



Q-SERIES® Optical

QFOT1L 1310nm DFB Fiber Optic Transmitter

Installation & Operation Manual



Although every effort has been taken to ensure the accuracy of this document it may be necessary, without notice, to make amendments or correct omissions. Specifications subject to change without notice.

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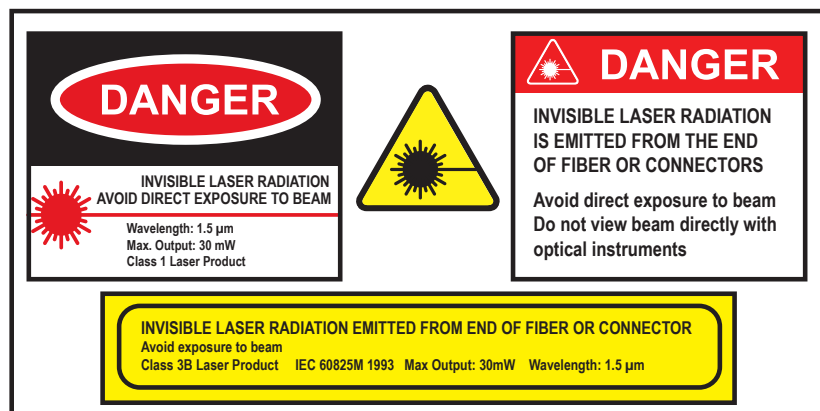
PREFACE

1. Preface

This manual is designed for QFOT1L series 1310nm optical transmitter along with description of product feature, specification, installation, adjustment and troubleshooting. To install this transmitter successfully and use it safely, users should read this manual carefully before installation, and perform the installation and adjustment according to this manual. Please contact ATX Networks if any question.

Important User Information

- **Caution:** Invisible laser radiation is emitted from the fiber output ports, which may cause permanent injury to skin or eyes.
- Ground first before turning on the power (Grounding resistance should be less than 4 Ohm), so as to prevent laser and user from static damaging.
- UPS power supply and air conditioned environment are highly recommended for the stable and long-time transmitter operation.



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OVERVIEW

2. Overview

QFOT1L is 1310nm DFB laser transmitter delivering TV signal, digital TV signal, telephone voice signals and data signals over long distance fiber cable for CATV networks. The product utilizes a high performance cooled DFB laser, RF gain manual control along with RF pre-distortion circuit.

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FEATURES

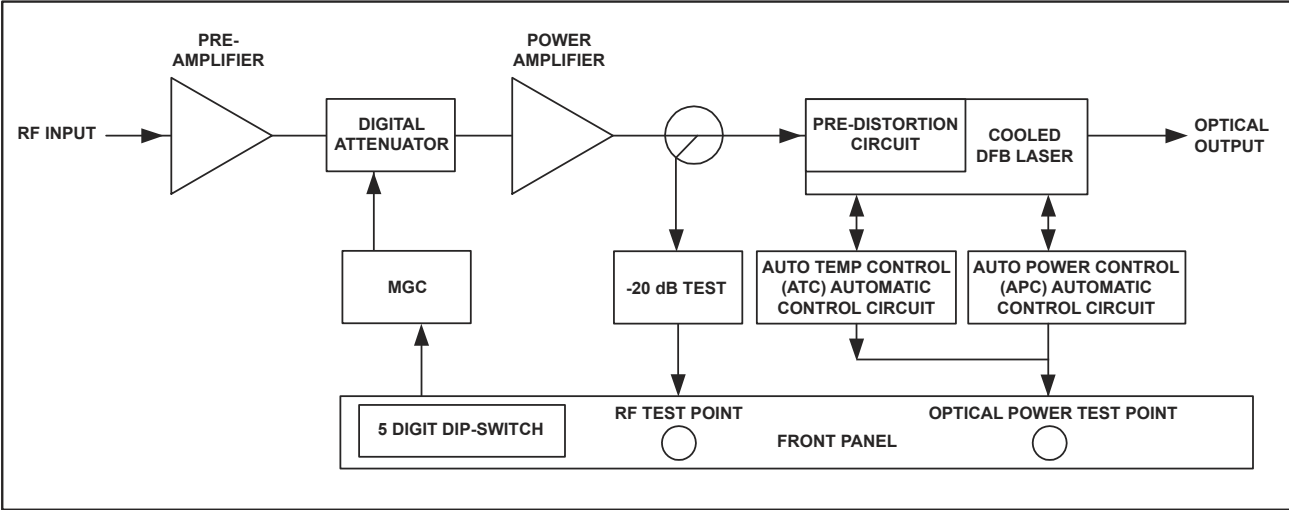
3. Features

- High performance DFB laser with narrow spectrum and good linearity.
- Excellent pre-distortion technology leading to improved CTB, CSO and C/N.
- RF gain manual control
- GaAs Technology

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FUNCTIONAL DIAGRAM

4. Functional Diagram



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SPECIFICATIONS

5. Specifications

5.1. Link Test Condition

Test Condition:

Test link consists of the QFOT1L transmitter, 10 Km standard fiber, attenuator and standard optical receiver. Input RF channels are 59 PAL-D channels (equivalent to 77 NTSC channels). The optical receiver input power is -1 dBm.

5.2. Specifications Table

SPECIFICATIONS	VALUE								
	4mW	6mW	8mW	10mW	12mW	14mW	16mW	18mW	20mW
OPTICAL POWER	4mW	6mW	8mW	10mW	12mW	14mW	16mW	18mW	20mW
OPTICAL LINK PATH LOSS	7 dB	9 dB	10 dB	11 dB	11.8 dB	12.5 dB	13 dB	13.6 dB	14 dB
OPTICAL WAVELENGTH	1310nm +/- 20								
TYPE OF LASER	DFB Laser with Isolator								
OPTICAL MODULATION MODE	Direct Modulation								
OPTICAL CONNECTOR TYPE	SC/APC								
FREQUENCY RANGE	47-1000 MHz								
RF INPUT LEVEL	15-25 dBmV								
FLATNESS IN BAND	+/- 0.75 dB								
RF INPUT IMPEDANCE	75 Ω								
INPUT REFLECTION LOSS	≥ 16 dB from 47-1000 MHz								
C/COMP. TR. BT.	≥ 67 dB								
C/COMP. 2nd ORD.	≥ 62 dB								
CARRIER-TO-NOISE RATIO	≥ 51 dB								
MGC CONTROL RANGE	1 dB / 2 dB / 4 dB / 16 dB								
POWER VOLTAGE	100-240 VAC (50/60 Hz)								
POWER CONSUMPTION	20W								
OPERATION TEMPERATURE	0°C to +50°C (+32°F to +122°F)								
STORE TEMPERATURE	-40°C to +85°C (-40°F to +185°F)								
RELATIVE HUMIDITY	Max 95% Non-condensing								
DIMENSIONS	1.75"H x 19.0"W x 12.8"D (4.45H x 48.26W x 32.51D cm)								
WEIGHT	11.0 lbs (5.0 kg)								
NOTE:									
Test Condition: 77 channels NTSC signal to optical transmitter. C/CTB, C/CSO and C/N at -1 dBm optical input (10 km fiber + optical attenuator) measured at standard optical receiver with 36 dBmV RF output.									

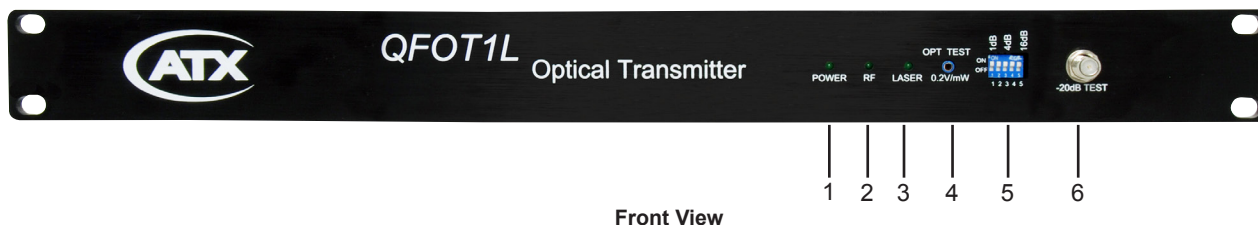
5.3. Optical Link C/N Table

OPTICAL LINK PATH C/N SPECIFICATIONS															
OPTICAL LOSS (dB)	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
QFOT1L-04	53.8	52.8	51.8	51.0	50.1	49.2	48.2								
QFOT1L-06				53.0	52.0	51.0	50.1	49.1	48.1						
QFOT1L-08					52.8	51.9	51.0	50.1	49.1	48.2					
QFOT1L-10						52.9	51.9	51.0	50.1	49.1	48.2				
QFOT1L-12							52.7	51.8	50.8	49.9	49.0	48.0			
QFOT1L-14								52.4	51.5	50.5	49.5	48.6	47.8		
QFOT1L-16									52.0	51.0	50.1	49.1	48.1		
QFOT1L-18									52.5	51.6	50.6	49.7	48.7	47.9	
QFOT1L-20										51.9	51.0	50.0	49.0	48.0	
QFOT1L-22										52.2	51.4	50.4	49.4	48.6	47.8

FUNCTION GUIDE

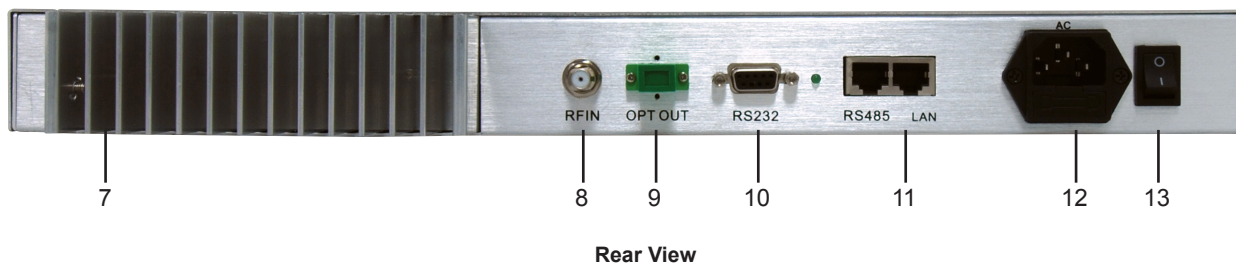
6. Function Guide

6.1. Front Panel Guide



- 1 **Power LED:** When AC power is ON, the Power LED is green.
- 2 **RF LED:** When input RF level is higher than 10 dBmV, RF LED is green.
- 3 **Laser LED:** When there is a laser output, the Laser LED is green.
- 4 **Laser Power Test Port:** When Laser LED is green, user can test the optical output power at this port via digital meter. Each 0.2V DC voltage represents 1mW optical output power.
- 5 **Manual Gain Control Dip Switch:** Controls digital attenuator to increase or decrease RF level into laser.
- 6 **RF Input Test Port:** Standard 75 Ohm style F-style test port for RF signal on-line test. Level tested from this port is 20 dB lower than the actual RF drive level to the laser.

6.2. Rear Panel Guide



- 7 **Case Grounding Nut:** Provided for optionally connecting the transmitter to ground.
- 8 **RF Input Port:** Standard 75 Ohm American style F port, used for connecting RF signal and the equipment. Level in this input port must be at the range of 15 to 25 dBmV. Too high level may damage laser.
- 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!
- 10 Reserved RS-232 standard network management port (not used in this version)
- 11 Reserved RS-485 and LAN standard network management port (not used in this version)
*It would be dangerous to point this port toward the human body especially eyes when equipment is energized!
- 12 **AC Power with Fuse:** AC power connection.
- 13 **AC Power Switch:** Turn ON or turn OFF the AC power.

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INSTALLATION & ADJUSTMENT

7. Installation & Adjustment

7.1. Opening the Cover

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

7.2. 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

7.3. Installation

- a) Mount the transmitter 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) 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 close to the value tested from Optical Power Test Port in the front panel. (When measuring the optical power, make sure that optical power meter is set at 1310nm wavelength and that fiber test jumper is clean.)
- d) 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 to 25 dBmV.

The recommended RF Input Level vs NTSC channel number.

Channel Number	10	20	30	40	50	60	70	80	90	100	110
Input RF (dbmV)	24	23	22	22	21	21	20	20	19	18	17

At this time, you can connect the RF signal to the RF input port of this transmitter. The front panel RF LED turns to green.

On the front panel, there is a 5-digit manual controller which controls the built-in digital RF attenuator. The attenuation value is:

Digit	1	2	3	4	5
ON	0	0	0	0	0
OFF	1 dB	2 dB	4 dB	8 dB	16 dB

The total attenuation number is the sum of all 5 digits.

For example, "10101" represents MGC value of "0+2 dB+0+8 dB+0=10 dB".

Since the effective MGC range is 15 dB, it is recommended that 5th digit should be kept in the "ON" position while the first 4 digit combinations give the value from 0 dB to 15 dB.



When MGC increases, the RF level to the DFB laser decreases; when MGC decreases, the RF level to the DFB laser increases. Therefore the user can decrease or increase the optical modulation index (OMI) of this transmitter. When changing the MGC value, it is suggested to observe the RF performance at the front panel -20 dB test port or the RF port of an optical receiver linked with this transmitter.

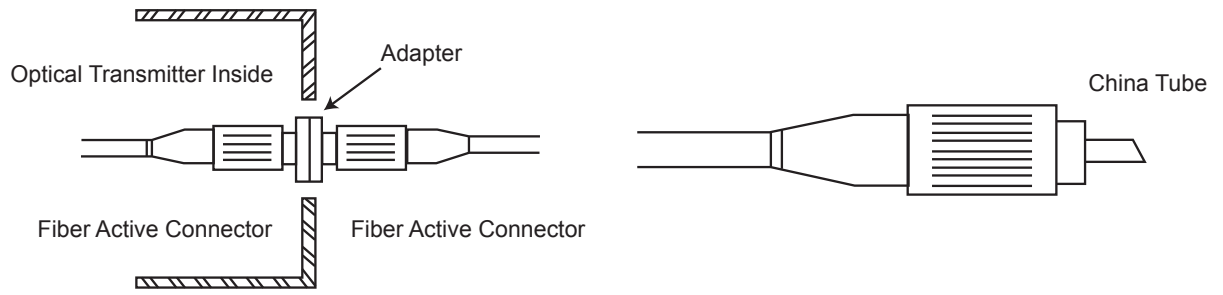
The recommended MGC value of the transmitter is attached on the side of the transmitter along with the transmitter serial number.

- e) 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.

CLEANING & MAINTENANCE

8. 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 optic connector. The clean methods are recommended below:



- For safety reasons, the AC power to the transmitter should be turned off first.
- 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.
- Use a lint-free fiber optic wipe saturated with alcohol to clean the connector carefully. Once finished, still wait 1 to 2 minutes until active connector surface is dry in the air.
- 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.
- The fiber 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.
- 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.

NOTES:

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

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AFTER-SALE CUSTOMER SERVICE

9. After-sale Customer Service

- a) If the equipment has failed, please contact ATX immediately.
- b) Do try to attempt to repair the problem without the help from a ATX technician.
- c) **NOTE:** 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.

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TROUBLESHOOTING

10. Troubleshooting

SYMPTOM	FAULT	ACTION
No LED display after turning on the power	No input power or a problem with the internal switching power supply.	Check the power socket fuse and input AC voltage to the power supply (AC90V~250V). If they are normal, the switching power supply might be in problem, contact ATX.
After turning on power, LED normal, but optical output power low.	<ol style="list-style-type: none"> 1. Check jumper quality 2. Contaminated optical active 3. Damaged ceramic ferrule in adapter 	<ol style="list-style-type: none"> 1. Swap to a good test jumper 2. Clean contaminated fiber active connector or adapter 3. Swap the damaged adapter
After connecting to network, all TV channels are noisy	<ol style="list-style-type: none"> 1. Low received optical power, causing poor C/N. 2. RF input level too low for sufficient laser modulation. 3. System link path C/N too low. 4. Back-reflection from bad or dirty optical connectors 	<ol style="list-style-type: none"> 1. Clean fiber active connector or adapter (Chapter 8 Cleaning & Maintenance). 2. Check RF input levels to transmitter. (15-25dBmV) 3. Check link loss 4. Use only angled (SC/APC) optical connectors or fusion splice where necessary.
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"> 1. Optical input power to receiver too high. 2. RF modulation too high. 3. RF input drive to transmitter too high. 	<ol style="list-style-type: none"> 1. Check input power at optical receiver and pad if necessary. 2. Check optical transmitter modulation level parameter, and readjust if too high 3. Make sure the RF input level is within the range (15~25dBmV)

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SERVICE & SUPPORT

11. Service & Support

11.1. Contact ATX Networks

Please contact ATX Technical Support for assistance with any ATX products. Please contact ATX Customer Service to obtain a valid RMA number for any ATX products that require service and are in or out-of-warranty before returning a failed module to the factory.

RF & OPTICAL TECHNICAL SUPPORT

Tel: (905) 428-6068

Toll Free: (800) 565-7488 (USA & Canada only)

► Press *3 for **Technical Support**

► Then press 2 for **RF & Optical Products (MAXNET, SignalOn, HFC Enhance, PCI Filters, Q-Series, FLEXNET, SCN, SMAC FiberLinx)**

Email: rfsupport@atxnetworks.com

CUSTOMER SERVICE

ATX Networks

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Ajax, ON L1S 7H4 Canada

Tel: (905) 428-6068

Toll Free: (800) 565-7488 (USA & Canada only)

► Press *1 for **Customer Service**

Fax: (905) 427-1964

Toll Free Fax: (866) 427-1964 (USA & Canada only)

Web: www.atxnetworks.com

Email: support@atxnetworks.com

11.2. Warranty Information

All of ATX Networks' products have a 1-year warranty that covers manufacturer's defects or failures.



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