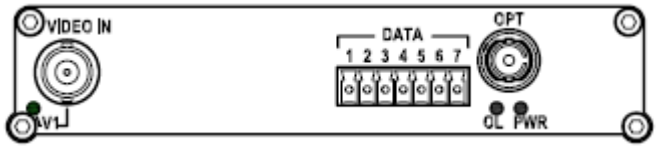
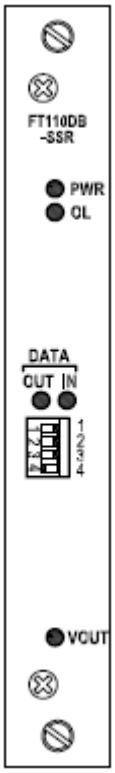
All Digital Fiber Optic Manufacturing Specialists

Installation and Operation Manual

FT110DB Series





10-bit Digital Series

1-ch Video with 1 Bi-directional Data
Fiber Optic Converter

OT Systems Ltd., 2009
Rev 1.1

Models covered in this manual

Standalone Units

Single-Mode Transmitters
FT110DB-SSTSA
FT110DB-SSTLSA

Single-Mode Receivers
FT110DB-SSRSA
FT110DB-SSRLSA

Multi-Mode Transmitter
FT110DB-SMTSA

Multi-Mode Receiver
FT110DB-SMRSA

Card Modules

Single-Mode Transmitters
FT110DB-SST
FT110DB-SSTL

Single-Mode Receivers
FT110DB-SSR
FT110DB-SSRL

Multi-Mode Transmitter
FT110DB-SMT

Multi-Mode Receiver
FT110DB-SMR

Remark:
If the optical connector is FC type, the suffix in the model number will be *"-**F**XX".* Eg. FT110DB-**F**ST

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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 each contains 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 facilitated and/or 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 FT110DB Series products comprise of either single-mode or multi-mode fiber optic transmitters and receivers catering for optical transmission of ONE forward (Tx → Rx) video and ONE bi-directional (Tx ↔ Rx) data signal in one fiber. The products work at wavelengths 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 multi-systems video in NTSC, PAL and SECAM formats. Transparent data transmission is also accomplished in RS232, RS422 and RS485 formats regardless of the types of communication protocol implemented within the system. Time Division Multiplex (TDM) technique is employed for digital transmission of forward video and data; whereas optical Wavelength Division Multiplex (WDM) technique is employed for simultaneous reverse data transmission so as bi-directional data transmission is accomplished.

For the single-mode transmission, we also offer specifically designed products for long-haul transmissions up to 60km. Their model names include a letter “L” in the suffix, e.g. FT110DB-SST**L** for Tx, FT110DB-SSR**L** for Rx, etc.

The FT110DB Series units are available as standalone units, which can be mounted horizontally or vertically wall-mounted on any fixtures. The standalone unit comes with an external power adaptor FT-PA/12V, which can be powered by a local residential power supply outlet.

The FT110DB Series units are also available as plug-in cards installed in 19” rack-mount chassis deployed in small, medium to large systems. Each plug-in card occupies one slot space inside the rack-mount chassis. The rack mount chassis has to be ordered separately which is integrated with a power supply unit for powering the installed card modules.

2.2 Models selection table

Type	Mode	Models[1]	Descriptions	Installation requirements	Remarks
Standalone Units	SIngle-Mode	FT110DB-SSTSA	Single-mode 1-Ch. Video Transmitter & 1 Data Transceiver Standalone Unit	Horizontally or vertically wall-mounted Standalone unit	FT-PA/12V external power adaptor is included for the Standalone unit[2]
		FT110DB-SSTLSA	Single-mode Long-haul 1-Ch. Video Transmitter & 1 Data Transceiver Standalone Unit		
		FT110DB-SSRSA	Single-mode 1-Ch. Video Receiver & 1 Data Transceiver Standalone Unit		
		FT110DB-SSRLSA	Single-mode Long-haul 1-Ch. Video Receiver & 1 Data Transceiver Standalone Unit		
	Multi-Mode	FT110DB-SMTSA	Multi-mode 1-Ch. Video Transmitter & 1 Data Transceiver Standalone Unit		
		FT110DB-SMRSA	Multi-mode 1-Ch. Video Receiver & 1 Data Transceiver Standalone Unit		
Card Modules	Single-Mode	FT110DB-SST	Single-mode 1-Ch. Video Transmitter & 1 Data Transceiver Card Module	Housed in FT-C18 chassis[3]	FT-C18 chassis has to be ordered separately
		FT110DB-SSTL	Single-mode Long-haul 1-Ch. Video Transmitter & 1 Data Transceiver Card Module		
		FT110DB-SSR	Single-mode 1-Ch. Video Receiver & 1 Data Transceiver Card Module		
		FT110DB-SSRL	Single-mode Long-haul 1-Ch. Video Receiver & 1 Data Transceiver Card Module		
	Multi-Mode	FT110DB-SMT	Multi-mode 1-Ch. Video Transmitter & 1 Data Transceiver Card Module		
		FT110DB-SMR	Multi-mode 1-Ch. Video Receiver & 1 Data Transceiver Card Module		

[1] If the optical connector is FC type, the suffix in the model number will be *"-**F**XX"*. Eg. FT110DB-**F**ST

[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 packed 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 transit.

The FT110DB Series standalone units (Fig. 3.1) can be either horizontally or vertically wall-mounted, or mounted on any fixtures, etc. The Standalone unit works with an external power adaptor FT-PA/12V powered by a local residential power supply outlet.

The FT110DB 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 a local residential power supply outlet. FT-C18 is a standard 19" (483mm) rack-mount chassis which occupies 4 rack units space (177.8mm) in height. Each FT110DB card module occupies one slot space inside and a total of 18 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, e.g. a plank, (either on the wall or on a flat surface) with four screws piercing through the holes on the mounting frame to secure it in position.

b) The provided power adaptor 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) 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.

d) 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), and UTP cable for data input/output (Tx/Rx).

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.

b) Repeat the above procedure for all the rest card modules. Unused slots must be covered with blank panels (provided separately).

c) 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.

d) 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), and UTP cable for data input/output (Tx/Rx).

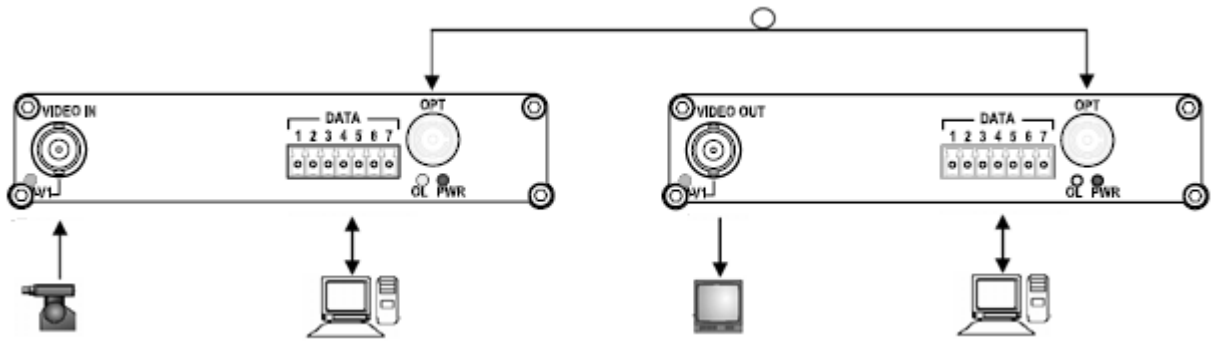
e) With all the signals available at the input and output ports, check the status of LEDs located on the unit. With correct status of each LED, installation is now completed [for LEDs status, see **Operational Guides** on this manual's section **(5)**].

(4) Cable Connections & Setup Procedures

4.1 System cable connections

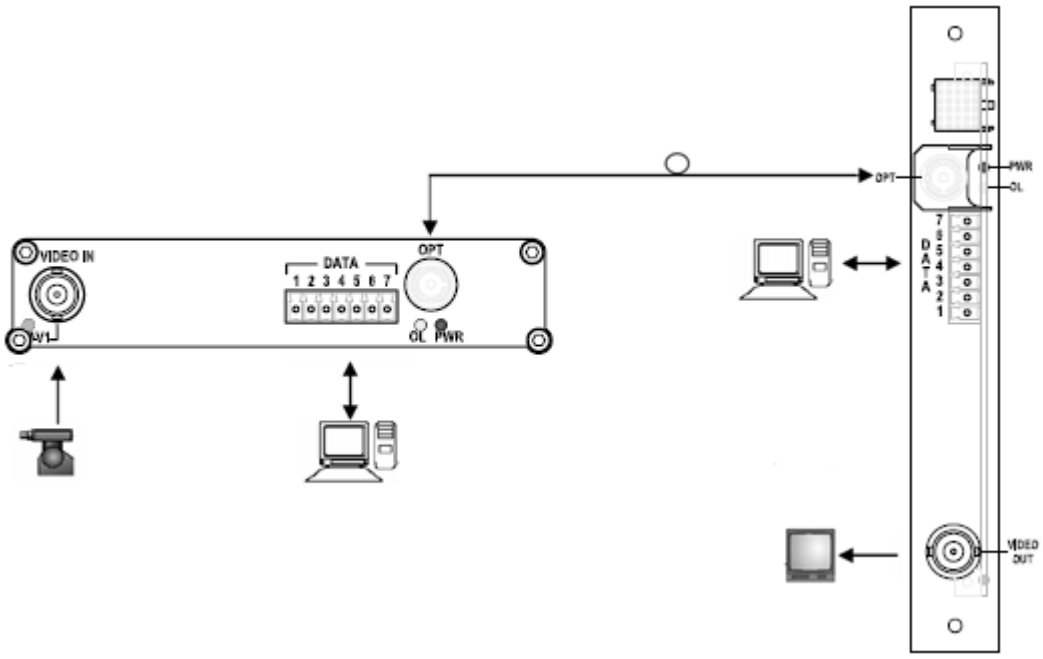
Signal Type	Cable Type	Connector
Optical	Single-mode or Multi-mode fiber	ST (or FC) Connector
Video	Coaxial Video Cable	BNC Connector
Data	Twisted-pair Cable	Screw Terminal Block

Typical System Cable Connections Diagrams:



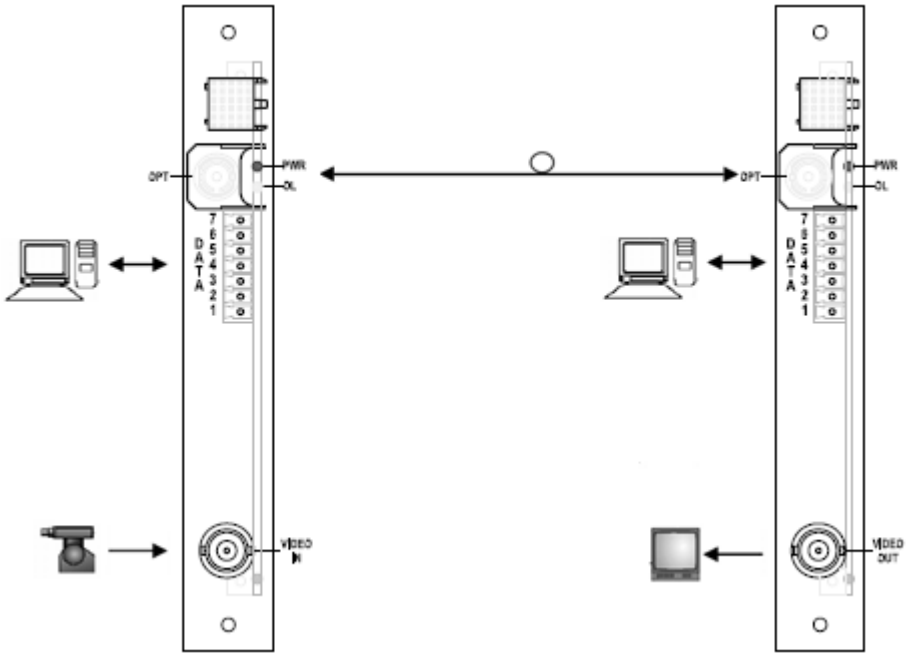
Standalone Transmitter Standalone Receiver

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) / Data format	1	2	3	4	5	6	7
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:

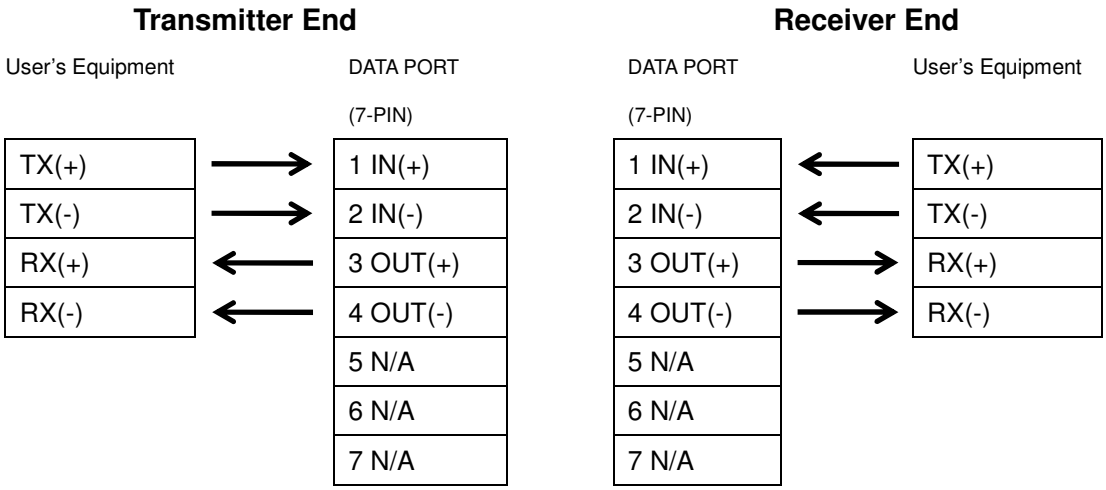


Fig. 4.4.1 *Connector Pin Assignments for 4-wire RS422/485 data format at Data port*

2-Wire RS485 Half Duplex Data communication connection diagram:

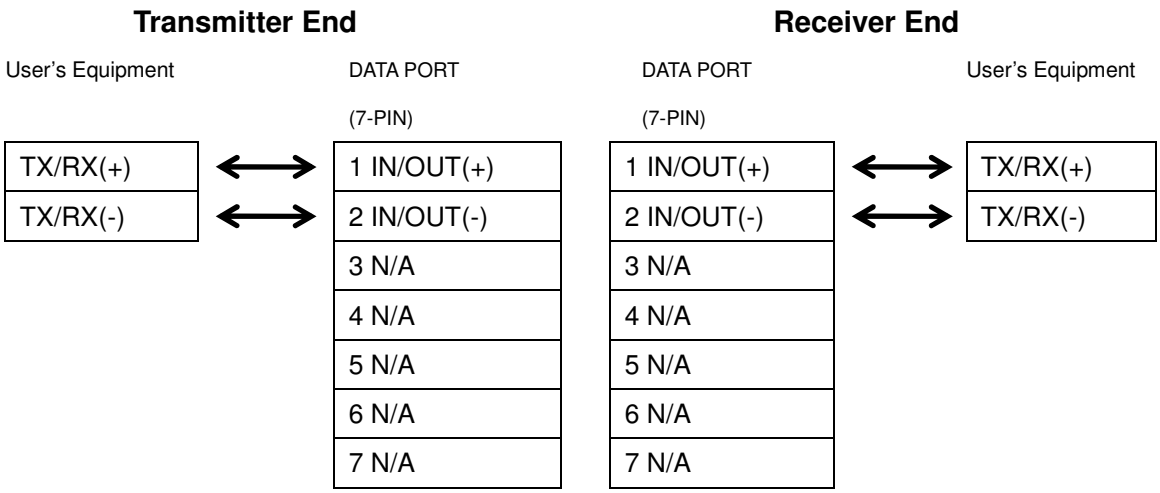


Fig. 4.4.2 *Connector Pin Assignments for 2-wire RS485 data format at Data port.*

RS232 Data communication connection diagram:

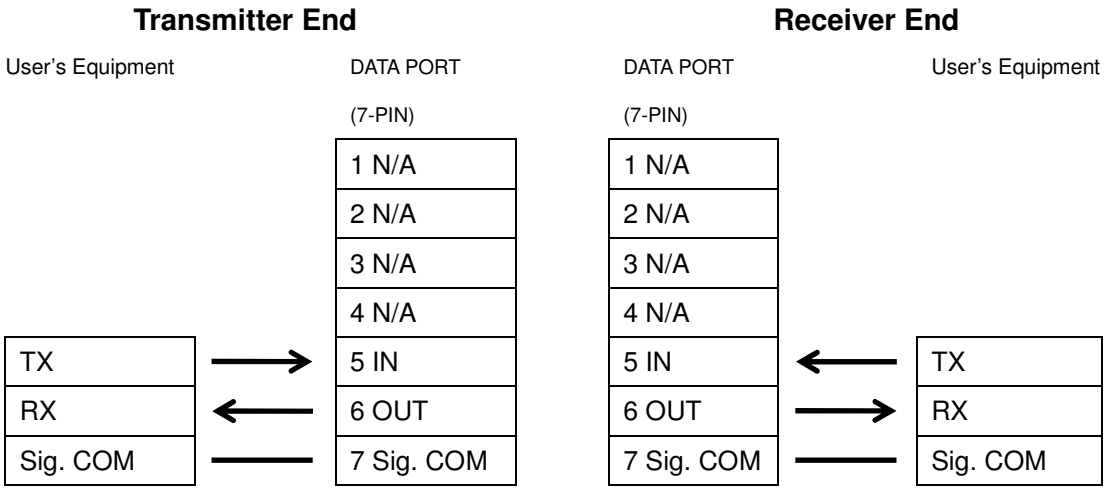
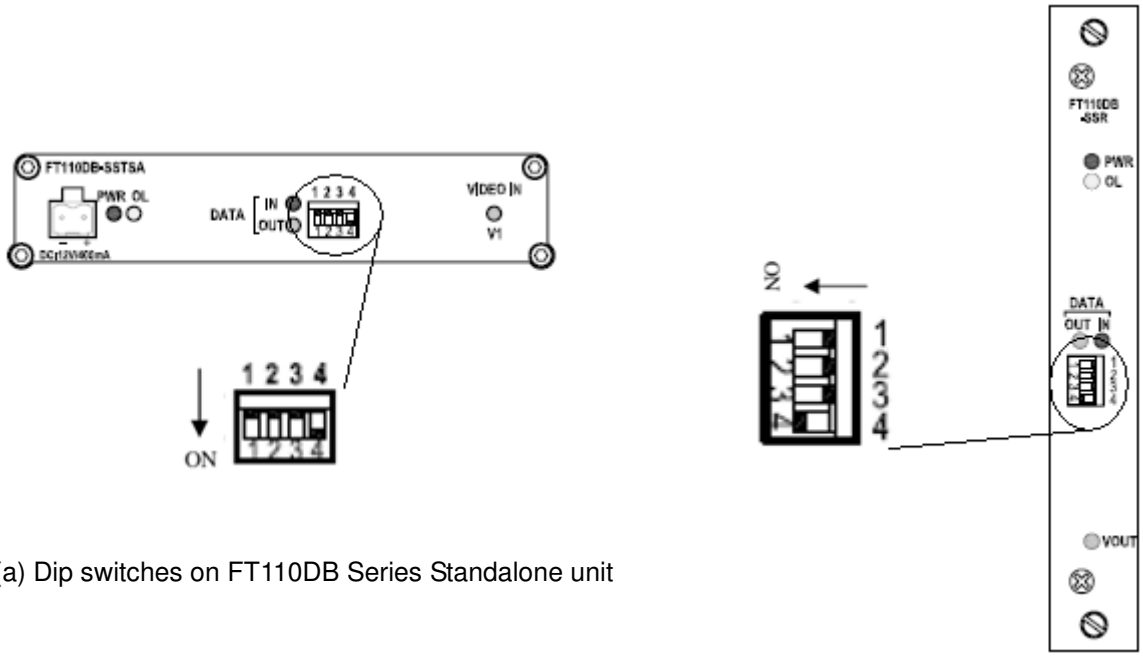


Fig. 4.4.3 *Connector Pin Assignments for RS232 data format at Data port*

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 FT110DB Series Standalone unit

(b) Dip switches on FT110DB 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 Unterminated*	**OFF**

Line Input Termination

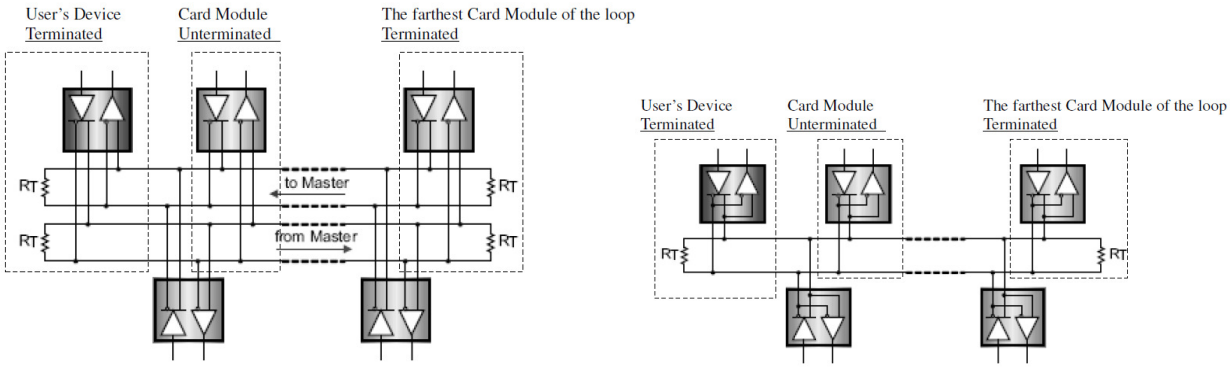
Function / Switch No.	Sw. 2
Line Input Terminated	ON
Line Input Unterminated*	**OFF**

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

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 devices can be disabled to stay on 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. For more than one RS485 devices are connected in a daisy-chain configuration, only the farthest device of the loop, i.e. the device located at the end of the lines, should be terminated; whereas the middles ones are set to "Unterminated" status. See the figure 4.6 below for reference.



(a) RS485/422 4-wires Bus structure (b) RS485 2-wire Bus structure

Fig. 4.6 *Termination of different Bus structures*

4.4 Ground connection

For enhanced safety precautions to reduce the risks of human hazards and physical damages caused by lightning and other power surges, in addition to the incorporation of the surge protective devices into the products, a screw is provided on the Standalone cabinets (Fig. 4.7). It is highly recommended that the Standalone unit must have good ground connections made to the system earthing terminals in accordance with the local safety practice.

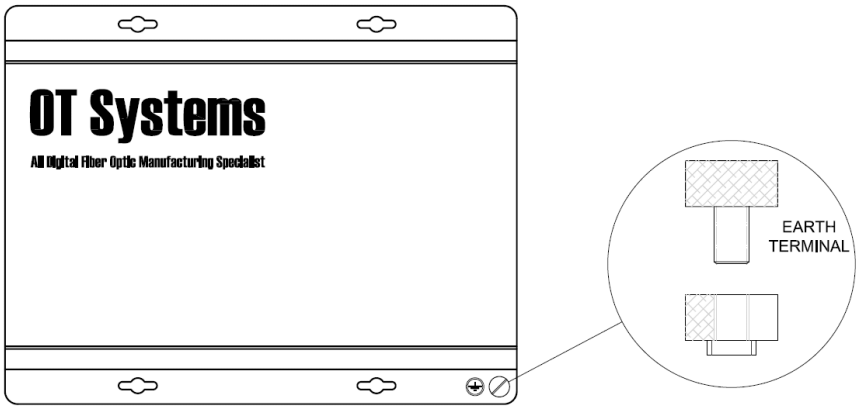


Fig. 4.7 *Standalone unit earth terminal location*

(5) Operational Guides

5.1 FT110DB 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		Green	Lit when video signal is fed into the VIDEO IN connector.
DATA	IN	Red	Blinks when input data is available at Tx.
	OUT	Green	Blinks when output data is available at Tx.

Signal Ports

OPT -	ST (or FC) Optical Connector for fiber cable connection.
VIDEO IN -	BNC Video Connector for video signal input.
DATA -	7-pin Screw Terminal Block for data signal.

5.2 FT110DB 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		Green	Lit when video signal is received at VIDEO OUT connector.
DATA	IN	Red	Blinks when input data is available at Rx.
	OUT	Green	Blinks when output data is available at Rx.

Signal Ports

OPT -	ST (or FC) Optical Connector for fiber cable connection.
VIDEO OUT -	BNC Video Connector for video signal output.
DATA -	7-pin Screw Terminal Block for data signal.

(6) Specifications

MODELS* / PARAMETERS	FT110DB-SST(R)SA FT110DB-SST(R) (Single-Mode)	FT110DB-SST(R)LSA FT110DB-SST(R)L (Single-Mode)	FT110DB-SMT(R)SA FT110DB-SMT(R) (Multi-Mode)
OPTICAL			
No. of Fiber / Connector	1 / ST (or FC)	1 / ST (or FC)	1 / ST (or FC)
Wavelength	1310/1550 nm	1550/1310 nm	1310/1550 nm
Optical Power Budget	17 dB	24 dB	23 dB
Max Distance	40 km	60 km	4 km
ELECTRICAL VIDEO			
Channel / Connector	1 / BNC		
System	PAL, NTSC, SECAM		
Bandwidth	6.5 MHz		
Input/Output Impedance	75 Ohm		
Input/Output Level	1.0 Vp-p typical		
Differential Gain	< 1% typical		
Differential Phase	< 1^{o} 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		
POWER			
Power consumption	12VDC @ 4.8W		
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: 0.56 kg Card module: 0.16 kg		
Dimensions (W x H x D)	Standalone unit: 156 x 30.5 x 223 mm (MAX) Card module: 148 x 20.4 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 *"-**F**XX"*. Eg. FT110DB-**F**ST

(7) Drawings

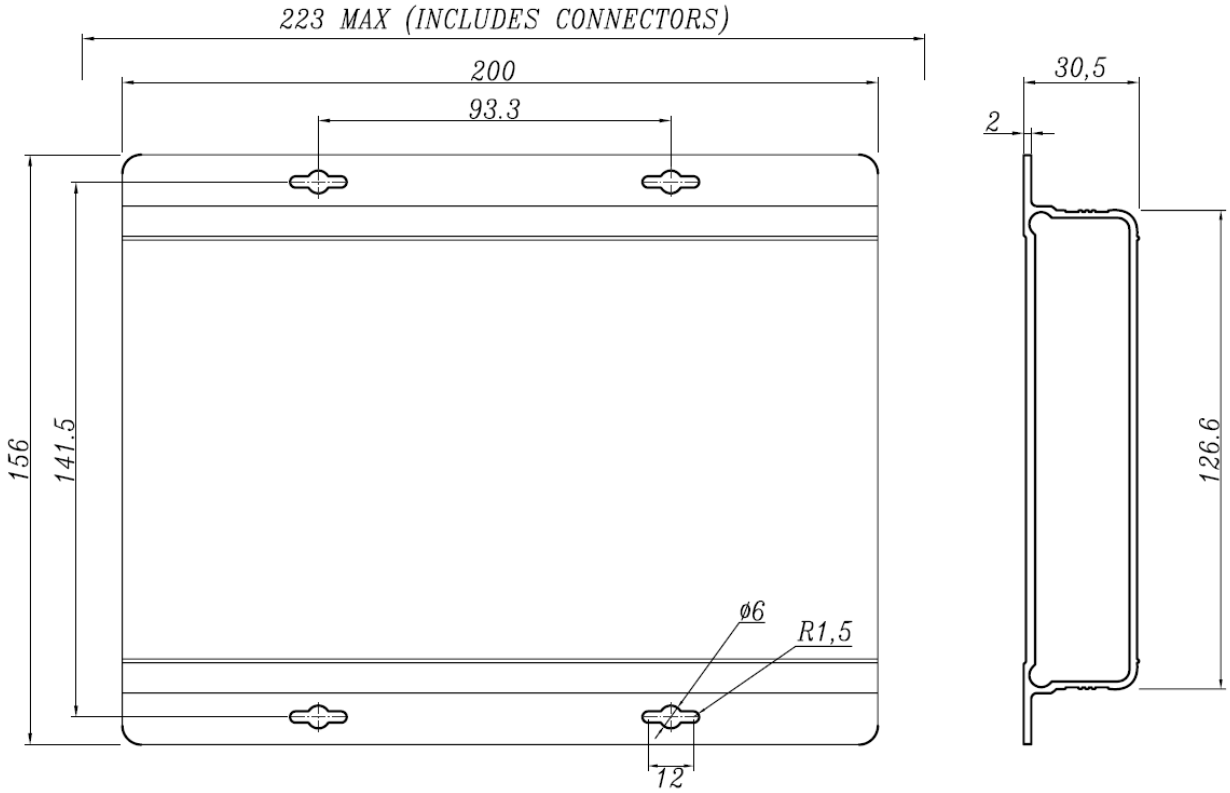


Fig. 7.1 *Dimensional drawings of Standalone unit (mm)*

(8) Warranty Information

All OT Systems products are subject to 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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