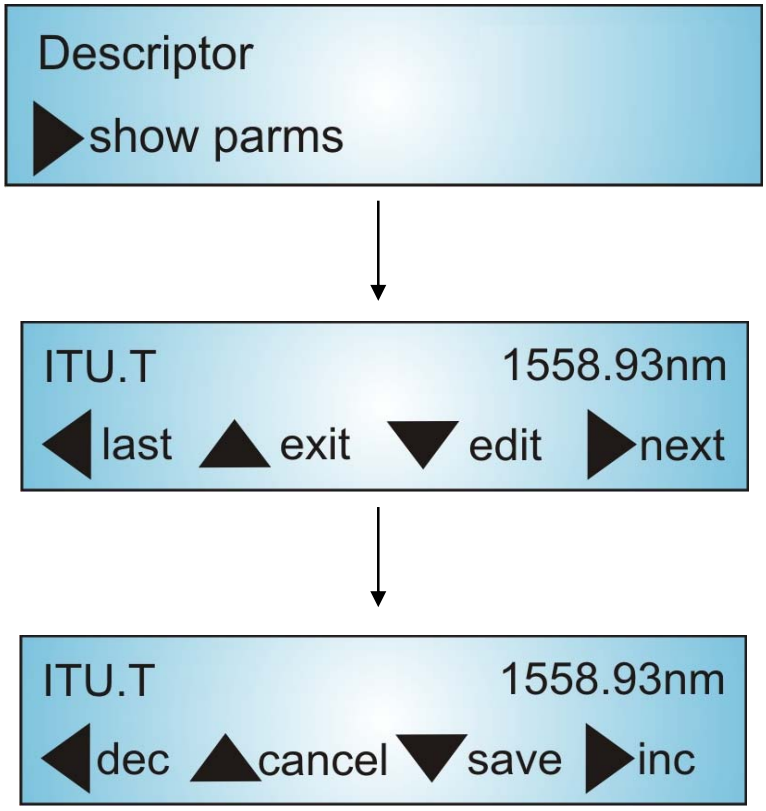
In the main menu, press ➔ key to toggle between parameters.

> **Note:**
>
> The LCD displays only 2 lines at a time. The first line shows the parameter description and current value/status; the second line shows the key selections.

Press ↑ to return to the main menu at any time.

5.2.3 Set ITU.T Wavelength Level

This menu is where optical wavelength can be adjusted via the ITU frequency standard.
Refer to **Section 4.5** for the full ITU Frequency grid.
To adjust the optical wavelength, please follow these instructions:



In the main menu, press → key to toggle to **ITU.T**.

Press ↓ edit once, you now may press → or ← to change the value.

Press ↓ to save changes.

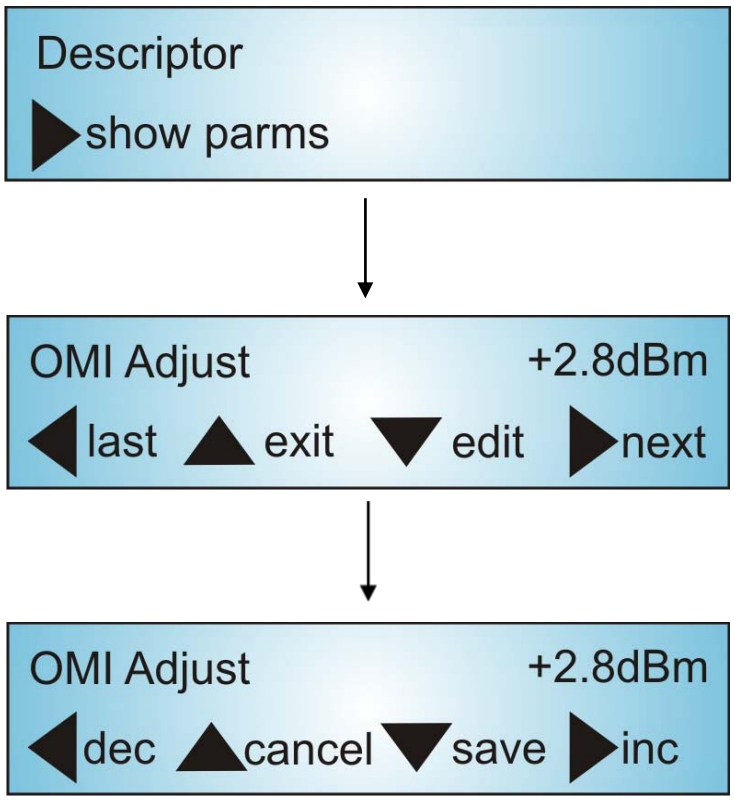
Press ↑ to return to the main menu at any time.

5.2.4 Adjust OMI Level

This menu is where the OMI can be lowered or raised, depending on the desired performance of the optical link:

- If raised, the CNR will increase, but at the expense of the CTB/CSO.
- If lowered, the CNR will decrease, but the CTB/CSO will improve.

As a general rule, CNR improvement vs. CTB degradation is a 2:1 ratio. In other words, if the CNR improves by 1 dB the CTB get worse by 2 dB. This is only the case if the gain control is in manual mode and the RF input is within the specified range of the TX.



In the main menu, press → key to toggle to **OMI Adjust**.

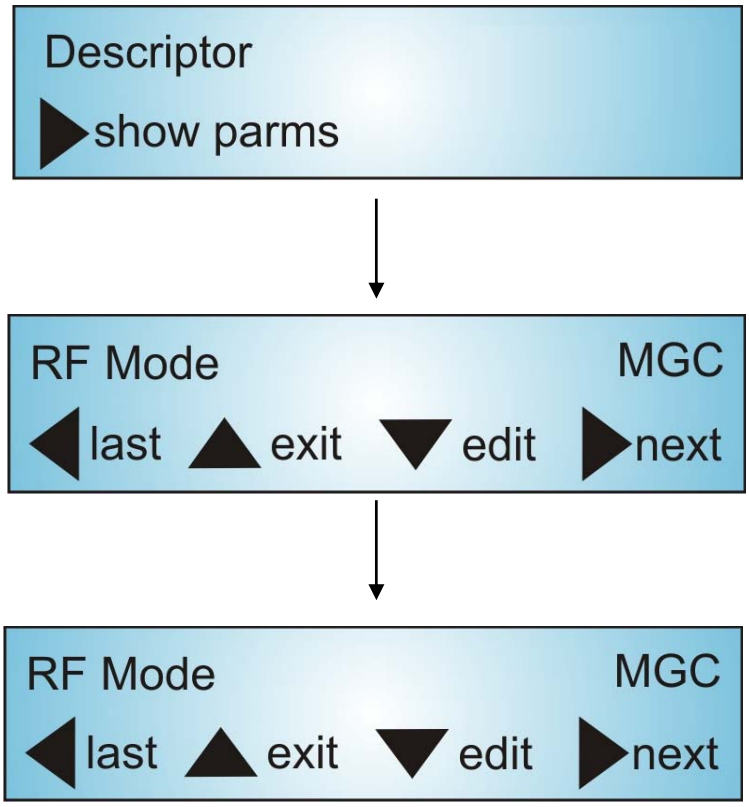
Press ↓ edit once, you now may press → or ← to change the value.

Press ↓ to save changes.

Press ↑ to return to the main menu at any time.

5.2.5 Select RF Mode

Use this menu to select either MGC or AGC mode.
To set the gain control mode (manual or automatic), follow these instructions:



In the main menu, press → key to toggle to **RF Mode**.

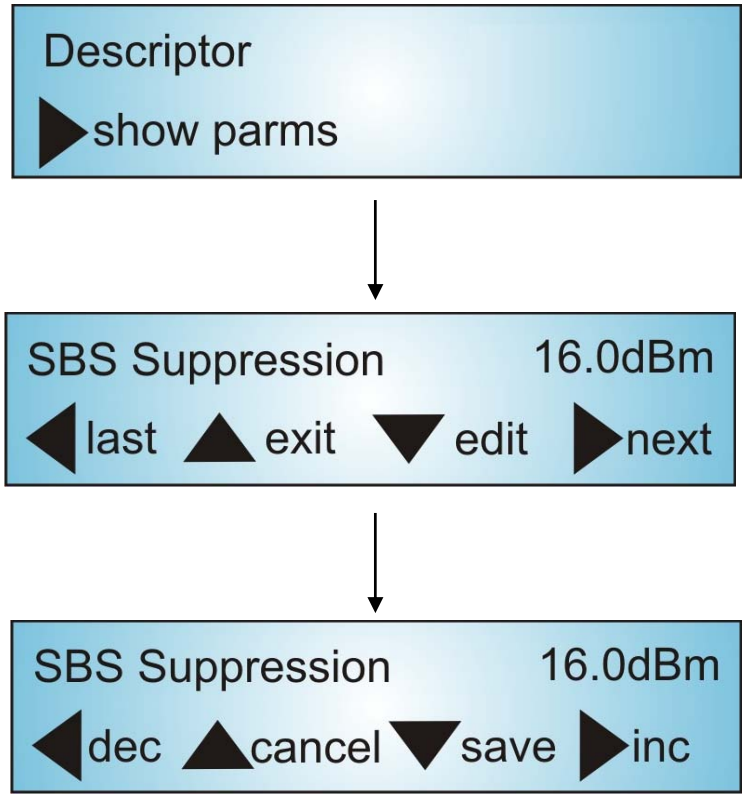
Press ↓ edit once, you now may press → or ← to change to either **MGC** or **AGC** mode.

Press ↓ to save changes.

Press ↑ to return to the main menu at any time.

5.2.6 Adjust SBS Suppression

This menu is where the SBS level of the TX would be tuned to match the launch power.
Refer to **Section 4.4** to determine the correct SBS value for your optical network.
To adjust SBS suppression, follow these instructions:



In the main menu, press → key to toggle to **SBS Suppression**.

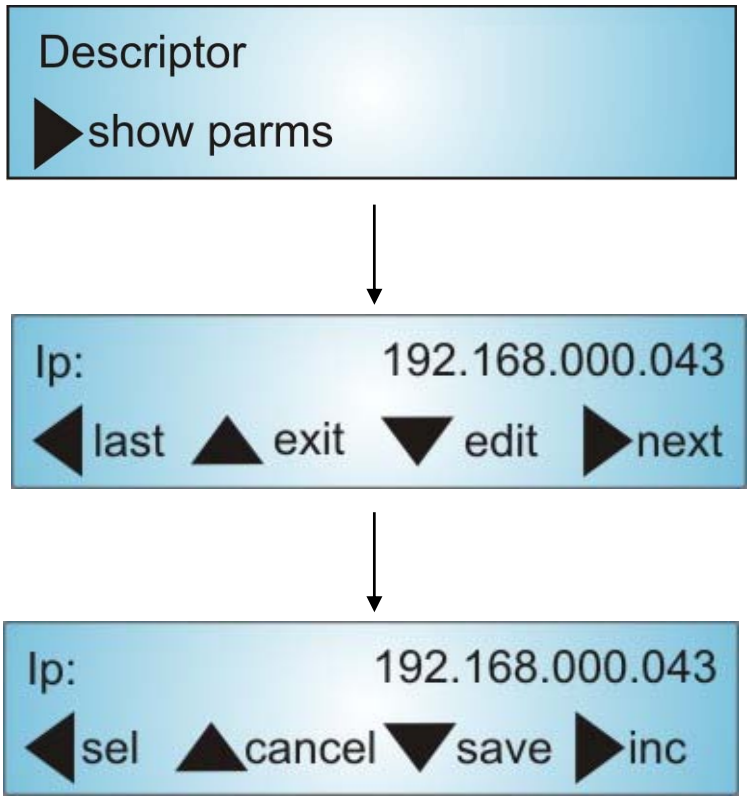
Press ↓ edit once, you now may press → or ← to change the value.

Press ↓ to save changes.

Press ↑ to return to the main menu at any time.

5.2.7 Set IP Address

This menu is where the IP address of the SNMP unit is set.
To set the IP address of the SNMP unit, follow these instructions:



In the main menu, press key to toggle to **Ip**.

Press edit once, you now may press to move to the digit you want to change.

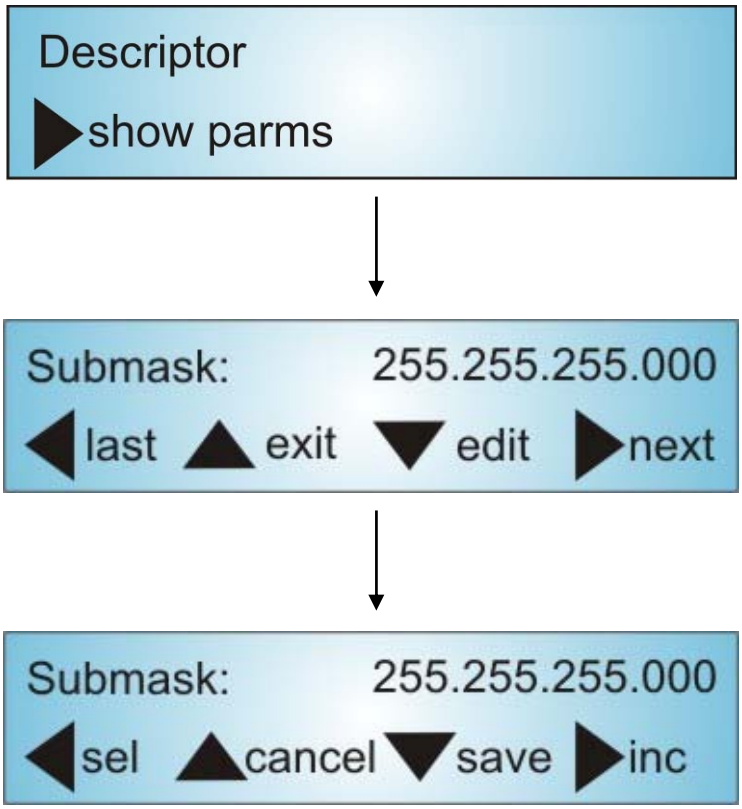
Press to increment the selected digit by one.

Press to save changes.

Press to return to the main menu at any time.

5.2.8 Set Submask Address

This menu is where the submask address is set.
To set the submask address, follow these instructions:



In the main menu, press → key to toggle to **Submask**.

Press ↓ edit once, you now may press ← to move to the digit you want to change.

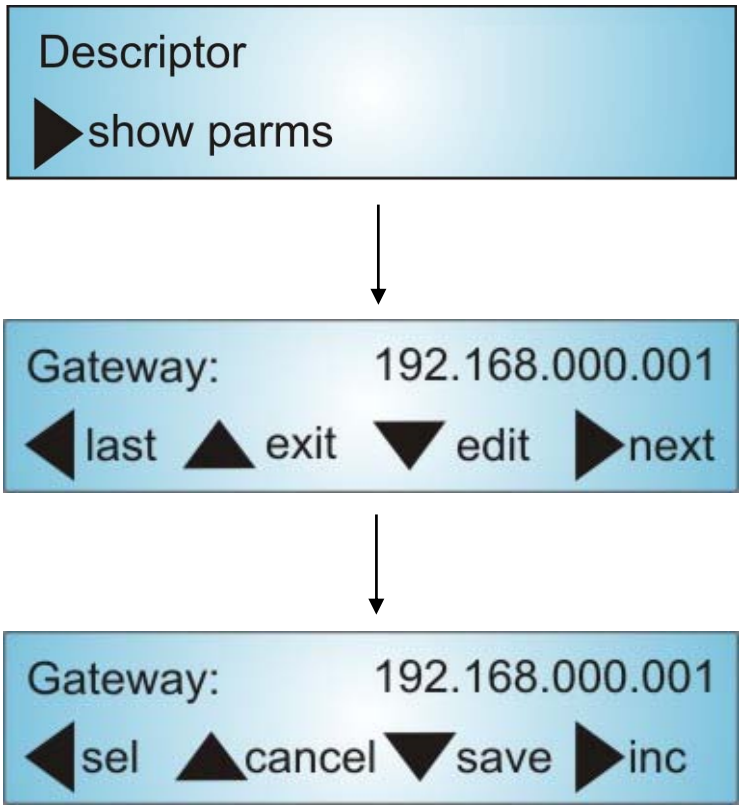
Press → to increment the selected digit by one.

Press ↓ to save changes.

Press ↑ to return to the main menu at any time.

5.2.9 Set Gateway Address

This menu is where the gateway address of the SNMP unit is set.
To set the gateway address of the SNMP unit, follow these instructions:



In the main menu, press ➔ key to toggle to **Gateway**.

Press ↓ edit once, you now may press ← to move to the digit you want to change.

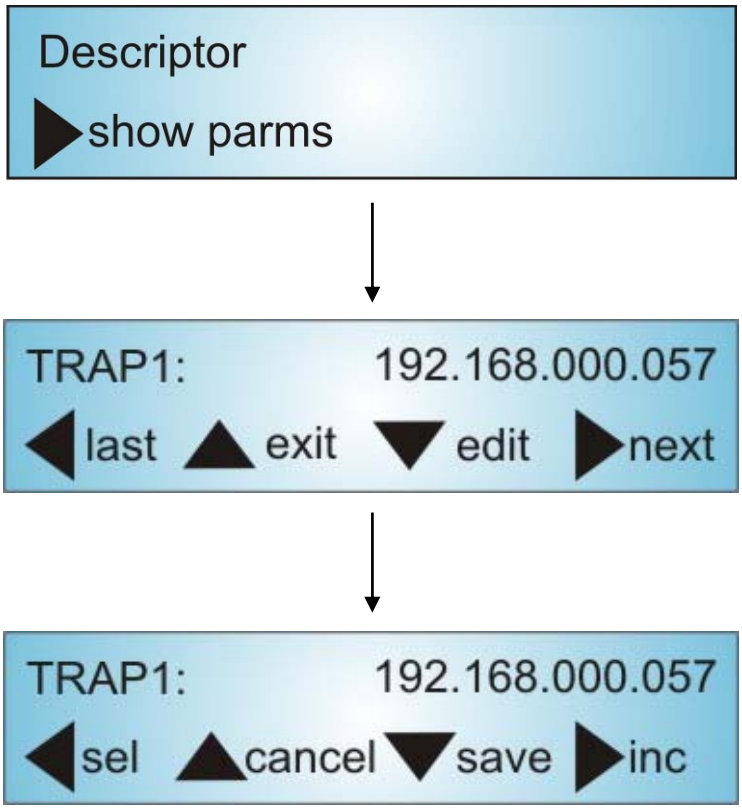
Press ➔ to increment the selected digit by one.

Press ↓ to save changes.

Press ↑ to return to the main menu at any time.

5.2.10 Set TRAP1 Address

This menu is where the TRAP1 address of the SNMP unit is set.
To set the TRAP1 address of the SNMP unit, follow these instructions:



In the main menu, press → key to toggle to **TRAP1**.

Press ↓ edit once, you now may press ← to move to the digit you want to change.

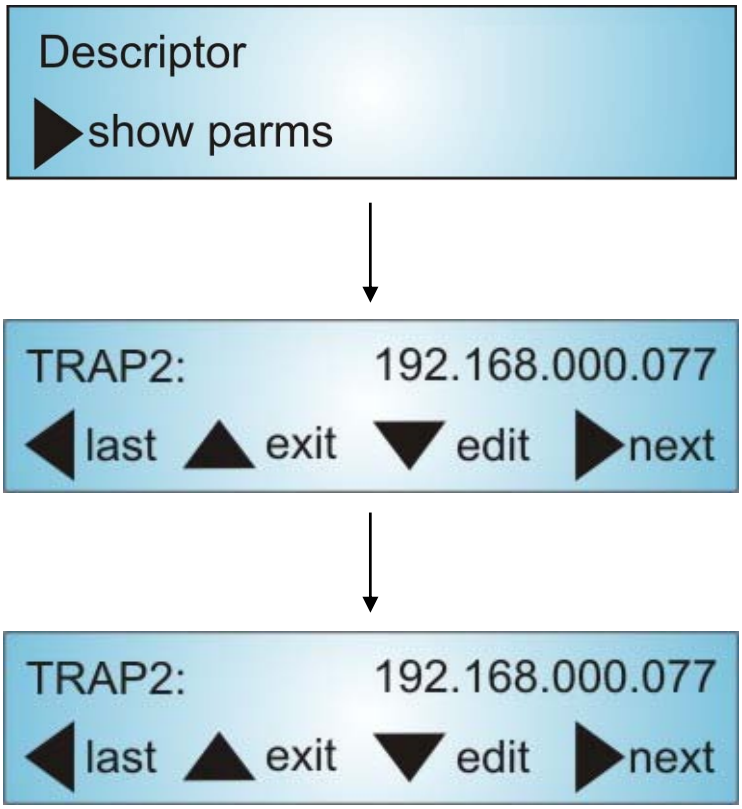
Press → to increment the selected digit by one.

Press ↓ to save changes.

Press ↑ to return to the main menu at any time.

5.2.11 Set TRAP2 Address

This menu is where the TRAP2 address of the SNMP unit is set.
To set the TRAP2 address of the SNMP unit, follow these instructions:



In the main menu, press key to toggle to **TRAP2**.

Press edit once, you now may press to move to the digit you want to change.

Press to increment the selected digit by one.

Press to save changes.

Press to return to the main menu at any time.

5.3 AT5000-XMOD2 – Status Monitoring

5.3.1 Parameter List

The AT5000-XMOD2 provides comprehensive monitoring of its important parameters. This information is relayed back to the user via the LCD display and warning LEDs.
Below is a complete parameter list.

Parameters	Description
Descriptor	Read only menu, which tells the operator what type of transmitter they are operating.
Model	Read only menu, which tells the operator the model type with the 8000 series TX family.
Modulator S/N	Read only menu, which tells the operator the production serial number of the unit in operation.
LD S/N	Read only menu, which tells the operator the production serial number of the laser transmitter in operation.
Date Code	Read only menu, which tells the operator the date the TX was manufactured (production date).
Version	Read only menu, which tells the operator the version of firmware installed in the unit.
Optical Power Port 1	Read only menu, this parameter tells the user the optical power out of port 1 in dBm.
Optical Power Port 2	Read only menu, this parameter tells the user the optical power out of port 2 in dBm.
Laser Current	Read only menu, which tells the operator the current of the CW laser in mA.
Laser Temp	Read only menu, which tells the operator the temperature setting on the CW laser. Generally this is how the wavelength is set on a particular TX.
TEC Current	Read only menu, this is the current setting for the thermo-electric cooler device used to keep the DFB laser temperature constant.
ITU.T	is ordered with the required ITU Wavelength see table 4.5 page 17 for ITU Frequency Grid Wavelength Options
OMI Adjust	This menu is where the OMI can be adjusted.
RF Mode	This menu is where the RF mode can be selected between Manual Gain Control (MGC) and Automatic Gain Control (AGC).

Parameters (cont.)	Description (cont.)
RF Level	Read only menu, shows the RF level as LOW, NORMAL or HIGH.
SBS Suppression	This menu is where the SBS level of the TX would be tuned to match the launch power.
SBS State	Read only menu, this parameter shows the current status of SBS.
CSO State	Read only menu, this parameter shows the current status of CSO.
System Temp	Read only menu, this parameter shows the temperature of the TX module in °C.
+5V monitor	Read only menu, this parameter shows the current voltage level on the +5V rail in volts (V).
-5V monitor	Read only menu, this parameter shows the current voltage level on the -5V rail in volts (V).
+15V monitor	Read only menu, this parameter shows the current voltage level on the +15V rail in volts (V).
-15V monitor	Read only menu, this parameter shows the current voltage level on the -15V rail in volts (V).
+24V monitor	Read only menu, this parameter shows the current voltage level on the +24V rail in volts (V).
Ip	This menu is where the IP address of the SNMP unit can be configured.
Submask	This menu is where the submask address can be configured.
Gateway	This menu is where the gateway address of the SNMP unit can be configured.
Trap1	This menu is where the TRAP1 address of the SNMP unit can be configured.
Trap2	This menu is where the TRAP2 address of the SNMP unit can be configured.

5.3.2 Alarm List

Display Item	Description / alarms
Laser Temp	Laser diode temperature This alarm is triggered when the temperature of the laser deviates from its factory setting by +/- 5 °C.
Laser Current	Laser diode current This alarm is triggered when the current of the laser deviates from its factory setting by +/- 50 mA.
Laser Power	Port 1 or 2 optical power This alarm is independent for each port. It is generated when the optical power reaches either < 2 dBm (Low) or > 19 dBm (High)
Cooling Current	Thermo-Electric cooler current This alarm is triggered when the cooling current reaches 800 mA (High) or the cooling current reaches -800 mA (Low).
RF level	RF level This alarm is triggered when the RF level reaches 200 (High) or 10 (Low).
System Temp	Module temperature This alarm is triggered when the model temperature reaches 58 °C (High) or the module temperature reaches -10 °C (Low).
+5 V power supply	+5 V power supply This alarm is triggered if the supply exceeds 5.8 volts or declines below 4.3 volts. Also if either condition is met the microprocessor resets.
-5 V power supply	-5 V power supply This alarm if triggered if the supply exceeds -4.3 volts or declines below -5.8 volts.
+15 V power supply	+12 V power supply This alarm is triggered if the supply exceeds 16 volts or declines below 14 volts.
-15 V power supply	-12 V power supply This alarm if triggered if the supply exceeds -14 volts or declines below -16 volts.
+24 V power supply	+24 V power supply This alarm if triggered if the supply exceeds 25 volts or declines below 22 volts.

Note: The above values are for monitoring purposes and may vary in accuracy by up to 10%.

5.3.3 Alarm Limits

Warning/Alarm Description	Alarm Limit	Threshold Status
Laser Temperature	15 °C	LOLO
	20 °C	LOW
	30 °C	HIGH
	35 °C	HIHI
Laser Current	0 mA	LOLO
	100 mA	LOW
	600 mA	HIGH
	700 mA	HIHI
Cooling Current	-1 A	LOLO
	-0.8 A	LOW
	0.8 A	HIGH
	1 A	HIHI
System Temperature	-20 °C	LOLO
	-10 °C	LOW
	58 °C	HIGH
	60 °C	HIHI
+5 V power supply	4.0 V	LOLO
	4.3 V	LOW
	5.8 V	HIGH
	6.0 V	HIHI
-5 V power supply	--6.0 V	LOLO
	-5.8 V	LOW
	-4.3 V	HIGH
	-4.0 V	HIHI
+15 V power supply	12 V	LOLO
	14 V	LOW
	16 V	HIGH
	18 V	HIHI

Warning/Alarm Description (cont.)	Alarm Limit (cont.)	Threshold Status (cont.)
-15 V power supply	-18 V	LOLO
	-16 V	LOW
	-14 V	HIGH
	-12 V	HIHI
+24 V power supply	20 V	LOLO
	22 V	LOW
	25 V	HIGH
	28 V	HIHI

When a parameter value is between LOW and HIGH, the unit will work and operate normally with no alarms. This is the recommended 'normal' threshold range to operate under.

When a parameter value is between LOW and LOLO, the unit will still work and operate normally but will have a low level warning alarm.

When a parameter value is between HIGH and HIHI, the unit will still work and operate normally but will have a low level warning alarm.

When the value of the alarm parameter is below LOLO, or exceeds HIHI, a system alarm will occur, as indicated by the Status LED turning red. When an alarm occurs, it is important that the parameter be recovered back to its normal operating range as soon as possible or substantial damage can occur to the unit.

5.3.4 Alarm System via LEDs

The AT5000 XMOD2 alerts immediate attention to the user via the front-panel LEDs. These operate as follows:

LEDs	Description / alarms
LASER LED	
GREEN	Laser Transmitter is ON.
OFF	Laser Transmitter is OFF.
ALARM LED	
GREEN	System parameter are all OK.
RED	There is at least one alarm on the system.
COMM LED	
Flashing	The Transmitter is communicating with an external terminal.
OFF	No communication with an external terminal.

5.4 SNMP and Remote Monitoring Configuration

5.4.1 SNMP

The transmitter provides an Ethernet interface that conforms to the IEEE-802.3 physical layer specifications. This interface supports connections to proprietary element and network management systems.
This interface assumes a master/slave type of relationship between EMS/NMS and transmitter. The host computer system is capable of querying connected equipment for status as well as sending control information through SNMP messages.
The physical interface is an RJ45 Ethernet port.

5.4.2 Configuring the Transmitter for Network Communication

When the transmitter is operated initially, the SNMP Agent and IP Address are in a default state that needs to be configured. This can be done from the front keypad and read from the display.

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