

PRODUCT DATA SHEET

FTDS

Optical Displayport 1.2 Extension System



Revision History

Version Number	Revision Date	Page	Description of Changes
1.0	Mar 17, 2016	ALL	Initial Version
1.1	Oct 02.2019	ALL	Renewal Specification

PROPRIETARY NOTE

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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-1 or 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	Rating
Storage temperature	-20°C ~ +70°C Non-Condensing
Operating temperature	0°C ~ +50°C Non-Condensing
Transportation temperature	-20°C ~ +70°C Non-Condensing
Power Supply	-0.3 ~ 5.5 V
Relative Humidity	10 ~ 80 %
Lead solder temperature	260°C, 10 seconds

NOTICE

Stresses greater than those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating 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.

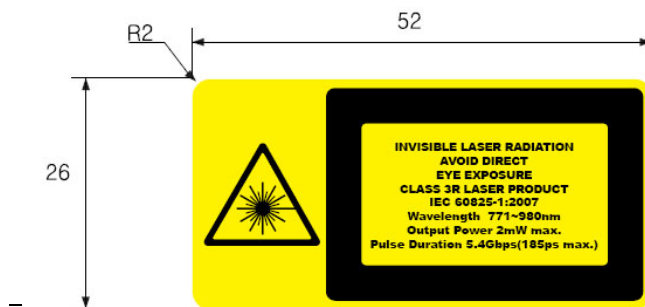
5. Optical Specification

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.

Transmitter module of FTDS is Class 3R 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	

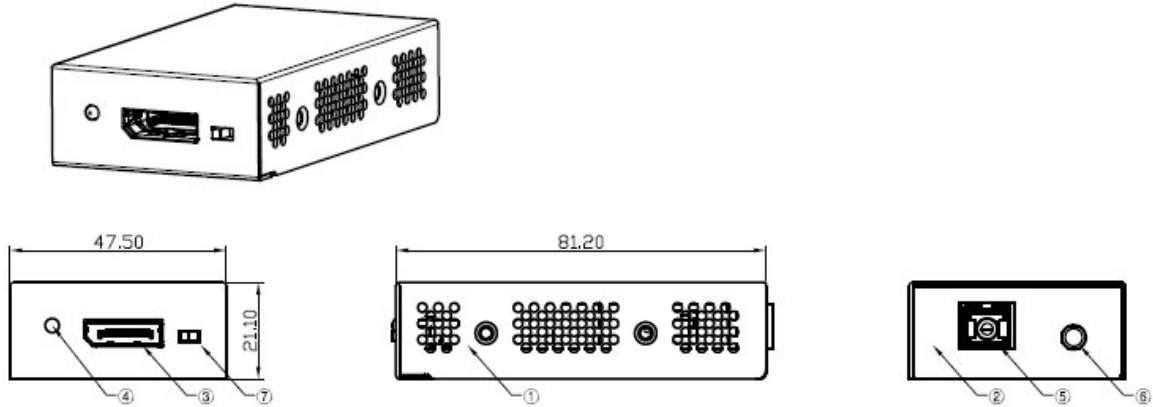
6. Compatibility Test Result

SOURCE	MONITOR	VIEW SONIC- VP2780		SAMSUNG- U28D590D		LG- 27MU27		LG- 31MU97		PHILIPS- 4096UC		ASUS- PB287		WASABI MANGO- UHD420 REAL4K	
	RX-SW TX-SW	DE	MA	DE	MA	DE	MA	DE	MA	DE	MA	DE	MA	DE	MA
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		
		Manual													
	R9 270X	Default			PASS		PASS		PASS		PASS		PASS		PASS
		Manual		PASS											

DE=Default
MA=Manual

7. Mechanical Specification

7.1 Transmitter and Receiver Case Dimension



NO	PART NAME	NO	PART NAME	NO	PART NAME
1	TOP CASE	4	LED INDICATOR	7	EQ ON/OFF SWITCH
2	BOTTOM CASE	5	OPTICAL MODULE	-	
3	DISPLAYPORT	6	POWER JACK	-	

7.2 Design drawing

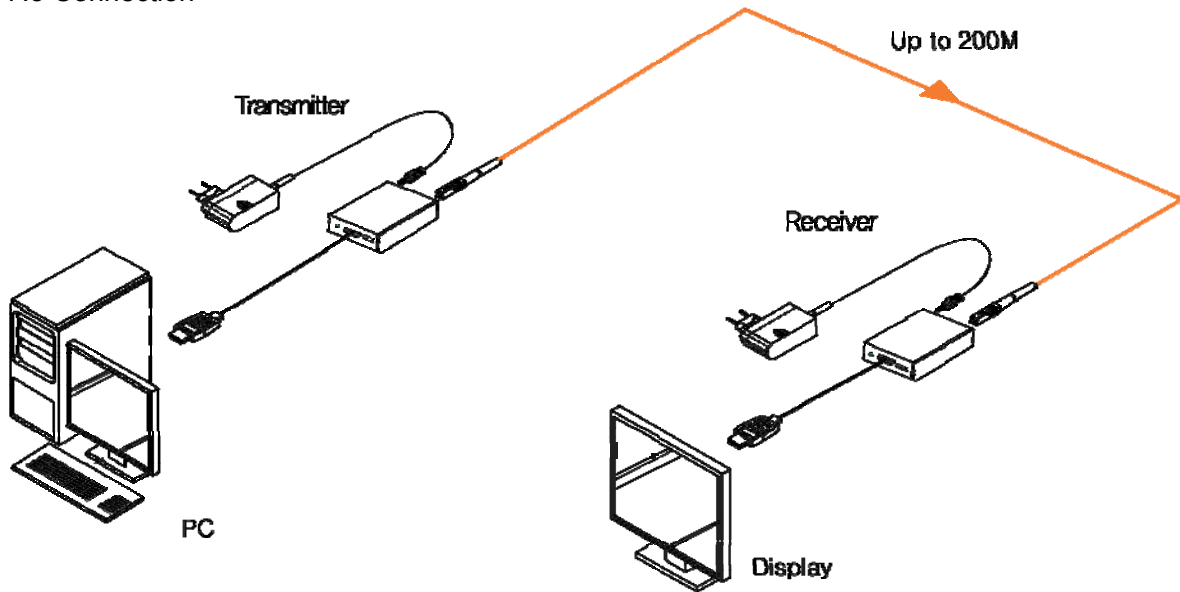
TX Assembly



RX Assembly



7.3 Connection



8. Regulatory

8.1 EMC & Safety Agency approval

8.1.1 CE-EMC compliance:

This Product is investigated to IEC60601-1:2005(3rd Ed.)+CORR 1:2006+CORR 2:2007
Medical Electrical Equipment

The Equipment complies with the standard EN60601-2:2007+AC:2010

EN55011:2015, EN61000-3-2:2014 and EN61000-3-3:2013

EN55022:2010+AC:2011, EN55024:2010

8.1.2 FCC compliance:

This Product is investigated to FCC 47CFR part 2 and part 15

8.1.3 Eye Safety

This Product is investigated to IEC60825-1:2007(2nd Ed.)

9. Packing Information

Set(Unpacking, FTDS Only)	81.2mm*47.5mm*21.1mm	134.8g
Package(1Set, Inner Box Packing)	242.0mm*185.0mm*70.0mm	850.0g
Package(Multi, 15PCS Packing)	595.0mm*305.0mm*345.0mm	12.0Kg

10. RoHS

OPHIT is fully aware of the requirement under the **Restriction of Hazardous Substances in Electrical and Electronic Equipment Directive EU 2015/863(RoHS3)**, which adds four new restricted substances to the previous Directive 2011/65/EU(RoHS2).

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 all products.

Substance	CAS #	RoHS Limity by % (PPM)
Lead (PB)	7439-92-1	0.1% (1000 PPM)
Mercury (Hg)	7439-97-6	0.1% (1000 PPM)
Hexavalent Chromium (CrVI)	15840-29-9	0.1% (1000 PPM)
Polybrominated Biphenyls (PBB)	-	0.1% (1000 PPM)
Polybrominated Diphenyl Ethers (PBDE)	-	0.1% (1000 PPM)
Cadmium (Cd)	7440-43-9	0.01% (100 PPM)
Bis(2-Etylhexyl) phthalate(DEHP)	117-81-7	0.1% (1000 PPM)
Benzyl butyl phthalate(BBP)	85-68-7	0.1% (1000 PPM)
Dibutyl Phthalate(DBP)	84-74-2	0.1% (1000 PPM)
Disobutyl Phthalate(DIBP)	84-69-5	0.1% (1000 PPM)

Banned Substances by RoHS Directive 2011/65/EU+2015/863/EU, EN50581:2012

OPHIT will continue to monitor any new amendments/changes to Directive and subsequently review our all products with regards to compliance. OPHIT will also ensure that any new information is communicated to its customers, suppliers and stakeholders as required.

Signature : Jong-Kook, Moon *Jong-kook, Moon*
Title/Issue date : President/July.22.2019

11. REACH

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 register substances.



Jong-Kook, Moon
President

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