



**Quality Fiber and RF, Inc**  
*FT13XX Series*  
**1310nm Broadcast Transmitter**  
**Users' Manual**

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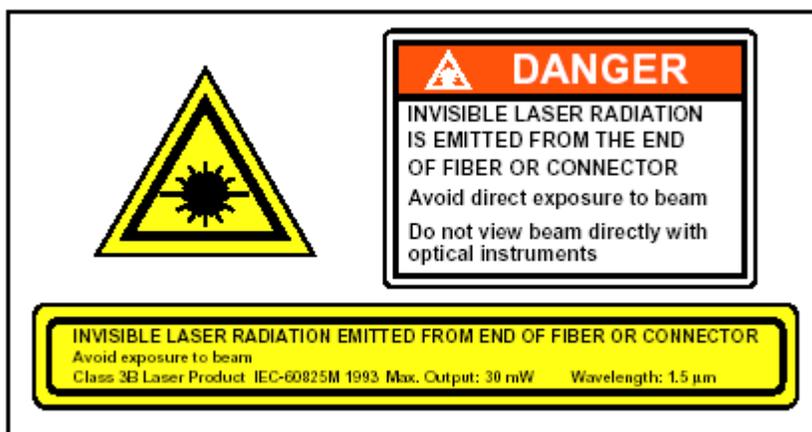
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## Preface

This manual is designed for the FT13XX series 1310nm broadcast transmitter along with a detailed description of product features, specifications, installation instructions, adjustments and troubleshooting help. To install this transmitter successfully and use it safely, users must read the manual carefully before installation, and perform their installation and adjustment according to this manual. Otherwise, some practices may lead to property damage or personal injury. Please contact us if any question.

### Important User Information

- **Caution:** There are invisible laser beams from Fiber output ports, which may cause permanent injury to skin or eyes.
- Grounding first before turning on the power (Grounding resistance should be less than  $4\Omega$ ), so as to prevent laser and user from static damaging.
- UPS power supply and air condition environment are highly recommended for the stable and long-time transmitter operation.



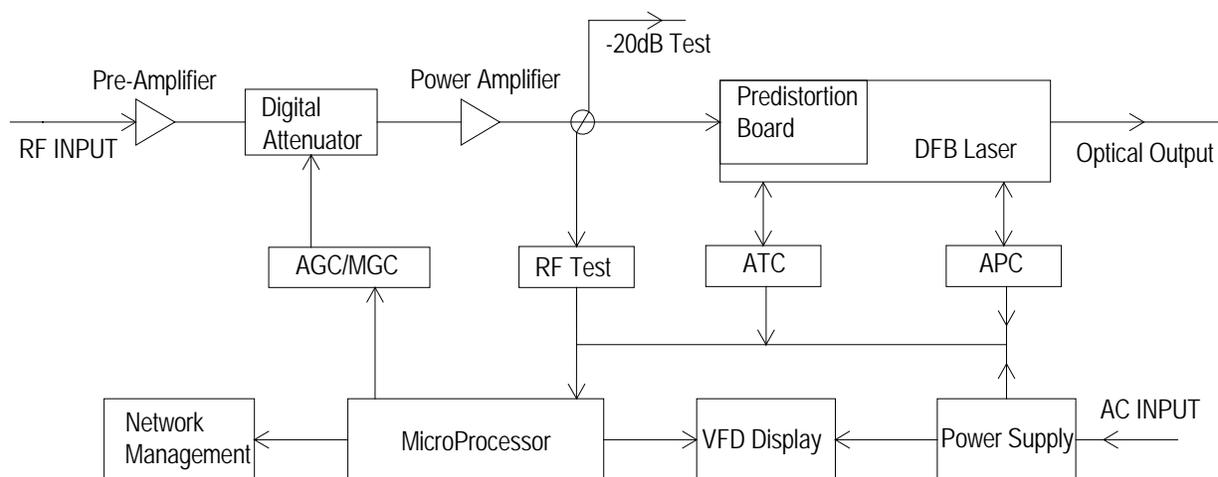
## Chapter 1 Overview

FT13XX is a powerful and versatile 1310nm DFB laser transmitter, capable of delivering both analog and digital TV signals, telephony, or data transmissions over long distance singlemode fiber cable for CATV networks. This product utilizes a high performance cooled DFB laser as the light source, an automatic digital RF processing circuit, along with a proprietary RF pre-distortion circuit. All functions are supervised by a built-in microprocessor monitoring system to automatically maintain excellent performance of this transmitter.

## Chapter 2 Features

- High performance DFB laser with narrow spectrum and good linearity
- RF power digital automatic processing technology
- Excellent pre-distortion technology leading to the improved CTB, CSO and C/N
- Built-in microprocessor controlling the laser and the RF performance
- Front panel VFD screen displaying the transmitter status
- 19" 1U standard rack with RS485 and RS232 ports for optional remote monitoring
- Optional Ethernet port for SNMP management

## Chapter 3 Functional Diagram



## Chapter 4 Specifications

### 4.1 Link Test Condition

The following test link consists of the FT13XX transmitter, 10Km standard fiber, an optical attenuator and standard optical receiver. Input RF channels are 77 NTSC channels. Specifications are with -1dBm optical input power to an optical receiver.

### 4.2 Specifications Table

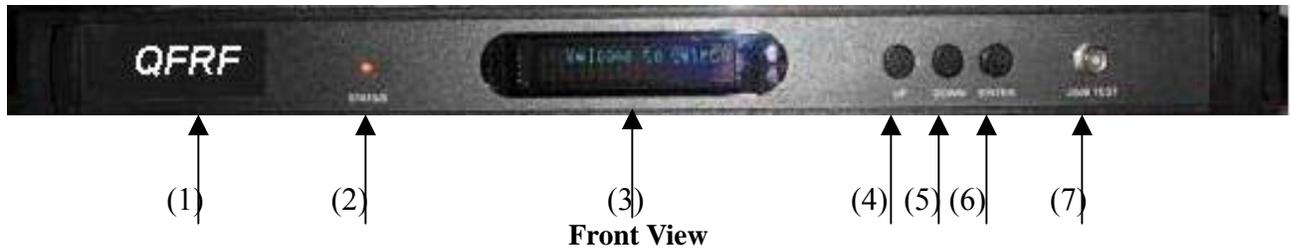
Item	Unit	Parameter									
		4	6	8	10	12	14	16	18	20	24
Optical Output Power	mW	4	6	8	10	12	14	16	18	20	24
Optical Link Path Loss	dB	7	9	10	11	11.8	12.5	13	13.6	14	14.8
Optical Wavelength	nm	1310±20									
Type of Laser		Cooled DFB in 14 pin butter-fly package with isolator									
Optical modulation		Direct Modulation									
Optical connector Type		SC/APC, Single Mode									
Frequency Range	MHz	45~870/1000									
RF Input Level	dBmV	15~25									
Flatness In Band	dB	±0.75									
RF Input Impedance	Ω	75									
RF Return Loss	dB	≥16 (45~870)MHz									
C/CTB	dB	≥67									
C/CSO	dB	≥62									
C/N	dB	≥51									
AGC Control Range	dB	±5									
Power Voltage	V	AC 90V~250V (50/60 Hz)									
Power Consumption	W	20									
Operation Temperature	□	0~45									
Store Temperature	□	-20~65									
Relative Humidity	%	Max 95% non-condensing									
Dimension	mm	433(L) × 325(W) × 44(H)									

### 4.3 Optical Link C/N Table:

Optical Loss(dB)	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
FT1304	53.8	52.8	51.8	51.0	50.1	49.2	48.2								
FT1306				53.0	52.0	51.0	50.1	49.1	48.1						
FT1308					52.8	51.9	51.0	50.1	49.1	48.2					
FT1310						52.9	51.9	51.0	50.1	49.1	48.2				
FT1312							52.7	51.8	50.8	49.9	49.0	48.0			
FT1314								52.4	51.5	50.5	49.5	48.6	47.8		
FT1316									52.0	51.0	50.1	49.1	48.1		
FT1318									52.5	51.6	50.6	49.7	48.7	47.9	
FT1320										51.9	51.0	50.0	49.0	48.0	
FT1324											52.5	51.7	50.7	49.7	48.0

## Chapter 5 Function Guide

### 5.1 Front Panel Guide



#### 1 Trademark

2 **LED status indicator:** Green light: normal; Red light: warning. Check VFD message to troubleshoot problem.

3 **VFD Monitor:** Displays each status parameter, product model, serial number and other information about this transmitter.

4 **UP button:** scroll the VFD display UP, or increase setting value

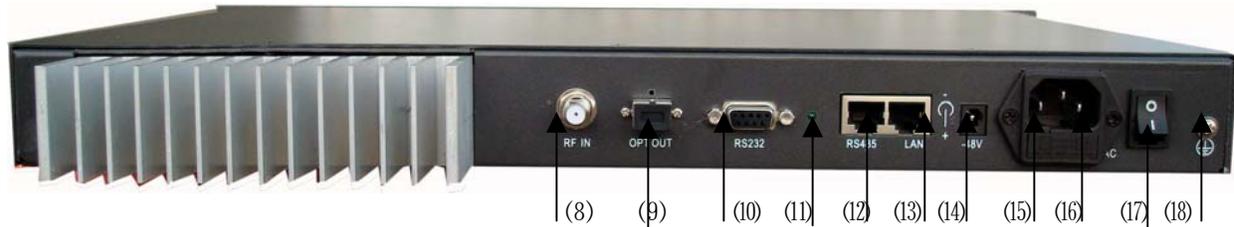
5 **Down button:** scroll the VFD display DOWN, or decrease setting value

6 **Enter button:** MGC mode select and ENTER button.

**Notice:** The default control mode of the FT13XX transmitter is AGC. **If the number of TV channels is less than 15**, press the UP or DOWN button until the VFD displays '**MOD LEVEL=XXdBmV**', then press the "Enter" button to select MGC mode. After selecting MGC mode, the VFD will display '**MOD LEVEL=XXdBmV**' and '**Please install...**'. At this point the user can change the modulation level in 1dB increments by pressing the UP or DOWN buttons. Once you have selected the desired modulation level, press ENTER again to make it effective. At that time the VFD will display '**MOD LEVEL=XXdBmV**' and transmitter will shift back to AGC mode. For instance, if user's ideal Modulating level is **42dBmV**, VFD would display "**MOD LEVEL= 42dBmV**" after operations shown above. Please consult a QFRF engineer for help with this feature.

7 **RF input test port:** Standard 75Ω style F-style test port for RF signal on-line test. Level tested from this port is 20dB lower than the actual RF drive level to the laser.

### 5.2 Rear Panel Guide



#### **Rear View**

8 **RF input port:** Standard 75Ω American style F port, used for connecting RF signal and the equipment. Level in this input port must be at the range of 15~25dBmV. Too high level may damage laser.

**Optimum input level is 17dBmV**

**\*The input level above 17dBmV may damage Laser. Please consult factory!**

9 **Optical signal output:** Optical signal output port, SC/APC, or optional FC/APC connector. There are invisible laser emissions from Fiber output when laser is active!

**\*It would be dangerous to point this port toward the human body especially eyes when equipment is energized!**

10 **RS-232 standard network management port:** Use for connecting equipment with RS-232 port in network management server.

11 **Network management indicator**

12 **RS-485 standard network management port:** Use for connecting equipment with RS-485 port on network management server.

13 **LAN network management port:** Use for connecting transmitter with Ethernet-basing network management server. (Contact factory for this option)

14 **-48V DC INPUT**

15 **Power in:** AC power connection.

**16 Fuse:** AC fuse

**17 AC Power switch:** Turn ON or turn OFF the power.

**18 Case grounding nut:** Provided for optionally connecting the transmitter to ground.

## 5.3 Parameter Display

### 5.3.1 Turning on power display

When first turning on the power, the VFD will display '**Initialize...**' for 2 seconds and the buzzer will briefly tweet one time indicating that the transmitter has initialized successfully.

### 5.3.2 Status display

After the transmitter has been powered ON and initialized, pressing the UP or DOWN button on the front panel will scroll the VFD to display in turn the following:

- (1) "**Quality Fiber and RF, Inc**": trademark
- (2) "**FT13XX-SC**": module name, **SC** indicated output fiber connector
- (3) "**POWER=XX.X mW**": output power, unit **mW**.
- (4) "**TEMP=XX.X °C**": internal temperature value of the laser
- (5) "**BIAS= XX mA**": bias current of the laser
- (6) "**RF INPUT = XXdBmV**": RF input level
- (7) "**ATT= XXdB**": attenuation value
- (8) "**MOD LEVEL= XXdBmV**": modulating level value
- (9) "**S/N: xxxx-xx-xxxx**": equipment series number

## 5.4 Alarm Indication

Display Message	Alarm Status	System Indication
Warning...!!! Input RF is low	Input RF is too low	<i>Status indicator</i> red light flashes
Warning... !!! Input RF is high	Input RF is too high	<ul style="list-style-type: none"> <li>• <i>Status indicator</i> red light flashes</li> </ul>

## Chapter 6 Installation & Adjustment

### 6.1 Opening the cover

- 6.1.1** Inspect the package. If the packaging has been damaged, or shows signs of water damage, please contact the freight company or contact Quality Fiber and RF.
- 6.1.2** After unpacking, check the equipment and accessories according to packing list. If there is any question, please contact Quality Fiber and RF.
- 6.1.3** If you think equipment has been damaged, please don't turn on the power and avoid worse damage. Please contact Quality Fiber and RF.

### 6.2 Supplies & Tools

An optical power meter

A digital multimeter

A Cable TV RF meter or spectrum analyzer

A standard fiber test jumper (FC/APC or SC/APC)

Denatured or 99% pure isopropyl alcohol and lint-free fiber optic cleaning wipes

### 6.3 Installation

- a. Mount the equipment in the rack and ground the case.
- b. Check input voltage using a digital multimeter in accordance with power requirement. Then turn on power.
- c. Check the message on the VFD and the status of the front panel LED indicator. Push the **UP** and **DOWN** button to check each parameter, insuring that the transmitter is operating normally. (If there is no RF input, the red LED will flash, and the VFD will display "**input RF is low**".)
- d. Connect standard fiber test cable to the transmitter's optical signal output. Measure the output optical power and confirm that the output optical power is the same as the value displayed on the VFD. (When measuring the optical power, make sure that optical power meter is set for 1310nm wavelength and that fiber test jumper is clean.)
- e. Measure the input RF signal level with a Cable TV meter or a spectrum analyzer, making sure that

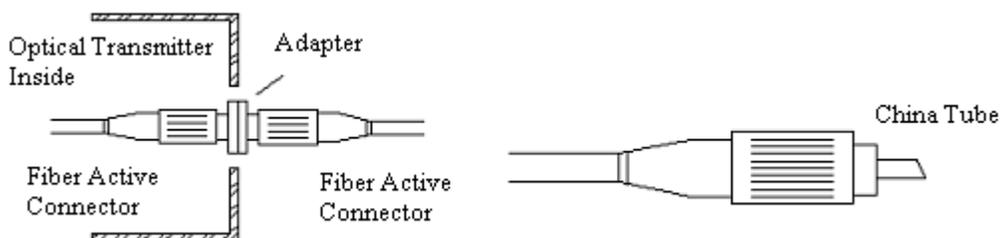
input RF signal is in the range of 15~25dBmV (optimum value 17dBmV). At this time, you can now connect the RF signal to the RF signal input port of the equipment. This time front panel LED turns to green and VFD displays RF input value as “**RF INPUT = XXdBmV**”.

The internal RF power detector is calibrated for 77 analog NTSC channels, so the displayed value may not be correct, depending upon your actual channel plan. It is possible to correct the displayed value to read your measured RF level by pressing the UP or DOWN button to scroll the VFD until it displays ‘**RF LEVEL=XXdBmV**’, and then press ENTER. The VFD will now display ‘**MOD LEVEL=XXdBmV**’ and ‘*Please install...*’, and the user can now set the RF input level in **1 dBmV** increments by pressing the UP or DOWN buttons. When the displayed value is equal to your tested value, press ENTER to make it effective, and at that time the VFD will display ‘**RF LEVEL=XXdBmV**’. For instance, if real RF input level is **20dBmV**, VFD would display “**RF LEVEL= 20dBmV**” after operations shown above.

- f. Re-measure optical output power, make sure that optical output power being normal, remove standard fiber test jumper and optical power meter, connect the equipment to network and end the installation.

## Chapter 7 Cleaning & Maintenance

Each fiber connector can become contaminated by dust or dirt in the operation process, which can result in increased optical link loss, or a degraded carrier-to-noise ratio. If you find that the optical receive power or RF output level of the optical receiver has declined, you should clean and maintain the fiber active connector. The clean methods are recommended below:



- a. Carefully unplug or unscrew the active fiber connector from the adapter, while being careful to avoid aiming the fiber connector at any human body or eye.
- b. Use a lint-free fiber optic wipe saturated with alcohol to clean the connector carefully. Once finished, still wait 1~2 minutes until active connector surface is dry in the air.
- c. When the cleaned optical active connector is reconnected to the adapter, please do not over-tighten or force the connector, to avoid damage to the ceramic ferrule.
- d. The fiber active connector should be cleaned on both ends. If optical power is still low after clean, cleaning the other end of the fiber is recommended. If the optical power is still low after cleaning both ends, it is recommended that you clean the inner adaptor. (Take care of the fiber when disassembly the adaptor).
- e. Use compressed air or a lint-free wipe to wash the adapter carefully. When using compressed air, aim the nozzle at the ceramic ferrule of the adaptor, cleaning the ferrule with compressed air.

### Notice:

1. Avoid aiming the optical output or fiber connector at the human body or eyes.
2. Assemble the fiber adaptor gently and carefully to prevent damage to the ceramic ferrule inside the adaptor.

## Chapter 8 After-sale customer service

- a. Our promises: One year free trouble fixing service and life-long customer service (1 year free guarantee time starts from the date indicated in products S/N attaching on side of products).
- b. If the equipment has failed, please immediately contact Quality Fiber and RF.
- c. Do try to attempt to repair the problem without the help from a QFRF technician.
- d. Notice: There are adhesive tape seals on both sides of the case. Any unauthorized removal of this tape seal by the user will void the 1 year warranty.

## Chapter 9 Troubleshooting

SYMPTOM	FAULT	ACTION
No VFD or LED display after turning on the power	No input power or a problem with the internal switching power supply.	Check input AC voltage to the power supply (AC90V~250V), if the voltage is normal, usually the cause is the internal switching power supply, contact QFRF.
After turning on power, VFD monitor and LED normal, but optical output power low.	<ol style="list-style-type: none"> <li>1. Check jumper quality</li> <li>2. Contaminated optical active connector or adapter</li> <li>3. Damaged ceramic ferrule in adapter</li> </ol>	<ol style="list-style-type: none"> <li>1. Swap to a good test jumper</li> <li>2. Clean contaminated fiber active connector or adapter</li> <li>3. Swap the damaged adapter</li> </ol>
After connecting to network, all TV channels have obvious noise point.	<ol style="list-style-type: none"> <li>1. Low received optical power, causing poor C/N.</li> <li>2. RF input level too low for sufficient laser modulation.</li> <li>3. System link path C/N too low.</li> <li>4. Back-reflection from bad or dirty optical connectors</li> </ol>	<ol style="list-style-type: none"> <li>1. Clean fiber active connector or adapter (Chapter 7 <u>Cleaning and maintenance</u>).</li> <li>2. Check RF input levels to transmitter. (15-25dBmV)</li> <li>3. Check link loss.</li> <li>4. Use only angled (SC/APC) optical connectors or fusion splice where necessary.</li> </ol>
After connecting to network, only some TV channels have a degraded SNR.	Some channels SNR too low.	Check the individual channel signal C/N or SNR. Check the flatness of the RF input signal
After connecting to network, some TV channels have obvious ripple, beats, lines, or distortions.	<ol style="list-style-type: none"> <li>1. Optical input power to receiver too high.</li> <li>2. RF modulation too high.</li> <li>3. RF input drive to transmitter too high.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check input power at optical receiver and pad if necessary.</li> <li>2. Check optical transmitter modulation level parameter, and readjust if too high</li> <li>3. Make sure the RF input level is within the range (15~25dBmV)</li> </ol>

Addendum note: to reset the transmitter to the default settings, as shipped from the factory, follow the following steps:

- 1) Power unit OFF.
- 2) While holding in both the UP and DOWN buttons, power the unit ON.
- 3) The VFD will display "Test Mode", and the transmitter will emit a loud beeping noise.
- 4) Power the unit OFF for 5 seconds, and then back ON. The modulation and display settings have now been restored to the factory defaults. These settings will work for 99% of the applications, and it is rarely needed to deviate from these. Please consult the factory if unsure.