



HDMI, VIDEO INTERFACE CONTROLLER FOR eDP PANEL

Model: DD-1920-HDMI-EDPT

Part number : 41766001X-3 or up

INSTRUCTIONS

CONTENTS

Page:	2. Introduction, How to Proceed, Usage Note, Disclaimer
	3. System design – Diagram of a suggested system
	4. Assembly notes – Important information about system elements
	6. Connection & Operation – How to use the controller
	10. Connectors, pinouts & jumpers – Essential connection information
	18. Controller dimensions
	19. Application notes
	21. Troubleshooting
	22. Specifications
	23. Appendix I – Signal support modes table
	24. Appendix II – RS-232 control protocols and command set
	30. Appendix III – DV remote control unit work for DD-1920-HDMI-EDPT
	31. Warranty, Caution & Limitation of Liability, Trademarks
	32. Contact details
	33. Revision History

It is essential that these instructions are read and understood before connecting or powering up this controller.

Introduction

Designed for LCD monitor and other flat panel display applications, the DD-1920-HDMI-EDPT is a feature rich interface controller for :

- **TFT (active matrix) LCD panels of 1920x1080 resolutions in 60Hz with eDP panel interface.**
- **Support true 8 bits panel**
- **Support HDMI input.**

HOW TO PROCEED

- Ensure you have all parts & that they are correct, refer to:
 - Connection diagram

Controller Solution Generator

Full web resource matching controllers & panels with **connection diagrams** for download.
See at : <http://www.digitalview.com/csg>

- Connector reference (in following section)
- Assembly notes
- Check controller switch & jumper settings (errors may damage the panel)
- Prepare the signal sources
- Connect the parts
- Understand the operation & functions

IMPORTANT USAGE NOTE

This equipment is for use by developers and integrators, the manufacturer accepts no liability for damage or injury caused by the use of this product. It is the responsibility of the developer, integrators or other user of this product to:

- Ensure that all necessary and appropriate safety measures are taken.
- Obtain suitable regulatory approvals as may be required.
- **Check power settings to all component parts before connection.**

DISCLAIMER

There is no implied or expressed warranty regarding this material.

ASSEMBLY NOTES

This controller is designed for monitor and custom display projects using 1920x1080 resolution with eDP interface panels. The following provides some guidelines for installation and preparation of a finished display solution.

Preparation: Before proceeding it is important to familiarize yourself with the parts making up the system and the various connectors, mounting holes and general layout of the controller. As much as possible connectors have been labeled. Guides to connectors and mounting holes are shown in the following relevant sections.

- LCD Panel:** This controller is designed for typical eDP interfaced panels with panel voltage 3.3V(4A), 5V(4A), 10V(4A) or 12V(4A). Due to the variation between manufacturers of panels signal timing and other panel characteristics, factory setup and confirmation should be obtained before connecting to a panel. **(NOTE: Check panel power jumper settings before connection)**
- LCD Controller:** Handle the controller with care as static charge may damage electronic components. Make sure correct jumper to match the target LCD panel.
- Panel cable:** In order to provide a clean signal it is recommended that all eDP panel cables supplied by Digital View. Care should be taken when placing the cables to avoid signal interference.
- Inverter/Backlight driver:** This will be required for the backlight of an LCD, some LCD panels have an inverter/backlight driver built in. As LCD panels may have 1 or more backlight tubes and the power requirements for different panel backlights may vary it is important to match the inverter/backlight driver in order to obtain optimum performance. See Application notes page 19 for more information on connection.
- Inverter/backlight cables:** Different inverter/backlight models require different cables and different pin assignment. Make sure correct cable pin out to match the inverter/backlight. Using wrong cable pin out may damage the inverter/backlight.
- Function Controls:** The following section discusses the controls required and the section on connectors provides the detail. The controls are minimal: On/Off, Backlight Brightness (depends on inverter), OSD switch mount (5 momentary buttons) analog VR type or (8 momentary buttons) digital type.
- Function controls cable:** The cables to the function switches should be of suitable quality and length so that impedance does not affect performance. Generally lengths up to 1 meter (3 feet) should be acceptable.
- Optional LED:** The pin direction of the LED should be corrected for right color indication. Red color stands for standby. Green colors stands for signal on. The status LED is an optional part only, can be unconnected.
- Optional IR sensor:** It is an optional part only, can be unconnected if not using IR remote control.
- RS-232 control interface :** Serial control via this interface port.
- External panel power output :** User for specific panel model.
- Panel control signal :** Use for specific panel model.
- Backlight status input :** 2 ways connector provides interface for connection with the specific panel type which support the panel with backlight status monitoring function.
- Micro HDMI input :** Plug the HDMI cable to the Micro HDMI connector P1 on the controller board. (Standard HDMI (Type A) connector P3 is a built option on request.)
- Power Input:** 12V/24VDC is required, this should be a regulated supply. It allows 12V (5A) or 24V (5A) via PP2 power input connector. The power rating is depending on the panel and inverter used. Although the controller provides power regulation for the LCD power, this does not relate to the power supplied to the backlight driver/inverter. If an unregulated power supply is provided to an backlight driver/inverter, any fluctuations in power may affect operation, performance and lifetime of the inverter and or backlight tubes.
 - Power output:** Note the controller has an overall 3Amp current limit and the current available from the auxiliary power output will be dependent on the power input and other system requirements.
 - Power Safety:** Note that although only 12V / 24VDC is required as 'power-in' a backlight inverter for panel backlighting produces significantly higher voltages (the inverter does not connect to the ground plane). We strongly advise appropriate insulation for all circuitry.
 - EMI:** Shielding will be required for passing certain regulatory emissions tests. Also the choice of external Controller to PC signal cable can affect the result.
 - Ground:** The various PCB mounting holes are connected to the ground plane.
 - Servicing:** The board is not user serviceable or repairable. Warranty does not cover user error in connecting up to the controller and is invalidated by unauthorized modification or repairs.

- **Controller Mounting:** It is recommended that a clearance of at least 10mm is provided above and 5mm below the controller when mounted. Additionally consideration should be given to:
 - Electrical insulation.
 - Grounding.
 - EMI shielding.
 - Cable management. Note: It is important to keep panel signal cables apart from the inverter & backlight cables to prevent signal interference.
 - Heat & Ventilation: Heat generated from other sources, for example the backlight of a very high brightness panel may generate significant heat which could adversely affect the controller.
 - Other issues that may affect safety or performance.

- **PC Graphics Output:** A few guidelines:
 - Signal quality is very important, if there is noise or instability in the PC graphics output this may result in visible noise on the display.
 - Refer to graphics modes table in specifications section for supported modes.
 - Non-interlaced & interlaced video input is acceptable.

IMPORTANT: Please read the Application Notes section for more information.

CONNECTION & OPERATION

CAUTION: Never connect or disconnect parts of the display system when the system is powered up as this may cause serious damage.

CONNECTION

Connection and usage is quite straight forward (it is useful to have the relevant connection diagram available at this time):

1. **LCD panel & backlight driver:** Connect the inverter/Backlight driver (if it is not built-in the panel) to the inverter/backlight connector of the LCD panel.
2. **eDP interface panels:** The controller board supports eDP interface FHD panel. Plug the eDP cable to J6. And make sure the matching panel timings and correct jumper settings (JA3 & JA6) by referring to the panel support table and jumper settings table in page 12-14.
3. **Inverter/Backlight driver:** Plug the inverter/backlight cable to CNB1 and CNA1 (if necessary). Plug another end to the connector on the inverter/backlight of panel side.
4. **Function switch & Controller:** Plug the OSD switch mount cable to CNC1 on the controller board and another to the OSD switch mount.
5. **LED & Controller:** Plug in a 3-way with dual color LED to connector LED1 on the controller board.
6. **IR & Controller:** Plug in a 3-way with IR sensor to connector IR1 on the controller board.
7. **Jumpers & Inverter & Panel voltage:** Particularly pay attention to the settings of JA3, JA6, JB2 and JB3. JB2 & JB3 are used for inverter control (read inverter specification and information on the jumper table to define the correct settings). JA3 & JA6 is used for panel voltage input (read panel specification and information on the jumper table to define the correct settings).
8. **Input signal cable & Controller:** Plug the corresponding signal input to the connector on the controller board.
9. **Power supply & Controller:** Plug the DC 12V/24V power in to the connector PP2.
10. **Power on:** Switch on the controller board and panel by using the OSD switch mount.

General:

- If you are using supplied cables & accessories, ensure they are correct for the model of panel and controller.
- If you are making your own cables & connectors refer carefully to both the panel & inverter specifications and the section in this manual, "Connectors, Pinouts & Jumpers" to ensure the correct pin to pin wiring.

PC SETTINGS

The controller has been designed to take a very wide range of input signals however to optimize the PC's graphics performance we recommend choosing 60Hz vertical refresh rate – this will not cause screen flicker.

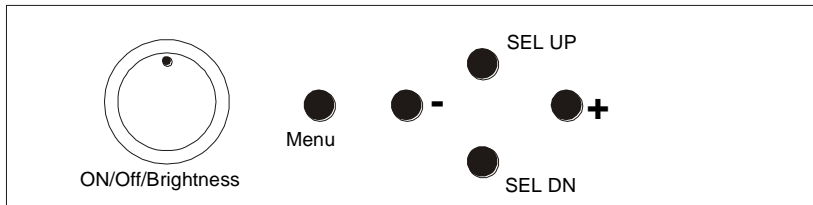
OPERATION

Once the system has been connected and switched on there are a number of functions available to adjust the display image as summarized in the following sections. The settings chosen will be saved for each mode independently.

LCD DISPLAY SYSTEM SETTINGS

NOTE: By way of explanation the following refers to a set of sample buttons that may be obtained as an option. In addition to power on/off and connection for backlight brightness the controller provides an On Screen Display of certain functions which are controlled by 5 momentary type buttons (analog VR type) or 8 momentary type buttons (digital type):

Controls	Analog VR type	Digital type
On/Off – turns controller board power on	VR toggle switch	On/Off button
Brightness – controls backlight brightness	Rotary VR	Brightness +/- buttons
Menu • Turns OSD menu On or Off (it will auto time off)	Menu button	Menu button
Select up • Moves the selector to the previous level function (up)	SEL UP	SEL UP
Select down • Moves the selector to the next level function (down) • Confirm the OSD selection	SEL DN	SEL DN
+ • Increase the OSD parameter values • Moves the selector to next function (forward)	+	+
- • Decrease the OSD parameter values • Moves the selector to previous function (backward)	-	-

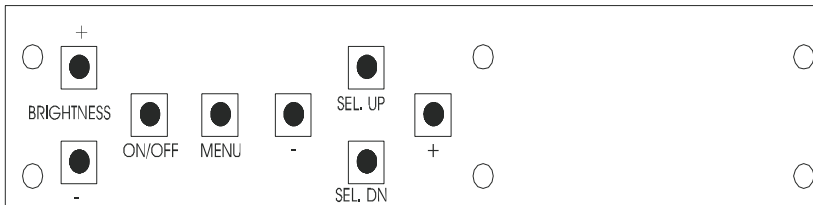


Analog VR type

12V / 24VDC power input :

Analog 10K VR Type OSD switch mount uses
P/N 410680550-3 or up

OSD cable: P/N 416122900-3


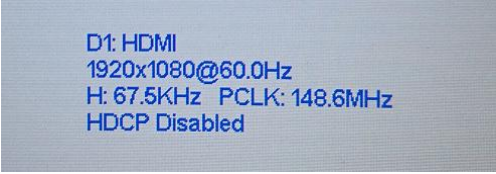


Digital type

12V / 24VDC power input :

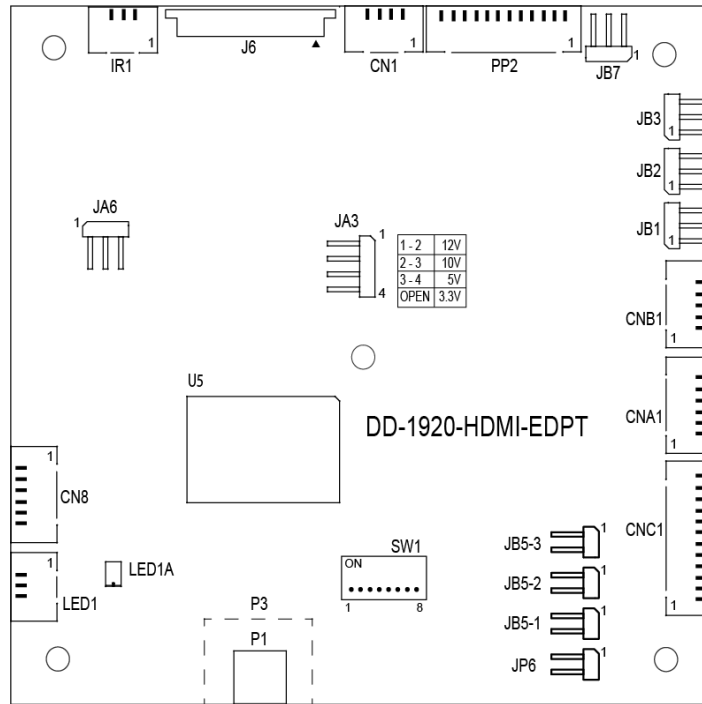
Digital 10K Type OSD switch mount uses
P/N 416100520-3 or up

OSD cable: P/N 416122900-3

 Information	Information:
	 <p>D1: HDMI 1920x1080@60.0Hz H: 67.5KHz PCLK: 148.6MHz HDCP Disabled</p>

CONNECTORS, PINOUTS & JUMPERS

The various connectors are:



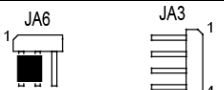
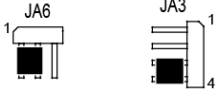
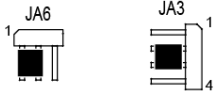
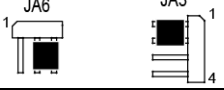
Summary: Connectors

Ref	Purpose	Description
CN1	Audio output (Stereo) from HDMI	12513WR-04 or compatible (Matching type : Molex 51146-0400 or compatible)
CN8	RS-232 serial control	12513WR-06 or compatible (Matching type : Molex 51146-0600 or compatible)
CNA1	Auxiliary power output	12513WR-06 or compatible (Matching type : Molex 51146-0600 or compatible)
CNB1	Backlight inverter	12513WR-05 or compatible (Matching type : Molex 51146-0500 or compatible)
CNC1	OSD control	12513WR-12 or compatible (Matching type : Molex 51146-1200 or compatible)
IR1	Infra-red sensor connector	12513WR-03 or compatible (Matching type : Molex 51146-0300 or compatible)
J6	eDP connector	I-PEX 20455-030E-12 (Matching type : I-PEX 20454-030T)
LED1	Power LED connector	12513WR-03 or compatible (Matching type : Molex 51146-0300 or compatible)
P1	HDMI in	Micro HDMI connector (Type D)
P3	HDMI in (Build option)	Standard HDMI connector (Type A)
PP2	Power input	12513WR-12 or compatible (Matching type : Molex 51146-1200 or compatible)
SW1	Panel selection	8-way DIP Switch

Summary: Jumpers setting

Ref	Purpose	Note
JA3	Panel power voltage select CAUTION: Incorrect setting can damage panel	See panel voltage setting table 1
JA6	Panel power voltage select CAUTION: Incorrect setting will cause panel damage	See panel voltage setting table 1
JB1	Backlight brightness voltage range	1-2 = 5V max 2-3 = 3.3V max
JB2	Backlight inverter on/off control – signal level	2-3 = On/Off control signal 'High' = +5V 1-2 = On/Off control signal 'High' = +3.3V Open = On/Off control signal 'High' = Open collector CAUTION: Incorrect setting can damage inverter.
JB3	Backlight inverter on/off control - polarity	1-2 = control signal 'high' = CCFT ON 2-3 = control signal 'low' = CCFT ON
JB5	Backlight control type selection	JB5-1 = VR/Digital switch mount control JB5-2 = Analog backlight brightness - voltage range 0-5V JB5-3 = PWM (Pulse Width Modulation) brightness
JB7	Backlight control voltage on CNB1 pin4 (Function when JB5-1 sets closed)	Open = For OSD switch mount control (Default) 1-2 = 0V 2-3 = 3.3V/5V controlled by JB1
JP6	Input power control	Short = External switch control and fix the board ON Open = Switch mount control
SW1	Panel selection	See table below

Table 1 : Panel voltage setting table :

Input voltage via PP2	Panel Voltage	JA3	JA6	Jumper on board
12VDC	3.3V	OPEN	1-2	
	5V	3-4	1-2	
	10V	2-3	1-2	
	12V	1-2	2-3	

CAUTION: Incorrect setting can damage panel & controller

Input voltage via PP2	Panel Voltage	JA3	JA6	Jumper on board
24VDC**	3.3V	OPEN	1-2	
	5V	3-4	1-2	
	10V	2-3	1-2	
	12V	1-2	1-2	

CAUTION: Incorrect setting can damage panel & controller

**** Ensure that the backlight inverter supports 24V operation prior to connecting a 24VDC input. Because CNA1 pin 1 and CNB1 pin 2 will output 24VDC if input 24VDC via PP2.**

JA3, JA6 location on board : (Please pay attention to the jumper settings on JA3, JA5 & JA6 which are red in color)

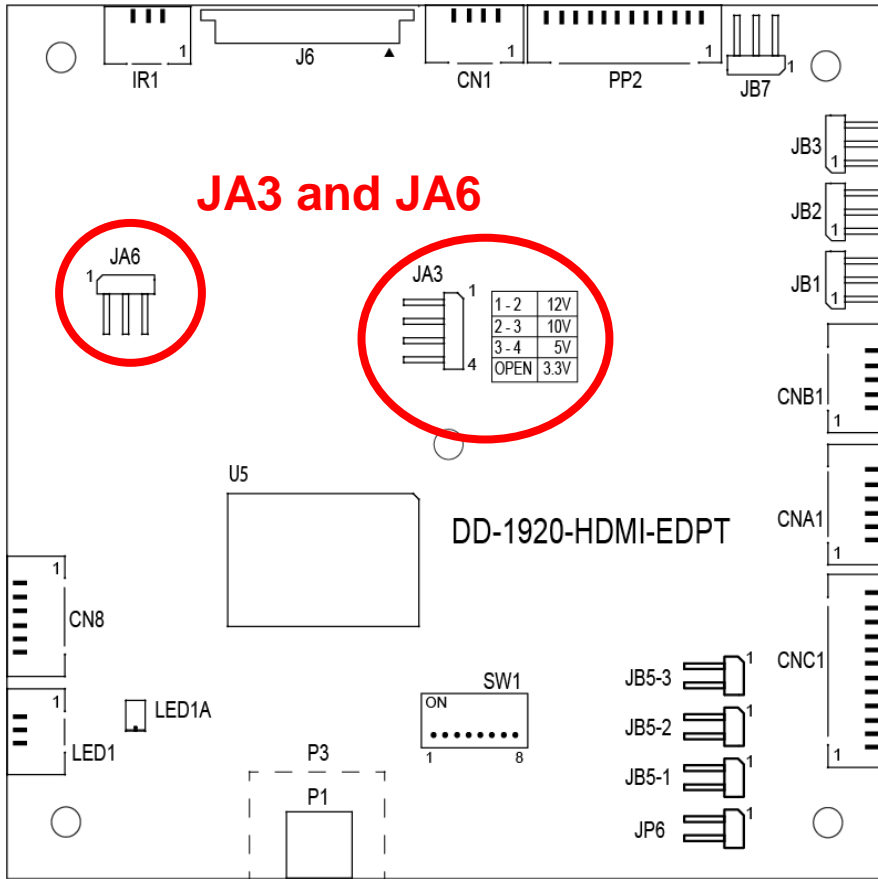


Table 2 : DIP Switch selection – SW1

Pos #1	Pos #2	Pos #3	Pos.#4	Description	Panel resolution
For WUXGA panels					
OFF	OFF	OFF	OFF	Innolux N173HGE-E11	1920x1080
OFF	OFF	OFF	OFF	NEC NL192108BC18-06F	1920x1080

Remark : The above panel timings are generated based on the panel specification. Some of the panel timings settings may not exactly to match the panel model we specified in this table.

Pos #5	Pos #6	Pos #7	Description
OFF	OFF	OFF	WUXGA (1920 x 1200 / 1080)
ON	OFF	OFF	UXGA
OFF	ON	OFF	SXGA
ON	ON	OFF	WXGA
OFF	OFF	ON	XGA
ON	OFF	ON	SVGA
OFF	ON	ON	VGA / WVGA
ON	ON	ON	Others

Pos. #8	OFF	Reserved
---------	-----	----------

CN1 – Audio output (Stereo) from HDMI: YEONHO 12513WR-04 compatible (Matching type : Molex 51146-0400 or compatible)

PIN	SYMBOL	DESCRIPTION
1	AMP L -	Audio Left channel (Negative)
2	AMP L +	Audio Left channel (Positive)
3	AMP R -	Audio Right channel (Negative)
4	AMP R +	Audio Right channel (Positive)

CN8 – RS-232 serial control: YEONHO 12513WR-06 compatible (Matching type : Molex 51146-0600 or compatible)

PIN	SYMBOL	DESCRIPTION
1	EXT_SCL	Reserved
2	EXT_SDA	Reserved
3	VCC	+5V
4	TXD	RS-232 Tx data
5	GND	Ground
6	RXD	RS-232 Rx data

CNA1 - Auxiliary power output: YEONHO 12513WR-06 compatible (Matching type : Molex 51146-0600 or compatible)

PIN	SYMBOL	DESCRIPTION
1	AUX 12V / 24V	+12V / +24V DC
2	AUX 12V / 24V	+12V / +24V DC
3	AUX 12V / 24V	+12V / +24V DC
4	GND	Ground
5	GND	Ground
6	AUX 5V	+5V DC, 500mA max.

CNB1 – Backlight inverter connector: YEONHO 12513WR-05 compatible (Matching type : Molex 51146-0500 or compatible)

PIN	SYMBOL	DESCRIPTION
1	GND	Ground
2	VBKL	+12V / +24V DC, backlight power supply
3	BLCTRL	On/Off control (enable) – see JB2 & JB3
4	BVR_WIP	Brightness VR – WIP
5	BVR_A	Brightness VR A

CNC1 – OSD switch mount control: YEONHO 12513WR-12 compatible (Matching type : Molex 51146-1200 or compatible)

PIN	SYMBOL	DESCRIPTION
1	PSWIN	Power button A
2	SW_ON	Power button B
3	BVR_A	Backlight Brightness VR pin A
4	BVR_WIP	Backlight Brightness R pin WIP
5	BVR_B	Backlight Brightness VR pin B (470 ohm resistor to +5V Vcc)
6	GND	Ground
7	MENU	OSD menu
8	-/LEFT	OSD -/Left
9	+ /RIGHT	OSD +/Right
10	SEL_DN	OSD Select down
11	SEL_UP	OSD Select up
12	NC	No connection

The VR for brightness depends on the inverter. The main power load for On/Off is handled by a relay on the controller.

IR1 – Infra-Red sensor connector: YEONHO 12513WR-03 compatible (Matching type : Molex 51146-0300 or compatible)

PIN	SYMBOL	DESCRIPTION
1	GND	Ground
2	VCC	+3.3V
3	IR Data	IR data

J6 – eDP connector: I-PEX 20455-030E-12 (Matching type : I-PEX 20454-030T)

PIN	SYMBOL	DESCRIPTION
1	GND	Ground
2	GND	Ground
3	GND	Ground
4	GND	Ground
5	PANEL_VCC	Panel power
6	PANEL_VCC	Panel power
7	PANEL_VCC	Panel power
8	PANEL_VCC	Panel power
9	PANEL_VCC	Panel power
10	DP_TX_33V	Power for connector (3.3V 500mA)
11	GND	Ground
12	DPTX_HPD	Hot Plug Detect
13	DPTX_AUX_N	Auxiliary Channel (negative)
14	GND	Ground
15	DPTX_AUX_P	Auxiliary Channel (positive)
16	GND	Connected to Ground (100K)
17	GND	Connected to Ground (100K)
18	DPTX_L3N	Lane 3 (negative)
19	GND	Ground
20	DPTX_L3P	Lane 3 (positive)
21	DPTX_L2N	Lane 2 (negative)
22	GND	Ground
23	DPTX_L2P	Lane 2 (positive)
24	DPTX_L1N	Lane 1 (negative)
25	GND	Ground
26	DPTX_L1P	Lane 1 (positive)
27	DPTX_L0N	Lane 0 (negative)
28	GND	Ground
29	DPTX_L0P	Lane 0 (positive)
30	GND	Ground

LED1 – Status LED connector: YEONHO 12513WR-03 compatible (Matching type : Molex 51146-0300 or compatible)

PIN	DESCRIPTION
1	Green LED pin (anode)
2	LED pin common (cathode)
3	Red LED pin (anode)

P1 – HDMI (1.4) Micro HDMI connector (Type D)

PIN	SYMBOL	DESCRIPTION
1	HPDET	Hot Plug Detect
2	UTILITY	N.C. on device
3	DATA2+	TMDS Data2+
4	DATA2S	TMDS Data2 Shield
5	DATA2-	TMDS Data2-
6	DATA1+	TMDS Data1+
7	DATA1S	TMDS Data1 Shield
8	DATA1-	TMDS Data1-
9	DATA0+	TMDS Data0+
10	DATA0S	TMDS Data0 Shield
11	DATA0-	TMDS Data0-
12	CLK+	TMDS Clock+
13	CLKS	TMDS Clock Shield
14	CLK-	TMDS Clock-
15	CEC	CEC control
16	DDC/CEC GND	DDC/CEC Ground
17	SCL	SCL (I ² C Serial Clock for DDC)
18	SDA	SDA (I ² C Serial Data Line for DDC)
19	+5V	+5V Power (max 50mA) EDID/DDC

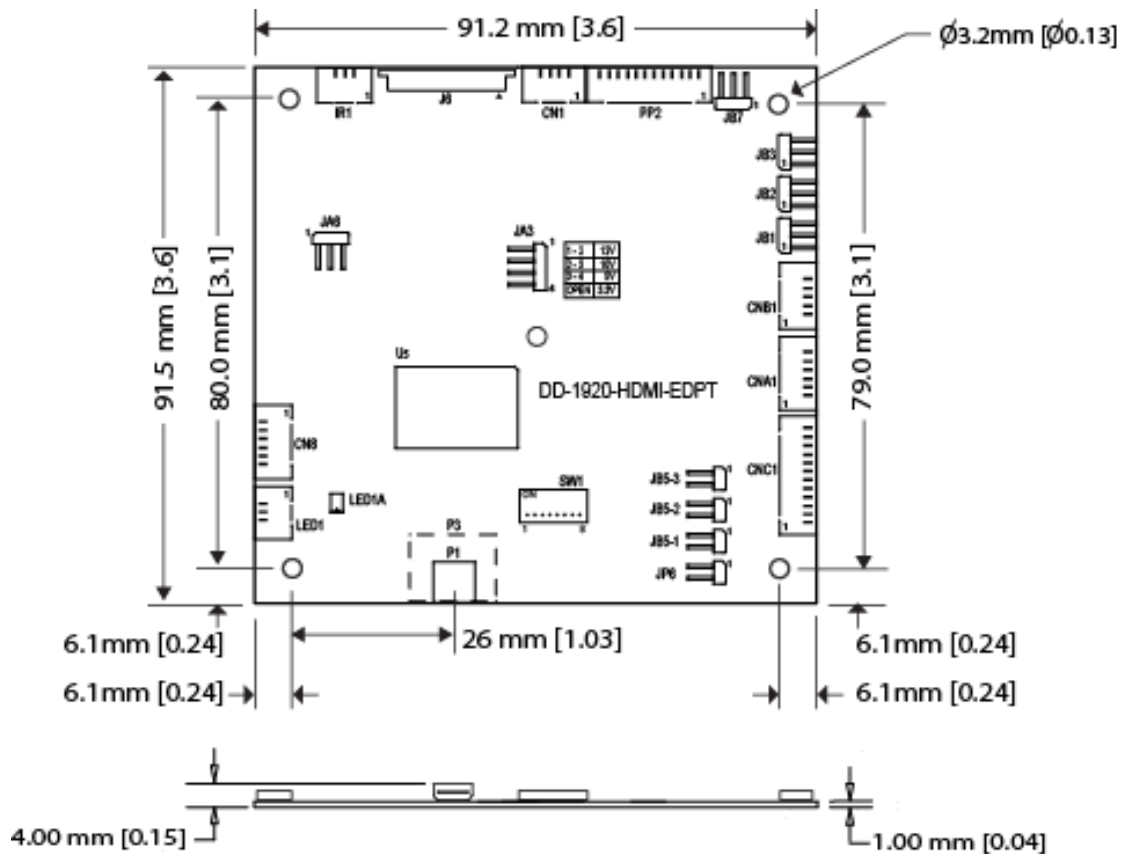
P3 – HDMI (1.4) Standard HDMI connector (Type A) – Build option

PIN	SYMBOL	DESCRIPTION
1	DATA2+	TMDS Data2+
2	DATA2S	TMDS Data2 Shield
3	DATA2-	TMDS Data2-
4	DATA1+	TMDS Data1+
5	DATA1S	TMDS Data1 Shield
6	DATA1-	TMDS Data1-
7	DATA0+	TMDS Data0+
8	DATA0S	TMDS Data0 Shield
9	DATA0-	TMDS Data0-
10	CLK+	TMDS Clock+
11	CLK@	TMDS Clock Shield
12	CLK-	TMDS Clock-
13	NC	No connection
14	NC	No connection
15	SCL	SCL (I ² C Serial Clock for DDC)
16	SDA	SDA (I ² C Serial Data Line for DDC)
17	GND	Ground
18	+5V	+5 V Power (max 50 mA)
19	HPDET	Hot Plug Detect

PP2 – Power supply: YEONHO 12513WR-12

PIN	SYMBOL	DESCRIPTION
1	VDD (+12V/24V)	+12V / +24V in
2	VDD (+12V/24V)	+12V / +24V in
3	VDD (+12V/24V)	+12V / +24V in
4	VDD (+12V/24V)	+12V / +24V in
5	VDD (+12V/24V)	+12V / +24V in
6	VDD (+12V/24V)	+12V / +24V in
7	GND	Ground
8	GND	Ground
9	GND	Ground
10	GND	Ground
11	GND	Ground
12	GND	Ground

CONTROLLER DIMENSIONS



Ready-made 3D Pro-E (SLDPRT) drawing files - Save time and effort for your system volumetric analysis design. Includes jpg file previews. Please go to download at <http://www.digitalview.com/products/DD-1920-HDMI-EDPT-lcd-controller>

The maximum thickness of the controller is 4mm (measured from bottom of PCB to top of components, including any underside components & leads). We recommend clearances of:

- 5mm from bottom of PCB - if mounting on a metal plate we also recommend a layer of suitable insulation material is added to the mounting plate surface.
- 10mm above the components
- 3-5mm around the edges

Any of the holes shown above can be used for mounting the PCB, they are 3.2mm in diameter.

CAUTION: Ensure adequate insulation is provided for all areas of the PCB with special attention to high voltage parts such as the inverter.

APPLICATION NOTES

USING THE CONTROLLER WITHOUT BUTTONS ATTACHED

This is very straightforward:

- Firstly setup the controller/display system with the buttons. With controls attached and display system active make any settings for color, tint and image position as required then switch everything off.
- Remove the control switches, the 12-way (CNC1) cable.
- Use a jumper or similar to connect pins 1 & 2 on JP6, this will fix the board On.
- Refer to inverter specifications for details as to fixing brightness to a desired level, this may require a resistor, an open circuit or closed circuit depending on inverter.

Summary: On CNC1 the only pins that are used are for On/Off and Brightness (if controller mounted inverter is used). On CNC1 the pins are for momentary type buttons so it doesn't matter that no buttons are attached.

INVERTER CONNECTION

There are potentially 3 issues to consider with inverter connection:

- Power
- Enable
- Brightness

Please read the following sections for a guide to these issues.

Inverter Power: As per the table for CNB1 pin 1 is ground and pin 2 provides 12V/24V DC. This should be matched with the inverter specification: see table.

CNB1

PIN	DESCRIPTION
1	Ground
2	+12V/+24VDC

Remark: For higher power inverter, more current (for 12V/24V) can be taken from CNA1 pin 1.

Enable: This is a pin provided on some inverters for On/Off function and is used by this panel controller for VESA DPMS compliance. If the inverter does not have an enable pin or the enable pin is not used then DPMS will not be operational. Pin 3 should be matched to the inverters specification for the 'enable' or 'disable' pin.

CNB1

PIN	DESCRIPTION
3	Enable

Further, jumpers JB2 & JB3 should be set to match the inverters specification for the enable pin power and High or Low setting: see table.

Ref	Purpose	Note
JB2	Inverter enable voltage	1-2 H = 3.3V, 2-3 H = 5V, OPEN H = open collector
JB3	Inverter control	1-2 H = On, 2-3 L = On

Brightness: There are various methods for brightness control and it is important to consider the specifications for the inverter to be used. Generally the situation is:

- Brightness can control by using a resistor or VR (Variable Resistor).
- Brightness controlled by adding a circuit such as PWM (Pulse Width Modulation).
- No adjustment of brightness is possible.

CNB1 pins 4 & 5 are available for connecting to an inverter or circuit where VR control is supported.

CNB1

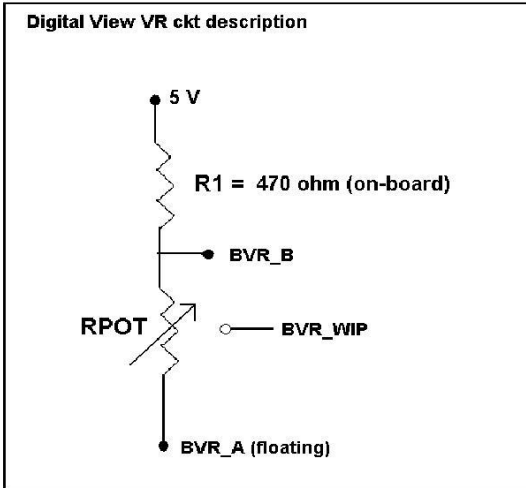
PIN	DESCRIPTION
4	VR WIP
5	VR A

This can then be matched with function controls connected to CNC1 pins 4 & 3 or 5: see table.

CNC1

PIN	DESCRIPTION
3	VR A
4	VR WIP
5	VR B

Design Guideline for making VR circuitry :



Signal description / Notes :

- 1) R1 : 470ohm on board
- 2) RPOT is an external potentiometer (in-line dip style) that can be plugged directly into CNC1 pins 3,4,5. RPOT must be supplied / installed by user.
- 3) BVR_B : Voltage tapped from “top” of potentiometer, the node of R1 and RPOT.
- 4) BVR_WIP : Voltage tapped from wiper arm of RPOT.
- 5) BVR_A : Voltage tapped from “bottom” of RPOT.

Note : BVR_A voltage is left floating on the controller board. To use this circuit, you need to tie this point to a potential (usually GND, available at CNC1 pin 6).

CNB1 – Backlight inverter connector: JST B5B-XH-A (Matching type : XHP-5)

PIN	SYMBOL	DESCRIPTION
1	GND	Ground
2	VBKL	+12V/24VDC, backlight power supply
3	BLCTRL	On/Off control (enable) – see JB2 & JB3
4	BVR_WIP	Brightness VR - WIP
5	BVR_A	Brightness VR A

CNC1 – OSD switch mount control, Hirose DF13A-12P-1.25H (Mating type : DF13-12S-1.25C)

PIN	SYMBOL	DESCRIPTION
1	PSWIN	Power button A
2	SW_ON	Power button B
3	BVR_A	Backlight Brightness VR pin A
4	BVR_WIP	Backlight Brightness R pin WIP
5	BVR_B	Backlight Brightness VR pin B (470 ohm resistor to +5V Vcc)
6	GND	Ground
7	MENU	OSD menu
8	-/LEFT	OSD -/Left
9	+/RIGHT	OSD +/Right
10	SEL_DN	OSD Select down
11	SEL_UP	OSD Select up
12	NC	No connection

The VR for brightness depends on the inverter. The main power load for On/Off is handled by a relay on the controller.

Example for circuit design :

- 1.) Choose RPOT = 10K
- 2.) Tie BVR_A to GND
- 3.) Circuit analysis gives BVR_WIP as the following (see Figure 1)

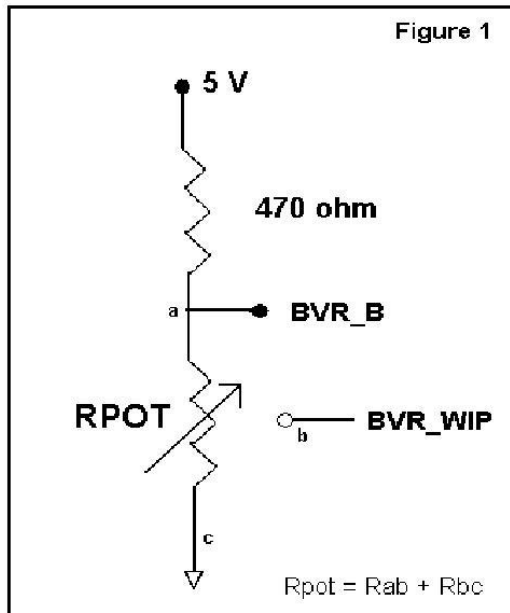
$$BVR_WIP = 5 \times (Rbc/10.47)$$

where BVR_WIP is in Volts.
And Rbc is the resistance from the wiper arm to bottom of pot in Kohms.

To evaluate, plug in different values of Rbc :

Rbc	BVR_WIP
0	0 V
2.5 K	1.2 V
5 K	2.4 V
7.5 K	3.6 V
10 K	4.8 V

So this circuit could provide Brightness adjust voltage ranging from 0V to 5V.



TROUBLESHOOTING

General

A general guide to troubleshooting a flat panel display system it is worth considering the system as separate elements, such as:

- Controller (jumpers, PC settings)
- Panel (controller, cabling, connection, panel, PC settings)
- Backlight (inverter, cabling, backlight tubes)
- Cabling
- Computer system (display settings, operating system)

Through step by step cross checking with instruction manuals and a process of elimination to isolate the problem it is usually possible to clearly identify the problem area.

No image:

- If the panel backlight is not working it may still be possible to just see some image on the display.
- A lack of image is most likely to be caused by incorrect connection, lack of power, failure to provide a signal or incorrect graphic card settings.

Image position:

If it is impossible to position the image correctly, i.e. the image adjustment controls will not move the image far enough, then test using another graphics card. This situation can occur with a custom graphics card that is not close to standard timings or if something is in the graphics line that may be affecting the signal such as a signal splitter (please note that normally a signal splitter will not have any adverse effect).

Image appearance:

- A faulty panel can have blank lines, failed sections, flickering or flashing display
- Incorrect graphics card refresh rate, resolution or interlaced mode will probably cause the image to be the wrong size, to scroll, flicker badly or possibly even no image.
- Incorrect jumper settings on the controller may cause everything from total failure to incorrect image. CAUTION: Do not set the panel power input incorrectly.
- Sparkling on the display: faulty panel signal cable.

Backlight:

Items to check include: Power input, Controls, Inverter and Tubes generally in this order.

If half the screen is dimmer than the other half:

- Check cabling for the inverter.
- For a specific backlight tube check the AC pins orientation (CAUTION: Never reverse any DC power pins).

Also:

- If adjusting brightness control has no effect the chances are that the VR rating or method of adjusting brightness is not compatible or correctly connected to the inverter.
- If system does not power down when there is a loss of signal

Continued failure:

If unit after unit keeps failing consider and investigate whether you are short circuiting the equipment or doing something else seriously wrong.

Generally after common sense issues have been resolved we recommend step by step substitution of known working parts to isolate the problem.

The following are some of LED indicators onboard that can help to know the health status of the controller board:

LED1A

- Green : Valid video signal received on the selected input port.
- Red : No video signal received on the selected input port.
- Green + Red : The board is fail to boot up. Suggest to send it back to factory for check.
- Off : The board is not powered on.

SPECIFICATIONS

Panel compatibility	Compatible with 1920x1200 resolutions of TFT LCD panels with eDP panel interface. A specified BIOS and some factory adjustment is required for individual panel timings.
No. of colors	Up to 3 x 8 bit providing 16.7 million colors.
Panel power	DC 3.3V, 5V, 10V, 12V
Panel signal	eDP
Video inputs	HDMI 1.4
Functions display	On screen display (OSD) of functions
OSD menu functions	Image controls: Panel brightness/contrast, Saturation, Hue, Color temperature, Sharpness, Aspect ratio, Rotate, Gamma, PIP/PBP.
OSD menu controls available	Power On/Off OSD Menu OSD Select up OSD Select down Setting + Setting -
Control interface	Buttons, RS-232, IR Remote control
Audio	Digital audio line out (from header) with OSD volume control. (not amplified)
Settings memory	Settings are stored in non volatile memory
PC Connectivity	VGA / SVGA / XGA / SXGA / UXGA / WUXGA analog or digital
Controller dimensions	91.4mm x 91.4mm (3.6" x 3.6")
Power consumption	10W approx. (not including panel power consumption)
Power load maximum	The controller has an overall 3Amp current limit.
Input voltage	12V/24VDC +/- 5%
On board battery lifetime	3 years at storage (without applying power to the unit). The battery is not rechargeable.
Power protection	Fuse fitted (Resettable)
DC Power handling	Reverse power polarity protection is equipped on the board
Storage temperature limits	-40°C to +70°C
Operating temperature limits	0°C to +60°C
Use of memory on board	Volatile memory - 30KB SRAM (OSD) Non-Volatile memory - 32Mb Flash (System program) - 16Kb EEPROM (System settings)

NOTES

Please note the following:

- For specific panel setup a sample of an LCD may be required (this will be returned) and a copy of the full technical specifications for the panel from the manufacturer.
- Re-layout and custom development services are available.

APPENDIX I – SIGNAL SUPPORT MODE TABLE**HDMI 1.4 input port (P1 and P3) :**

Resolution
640x480 60Hz
640x480 72Hz
640x480 75Hz
800x600 56Hz
800x600 60Hz
800x600 72Hz
800x600 75Hz
1024x768 60Hz
1024x768 70Hz
1024x768 75Hz
1280x720 50Hz
1280x720 60Hz
1280x768 60Hz
1280x768 75Hz
1280x800 60Hz
1280x800 75Hz
1280x1024 60Hz
1280x1024 75Hz
1360x768 60Hz
1366x768 60Hz
1440x900 75Hz
1600x1200 75Hz
1680x1050 60Hz
1680x1050 75Hz
1920x1080 60Hz
1920x1200 60Hz

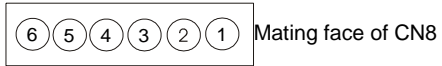
Resolution
480p60Hz
480p59.94Hz
576p50Hz
720p60Hz
720p59.94Hz
720p50Hz
1080p60Hz
1080p59.94Hz
1080p50Hz

Appendix II – RS-232 control protocols and command set

RS-232 Serial control (Baud rate 9600), 8 bits, 1 stop bit and no parity

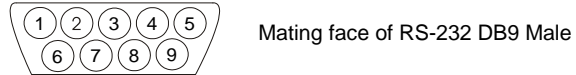
Physical connection :

Controller side
Connector interface : CN8
Mating connector : Molex 51146-0600



PIN#	Description
4	RS-232 Tx Data
5	Ground
6	RS-232 Rx Data

Computer side
Connector interface : Serial port
Mating connector : DB9 Female



PIN#	Description
2	RS-232 Rx Data
3	RS-232 Tx Data
5	Ground

Remark :

(1) : ~~RS-232 connection cable, 600mm P/N 426090200-3 can be ordered separately for connection.~~

Software connection :

The OSD function can be controlled through sending the RS-232 protocol.

The RS-232 program can be custom-made to fit for application or it can be used the serial control program, like Accessport, Telix or Serial Utility program developed by DigitalView. Please contact your local support for information.

1. Commands to implement switch mount control buttons

Function	Command	Description	Remark
Menu button	0xf7	Menu button pressed	Button equivalent
Select-down button	0xfa	Select-down button pressed	Button equivalent
Select-up button	0xfb	Select-up button pressed	Button equivalent
Right/+ button	0xfc	Right/+ button pressed	Button equivalent
Left/- button	0xfd	Left/- button pressed	Button equivalent

2. Parameter setting - immediate, relative, reset and query

Function	Command	Description	Acknowledge (if enabled)
Volume control - left+right channel	0x80, "a" "A", nn "+" "-" "r" "R" "?"	Set audio (L+R) volume = value/increment/decrement Reset Query	nn = 0x00~ 0x64 (0~100%) Default: 0x32 (50%)
Volume control - on/off (mute)	0x80, "m" "M", "0" "1" "r" "R" "?"	Disable audio output. Enable audio output. Reset Query	"0" - audio off (mute). "1" - audio on. (Default)
Brightness control	0x81, nn "+" "-" "r" "R" "?" "m" "n"	Set brightness = value/increment/decrement Reset Query Current Source Maximum query Minimum query	nn = 0x00~ 0x64 (0~100%) Default: 0x32 (50%)
Contrast control	0x82, "a" "A", nn "+" "-" "r" "R" "?" "m" "n"	Set contrast = value/increment/decrement Reset Query Maximum query Minimum query	nn = 0x00~ 0x64 (0~100%) Default: 0x32 (50%)
Color saturation control	0x83, nn "+" "-" "r" "R" "?" "m" "n"	Set color saturation = value/increment/decrement Reset Query Maximum query Minimum query	nn = 0x00~ 0x64 (0~100%) Default: 0x32 (50%)
Hue control	0x84, nn "+" "-" "r" "R" "?" "m" "n"	Set tint = value/increment/decrement Reset Query Maximum query Minimum query	nn = 0x00~ 0x64 (0~100%) Default: 0x32 (50%)
Sharpness	0x8a, nn "+" "-" "r" "R" "?"	Set sharpness = value/increment/decrement Reset Query	nn = 0x00~ 0x04 Default: 0x02
Aspect Ratio	0x8c, "1" "9" "A" "F" "r" "R" "?"	Set video aspect ratio= Value Reset Query	"1" – fill screen (Default) "9" – 4:3 "A" – 16:9 "F" – 5:4
Rotate OSD	0x8f, "0" "1" "2" "3" "?"	Normal OSD rotate rotated 90 rotated 180 rotated 270 Query	"0" – normal OSD. (Default) "1" – rotated 90 OSD. "2" – rotated 180 OSD. "3" – rotated 270 OSD.

Specifications subject to change without notice

OSD H position	0x90, nn "+" "-" "r" "R" "?"	Set OSD horizontal position = value/increment/decrement Reset Query	nn = 0x00~ 0x64 (left ~ right) Default: 0x32 (middle)
OSD V position	0x91, nn "+" "-" "r" "R" "?"	Set OSD vertical position = value/increment/decrement Reset Query	nn = 0x00~ 0x64 (top ~ bottom) Default: 0x32 (middle)
OSD transparency	0x92, nn "+" "-" "r" "R" "?"	Set OSD transparency = value/increment/decrement Reset Query	nn = 0x00~ 0x64 (0~100%) Default: 0x00 (No transparency)
OSD menu timeout	0x93, nn "+" "-" "r" "R" "?"	Select menu timeout = value/increment/decrement Reset Query	OSD menu timeout value. nn = 0x00 – Always on nn = 0x0A - 0x3C (10~60sec) Default: 0x0A (10sec)
MMA value select	0x9d, n "r" "R" "?"	Select GAMMA value = Value Reset Query	"n": "5" – 1.8, "7" – 2.0, "2" – 2.2, (Default) "A" – 2.4 "C" – 2.6
Runtime counter	0xa1, nnnnn "r" "R" "?"	Set runtime counter value = nnnnn (* 0.5 hour) Reset to zero Query	Runtime = nnnnn. Max. input = 0x1ffe (0x1ffe * 0.5 hour = 65535 hours) Runtime counter counts when backlight is on
Colour temperature select	0xb3, n "r" "R" "?"	Select colour temperature = value Reset Query	"n" = "2" – 6500K. (Default) "4" – User "5" – 9300K "6" – 7500K "7" – 5800K "8" – sRGB
Red level of User colour temperature	0xb4, nn "+" "-" "r" "R" "?" "m" "n"	Set the level of the red channel for the user colour temp. = value/increment/decrement Reset Query Maximum query Minimum query	nn: 0x00~ 0xff (0~255) Default: 0x80
Green level of User colour temperature	0xb5, nn "+" "-" "r" "R" "?" "m" "n"	Set the level of the green channel for the user colour temp. = value/increment/decrement Reset Query Maximum query Minimum query	nn: 0x00~ 0xff (0~255) Default: 0x80
Blue level of User colour temperature	0xb6, nn "+" "-" "r" "R" "?" "m" "n"	Set the level of the blue channel for the user colour temp. = value/increment/decrement Reset Query Maximum query Minimum query	nn: 0x00~ 0xff (0~255) Default: 0x80
Video horizontal resolution enquiry	0xb7	Horizontal resolution (in pixels) in 3 to 4 digit hex number	
Video vertical resolution enquiry	0xb8	Vertical resolution (in lines) in 3 digit hex number	

Video horizontal sync frequency	0xb9	Horizontal sync frequency (in units of 100Hz) in 3 digit hex number	
Video vertical sync frequency	0xba	Vertical sync frequency (in units of Hz) in 3 digit hex number and 1 char	"nnnc" = vertical frequency nnn = 3 digit hex c= "i" (interlace) or "p" (progressive)
OSD status enquiry	0xbb	Status of OSD	"0" – OSD turned off "1" – OSD turned on
OSD turn off	0xbd	Turn off the OSD.	"0" – fail. "1" – successful.
Backlight control	0xe0, nn "+" "-" "R" "r" "?"	Set Backlight level = value/increment/decrement Reset Query	nn = 0x00~ 0x64 (0~100%) Default: 0x64 (100%)
Backlight On/Off	0xe1, "0" "1" "R" "r" "?"	Backlight Off / Backlight On Reset Query	"0" – Backlight Off "1" – Backlight On. (Default)
Backlight DA/PWM	0xe5 "0" "1" "R" "r" "?"	Set backlight control method: PWM / DA Reset Query	"1" – PWM (Default) "0" – D/A
Backlight PWM frequency	0xe6, nnn "+" "-" "R" "r" "?"	Set backlight PWM frequency = value/increase 20Hz/decrease 20Hz Reset Query	Value 100Hz : "0", "6", "4" 120Hz : "0", "7", "8" 140Hz : "0", "8", "C" 160Hz : "0", "A", "0" (Default) 180Hz : "0", "B", "4" 200Hz : "0", "C", "8" 220Hz : "0", "D", "C" 240Hz : "0", "F", "0" 260Hz : "1", "0", "4" 280Hz : "1", "1", "8" 300Hz : "1", "2", "C" 320Hz : "1", "4", "0" 340Hz : "1", "5", "4" 360Hz : "1", "6", "8" 380Hz : "1", "7", "C" 400Hz : "1", "9", "0" 420Hz : "1", "A", "4" 440Hz : "1", "B", "8"
Backlight Invert	0xe7 "0" "1" "R" "r" "?"	Set invert backlight level : Off / On Reset Query	"0" – Off (Default) "1" – On
OSD switch mount Lock	"0xee", "0x62" "0" "1" "?"	Unlock / Lock Query	"0" - Unlock (Default) "1" - Lock, no response to OSD switch mount keys
Default Power	"0xee", "0x6B", "0x50" "0" "1" "?"	Default power state after supplying power to controller Off On Query	"0" - default power off "1" - default power on

3. Other control

Function	Command	Description	Acknowledge (if enabled)
Select RS-232 acknowledge	0xc1, "0" "1"	Disable/enable command acknowledge.	"0" – acknowledge disabled. "1" – acknowledge enabled. (Default)
Command availability	0xc4, nn / nnnn	Check whether a command is available.	"0" – not available. "1" – available. e.g "0x81" command send "0xc4 0x38 0x31" feedback "0xc4 0x38 0x31 0x31" e.g "0xee 0x5c" command send "0xc4 0x45 0x45 0x35 0x43" feedback "0xc4 0x45 0x45 0x35 0x43 0x31"
Power On/Off	0xc8, "0" "1" "?"	Soft power on/off off/on query	"0" – soft power off. "1" – soft power on.
Query video input status	0xc9	Query the status of the displaying video windows source	Input status nn nn: "0","0" : no video source / disabled "H,"1" D1: HDMI Feedback 4 video windows status in form of: nn nn (P1)
Query BIOS version	0xcb, "0"	Read BIOS version	BIOS version "VV.YY.ZZ" VV = Vx or Ex, (x is version digit) V = Release version E = Engineering Sample YY= Version Number ZZ= Customer Number
Query PCBA number	0xcb, "1"	Read PCBA number	"nnnnn" = PCBA number DD-1920-HDMI-EDPT = "41766"
Query Revision Number	0xcb, "3"	Read Revision Number	"nn" = Revision number AA in firmware version no. "VV.YY.ZZ.AA"
Reset parameters	0xce	Reset all parameters to default value	"1" – successful.

n = 1-byte ascii-coded hex number, e.g., parameter value of 0x1 is represented by "1" (0x31).
mn or nn = 2-byte ascii-coded hex number, e.g., parameter value of 0x1e is represented by "1", "e" | "E" (0x31, 0x6e|0x4e).

n = 1-byte ascii-coded hex number, e.g., parameter value of 0x1 is represented by "1" (0x31).
 mn or nn = 2-byte ascii-coded hex number, e.g., parameter value of 0x1e is represented by "1", "e" | "E" (0x31, 0x6e|0x4e).

The RS-232 command strings sent in one time can support up to 380 bytes via CN8 port
 The RS-232 command string sent in one time can support up to 50 bytes via CN1 or J1 port.

n = 1-byte ascii-coded hex number, e.g., parameter value of 0x1 is represented by "1" (0x31).
 mn or nn = 2-byte ascii-coded hex number, e.g., parameter value of 0x1e is represented by "1", "e" | "E" (0x31, 0x6e|0x4e).
 Please refer to the ASCII to Hex convert table below.

Hex to ASCII conversion table

Hex	ASCII	Hex	ASCII	Hex	ASCII	Hex	ASCII
0x30	0	0x41	A	0x61	a	0x2B	+
0x31	1	0x42	B	0x62	b	0x2D	-
0x32	2	0x43	C	0x63	c	0x3F	?
0x33	3	0x44	D	0x64	d		
0x34	4	0x45	E	0x65	e		
0x35	5	0x46	F	0x66	f		
0x36	6	0x47	G	0x67	g		
0x37	7	0x48	H	0x68	h		
0x38	8	0x49	I	0x69	i		
0x39	9	0x4A	J	0x6A	j		
		0x4B	K	0x6B	k		
		0x4C	L	0x6C	l		
		0x4D	M	0x6D	m		
		0x4E	N	0x6E	n		
		0x4F	O	0x6F	o		
		0x50	P	0x70	p		
		0x51	Q	0x71	q		
		0x52	R	0x72	r		
		0x53	S	0x73	s		
		0x54	T	0x74	t		
		0x55	U	0x75	u		
		0x56	V	0x76	v		
		0x57	W	0x77	w		
		0x58	X	0x78	x		
		0x59	Y	0x79	y		
		0x5A	Z	0x7A	z		

Appendix III – DV remote control unit work for DD-1920-HDMI-EDPT

P/N 559000106-3 :
DigitalView remote control unit
(without DV logo silk screen
printing)

P/N 559000105-3 :
DigitalView remote control unit
(with DigitalView logo silk screen
printing)



BUTTON	FUNCTION
POWER BUTTON	Soft power ON/OFF button.
SEL UP (^) / SEL DN (v)	1. In OSD menu, pressing "SEL UP" button to move previous level of selection. 2. In OSD menu, pressing "SEL DN" button to move next level of selection or to CONFIRM the selection.
+ BUTTON	When OSD menu displayed, press this button to select functions (forward) or increase the values.
- BUTTON	When OSD menu displayed, press this button to select functions (backward) or decrease the values.
OSD NEXT BUTTON	Use to turn on/off the OSD menu.
OSD BACK	Turn off the OSD menu.
Mute	Mute / Un-mute audio

WARRANTY

The products are warranted against defects in workmanship and material for a period of three (3) year from the date of purchase provided no modifications are made to it and it is operated under normal conditions and in compliance with the instruction manual.

The warranty does not apply to:

- Product that has been installed incorrectly, this specifically includes but is not limited to cases where electrical short circuit is caused.
- Product that has been altered or repaired except by the manufacturer (or with the manufacturer's consent).
- Product that has subjected to misuse, accidents, abuse, negligence or unusual stress whether physical or electrical.
- Ordinary wear and tear.

Except for the above express warranties, the manufacturer disclaims all warranties on products furnished hereunder, including all implied warranties of merchantability and fitness for a particular application or purpose. The stated express warranties are in lieu of all obligations or liabilities on the part of the manufacturer for damages, including but not limited to special, indirect consequential damages arising out of or in connection with the use of or performance of the products.

CAUTION

Whilst care has been taken to provide as much detail as possible for use of this product it cannot be relied upon as an exhaustive source of information. This product is for use by suitably qualified persons who understand the nature of the work they are doing and are able to take suitable precautions and design and produce a product that is safe and meets regulatory requirements.

LIMITATION OF LIABILITY

The manufacturer's liability for damages to customer or others resulting from the use of any product supplied hereunder shall in no event exceed the purchase price of said product.

TRADEMARKS

The following are trademarks of Digital View Ltd:

- Digital View
- DD-1920-HDMI-EDPT

CONTACT DETAILS

Digital View has offices in Asia, Europe and USA :

USA

Digital View Inc.
18440 Technology Drive
Building 130
Morgan Hill,
California, 95037
USA

Tel: (1) 408-782 7773 **Fax:** (1) 408-782 7883

Sales: ussales@digitalview.com

EUROPE

Digital View Ltd.
The Lake House
Knebworth Park
Herts, SG3 6PY
UK

Tel: +44-(0)20-7631-2150 **Fax:** +44-(0)20-7631-2156

Sales: uksales@digitalview.com

ASIA

Digital View Ltd
705-708, 7/F Texwood Plaza
6 How Ming St.
Kwun Tong
Hong Kong

Tel: (852) 2861 3615 **Fax:** (852) 2520 2987

Sales: hksales@digitalview.com

WEBSITE

www.digitalview.com

Revision History

Date	Rev No.	Page	Summary
10 September 2018	1.0	All	First issued.