



FTDS

Optical Displayport 1.2 Extension system

Customer :

Specification for

Model : FTDS

Revised :
Original Release Date : Mar 17, 2016

OPHIT

Revision History

Version Number	Revision Date	Author	Description of Changes
1.0	Mar 17, 2016	K.H KIM	Initial Version

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1. General Description

FTDS, This unique fiber optical transceiver let your PC, digital HDTV or Projector extend up to 200 meter(656ft) away from host based on DisplayPort standard without signal degradation by UHD (3840x2160 or 4096x2160 @60Hz) resolution.

- High Speed and long distance transmission by optical system
- Compatible with DisplayPort standard V1.2
- Supports 50-micron OM3 or OM4 Fiber with an SC Connector
- Main-link video signal / AUX data and Hot Plug Detection signal is transmitted by-
1 channel multimode optical fiber
- External power supply use(TX, RX)
- Mode switch use(TX, RX)
- DPCD(DisplayPort Configuration Data) compliant
- DPCP or HDCP compliant

※ Does not support DP-Dual(HDMI) Mode and FAUX(720Mbps Fast Aux) Mode

※ It works guarantee only the included DP-Cable. (Molex DP Cable-2meter / 2ea)

2. General Specification

Parameter	Symbol	
	Transmitter	Receiver
Optical Converter	850nm, 4Ch Transmit OSA 911nm, 1Ch VCSEL 980nm, 1Ch PIN P/D Diode	850nm, 4Ch Receive OSA 980nm, 1Ch VCSEL 911nm, 1Ch PIN P/D Diode
Input and Output Signal	DISPLAYPORT 1.2a Standard	
Video Bandwidth	5.4Gbps / Channel	
Module Size	81.2mm(W) x 21.1mm(D) x 47.5mm(H)	
Optical Connector	SC Connector	
Electrical Connector	DisplayPort Female Connector (20 Pin)	
Applied Fiber	OM3 or OM4 Multi-mode glass-fiber.	
Maximum Supporting Resolution	UHD(3840x2160@60Hz / 4096x2160@60Hz)	
Transmission distance	200 meter (656 ft)	
External Power	5V / 2A (1.35ø DC JACK)	

3. Absolute Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Units
Power Supply	V_{CC}	-0.3	+5.5	V
Operating temperature	V_{OT}	0	+50	°C
Storage temperature	V_{ST}	-20	+70	°C
Relative Humidity	H_{RH}	10	80	RH

NOTICE

Stresses greater than those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions above those indicated in the operations section for extended periods of time may affect reliability.

4. Electrical Specification

4.1 Transmitter Box

Parameter		Symbol	Min	Typ	Max	Units	Condition
P O W E R	Supply Voltage(DC)	Vcc	+4.5	+5.0	+5.5	V	
	Supply Current	Icc		350		mA	
	Power Dissipation	Po		1.75		W	
S I G N A L	Diff. P-to-P Input level 1	VTX- DIFF-PP1	0.34	0.4	0.46	V	
	Diff. P-to-P Input level 2	VTX- DIFF-PP2	0.51	0.6	0.68	V	
	Diff. P-to-P Input level 3	VTX- DIFF-PP3	0.69	0.8	0.92	V	
	Diff. P-to-P Input level 4	VTX- DIFF-PP4	1.02	1.2	1.38	V	
	TX DC Common Mode	VTX-DC- CM	0		2.0	V	
	TX AC Common Mode HBR2	VTX-AC- CM			30	mV rms	
H P D	Hot Plug Detect Voltage	HPD	2.25		3.6	V	
	Hot Plug Detection Threshold		2.0			V	
	Hot Unplug Detection Threshold				0.8	V	
	IRQ HPD Pulse Detection Threshold		2.0			Ms	

4.2 Receiver Box

	Parameter	Symbol	Min	Typ	Max	Units	Condition
P O W E R	Supply Voltage	Vcc	+4.5	+5.0	+5.5	V	
	Supply Current	Icc		400		mA	
	Power Dissipation	Po		2.00		W	
S I G N A L	Diff. P-to-P Output Voltage	T RX-DIFFp-p_HBR2	70			mV	For HBR2
	Diff. P-to-P Output Voltage	V RX-DIFFr-p	40			mV	For RBR
	RX DC Common Mode	VRX-DC-CM	0		2.0	V	
H P D	Hot Plug Detect Voltage	HPD	2.25		3.6	V	
	Hot Plug Detection Threshold		2.0			V	
	Hot Unplug Detection Threshold				0.8	V	
	IRQ HPD Pulse Detection Threshold		2.0			Ms	

4.3 Connector Pin Assignment

4.3.1 Transmitter

4.3.1.1 DisplayPort Connector

Pin	Signal Assignment	Pin	Signal Assignment
1	ML_Lane3(n)	2	GND
3	ML_Lane3(p)	4	ML_Lane2(n)
5	GND	6	ML_Lane2(p)
7	ML_Lane1(n)	8	GND
9	ML_Lane1(p)	10	ML_Lane0(n)
11	GND	12	ML_Lane0(p)
13	No Connect(CONFIG1)	14	No Connect(CONFIG2)
15	AUX_CH(p)	16	GND
17	AUX_CH(n)	18	Hot Plug Detect
19	Return	20	DP_PWR

4.3.1.2 Mode switch

Pin	Signal Assignment
DEFAULT	Minimum DP output level (Recommend)
MANUAL	Maximum DP output level

※ Switch setting is in accordance with the characteristics of the graphics card.

4.3.2 Receiver

4.3.2.1 DisplayPort Connector

Pin	Signal Assignment	Pin	Signal Assignment
1	ML_Lane0(p)	2	GND
3	ML_Lane0(n)	4	ML_Lane1(p)
5	GND	6	ML_Lane1(n)
7	ML_Lane2(p)	8	GND
9	ML_Lane2(n)	10	ML_Lane3(p)
11	GND	12	ML_Lane3(n)
13	No Connect(CONFIG1)	14	No Connect(CONFIG2)
15	AUX_CH(p)	16	GND
17	AUX_CH(n)	18	Hot Plug Detect
19	Return	20	DP_PWR

4.3.2.2 Mode switch

Pin	Signal Assignment
DEFAULT	Auto setting (Recommend)
MANUAL	Special setting of EQ / VOD / Pre-emphasis

※ Switch setting is in accordance with the characteristics of the monitor.

5. Optical Specification

5.1 Transmitter Characteristics

Optical Parameter	Symbol	Min	Typ	Max	Units	Conditions
Transmit Wavelength Lane 0	λ_0		778		nm	
Transmit Wavelength Lane 1	λ_1		801		nm	
Transmit Wavelength Lane 2	λ_2		824		nm	
Transmit Wavelength Lane 3	λ_3		850		nm	
Transmit Wavelength Lane 4	λ_4		911		nm	
Optical Modulation Amplitude (Lanes 0 – 4)	OMA	-6.0			dBm	
Rise/Fall time (Lanes 0 – 3)	r/f			77	ps	Differential, 20%-80%
Rise/Fall time Lane 4	r/f			300	ps	Differential, 20%-80%
Peak Optical Output Power	P_{PEAK}			3.0	dBm	
OMA Sensitivity BER=1e-12, Lane 5	SEN			-12.5	dBm	
Total RMS Jitter, (Lanes 0 – 3) ¹	TJ_{RMS}			10	ps	
Total Jitter (P-P)	$TJ_{P=P}$			45	ps	
SD Guaranteed Off – Lane 5				-24	dBm	
SD Guaranteed On – Lane 5		-13			dBm	
SD Hysteresis – Lane 5		1.0			dB	

Transmitter module of Model FTDS includes 4 channel VCSEL (Vertical Surface Emitting Laser Diode) with 850, 911, 980nm invisible laser radiation.

Do not view directly laser module of transmitter or the end of the other side of optical cable connected to transmitter with optical instrument.

Transmitter module of FTDS is Class 1M Laser Product.

5.2 Receiver Characteristics

Optical Parameter	Symbol	Min	Typ	Max	Units	Conditions
Transmit Wavelength Lane 5	λ_5		980		nm	
OMA Sensitivity Lanes (0 – 3)	SENS			-12.5	dBm	6.0-Gbps BER =1E-12
OMA Sensitivity Lane 4	SENS			-12.5	dBm	1250 Mbps BER =1E-12
OMA – Lane 5	OMA	-6.0			dBm	
SD Guaranteed Off – (Lanes 0–3)	SD _{OFF}			-24	dBm	
SD Guaranteed On – (Lanes 0–3)	SD _{ON}	-13			dBm	
SD Guaranteed Off – Lane 4	SD _{OFF}			-24	dBm	
SD Guaranteed On – Lane 4	SD _{ON}	-13			dBm	
SD Hysteresis – All Lanes		1.0			dB	
Receive Wavelength Lane 0	λ_0		778		nm	
Receive Wavelength Lane 1	λ_1		801		nm	
Receive Wavelength Lane 2	λ_2		824		nm	
Receive Wavelength Lane 3	λ_3		850		nm	
Receive Wavelength Lane 4	λ_4		911		nm	

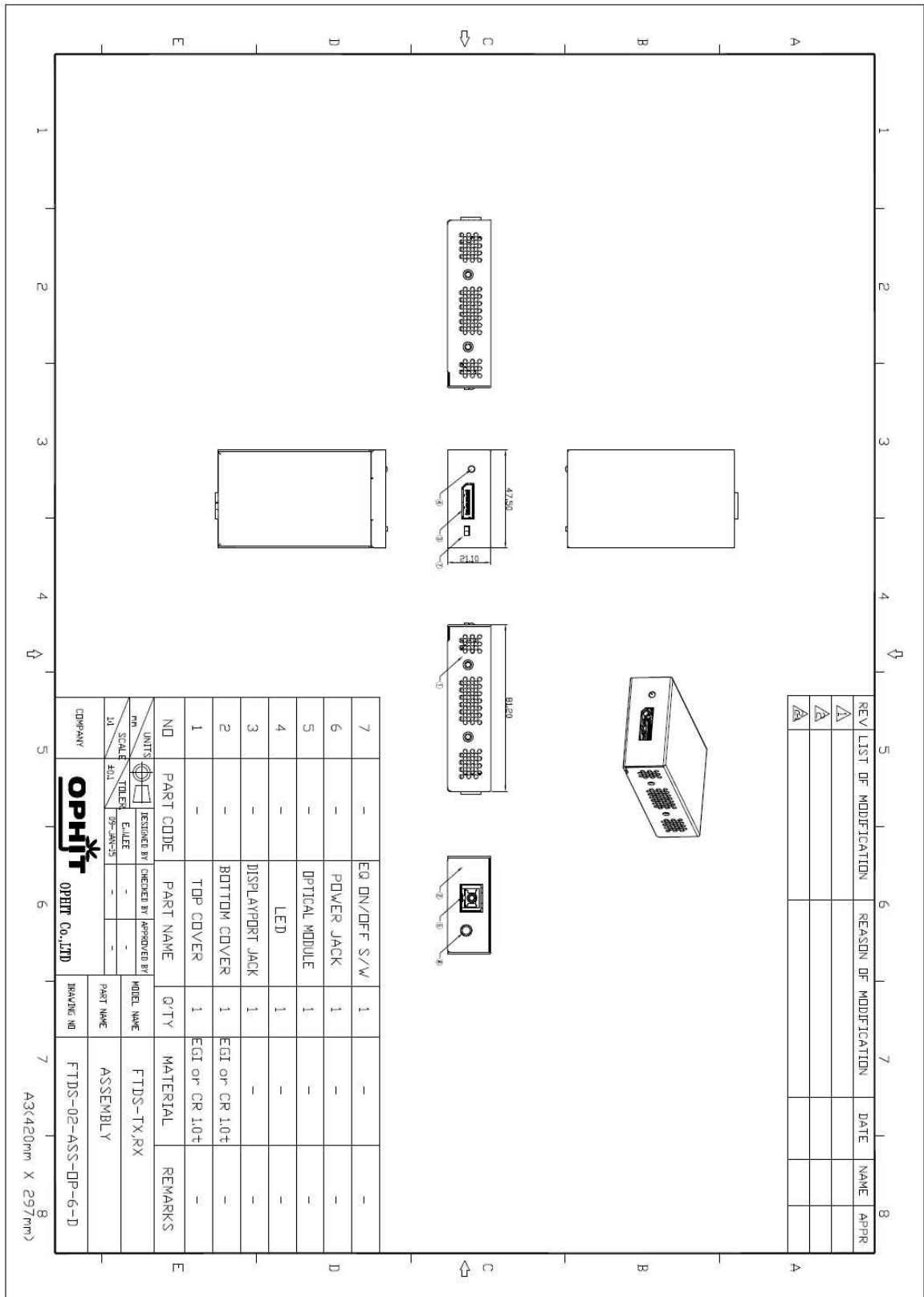
6. Compatibility Test Result

SOURCE	MONITOR	VIEW SONIC- VP2780		SAMSUNG- U28D590D		LG- 27MU27		LG- 31MU97		PHILIPS- 4096UC		ASUS- PB287		WASABI MANGO- UHD420 REAL4K	
	Rx-S/W Tx-S/W	Default	Manual	Default	Manual	Default	Manual	Default	Manual	Default	Manual	Default	Manual	Default	Manual
N V I D I A	GTX 750TI	Default	PASS		PASS		PASS		PASS		PASS		PASS		
		Manual													
	GTX 960	Default	PASS		PASS		PASS		PASS		PASS		PASS		
		Manual													PASS
	QUADRO K620	Default	PASS		PASS		PASS		PASS		PASS		PASS		PASS
		Manual													
A T I	RADEON HD7750	Default	PASS		PASS		PASS		PASS			PASS			
		Manual								PASS				PASS	
	R7 260X	Default	PASS		PASS		PASS		PASS		PASS		PASS		PASS
		Manual													
	R9 270X	Default			PASS		PASS		PASS		PASS		PASS		PASS
		Manual		PASS											

- ※ Switch setting is in accordance with the characteristics of graphics-card and monitor.
- ※ Above data is being self-test results in our factory.
- ※ It may be not working properly when it connected with particular graphics card and the monitor



7. Mechanical Specification

7.1 Transmitter and Receiver Case Dimension



8. RoHS

8.1 ROHS2 DOC

Declaration of RoHS Compliance

DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL OF 27.
January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment

Product Name : FTDS

Hereby we guarantee that we do not intentionally use the substances described below and based on third party chemical analysis the thresholds of the substances as indicated are not exceeded for our products.

Banned Substances by RoHS Directive 2011/65/EU, EN50581:2012

Substance	RoHS Limity by Weight	RoHS Limity by % (PPM)
Lead (PB)	1000mg/kg	0.1% (1000 PPM)
Mercury (Hg)	1000mg/kg	0.1% (1000 PPM)
Hexavalent Chromium (CR VI)	1000mg/kg	0.1% (1000 PPM)
Polybrominated Biphenyls (PBB)	1000mg/kg	0.1% (1000 PPM)
Polybrominated Diphenyl Ethers (PBDE)	1000mg/kg	0.1% (1000 PPM)
Cadmium (CD)	100mg/kg	0.01% (100 PPM)

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8.2 REACH DOC



**EUROPEAN UNION'S REACH REGULATION
DECLARATION CERTIFICATE**

The European REACH Regulation 1907/2006 on Registration, Evaluation, Authorization, and Restriction of Chemicals(REACH), Annex XV II entered into Force in June 2009, and affects all companies producing, Importing, using, or placing Products on the European market. The aim of the REACH regulation is to ensure a high Level of protection of human health and the environment from chemical substances.

OPHIT Co., Ltd substances management system follow and complies with the current revision of the REACH Regulation on the substances as identified by ECHA(European Chemical Agency).

OPHIT Co., Ltd products are considered articles as defined in REACH Article 3(3). These products/articles under normal and reasonable conditions of use do not have intended release of substances. Therefore the requirement in REACH Article 7(1)(b) for registration of substances contained in these products/articles does not apply.

OPHIT Co., Ltd products/articles, do not contain **Substances of very High Concern** or if there **SVHC** in the product/article, the content is less than the 0.1%(wt/wt) as defined by REACH Article 57, Annex XIV, Directive 67/548/EEC. Therefore the requirement in REACH Article 7(2) to notify ECHA if a product/article contains more than 0.1% wt/wt of an SVHC and tonnage exceeding 1 tone per importer per year is not applicable.

OPHIT's European operations do not manufacture or import chemicals, therefore OPHIT Co., Ltd has no obligation to resister substances.

-Model : FTDS

Jong-kook Moon

Jong-Kook, Moon
President

OPHIT Co., Ltd ACCEPTS NO DUTY TO NOTIFY USERS OF THIS OF DECLARATION OF UPDATES OR CHANGES TO THIS DECLARATION.

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