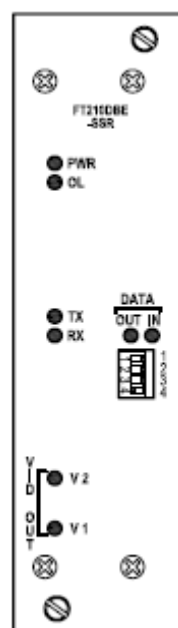
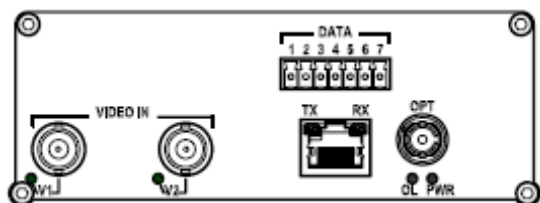




All Digital Fiber Optic Manufacturing Specialists

Installation and Operation Manual

FT210DBE Series



10-bit Digital Series

2-ch Video with 1 Bi-directional Data & Ethernet
Fiber Optic Converter

OT Systems Ltd., 2009

Rev 1.1

Models covered in this manual

Standalone Units

Single-Mode Transmitters

FT210DBE-SSTSA

FT210DBE-SSTLSA

Single-Mode Receivers

FT210DBE-SSRSA

FT210DBE-SSRLSA

Multi-Mode Transmitter

FT210DBE-SMTSA

Multi-Mode Receiver

FT210DBE-SMRSA

Card Modules

Single-Mode Transmitters

FT210DBE-SST

FT210DBE-SSTL

Single-Mode Receivers

FT210DBE-SSR

FT210DBE-SSRL

Multi-Mode Transmitter

FT210DBE-SMT

Multi-Mode Receiver

FT210DBE-SMR

Remark:

If the optical connector is FC type, the suffix in the model number will be “-*FXX*”. Eg.

FT210DBE-FST

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(1) Safety Instructions

Please be familiar with all information in this manual prior to installation and operation.

Note 1: The products described contain a Class 1 laser or LED fiber optic emitter. The following safety precautions apply.

Warning: Do not disconnect the fiber optic connector while the unit is powered up. Exposure to Class I invisible optical radiation is possible when the internal fiber optic connector is disconnected while the unit is powered up.

Caution: Any access to the controls, adjustments, or performing operations, which are other than those specified may result in hazardous radiation exposure. Permanent eye damage or other bodily injuries may be resulted from such exposure even for only seconds.

Note 2: This assembly contains parts sensitive to damage by electrostatic discharge (ESD). ESD precautionary procedures should be applied in the course of touching, removing or inserting parts or assemblies.

(2) Product Overview

2.1 Introduction

The FT210DBE Series products comprise of either single-mode or multi-mode fiber optic transmitters and receivers for the optical transmission of TWO forward (Tx → Rx) video, ONE bi-directional (Tx ↔ Rx) data and ONE Ethernet signals on one fiber. The products work at wavelengths of 1310nm and 1550nm with either a 9/125um or 62.5/125um fiber for single-mode or multi-mode transmission respectively.

A non-compressed 10-bit digital video transmission scheme is implemented which supports video in NTSC, PAL and SECAM formats. Transparent data transmission is also accomplished in RS232, RS422 and RS485 formats regardless of the type of communication protocol implemented within the system. Time Division Multiplex (TDM) technology is employed for digital transmission of forward video and data; whereas optical Wavelength Division Multiplex (WDM) technology is employed for simultaneous reverse data transmission as well as bi-directional data transmission.

For single-mode transmission, we also offer specifically designed products for long-haul transmissions up to 60km. These models include the letter “L” in the suffix, e.g. FT210DBE-SSTL for Tx, FT210DBE-SSRL for Rx, etc.

The FT210DBE Series units are available as standalone units, which can be mounted horizontally or vertically wall-mounted on any fixture. The standalone unit comes with an external power supply FT-PA/12V, which can be powered by local 110/220V power.

The FT210DBE Series units are also available as plug-in card modules installed in a 19” rack-mount chassis. Each plug-in card occupies two slots in the rack-mount chassis. The rack mount chassis has to be ordered separately, and comes with its own power supply for powering the installed card modules.

2.2 Models selection table

Type	Mode	Models ¹	Descriptions	Installation requirements	Remarks
Standalone Units	Single-Mode	FT210DBE-SSTSA	Single-mode Video Transmitter with Data, Ethernet Transceiver Standalone unit	Horizontally or vertically wall-mounted Standalone unit	FT-PA/12V external power supply is included for the Standalone unit ²
		FT210DBE-SSTLSA	Single-mode Long-haul Video Transmitter with Data, Ethernet Transceiver Standalone unit		
		FT210DBE-SSRSA	Single-mode Video Receiver with Data, Ethernet Transceiver Standalone unit		
		FT210DBE-SSRLSA	Single-mode Long-haul Video Receiver with Data, Ethernet Transceiver Standalone unit		
	Multi-Mode	FT210DBE-SMTSA	Multi-mode Video Transmitter with Data, Ethernet Transceiver Standalone unit		
		FT210DBE-SMRSA	Multi-mode Video Receiver with Data, Ethernet Transceiver Standalone unit		
Card Modules	Single-Mode	FT210DBE-SST	Single-mode Video Transmitter with Data, Ethernet Transceiver Card Module	Housed in FT-C18 chassis ³	FT-C18 chassis has to be ordered separately
		FT210DBE-SSTL	Single-mode Long-haul Video Transmitter with Data, Ethernet Transceiver Card Module		
		FT210DBE-SSR	Single-mode Video Receiver with Data, Ethernet Transceiver Card Module		
		FT210DBE-SSRL	Single-mode Long-haul Video Receiver with Data, Ethernet Transceiver Card Module		
	Multi-Mode	FT210DBE-SMT	Multi-mode Video Transmitter with Data, Ethernet Transceiver Card Module		
		FT210DBE-SMR	Multi-mode Video Receiver with Data, Ethernet Transceiver Card Module		

¹ If the optical connector is FC type, the suffix in the model number will be “-FXX”. Eg. FT210DBE-FST

² FT-PA/12V works under 100 -240VAC, 50/60Hz power supply

³ Refer to FT-C18 product manual for specifications

(3) Installation

3.1 General

All OT Systems products are thoroughly inspected, tested and securely packaged before delivery to ensure a stable, intact and trouble-free service. Please check the equipment upon receipt for any visible damage which may have been caused during shipping.

The FT210DBE Series standalone units (Fig. 3.1) can be either horizontally or vertically wall-mounted, or mounted on any fixture. The Standalone unit works with an external power supply FT-PA/12V powered by local 110/220V power.

The FT210DBE Series card modules are housed inside the FT-C18 rack-mount chassis (Fig. 3.2) with an included power supply unit. The whole chassis is powered by local 110/220V power. FT-C18 is a standard 19" (483mm) rack-mount chassis which occupies 4 rack units (177.8mm) in height. Each FT210DE card module occupies two slots and a total of 9 cards can be housed inside the chassis.



Fig. 3.1 Standalone unit



Fig. 3.2 FT-C18 chassis

3.2 Standalone unit installation

- a) Mount the standalone unit onto a fixture, (either on the wall or on a flat surface) with four screws through the holes on the mounting frame to secure it in position.
- b) The provided power supply should also be mounted on the same fixture or in the proximity for connection of the supply cables to the unit, provided that an AC power supply socket is nearby for powering the adaptor.
- c) Connect all the signal inputs and outputs at the back of the unit with appropriate cables: fiber optic cable for optical link, BNC cable for video input/output (Tx/Rx), UTP cable for data input/output (Tx/Rx) and Ethernet cables for the Ethernet network or the Ethernet equipment connections.
- d) Once the unit is powered up, check that the red POWER LED on the unit is lit. If not, check the power supply cable connections between the unit and the power supply socket.
- e) With all the signals available at the input and output ports, check the status of LEDs located on the unit. With correct status of each LED, installation is now completed [for LEDs status, see **Operational Guides** on this manual's section (5)].

3.3 Card module installation

- a) Insert the card module into the FT-C18 chassis along the top and bottom card guides of an empty slot and push the card into the multi-pin socket at the rear firmly. Secure with the provided thumb screws.
- b) Repeat the above procedure for all the rest card modules. Unused slots must be covered with blank panels provided.
- c) Connect all the signal inputs and outputs at the back of the unit with appropriate cables: fiber optic cable for optical link, BNC cable for video input/output (Tx/Rx), UTP cable for data input/output (Tx/Rx) and Ethernet cables for the Ethernet network or the Ethernet equipment connections.
- d) Once the chassis is powered up, check that the red POWER LED on the front and back panels of the card modules are lit. If not, check the power supply cable connections between the chassis and the power supply socket. For failures of individual card's POWER LEDs, check the corresponding card modules, whether they have been inserted properly.
- e) With all the signals available at the input and output ports, check the status of LEDs located on the unit. With correct status of each LED, installation is now completed [for LEDs status, see **Operational Guides** on this manual's section (5)].

(4) Cable Connections & Setup Procedures

4.1 System cable connections

Signal Type	Cable Type	Connector
Optical	Single-mode or Multi-mode fiber	ST (or FC) Connector
Video	Coaxial Video Cable	BNC Connector
Data	Twisted-pair Cable	Screw Terminal Block
Ethernet	Twisted-pair Cable	RJ45 Connector Jack

Typical System Cable Connections Diagrams:

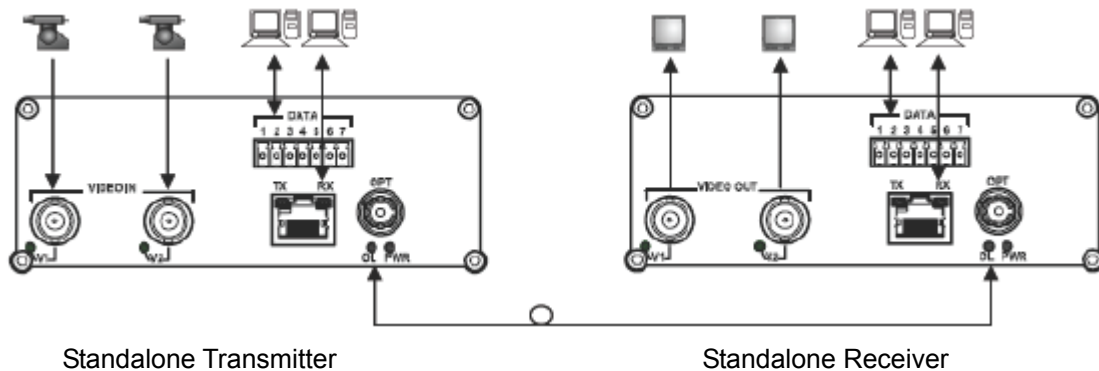
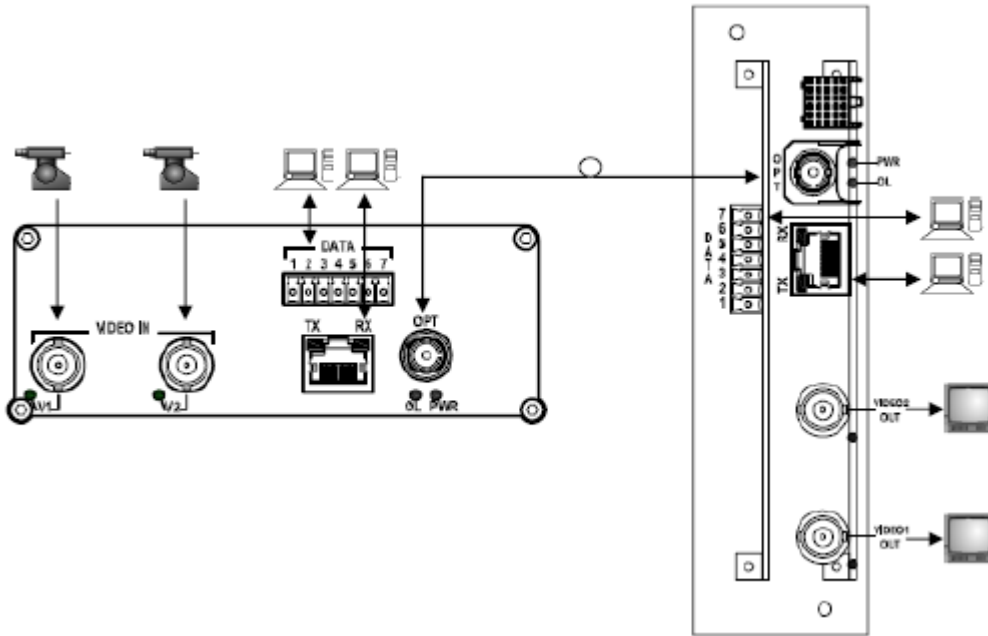


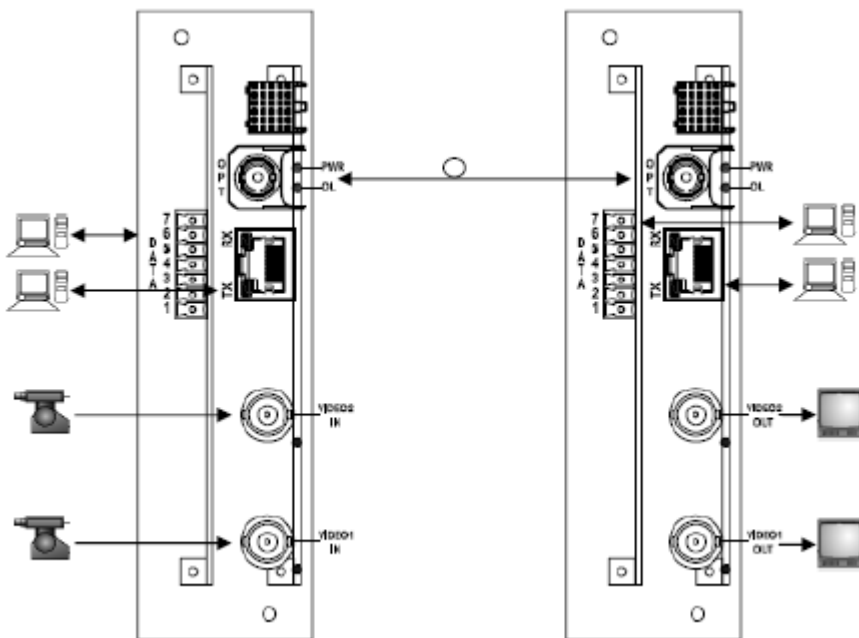
Fig 4.1 Standalone unit to Standalone unit connection diagram



Standalone Transmitter

Card Module Receiver

Fig 4.2 Standalone unit to Card Module connection diagram



Card Module Transmitter

Card Module Receiver

Fig 4.3 Card Module to Card Module connection diagram

4.2 Data port assignment and pin connections

For data input and output connections, please note the following pin assignment:

Pin Assignment (Screw Terminal Block)	1	2	3	4	5	6	7
Data format							
RS422/485 (4-Wire)	IN(+)	IN(-)	OUT(+)	OUT(-)	N/A	N/A	N/A
RS485 (2-Wire)	IN/OUT (+)	IN/OUT (-)	N/A	N/A	N/A	N/A	N/A
RS232	N/A	N/A	N/A	N/A	IN	OUT	Sig. COM

4-Wire RS422/485 Full Duplex Data communication connection diagram:

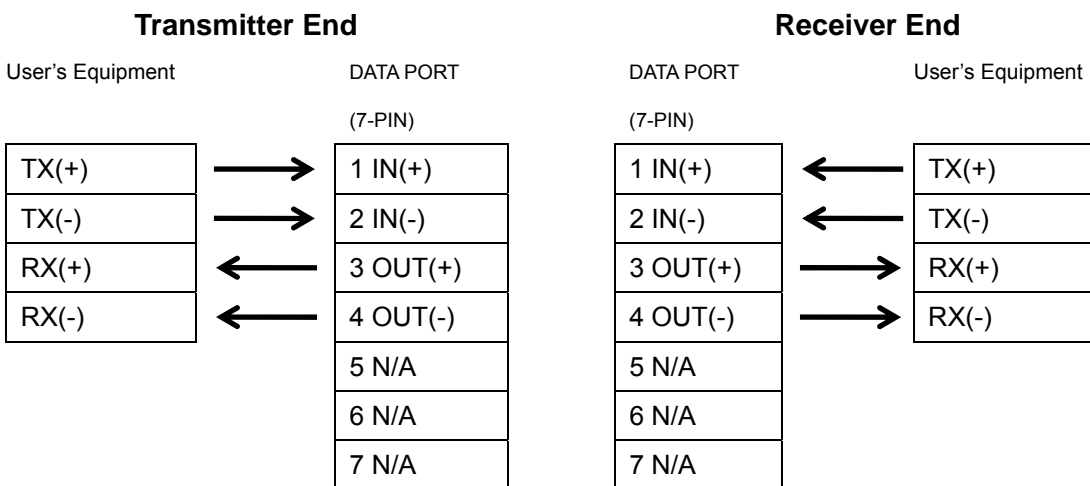


Fig. 4.4.1 Connector Pin Assignments for 4-wire RS422/485 data format at Data port

2-Wire RS485 Half Duplex Data communication connection diagram:

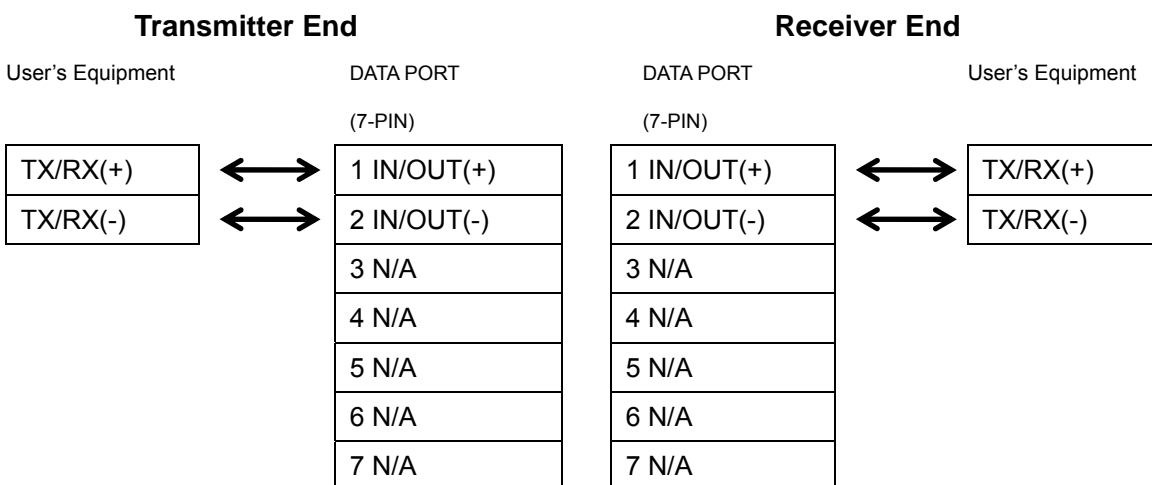


Fig. 4.4.2 Connector Pin Assignments for 2-wire RS485 data format at Data port.

RS232 Data communication connection diagram:

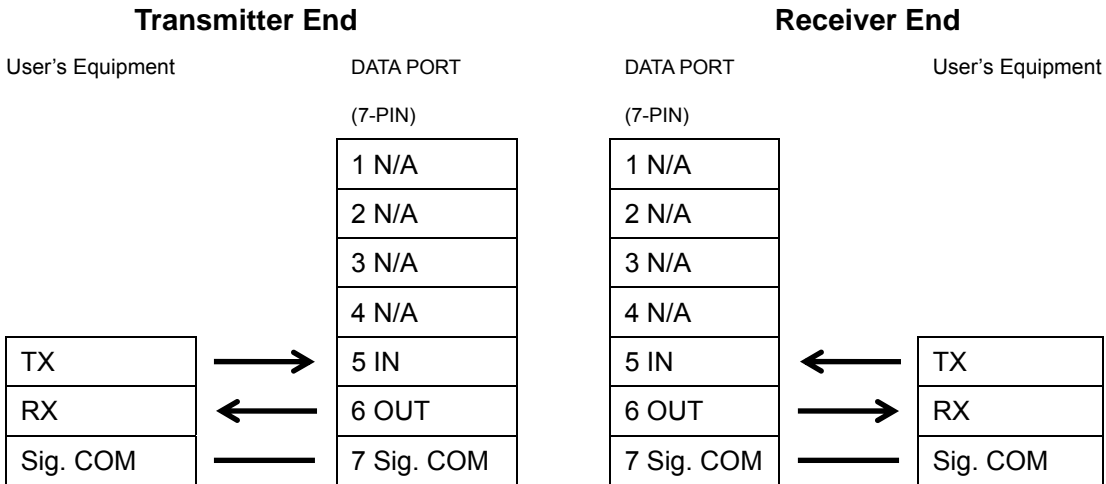
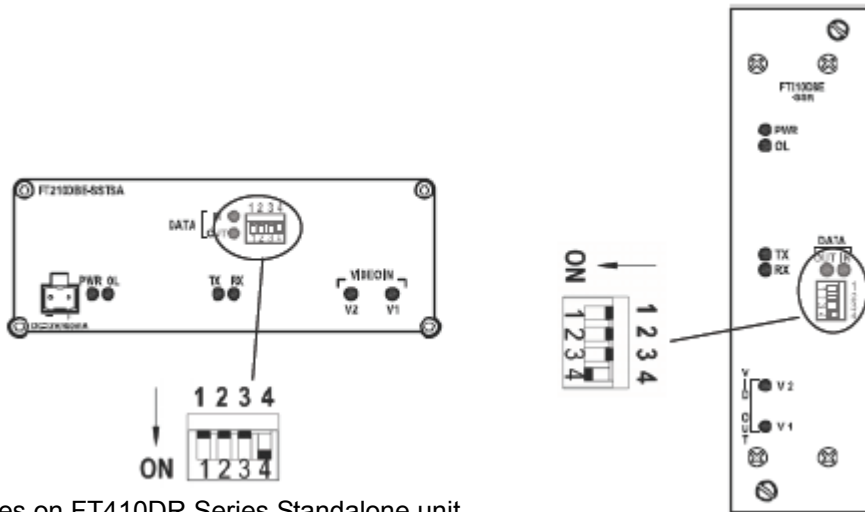


Fig. 4.4.3 Connector Pin Assignments for RS232 data format at Data port

4.3 Dip switch setting procedures

The only setup procedure is to select the appropriate line terminations and data transmission formats. Selections must be made by setting the dip switches (Fig. 4.5) through the access on the front panel.



(a) Dip switches on FT410DR Series Standalone unit

(b) Dip switches on FT410DR Series Card Module

Fig. 4.5 Location of Dip Switches

Dip switch settings for various types of data transmissions

Function / Switch No.	Sw. 3	Sw. 4
RS485 (2-Wire)	OFF	OFF
RS422/485 (4-Wire)*	OFF	ON
RS232	ON	OFF

* **Factory setting [RS422/485 (4-Wire)]**

Dip switch settings for line terminations

Line Output Termination

Function / Switch No.	Sw. 1
Line Output Terminated	ON
Line Output Underminated*	OFF

Line Input Termination

Function / Switch No.	Sw. 2
Line Input Terminated	ON
Line Input Underminated*	OFF

* **Factory setting (Line Output and Line Input "Underminated")**

Industrial practice for line terminations

For RS422 4-wire communication, it is suggested to keep the input and output lines terminated in the ONE Tx to ONE Rx configuration.

For RS485 2/4-wire communication, the RS485 device can be disabled to stay in a Hi-Z state. It is very important that the data lines have to be terminated with a resistor being connected across the pair wires so as to eliminate the residual standing signal waves on the lines in the Hi-Z line condition. So, it is recommended that the lines should be terminated with the appropriate resistance. When more than one RS485 device are connected in a daisy-chain configuration, only the farthest device on the loop, i.e. the device located at the end of the line, should be terminated; whereas the middles ones are set to "Underminated" status. See the figure 4.6 below for reference.

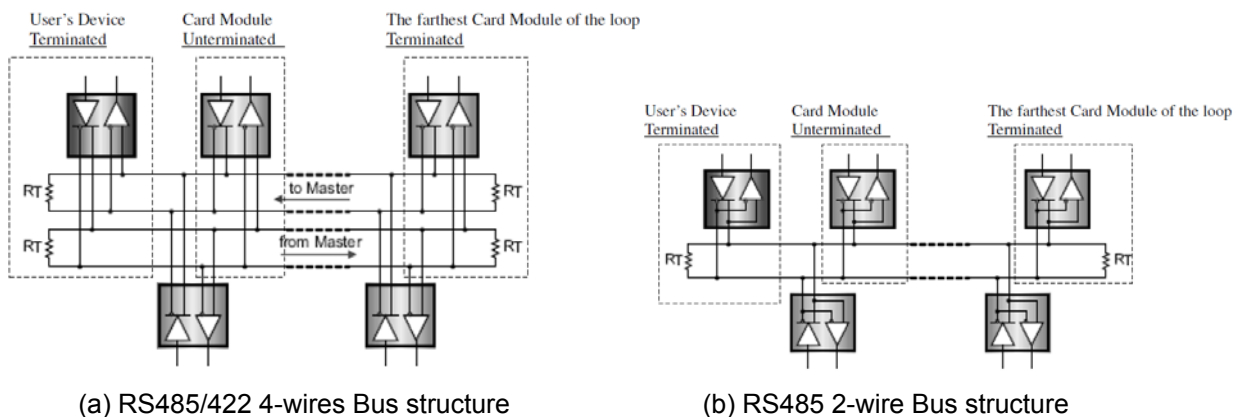


Fig. 4.6 Termination of different Bus structures

4.4 RJ-45 Pin Assignment for Ethernet Port

According to the EIA/TIA 586B standard, the Straight-through cable is used to connect between OT products and switch.

4.5 Ground connection

For enhanced safety to reduce the risks of electrical shock and physical damage, caused by lightning and other power surges, as well as a connection to the surge suppression devices in the product, a screw terminal is provided on the Standalone cabinets (Fig. 4.7). It is highly recommended that the Standalone unit have good ground connections to the buildings ground in accordance with the local codes.

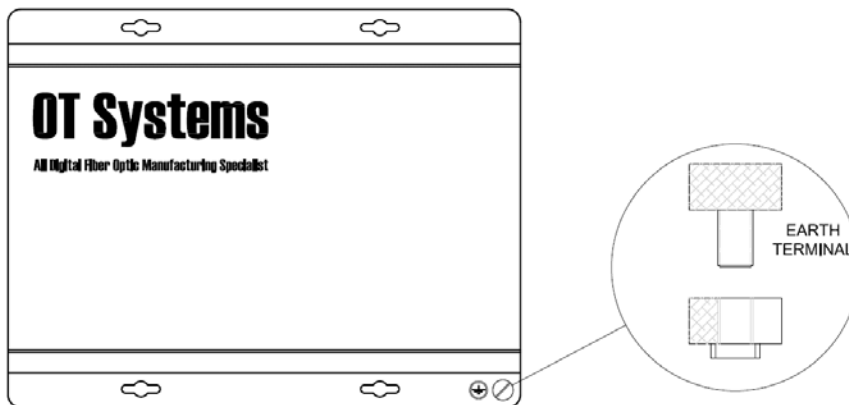


Fig. 4.7 Standalone unit earth ground terminal location

(5) Operational Guides

5.1 FT410DBE Series Transmitter

LED Indicators

Indicator	Color	Description
PWR	Red	Lit when power is supplied to the Transmitter.
OL	Yellow	Lit when optical signal from receiver to transmitter is active.
VIDEO IN / VIN	V1	Green
	V2	Green
DATA	IN	Red
	OUT	Green
ETHERNET	TX	Amber
	RX	Green

Signal Ports

OPT -	ST (or FC) Optical Connector for fiber cable connection.
VIDEO IN -	BNC Video Connectors for video signal inputs.
DATA -	7-pin Screw Terminal Block for data signal.
ETHERNET -	RJ45 Connector Jack for connection of Ethernet Cable.

5.2 FT410DBE Series Receiver

LED Indicators

Indicator		Color	Description
PWR		Red	Lit when power is supplied to the Receiver.
OL		Yellow	Lit when optical signal from transmitter to receiver is active.
VIDEO OUT / VOUT	V1	Green	Lit when video signals are received at VIDEO OUT connectors.
	V2	Green	
DATA	IN	Red	Blinks when input data is available at Rx.
	OUT	Green	Blinks when output data is available at Rx.
ETHERNET	TX	Amber	Blinked when data is output to Rx.
	RX	Green	Blinked when data is input to Tx.

Signal Ports

OPT -	ST (or FC) Optical Connector for fiber cable connection.
VIDEO OUT -	BNC Video Connectors for video signal outputs.
DATA -	7-pin Screw Terminal Blocks for data signal.
ETHERNET -	RJ45 Connector Jack for connection of Ethernet Cable.

(6) Specifications

PARAMETERS	MODELS*	FT210DBE-SST(R)SA FT210DBE-SST(R) (Single-Mode)	FT210DBE-SST(R)LSA FT210DBE-SST(R)L (Single-Mode)	FT210DBE-SMT(R)SA FT210DBE-SMT(R) (Multi-Mode)
	OPTICAL			
No. of Fiber / Connector		1 / ST (or FC)	1 / ST (or FC)	1 / ST (or FC)
Wavelength		1550/1310 nm	1550/1310 nm	1550/1490 nm
Optical Power Budget		17 dB	24 dB	23 dB
Max Distance		40 km	60 km	1 km
ELECTRICAL VIDEO				
Channel / Connector		2 / BNC		

System	PAL, NTSC, SECAM
Bandwidth	≥ 6.0 MHz
Input/Output Impedance	75 Ohm
Input/Output Level	1.0 Vp-p typical
Differential Gain	< 1% typical
Differential Phase	< 1° typical
SNR	>65dB
DATA	
Channel / Connector	1 / 7-pin Screw Terminal
Direction	Bi-directional (Duplex)
Electrical Format	RS232, RS422, RS485 (2-wire, 4-wire) Tri-state
Transmission Rate	0~256Kbps
Ethernet	
Channel (Connector)	1 (RJ45 Connector Jack)
Direction	Duplex
Transmission Format	10/100 Base T; Full duplex
POWER	
Power consumption	12VDC @ 5.4W
Power Supply	Standalone Unit: FT/PA12V DC Adaptor Card module: Powered by FT-C18 chassis
Connector (Standalone unit)	2-pin Screw Terminal
PHYSICAL	
Weight	Standalone unit: 0.76 kg Card module: 0.4 kg
Dimensions (W x H x D)	Standalone unit: 156 x 50.5 x 223 mm (MAX) Card module: 148 x 41 x 213 mm (MAX)
ENVIRONMENTAL	
Operating Temperature	-40°C ~ +75°C
Storage Temperature	-40°C ~ +85°C
Relative Humidity	0 ~ 95% non-condensing
MTBF	>100'000 Hours

* If the optical connector is FC type, the suffix in the model number will be "-FXX". Eg. FT210DBE-FST

(7) Drawings

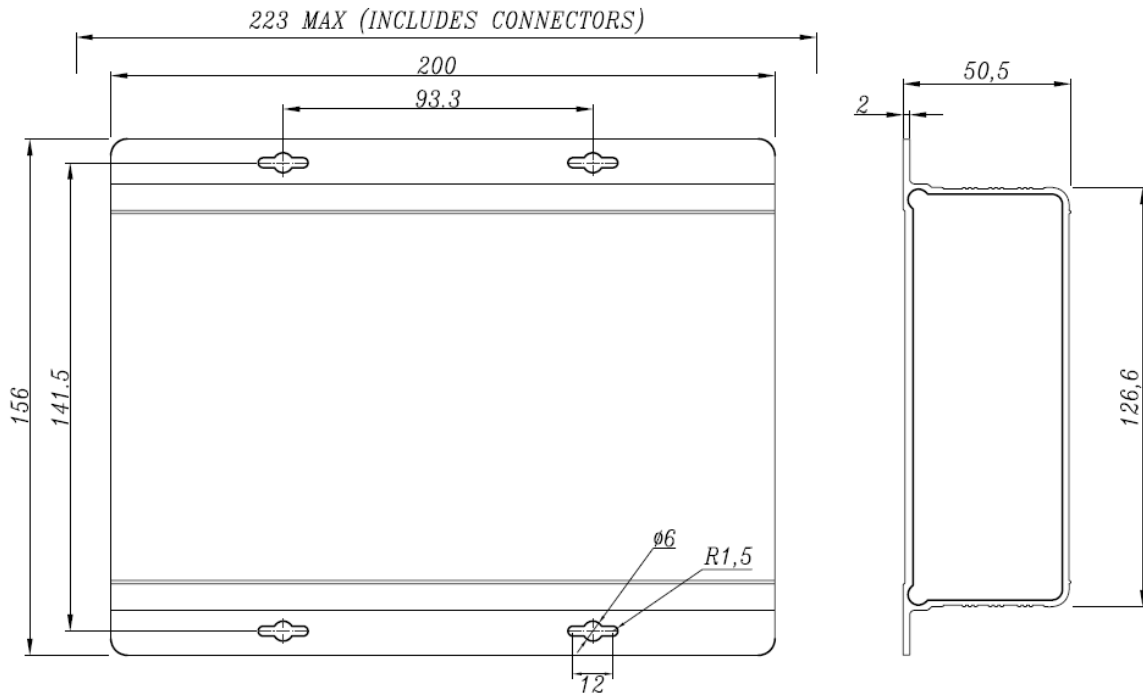


Fig. 7.1 Dimensional drawings of Standalone unit (mm)

(8) Warranty Information

All OT Systems products are subject to a limited life-time warranty offered by the company in normal circumstances. Please refer to the OT Systems Products Warranty Statement for details. Access to the statement is available in our company website at www.ot-systems.com.

(9) Contact Information

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