TABLE OF CONTENTS

Figures

Tables

REVISION HISTORY

REVISION	DESCRIPTION	DATE
1.0	First release version Drawings and specs updated	Nov 01
1.1	Specifications and drawings updated	Jan 02
1.2	Changed model number of 7707ET-FC to 7707ET Updated info on Address Jumper	Jun 02
1.3	Added 8 new CWDM wavelengths	Dec 02
1.4	Fixed formatting	Nov 08

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1. OVERVIEW

The 7705ET Ethernet Fiber Transceiver provides an economical method of transmitting two 10BaseT Ethernet channels or one 100Base-TX Ethernet channel over optical fiber. The converter is IEEE 802.3 10BASE-T and IEEE 802.3u 100BASE-TX compliant, mediates between a 10/100BASE-TX segment and supports both full duplex and half-duplex operation. A pair of 7705ET transceivers permits full duplex communication over a single optical fiber. Diagnostic LEDs provide indication of power, linkage and data reception.

Features:

- Auto negotiation for 10/100 speeds, half/full duplex modes
- Built in Ethernet switch for complete isolation of each transmission end
- Link status monitoring indicators
- VistaLINK® enabled for remote monitoring and control
- Optical output available in 1310nm, 1550nm and up to sixteen CWDM wavelengths in the 1270nm to 1610nm range
- Supports multi-mode or single-mode fiber
- Fully hot-swappable from front of frame with no fiber or Ethernet channel disconnect required
- SC/PC, ST/PC or FC/PC connector options

Two versions of the 7705ET allow the user to choose the optimal price / performance to suit a particular application. The "-F2" version is designed to receive and transmit on the same wavelength over two different fibers and has the lowest insertion loss. This version can operate with Multi-mode (MM) or Single-mode (SM) fiber. The standard version is designed to receive and transmit on the same wavelength over a single fiber and can operate with SM fiber only. Each version of the 7705ET is available with a 1310 nm FP laser output. (See section 3 for specification information):

The following chart shows some typical applications and power budget calculations.

Application	Output Power	Input Sensitivity (dBm)	Max Loss Budget	Controller (Side A)	Device (Side B)
Single Fiber, Single Wavelength 1310nm, FP laser	-11	-25	14	7705ET13	7705ET13
Dual Fiber, single wavelength 1310 nm, FP laser	-8	-28	20	7705ET13-F2	7705ET13-F2

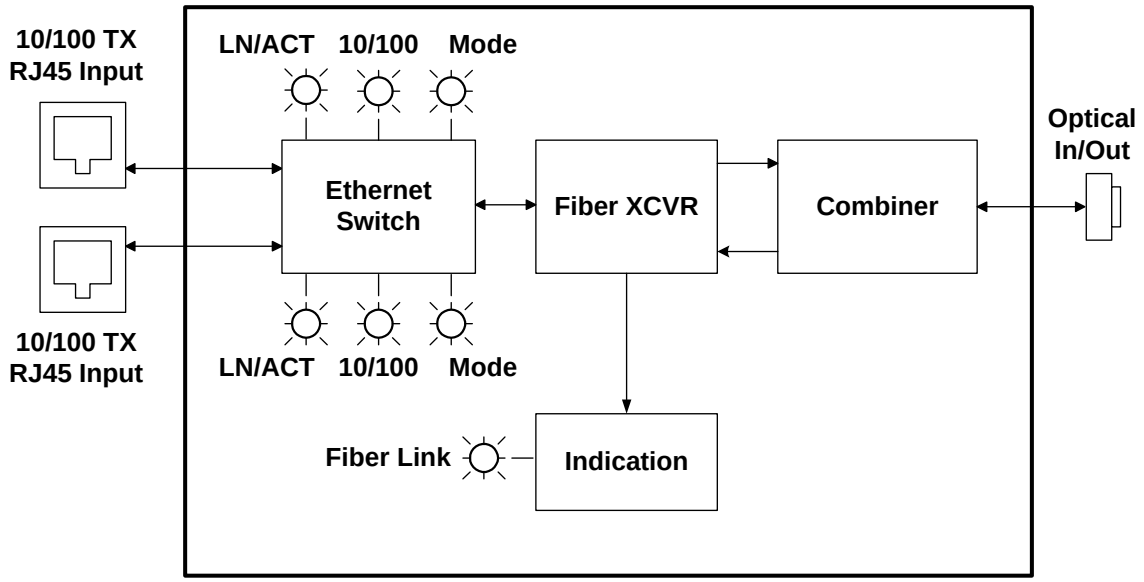


Figure 1-1: 7705ET Block Diagram

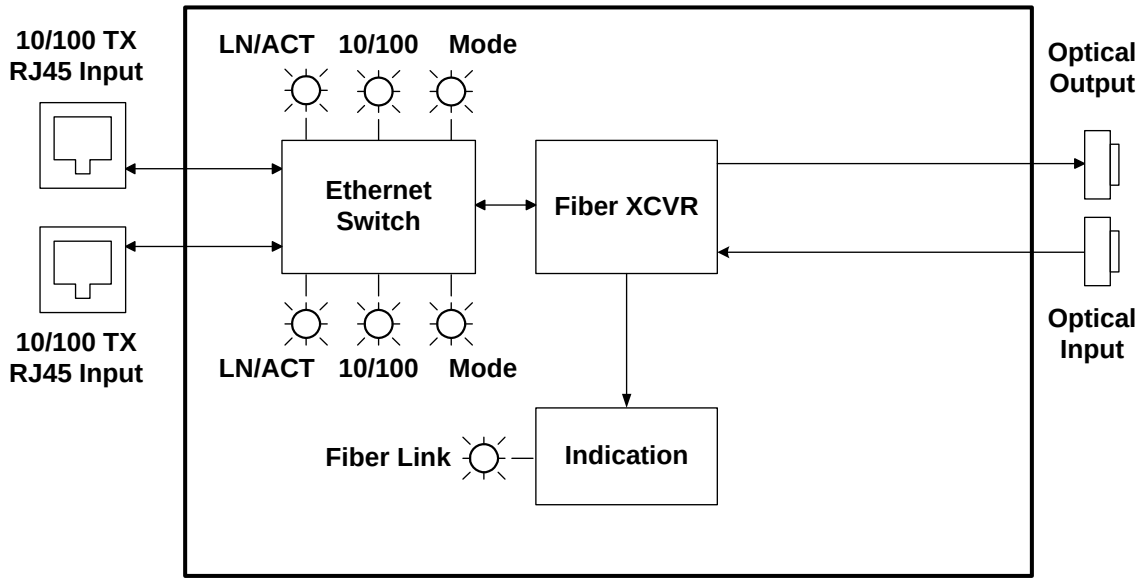


Figure 1-2: 7705ET-F2 Block Diagram

2. INSTALLATION

The 7705ET comes with a companion rear plate that has two RJ-45 input connectors and one SC/PC (shown), ST/PC or FC/PC optical connector. The 7705ET-F2 version comes with a companion rear plate that has two RJ-45 input connectors and two SC/PC, ST/PC or FC/PC optical connectors. For information on mounting the rear plate and inserting the module into the frame see section 3 of the 7700FR chapter.

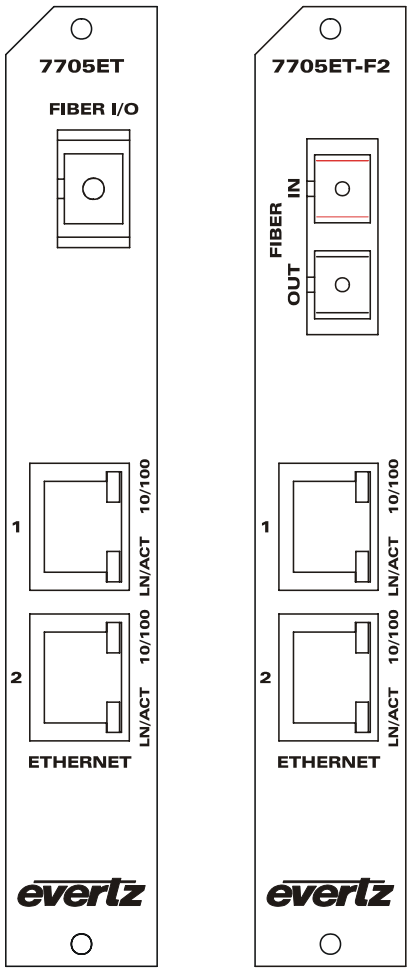


Figure 2-1: 7705ET Rear panels

2.1. ETHERNET CONNECTIONS

The RJ-45 connectors on the rear panel are for connection to network devices (server, workstation, router switch, etc.) with a 10/100BASE-TX port through a twisted pair cable. While both RJ-45 ports will auto-negotiate between 10 and 100 Mb/sec, the fiber port runs at only 100 Mb/sec. This means that while both RJ-45 ports can run at 100 Mb/sec at the same time, packets may be lost if both ports have a high traffic load. Therefore we recommend that only one RJ-45 port be used if it is to run at 100 Mb/sec.

The 7705ET Ethernet Transceiver is designed for use with 10/100Base-TX twisted pair Ethernet cabling systems. When connecting for 100Base-TX systems, category 5 UTP cable is required. The maximum cable run between the Ethernet Fiber Transceiver and the supporting hub is 100 metres. Make the network connection by plugging one end of the cable into the RJ-45 receptacle of the Ethernet Fiber Transceiver and the other end into a port of the supporting hub.

When connecting the 7705ET to a hub or switch a “straight through” cable must be used. When connecting the 7705ET to the Evertz 7700FC VistaLINK® Frame Controller, another 7705ET, or the network interface card of a computer, a “crossover” cable must be used.

Pin #	Name	Cable Pair	Description
1	TX+	-------1a------	Transmit + Output
2	TX-	-------1b-----	Transmit – Output
3	RX+	-------2a------	Receive + Input
4	not used		
5	not used		
6	RX-	-------2b------	Receive – Input
7	not used		
8	not used		

Table 2-1: Ethernet Connector Pin Definitions and Cable Wiring

Devices on the Ethernet network continually monitor the receive data path for activity as a means of checking that the link is working correctly. When the network is idle, the devices also send a carrier signal to one another to maintain the link. The 7705ET rear panel is fitted with two LEDs on each RJ-45 connector to monitor the Ethernet connection on each port.

10/100: This Green LED is On when a 100Base-TX link is established. The LED is Off when a 10Base-T link is established (the LINK LED is On) or if there is no link established (the LINK LED is Off). This LED should show the same information as the respective **10/100** LED on the card edge.

LN/ACT: This dual purpose Green LED indicates that the 7705ET has established a valid link, and whether the 7705ET is sending or receiving data. The LED will be On when the 7705ET has established a good link, providing a good indication that the segment is wired correctly. The LED will BLINK when the 7705ET is sending or receiving data. The LED will be Off if there is no valid connection.

2.2. OPTICAL CONNECTIONS

The 7705ET modules are designed to work with single-mode or multi-mode optical fiber depending on the version (FC, F2) ordered.

2.2.1. Single Fiber version (7705ET)

FIBER I/O: There is one SC/PC (shown), ST/PC or FC/PC female connector with the optical input/output from the 7705ET. This connector should be connected to the matching connector of another 7705ET module at the destination end with a suitable fiber optic cable. The 7705ET version receives on wavelengths in the 1270 to 1610nm range, transmits on a 1310 nm wavelength and is designed to work with either single-mode or multi-mode fiber optic cable.

In order to establish a valid link between a pair of single fiber 7705ET modules, one module must be configured as 'Address A', and the other as 'Address B'. Selection of the correct address is achieved by setting jumper J6. See section 5.3.

2.2.2. Dual Fiber Version (7705ET-F2)

FIBER IN: There is one SC/PC (shown), ST/PC or FC/PC female connector with the optical input to the 7705ET-F2. This connector should be connected to the FIBRE OUT connector of another 7705ET-F2 module at the destination end with a suitable fiber optic cable. The 7705ET-F2 version receives on wavelengths in the 1270 to 1610nm range.

FIBER OUT: There is one SC/PC (shown), ST/PC or FC/PC female connector with the optical output from the 7705ET-F2. This connector should be connected to the FIBRE IN connector of another 7705ET-F2 module at the destination end with a suitable fiber optic cable. The 7705ET-F2 version transmits on a 1310 nm wavelength and is designed to work with either single-mode or multi-mode fiber optic cable.

2.3. CARE AND HANDLING OF OPTICAL FIBER

2.3.1. Safety

Never look directly into an optical fiber. Non-reversible damage to the eye can occur in a matter of milliseconds.

The laser modules used in the 7705ET modules are Class I, with a maximum output power of 2mW.

2.3.2. Handling and Connecting Fibers

Never touch the end face of an optical fiber.

The transmission characteristics of the fiber are dependent on the shape of the optical core and therefore care must be taken to prevent fiber damage due to heavy objects or abrupt fiber bending. We recommend that you maintain a minimum bending radius of 3 cm to avoid fiber-bending loss that will decrease the maximum attainable distance of the fiber cable. The Evertz fiber optic modules come with cable lockout devices, to prevent the user from damaging the fiber by installing a module into a slot in the frame that does not have a suitable I/O module. For further information about care and handling of fiber optic cable see section 3 of the Fiber Optics System Design chapter of this manual.

3. SPECIFICATIONS

3.1. ETHERNET INPUT/OUTPUT

Standard: IEEE 802.3 10BASE-T, 802.3u 100BASE-TX
Connector: Two auto-negotiation 10/100Mbps RJ45 ports
Number of Channels: Two 10Base T or one 100Base-TX (Maximum bandwidth is 100 Mb/sec – see section 2.1)
Cable Requirements:
10BASE-T: UTP category 3, 4, or 5 cable up to 328 ft/100m
100BASE-TX: UTP category 5 cable up to 328 ft/100m

Straight-through or Crossover cable: Whether you use "straight-through" or "crossover cable" to connect to the 7705ET will depend on the device you are connecting to. When devices connect to each other on a network, they connect through a transmit and a receive line. When connecting the 7705ET to a hub or switch a “straight through” cable must be used. When connecting the 7705ET to the Evertz 7700FC VistaLINK® Frame Controller, another 7705ET, or the network interface card of a computer, a “crossover cable” must be used.

3.2. OPTICAL INPUT/OUTPUT

Connector:
Single Fiber versions: 1 Bi-directional optical connector: SC/PC, ST/PC or FC/PC female housing
Dual Fiber (F2) versions: 2 optical connector: SC/PC, ST/PC or FC/PC female housing
Maximum Input Power: 0 dBm
Input Optical Sensitivity:
Single fiber versions: -25 dBm
Dual fiber (F2) versions: -28 dBm
Fiber Size and Type:
Single Fiber version: 9 μm core / single mode
Dual Fiber (F2) version: 9 μm core / single-mode on TX, 62.5 μm core / multi-mode on RX
Optical Output Power:

Model	Nominal Transmit Wavelength	Laser Feedback Structure	Line Width	Optical Power
7705ET13	1310 nm	FP	< 4 nm	> -11 dBm
7705ET13-F2	1310 nm	DFB	< 4 nm	> -8 dBm

3.3. ELECTRICAL

Voltage: + 12VDC
Power: 6 Watts.
EMI/RFI: Complies with FCC regulations for class A devices.
Complies with EU EMC directive.

3.4. PHYSICAL

7700 or 7701 frame mounting:
Number of slots: 1

4. STATUS INDICATORS

The 7705ET series modules have 9 LED Status indicators on the front card edge to show operational status of the card at a glance. Figure 5-1 shows the location of the LEDs.

4.1. MODULE HEALTH LEDS

Two large LEDs on the front of the board indicate the general health of the module:

LOCAL FAULT: This Red LED indicates poor module health and will be On when there is insufficient optical input power, an optical transmitter failure or if a local input power fault exists (i.e.: a blown fuse). When the FRAME STATUS jumper is set to the ON position the LOCAL FAULT indication will also be reported to the FRAME STATUS bus.

MODULE OK: This Green LED indicates good module health. It will be On when a valid optical input signal is present, and the laser and board power are good.

4.2. FIBER LINK LED

The LED on the back of the board closest to the card top card edge indicates the status of the Fiber link.

FIBER LINK: On the single fiber 7705ET this Green LED indicates the presence of a valid optical link between a pair of 7705ET modules.

In order to establish a valid link between a pair of single fiber 7705ET modules, one module must be configured as 'Address A', and the other as 'Address B'. Selection of the correct address is achieved by setting jumper J6. See section 5.3.

On the dual fiber 7705ET-F2 this Green LED indicates that the 7705ET-F2 has established a valid link with another 7705ET-F2, and whether the 7705ET-F2 is sending or receiving data on the fiber link. The LED will be ON when the 7705ET-F2 has established a good link, providing a good indication that the fiber segment is connected correctly. The LED will BLINK when the 7705ET-F2 is sending or receiving data. The LED will be OFF if there is no valid connection.

4.3. CARD EDGE ETHERNET LEDS

The three LEDs on the rear of the module closest to the center of the module indicate the status of the Ethernet 1 port. The three LEDs on the front of the module indicate the status of the Ethernet 2 port. Both sets of LEDs function the same.

LN/ACT: This dual purpose Green LED indicates that the 7705ET series module has established a valid link, and whether the 7705ET is sending or receiving data on the respective Ethernet port. The LED will be ON when the 7705ET has established a good link, providing a good indication that the segment is wired correctly. The LED will BLINK when the 7705ET is sending or receiving data. The LED will be OFF if there is no valid connection. This LED should show the same information as the **LN/ACT** LED beside the respective RJ-45 connector on the rear panel

10/100 This Green LED is On when a 100Base-TX link is established. The LED is Off when a 10Base-T link is established (the LINK LED is On) or if there is no link established (the LINK LED is Off). This LED should show the same information as the **10/100** LED beside the respective RJ-45 connector on the rear panel.

HALF/FULL: This Green LED is Off when the Ethernet link is operating in the half duplex mode, and On when it is operating in the Full duplex mode. In half duplex mode the LED will blink On when a collision occurs on the Ethernet link.

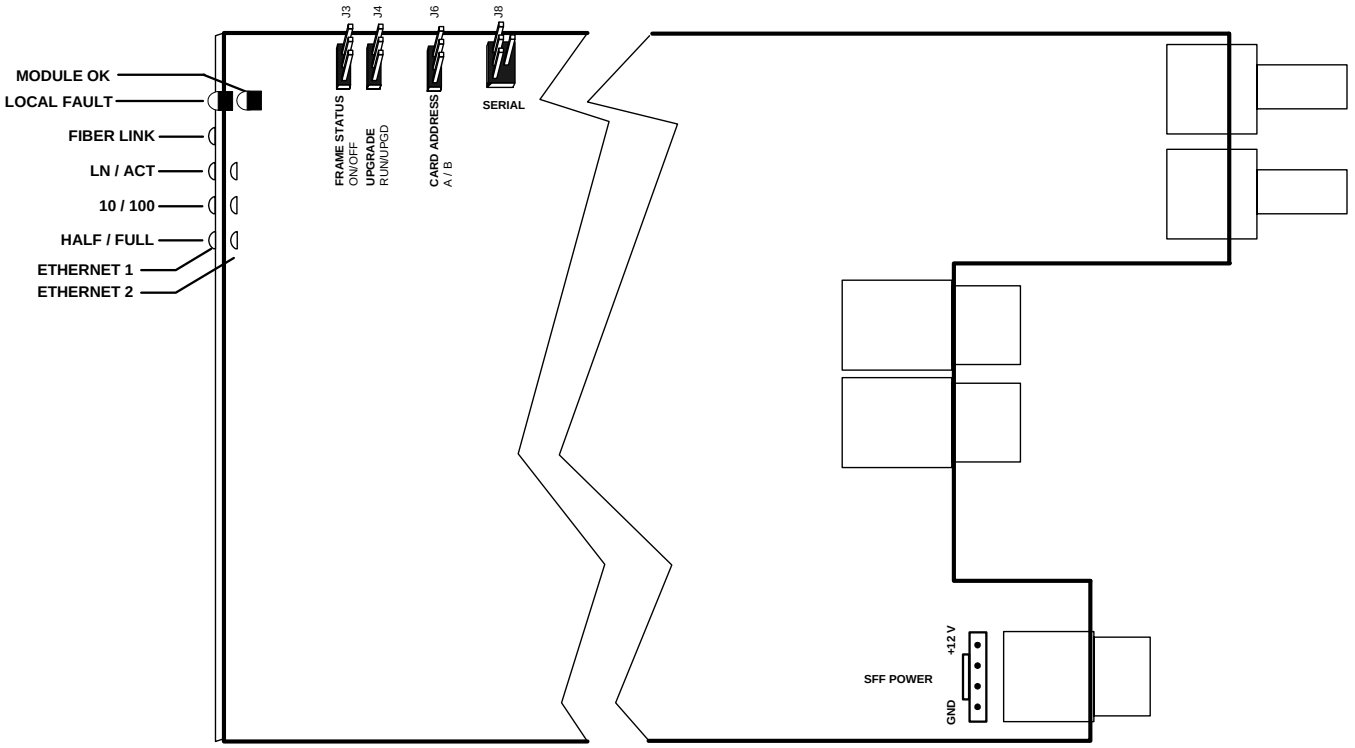
4.4. REAR PANEL ETHERNET LEDS

There are two LEDs adjacent to each on the Ethernet RJ-45 connectors on the rear panel that allow you to monitor the Ethernet connections while you are connected to the cables.

LN/ACT: This dual purpose Green LED indicates that the 7705ET has established a valid link, and whether the 7705ET is sending or receiving data on the respective Ethernet port. The LED will be ON when the 7705ET has established a good link, providing a good indication that the segment is wired correctly. The LED will BLINK when the 7705ET is sending or receiving data. The LED will be OFF if there is not a valid connection. This LED should show the same information as the respective **LN/ACT** LED on the card edge.

10/100: This Green LED is On when a 100Base-TX link is established. The LED is Off when a 10Base-T link is established (the LINK LED is On) or if there is no link established (the LINK LED is Off). This LED should show the same information as the respective **10/100** LED on the card edge.

5. JUMPERS AND USER ADJUSTMENTS



Note: Standard versions have one fiber connector, -F2 versions have two fiber connectors

Figure 5-1: LED and Jumper Locations

5.1. SELECTING WHETHER LOCAL FAULTS WILL BE MONITORED BY THE GLOBAL FRAME STATUS

The FRAME STATUS jumper J1 located at the front of the module determines whether local faults (as shown by the Local Fault indicator) will be connected to the 7700FR frame's global status bus.

FRAME STATUS: To monitor faults on this module with the frame status indicators (on the Power Supply FRAME STATUS LED's and on the Frame's Fault Tally output) install this jumper in the On position. (default)

When this jumper is installed in the Off position local faults on this module will not be monitored.

5.2. CONFIGURING THE MODULE FOR FIRMWARE UPGRADES

UPGRADE: The UPGRADE jumper J4 is used when firmware upgrades are being done to the module. For normal operation it should be installed in the *RUN* position. See the *Upgrading Firmware* section of this manual for more information.

To upgrade the firmware in the module unit pull it out of the frame. Move Jumper J4 into the *UPGRADE* position. Install the Upgrade cable provided (located in the vinyl pouch in the front of this manual) onto SERIAL header J8 at the top edge of the card. Re-install the module into the frame. Run the upgrade as described in the *Upgrading Firmware* section of this manual. Once the upgrade is completed, remove the module from the frame, move J4 into the *RUN* position, remove the upgrade cable and re-install the module. The module is now ready for normal operation.

5.3. SELECTING THE CARD ADDRESS (Single Fiber version only)

The Card Address jumper allows each single fiber 7705ET module to distinguish its own signal, and that of a sister card at the other end of a fiber link. In the case of an incomplete or damaged fiber link each 7705ET module will see reflections or its own signal. In order to establish a valid link between a pair of single fiber 7705ET modules, one module must be configured as 'Address A', and the other as 'Address B'. Selection of the correct mode is achieved by setting jumper J6, at the front of the board. It does not matter which card is selected as Address A and which as Address B, as long as they are different.

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