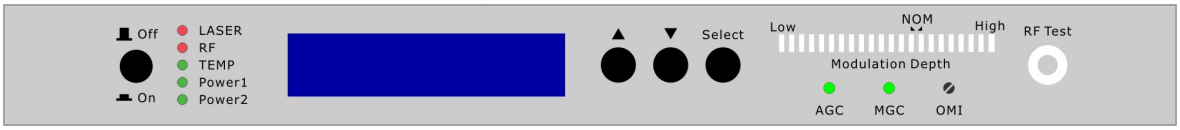
Quality Fiber and RF, Inc



1550nm Direct Modulation Optical Transmitter • FT1510D Model

Dual 6 dBm Outputs

USER MANUAL

PLEASE NOTE: PROPER ANALOG RF INPUT LEVEL IS NOTED ABOVE REAR F CONNECTOR. IF YOU ARE CARRYING DIGITAL CHANNELS, BE SURE THEY ARE 6-7 dB BELOW THIS LEVEL. IF YOU HAVE MORE THAN 80 CHANNELS IN YOUR LINEUP, BE SURE TO SEE SECTION 2.3 FOR PROPER LEVEL REDUCTION.

FT15xx Transmitter - 22dBmV Input (80 Channels)		
# CHAN	Analog dBmV	**Digital**
132.0	19.8	13
110.0	20.6	14
80.0	22.0	16
60.0	23.2	17
40.0	25.0	19
30.0	26.3	20
20.0	28.0	22
16.0	29.0	23
10.0	31.0	25
8.0	32.0	26

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1.0 PRODUCT SUMMARY

At 1550nm operation, direct modulation of the RF on to the laser diode will lead to high laser chirp (a condition where the laser's bias current modulation by the RF signal causes the optical spectrum to shift and jitter). In addition, the laser chip will also interact with the dispersion effect caused by standard single mode fiber (such as Corning SMF-28), generating serious distortions in the 1550nm wavelength. These distortions will become worse with the increase in transmission distance, bandwidth and the number of channels being transmitted.

The FT1510D is a 1550nm direct modulation optical transmitter with a high optical modulation index and AGC function. It features high linearity by using a low chirp ORTEL/EMCORE DFB laser, built-in pre-distortion compensation and AGC, APC, and ATC closed loop control, which improves the system performance significantly. It is also well-suited for FTTx (≤10Km) of secondary service areas (sub-headend), also can be used in WDM narrow-band multiplexing and IP/QAM.

2.0 INSTALLATION

2.1 Unpacking

Inspect the shipping boxes for any obvious damages.
Unpack the unit from all packaging boxes.
Inspect the appearance of the unit for any shipping damages.
Document and inform the shipping company and your local representative, if any damage was found.
Save the shipping boxes and their inserts for future reshipment in case the products need any upgrade or repair.

NOTE: When reshipping the products to send them back to QFRF, we are not responsible for any damages caused by not using the original packaging.

2.2 Transmitter Mounting and Power Connection

1. Place the unit into a 19-inch wide rack or cabinet. Make sure to leave a 1.75-inch (about 4.5cm) space above and below the unit.

2. According to the design request, FT1510D series 1550nm optic transmitter can work between 0°C~50°C（32°F~122°F）temperature range. We recommend 25°C（77°F）environment temperature.
Humidity should not be higher than 95%（under non-condensing conditions）. QFRF recommends keeping the equipment working in the suitable temperature & humidity (within the above range), and we also recommend that the transmitter be operated in a relatively dust-free environment.

3. The equipment is available in either an AC or DC voltage power supply. In the case

of both AC & DC powering option, the AC power supply is the Main power supply.
Power supply requirements:

AC input	94-245VAC, 50-60Hz
DC input	36-60VDC, floating
Power consumption	Maximum 50W

4. The DC power supply of the equipment must be the SELV supply stipulated as CAN/CSA C22.2 No.950-95 standard.

5. The machine should have good grounding with grounding resistance＜4Ω. According to the international standard, the 120V plug adopts the tri-wire rule, which includes a GROUND wiring for safety.

Before connecting power, please use large gauge (#20AWG and higher) electrical wire to connect the grounding screw on the bottom of the transmitter to a good electrical ground. Even when using the DC input power supply, it is still highly recommended that the equipment chassis be grounded.

2.3 RF connection

The Input RF level determines the Optical Modulation Index (OMI) of the laser and the system performance （CNR, CTB, CSO). For 77 analog NTSC channels, the proper RF input level is typically 22.0dBmV. To calculate the proper input levels for other channel loads, use the following formula: Suppose the new channel number is N:

New Input Level (dBmV) =22.0+ 10Log(77/N)

PLEASE NOTE: The suggested RF input drive level (marked above the F connector on the rear panel) is for 77 to 80 **ANALOG** channels. If your system contains mostly or all digital QAM channels, the recommended drive level should be reduced by 6dB, as digital channels contain 4X the amount of power as an equivalent analog carrier.

Connect the RF cable & the connector to the FT1510 rear panel. The RF connector is a 75 ohm F-type plug.

2.4 Optic connection

1. For protection & safety, the fiber optic connectors have been protected by a dust cover during transportation.

2. In order to ensure the lowest insertion loss & return loss, the end-interface of the fiber optic connector should be cleaned carefully. Please be careful not to dirty the connector, or touch the polished end with your fingers. Even the smallest amount of dust will affect the transmission quality. Upon removing the fiber optic connector, please be sure to reinstall the protective cover.

3. Clean all fiber patch cords before connecting to the transmitter.

Cleaning Guidelines:

Fiber Patch cord connectors

- Remove the dust cap of the fiber connectors and wipe the fiber connector tip with a dry lint-free cloth. Check if there are scratches or debris on the connector surface by using a microscope (ie.100x or 200x).

- If no scratch or debris is found, the connector is ready for connection. If scratches or debris is found, repeat the fiber patch cord connector cleaning guidelines.

Fiber Bulkhead connectors

- Compressed air may be used to clean fiber bulkhead connectors. Use compressed air according to the following specifications at least:

  - Non-residue, inert gas for precision dust removal

  - Ultra-filtered to < 0.2 microns

  - Recommended for optical systems

  - Using compressed air as listed above, remove the bulkhead dust cover and hold the can of compressed air about 6 inches away from the connector. After spraying a few short bursts into the bulkhead, the connector is clean and ready for connection.

- If compressed air is not available, the transmitter fiber bulkhead connector may be cleaned by 2.5 mm alcohol sponge, or the connector plate may be removed to clean the internal fiber patch cords.

CAUTION: Use caution when handling the fibers.
Do not exceed fiber manufacturer's pulling tension or bend radius specifications when removing fiber bulkhead connector plate.

- To remove the transmitter optical connector plate, remove the screw on the far left of the optical plate and remove the screw on the far right of the optical plate. Do not remove the screws on the optical bulkhead connector.

- Slowly remove the optical connector plate from the rear panel and disconnect each fiber connector from the bulkhead mounted on the plate.

- Clean each fiber connector according to the fiber cleaning guidelines.

4. - Make sure the laser key switches on the front panel of the transmitter are in the OFF position.

5. - Connect the fiber patch cord from the output of the transmitter to the optical power meter.

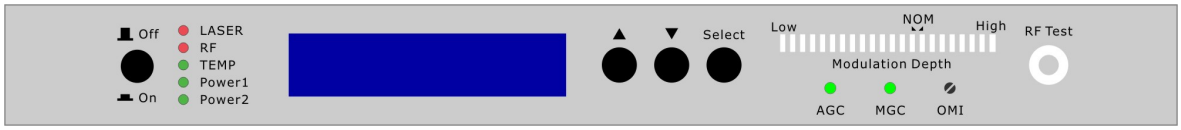
6. - Push in the transmitter laser power switch to the **ON** position.

7. - Use the optical power meter to verify that the transmitter optical power follows the specification.

8. - Push the transmitter laser power switch to the **OFF** position.

3.0 TRANSMITTER CONTROLS, INDICATORS, AND ALARMS

This section of the manual will give an overview of the available menus in the FT1510D series transmitter. All instructions in Section 3.0 refer to the representation of the front panel shown in the diagram below. The user can scroll through the transmitter's menus by using the push buttons that are on the front panel and are located in the right of the LCD screen.



3.1 FRONT PANEL operation

3.1.1 Open menu

A. Plug in 120V AC power supply

B. Turn on power switch in the rear panel

With the " **ON/OFF**" switch set to "**OFF**", the Front Panel will display:

Laser	LED Indicator	Red
RF	LED Indicator	Red
TEMP	LED Indicator	Green
POWER1	LED Indicator	Green
POWER2	LED Indicator	Green

C. Turn the laser start-up switch is set to "**ON**":

The Front Panel shows "**KEY ON...**". The Laser LED will turn from red to green when the input optic power is in the normal range and the machine enters the self-checking routine. After the self-check, the transmitter will begin normal operation and display " **Description**".

3.1.2 Start-up main menu

Press ▲\▼ button and the following menu will be displayed in sequence.

Menu # 1 - Description

Read-only menu, tells the model number of the transmitter

Menu # 2 - LD S/N

Read-only menu, tells the serial-number

Menu # 3 - OUTPUT

Read-only menu, displays the optical output power in dBm

Menu # 4 - LD CURRENT
Read-only menu, displays the laser bias current in mA

Menu # 5 - LD TEMP
Read-only menu, displays the laser temperature in °C

Menu # 6 - LD COOLING
Read-only menu, displays the amount of current that the Thermoelectric Cooler (TEC) requires to maintain the laser temperature at nominal 25 °C

Menu # 7 - RF MODE
Current RF Mode, displays either AGC/MGC
If AGC Mode is selected, the Display will read: RF Mode = AGC
If MGC Mode is selected, the Display will read: RF Mode = MGC

Menu # 8 - RF Level
Read-only menu, tells the RF input level

Menu # 9 - UNIT TEMP
Read-only menu, displays the system temperature

Menu # 10 - +5V Monitor
Read-only menu, displays the +5V voltage

Menu # 11 - -5V Monitor

Read-only menu, displays the -5V voltage

Menu # 12 - +24V Monitor

Read-only menu, displays the +24V voltage

Menu # 13 - IP

Adjustable list, displays the IP address of the SNMP

Menu # 14 - Sub
Adjustable list, displays the subnet mask address

Menu # 15 - GW

Adjustable list, displays the gateway address for SNMP

Menu # 16 - TR1

Adjustable list, displays the TRAP1 address for SNMP

Menu # 17 - TR2

Adjustable list, displays the TRAP2 address for SNMP

3.1.3 Menu assistant manual

1. RF Mode Setting

   The default control mode is AGC. When the RF mode menu displays RF Mode=AGC, press "Select" key and the menu will display RF Mode= . Then press "▲" or "▼", the menu will display RF Mode=Manual and the change from AGC to MGC has been finished after press " Select " again. If you want to change the current control mode back into AGC, press " Select " key when the current menu displays RF Mode=Manual, then the menu will display RF Mode= . Then press "▲" or "▼", the change from Manual to AGC will be finished after press " Select " to save and exit . And the menu will display RF Mode=AGC.

2. IP Address Setting

   Press ▲\▼ key to choose the menu that need to be amended.

   Press " Select " to enter the modification status, then press ▲\▼ button to increase\ decrease the value, and press " Select " to shift. at last press " Select " button to the end of the address to save.

   For example, amend IP setup menu, IP: 192.168.000.015; if change 5 to 6, Press " Select " to enter the modification status, and then press " Select " again to choose the number 5. Use ▲key to change 5 to 6, and press " Select " to the end to save amended IP:192.168.000.016.

4.0 ALARM Description

The **LASER WORKING** indicator (LED) is next to the laser power switch on the front panel. When it is green, the device is working properly; when it is red, the laser is not working; and when it is blinking red, there is an alarm.

A. With 120V power supply, if the transmitter is working properly, the digital panel will display "**READY: KEY OFF**" and there is Red LED.
B. Turning on the **LASER POWER** switch, the digital panel will display "**KEY ON**". After a few seconds, the laser is turned on automatically and the indicator LED turns from RED to GREEN.
C. Pressing the ▲\▼ arrow buttons can display the alarm parameters .
D. If any faults listed above have occurred, there will be an alarm (Red LED will be clinking), and the microprocessor will shut down the laser automatically, with the front digital display showing the reason for the fault.

In order to protect the laser, the power supply of the laser also has a time-delay function. After turning **ON** the **LASER POWER** switch, the laser will start to work after a 10 second delay.

5.0 WARRANTY AND REPAIR NOTES

1. Each unit comes with a full one year parts and labor warranty provided. QFRF will also do everything possible to supply an emergency spare to prevent long term outages.
2. The micro-processor software of the device has the function of monitoring the laser power and temperature, digital display, trouble alarm, network management etc. Therefore, it would be very difficult for the laser diode to be damaged by human error. If the Red LED is blinking (Alarm), please call QFRF at 772-545-9757 for technical assistance. It may be necessary for you to send the product back to us for repair. It is best to not open the top cover for repairs unless you have spoken to us first. Otherwise, even within the warranty period, you may incur repair charges if you cause more damage to the transmitter.
3. It is QFRF's intention to provide lifelong maintenance, even after the warranty period has expired.
4. If the transmitter is damaged by human error, repair fees may be charged.