



DPH

Displayport to HDMI Converter

Customer :

Specification for

Model : DPH

Revised : January 05, 2017
Original Release Date : April 25, 2016

OPHIT

Revision History

Version Number	Revision Date	Author	Description of Changes
0.1	April 25, 2016	U.H Lee	Initial Version
0.2	May 21, 2016	U.H Lee	Simplified Version
0.3	September 06, 2016	U.H Lee	Insert DC Jack and LED
1.0	January 05, 2017	U.H Lee	Mass Production

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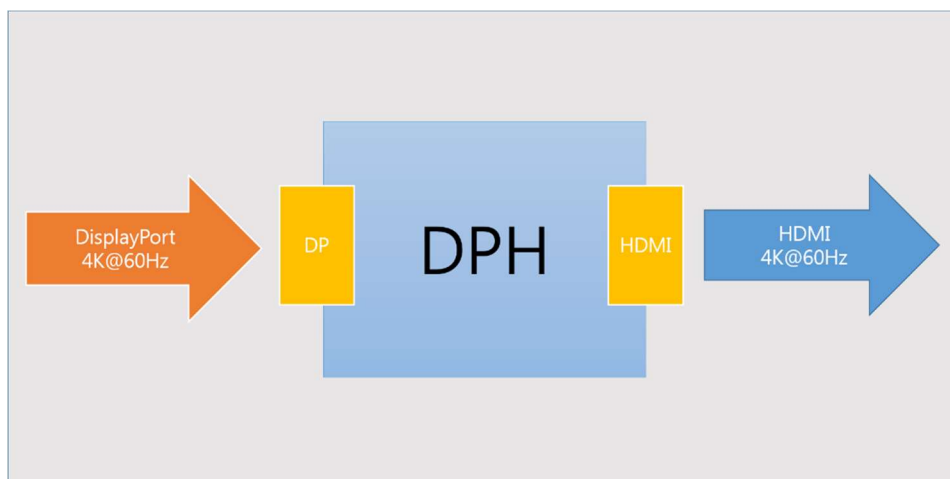
7.2 REACH DOC

1. General Description

DPH is a DisplayPort 1.2a to HDMI 2.0 Converter which receives both video and audio from DisplayPort and converts to HDMI output. DPH supports HDCP 1.4 and HDCP 2.2 repeater for downstream sink with an embedded key.

- Compliant with DisplayPort Specification 1.2a
 - Compliant with HDMI Specification 2.0
 - Supports full link training
 - Supports multiple color formats
 - DisplayPort : RGB 6/8/10/12 bpc
YCbCr 4:4:4, YCbCr 4:2:2 8/10/12 bpc
 - HDMI : RGB 8/10/12 bpc
YCbCr 4:4:4: YCbCr 4:2:2 and YCbCr 4:2:0 8/10/12 bpc
 - Supports up to 8-channel LPCM, compressed audio (AC-3, DTS) and HBR audio formats
 - Supports up to 192kHz audio frame rate and up to 24-bit audio sample size
 - Content protection (**is available in restricted environment**)
 - Supports HDCP 1.4 repeater with on-chip keys
 - Supports HDCP 2.2 repeater with on-chip keys
- ※ We guarantee the working only when using a HDMI 2.0 supported cable.

- Application



2. General Specification

Parameter	Symbol	
	Input	Output
Signal	DISPLAYPORT 1.2a	HDMI 2.0
Video Bandwidth	5.4Gbps	5.94Gbps
Module Size	53.0mm(W) x 16.0mm(D) x 52.4mm(H)	
Electrical Connector	DisplayPort Female Connector	HDMI Female Connector (Type A)
Maximum Supporting Resolution	UHD(3840x2160@60Hz / 4096x2160@60Hz)	
External Power (Included)	5V / 2A	

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 Power Consumptions

Parameter	Min	Typ	Max	Units
DP input 4lane/5.4Gbps, HDMI output 5.94Gbps 3.3V Normal Supply Current, I _{DD}		450.7		mA
DP input 4lane/5.4Gbps, HDMI output 5.94Gbps Power Consumption		579.7		mW

4.2 HDMI Transmitter Characteristics (3.4GHz < Data rate < 6GHz)

Symbol and Parameter	Min	Typ	Max	Units
Clock Channel				
V _{OD} Peak-to-peak differential output swing	400	1000	1200	mV
V _{OH} Single end high-level output voltage	A _{VCC} - 400		A _{VCC} + 10	mV
V _{OL} Single end low-level output voltage	A _{VCC} - 1000		A _{VCC} - 200	mV
Data Channel				
V _{OD} Peak-to-peak differential output swing	800	1000	1200	mV
V _{OH} Single end high-level output voltage	A _{VCC} - 400		A _{VCC} + 10	mV
V _{OL} Single end low-level output voltage	A _{VCC} - 1000		A _{VCC} - 400	mV
Clock Channel				
t _r differential output rise time	75			ps
t _f differential output fall time	75			ps
Data Channel				
t _r differential output rise time	42.5			ps
t _f differential output fall time	42.5			ps
t _{sk_intra} intra-pair differential skew			0.15	T _{bit}
t _{sk_intra} inter-pair differential skew			0.20	T _{character}
t _{ck-jitter} output clock jitter			0.30	T _{bit}
t _{DATA-jitter} output data jitter			1-H	T _{bit}
HPD Voltage		5.0		V

4.3 DisplayPort Receiver Characteristics

Symbol and Parameter	Min	Typ	Max	Units
V _{DIFF} : Differential peak-to-peak input voltage at package pins	100		1360	mW
Maximum adaptive RX equalization level at 1.35GHz		9		dB
Spread spectrum clock, down-spreading by SOURCE		0.5		%
Modulation Frequency	30		33	KHz
L _{RX_SKEW_INTRA_PAIR} : Intra-pair skew at Rx package pins(HBR2) RX intra-pair skew tolerance at HBR2			50	ps
L _{RX_SKEW_INTRA_PAIR} : Intra-pair skew at Rx package pins(HBR) RX intra-pair skew tolerance at HBR			150	ps
L _{RX_SKEW_INTRA_PAIR} : Intra-pair skew at Rx package pins(RBR) RX intra-pair skew tolerance at RBR			300	ps
V _{DC_CM} : RX input DC Common mode voltage		GND		V
R _{DIFF} : Differential termination resistance	80	100	120	Ω
R _{SE} : Single-ended termination resistance	40	50	60	Ω
Receiver Jitter Tolerance for High Bit Rate 2(HBR2)				
Total jitter tolerance at 2MHz	1026			mUI
Total jitter tolerance at 10MHz	636			mUI
Total jitter tolerance at 20MHz	624			mUI
Total jitter tolerance at 100MHz	620			mUI
Receiver Jitter Tolerance for High Bit Rate(HBR)				
Total jitter tolerance at 2MHz	1227			mUI
Total jitter tolerance at 10MHz	548			mUI
Total jitter tolerance at 20MHz	505			mUI
Total jitter tolerance at 100MHz	491			mUI
Receiver Jitter Tolerance for Reduced Bit Rate(RBR)				
Total jitter tolerance at 2MHz	1648			mUI
Total jitter tolerance at 10MHz	778			mUI
Total jitter tolerance at 20MHz	747			mUI
HPD Voltage		3.3		V

4.3 DisplayPort Receiver Characteristics

DisplayPort Receiver (IN, Female)

Pin	Signal Assignment	Pin	Signal Assignment
1	Main Link Lane 3 (Negative)	11	Ground
2	Ground	12	Main Link Lane 0 (Positive)
3	Main Link Lane 3 (Positive)	13	Ground
4	Main Link Lane 2 (Negative)	14	Ground
5	Ground	15	AUX Channel (Positive)
6	Main Link Lane 2 (Positive)	16	Ground
7	Main Link Lane 1 (Negative)	17	AUX Channel (Negative)
8	Ground	18	Hot Plug
9	Main Link Lane 1 (Positive)	19	Ground
10	Main Link Lane 0 (Negative)	20	DP Power (3.3V)

HDMI Transmitter (OUT, Female)

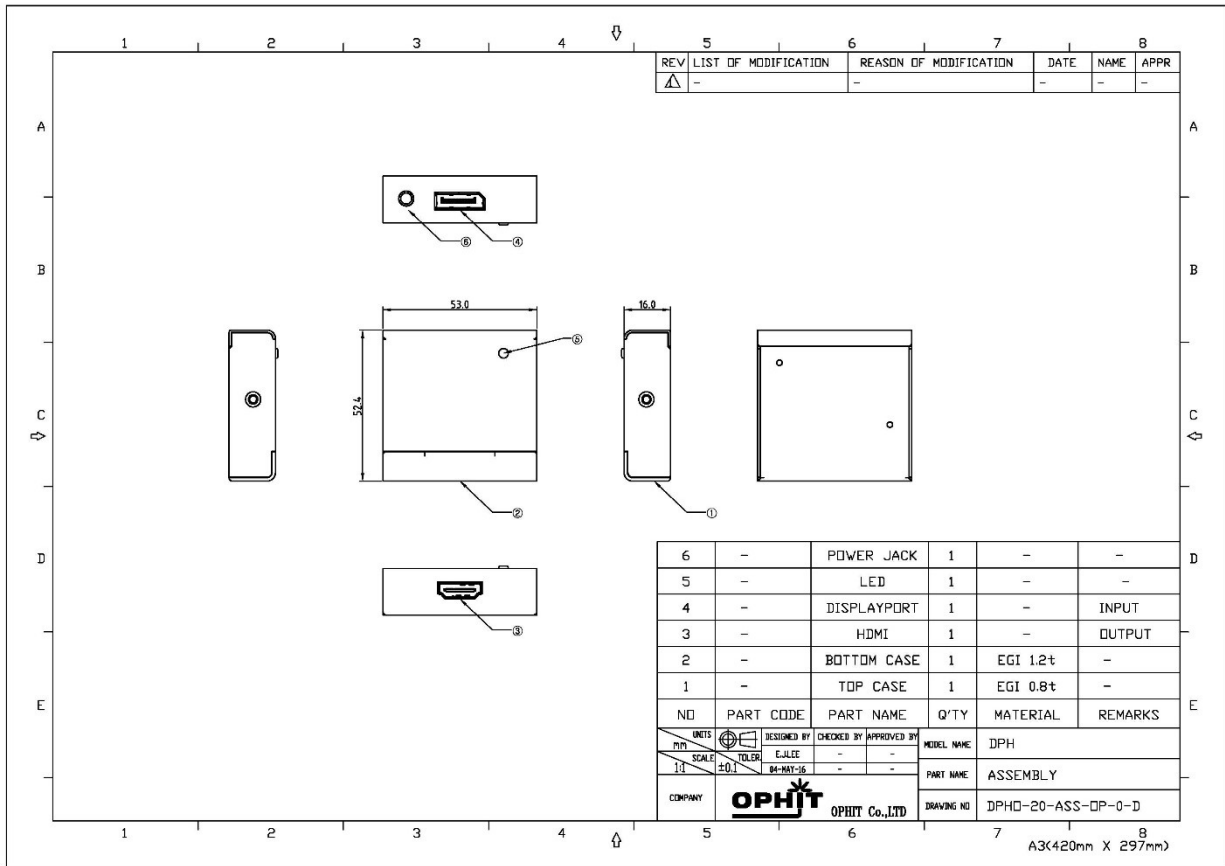
Pin	Signal Assignment	Pin	Signal Assignment
1	TMDS Data2 (Positive)	11	Ground
2	Ground	12	TMDS Clock (Negative)
3	TMDS Data2 (Negative)	13	NC
4	TMDS Data1 (Positive)	14	Ground
5	Ground	15	DDC (SCL)
6	TMDS Data1 (Negative)	16	DDC (SDA)
7	TMDS Data0 (Positive)	17	Ground
8	Ground	18	5V Power
9	TMDS Data0 (Negative)	19	Hot Plug Detect
10	TMDS Clock (Positive)		

5. Compatibility Test Result

<i>Sink \ Source</i>	<i>HD7750</i>	<i>GTX970</i>	<i>GTX960</i>	<i>Quantum 980</i>	<i>Quadro K620</i>
<i>View Sonic VP2780-4K</i>	<i>PASS</i>	<i>PASS</i>	<i>PASS</i>	<i>PASS</i>	<i>PASS</i>
<i>SAMSUNG U28E590</i>	<i>PASS</i>	<i>PASS</i>	<i>PASS</i>	<i>PASS</i>	<i>PASS</i>
<i>LG 40UF6700</i>	<i>PASS</i>	<i>PASS</i>	<i>PASS</i>	<i>PASS</i>	<i>PASS</i>
<i>LG 27MU67</i>	<i>PASS</i>	<i>PASS</i>	<i>PASS</i>	<i>PASS</i>	<i>PASS</i>
<i>WASABIMANGO UHD420</i>	<i>PASS</i>	<i>PASS</i>	<i>PASS</i>	<i>PASS</i>	<i>PASS</i>


6. Mechanical Specification

6.1 Transmitter and Receiver Case Dimension



7. RoHS

7.1 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 : DPH

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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7.2 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 register substances.

-Model : DPH

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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