

PRODUCT DATA SHEET

DPH

DisplayPort to HDMI Convertor



Revision History

Version Number	Revision Date	Page	Description of Changes
1.0	Jan.05, 2017	-	Initial Version
1.1	Oct.16, 2019	ALL	Renewal Specification

PROPRIETARY NOTE

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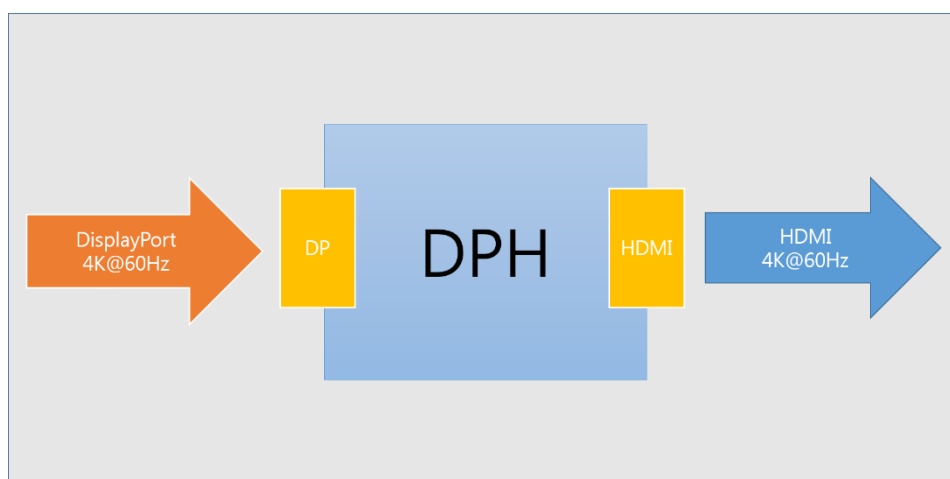
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1. General Description

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	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 %

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 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

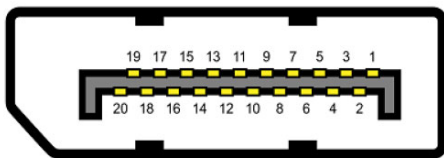
4.3 DisplayPort Receiver Characteristics

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 Modulation Frequency	30	0.5	33	% KHz
L _{RX_SKEW_INTRA_PAIR} : Intra-pair skew at Rx packagepins(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)	1648			mUI
Total jitter tolerance at 2MHz	778			mUI
Total jitter tolerance at 10MHz	747			mUI
Total jitter tolerance at 20MHz				
HPD Voltage		3.3		V

4.4 Connector Pin Assignment

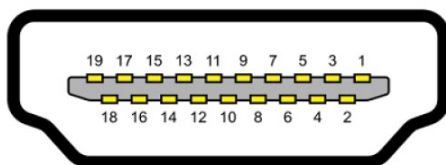
DisplayPort Receiver (IN, Female)

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)		

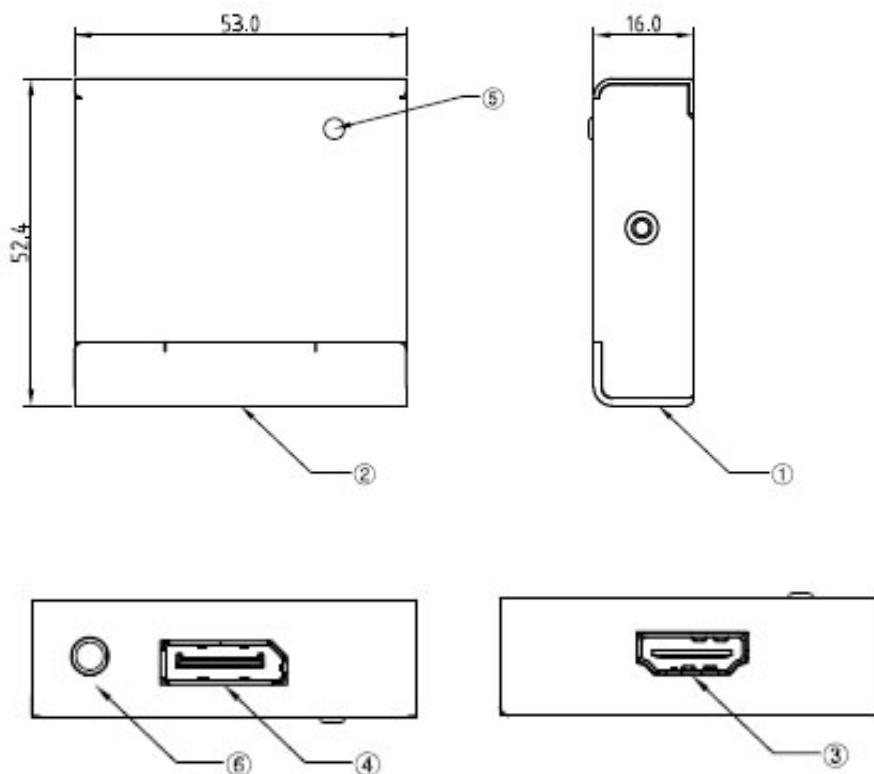


5. Compatibility Test Result

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

6. Mechanical Specification

6.1 Case Dimension



GENERAL SPECIFICATION V1.1 DPH

NO	PART NAME	NO	PART NAME	NO	PART NAME
1	TOP CASE	4	DISPLAYPORT(INPUT)	-	
2	BOTTOM CASE	5	LED INDICATOR	-	
3	HDMI(OUTPUT)	6	POWER JACK	-	

6.2 Design drawing

Assembly

- LEFT VIEW



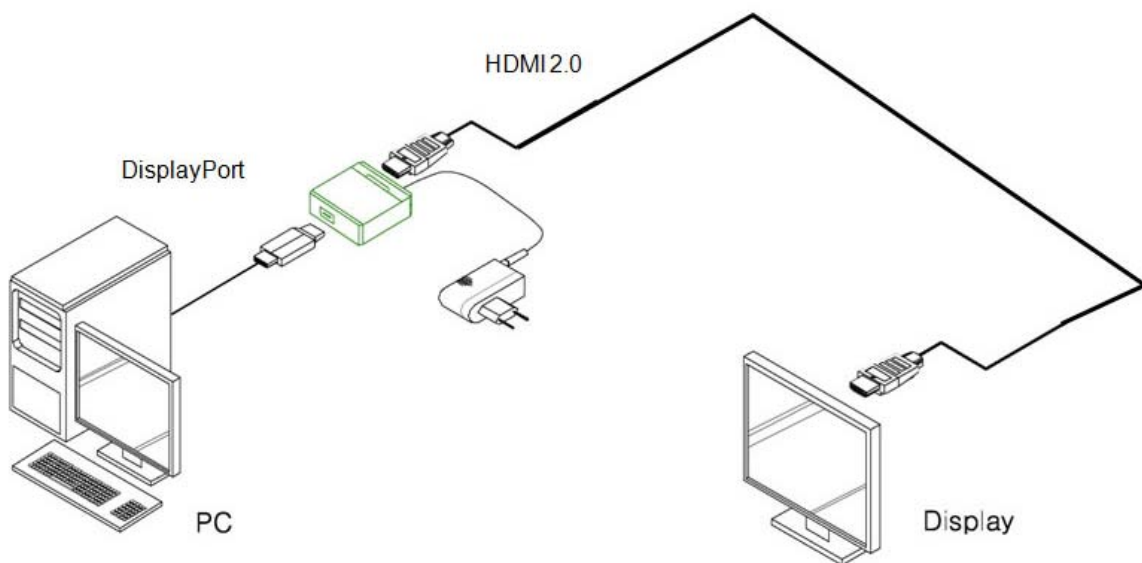
- FRONT VIEW



- RIGHT VIEW



6.3 Connection



7. Regulatory

7.1 EMC & Safety Agency approval

7.1.1 CE-EMC compliance:

This Product is investigated to EN55032:2012/EN 55024:2010/EN61000-3-2:2014 and EN61000-3-3:2013

8. Packing Information

Set(Unpacking, DPH Only)	52.4mm*53.0mm*16.0mm	80.0g
Package(1Set, Inner Box Packing)	160.0mm*140.0mm*67.0mm	338.0g
Package(Multi, 32PCS Packing)	595.0mm*305.0mm*345.0mm	10.8Kg

9. 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

10. 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.