Customer :

Specification for

Model : FTHS

Revised :
Original Release Date : May 02, 2016

OPHIT

Revision History

Version Number	Revision Date	Author	Description of Changes
0.1	May 02, 2016	K.H KIM	Initial Version

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1. General Description

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

- High Speed and long distance transmission by optical system
- Compatible with HDMI standard V2.0
- Supports 50-micron OM3 or OM4 Fiber with an SC Connector
- Main-link video signal / DDC data and Hot Plug Detection signal is transmitted by-1 channel multimode optical fiber
- External power supply use(TX, RX)
- SCDC(Status and Control Data Channel) compliant
- HDCP 2.2 compliant

※ Does not support CEC and HEAC.

※ HDMI cable is not include.

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	HDMI 2.0 Standard	
Video Bandwidth	6Gbps / Channel	
Module Size	81.2mm(W) x 21.1mm(D) x 47.5mm(H)	
Optical Connector	SC Connector	
Electrical Connector	HDMI Female Connector (19 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
POWER	Supply Voltage(DC)	Vcc	+4.5	+5.0	+5.5	V	
	Supply Current	Icc		610		mA	
	Power Dissipation	Po		3.05		W	
SIGNAL	Diff. P-to-P Input Voltage	V_{ID_PP}	75		1560	mVpp	
	Hot Plug Output Voltage	HPD		3.3		V	

4.2 Receiver Box

Parameter		Symbol	Min	Typ	Max	Units	Condition
POWER	Supply Voltage	Vcc	+4.5	+5.0	+5.5	V	
	Supply Current	Icc		570		mA	
	Power Dissipation	Po		2.85		W	
SIGNAL	Diff. P-to-P Output Voltage	V_{ID_PP}	800		1200	mV	
	Hot Plug Detect Voltage	HPD	2.1		5.0	V	

4.3 Connector Pin Assignment

4.3.1 Transmitter and Receiver

4.3.1.1 HDMI Connector

Pin	Signal Assignment	Pin	Signal Assignment
1	T.M.D.S. Data2 +	11	T.M.D.S Clock Shield
2	T.M.D.S. Data2 Shield	12	T.M.D.S Clock -
3	T.M.D.S. Data2 -	13	No Connect
4	T.M.D.S. Data1 +	14	No Connect
5	T.M.D.S. Data1 Shield	15	SCL
6	T.M.D.S. Data1 -	16	SDA
7	T.M.D.S. Data0 +	17	DDC Ground
8	T.M.D.S. Data0 Shield	18	+5V POWER
9	T.M.D.S. Data0 -	19	Hot Plug Detect
10	T.M.D.S Clock +		

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 FTHS 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 FTHS 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

1) Source

① Nvidia_GTX 960

② Nvidia_GTX 970

③ Nvidia_Sheild (HDCP 2.2 Support)

④ Murideo_FRESCO Six-G (HDCP 2.2 Support)

2) Sink

① ViewSonic_VP2780-4K (4096x2160@60Hz)

② Samsung_U28E590 (3840x2160@60Hz)

③ LG TV_40UF6700 (4096x2160@60Hz)

④ LG Monitor_27MU67 (3840x2160@60Hz)

⑤ WASABIMANGO_UHD420 (3840x2160@60Hz)

⑥ VISIO_P502ui-B1 (4096x2160@60Hz / YCbCr 4:2:0)

3) Etc.

① 5V@2A (1.35pie) Adapter : 2ea

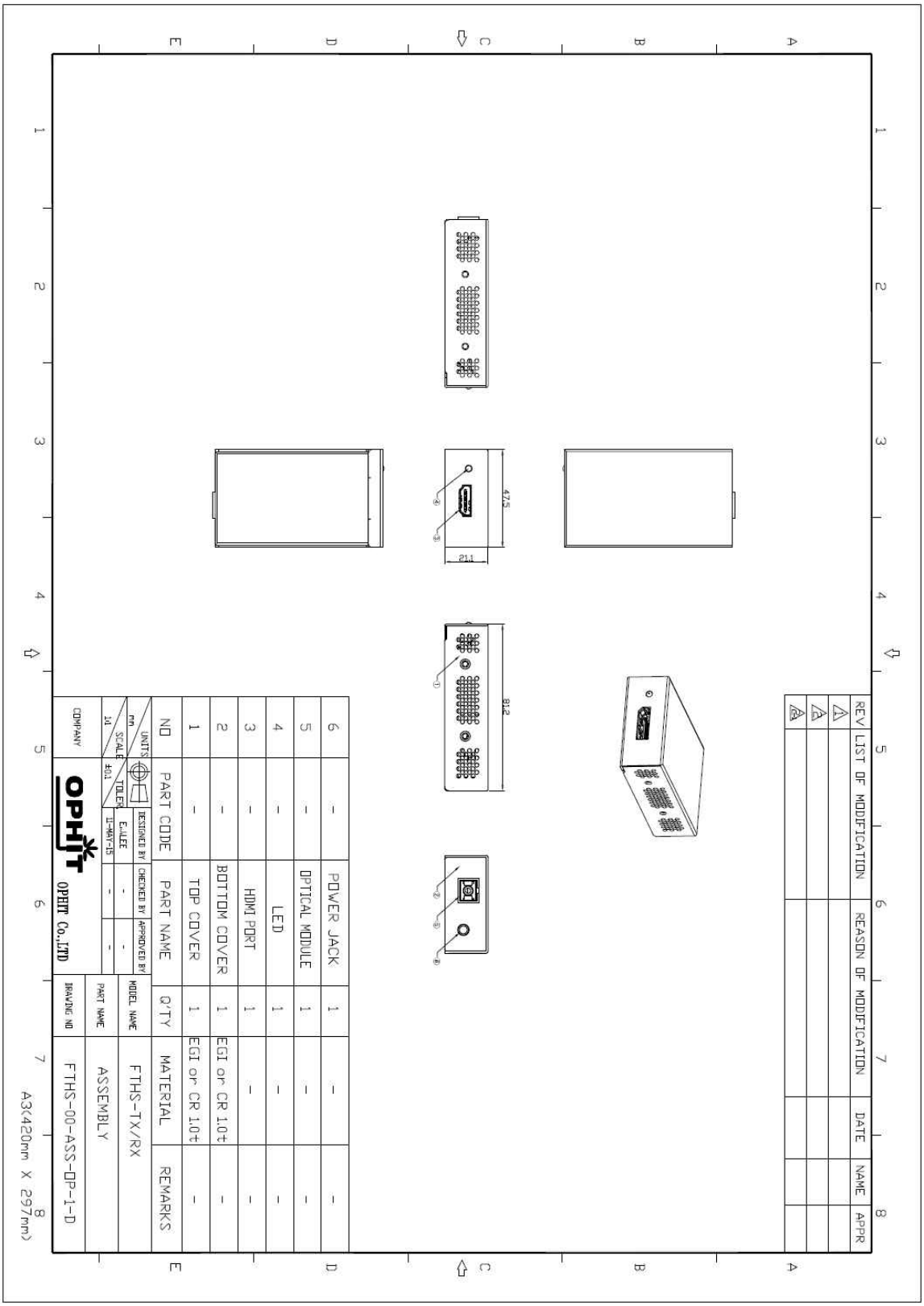
② SC Type OM3 Cable(200m) : 1ea

③ CANARE_HDMI Cable(1m) : 2ea

SINK / SOURCE	ViewSonic	Samsung (HDMI Port 2)	LG TV (HDMI Port 2)	LG Monitor (HDMI Port 1)	WASABIMANGO (HDMI Port 2)	VISIO (HDMI Port 5)
GTX 960	OK	OK	OK	OK	OK	OK
GTX 970	OK	OK	OK	OK	OK	OK
SHIELD	OK	OK	OK	OK	OK	OK
MURIDEO	OK	OK	OK	OK	OK	OK

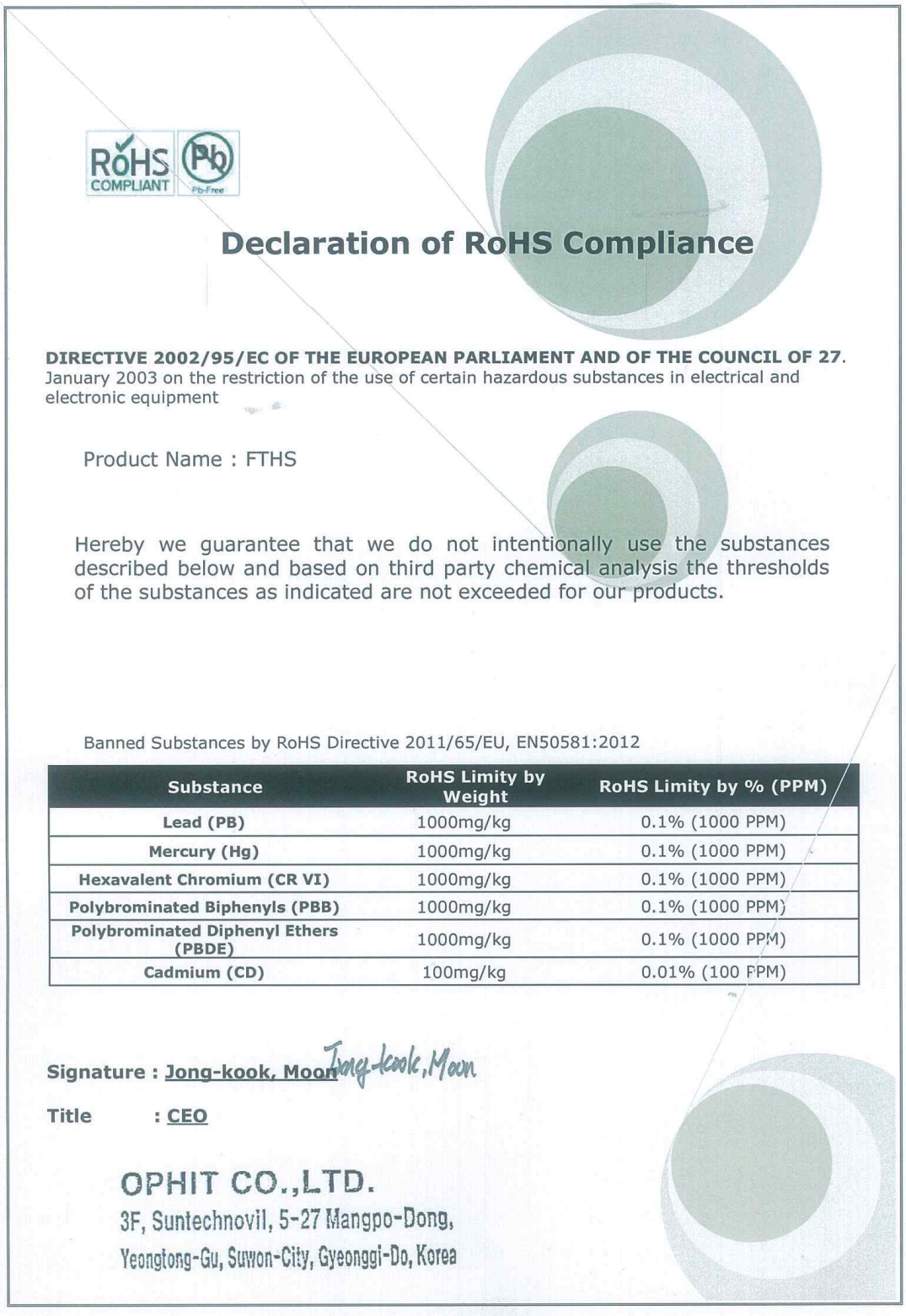
7. Mechanical Specification

7.1 Transmitter and Receiver Case Dimension



8. RoHS

8.1 ROHS2 DOC



RoHS COMPLIANT

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 : FTHS

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 XVⅡ 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 : FTHS

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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