



Intel® SDM, HDMI INTERFACE CONTROLLER BOARD FOR TFT PANEL

Model: SDM-1920-LVDS

Part number : 4176801XX-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
	21. Controller dimensions
	22. Application notes
	24. Troubleshooting
	25. Specifications
	26. Appendix I – Signal support mode table
	27. Appendix II – RS-232 control protocols and command set
	34. Appendix III - Mapping definition
	38. Appendix IV – DV remote control unit work for SDM-1920-LVDS
	39. Warranty, Caution & Limitation of Liability, Trademarks
	40. Contact details
	41. 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 SDM-1920-LVDS is a feature rich interface controller for :

- TFT (active matrix) LCD panels of 1920x1080 resolution in 60Hz with LVDS interface.
- Support true 10 bits panel.
- Support HDMI input.
- Support Intel SDM-S module.

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:

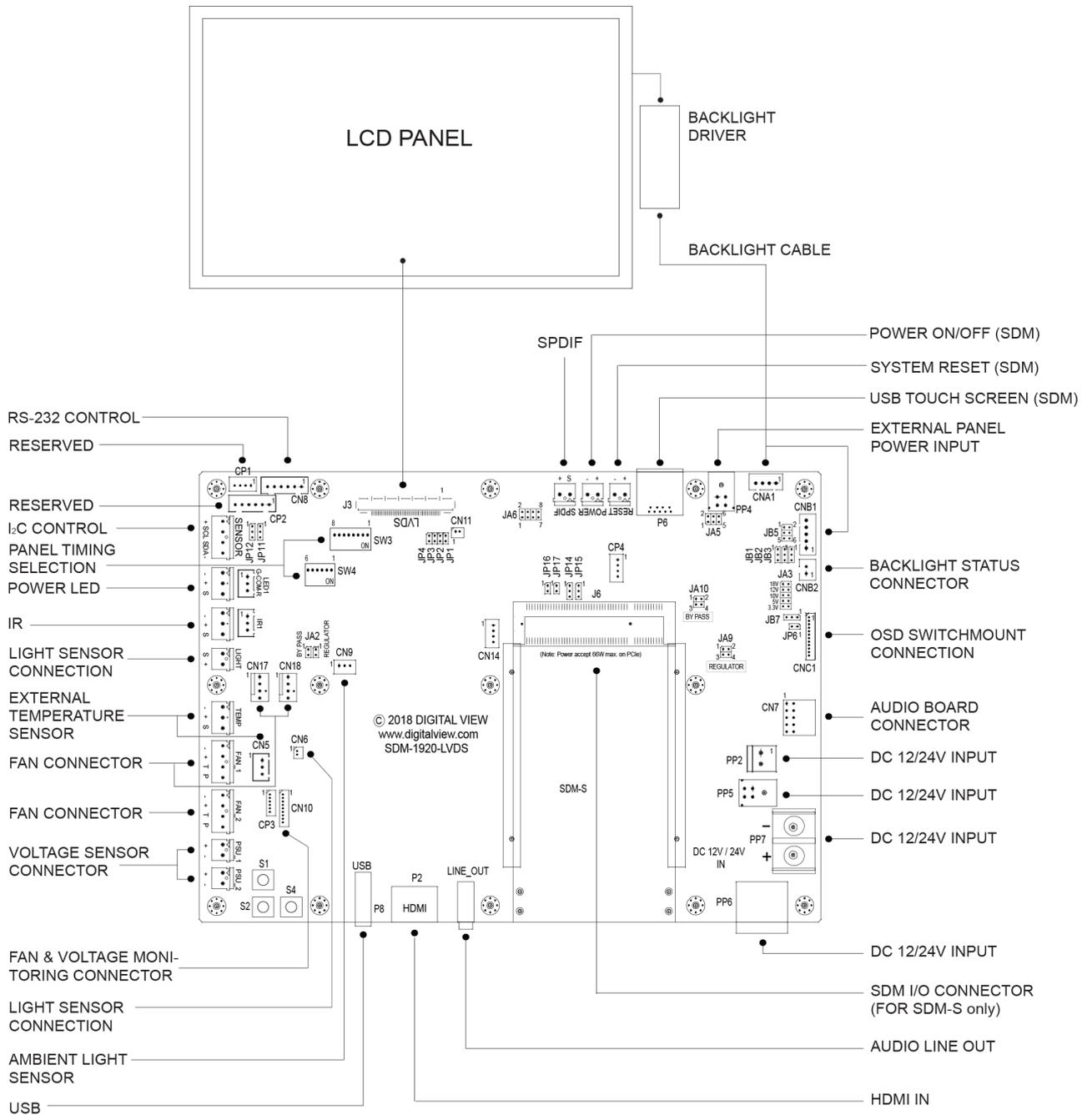
- Ensure that all necessary and appropriate safety measures are taken.
- Obtain suitable regulatory approvals as may be required.
- **Check power settings to all component parts before connection.**

DISCLAIMER

There is no implied or expressed warranty regarding this material.

SYSTEM DESIGN

A typical LCD based display system utilizing this controller is likely to comprise the following:



ASSEMBLY NOTES

This controller is designed for monitor and custom display projects using 1920x1080 resolution with LVDS TFT 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.

1. **LCD Panel:** This controller is designed for LVDS interfaced panels with panel voltage 3.3V(4A), 5V(4A), 10V(4A), 12V(4A) or 18V(3A), External for 10V, 12V and 18V interface. 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)**
2. **LCD Controller:** Handle the controller with care as static charge may damage electronic components. Make sure correct jumper to match the target LCD panel.
3. **Panel cable:** In order to provide a clean signal it is recommended that all panel cables (LVDS) supplied by Digital View. Care should be taken when placing the cables to avoid signal interference.
4. **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 22 for more information on connection.
5. **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.
6. **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 (5 momentary buttons) analog VR type or (8 momentary buttons) digital type.
7. **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.
8. **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.
9. **Optional IR sensor:** It is an optional part only, can be unconnected if not using IR remote control.
10. **RS-232 control interface :** Serial control via this interface port.
11. **External panel power output :** User for specific panel model.
12. **Panel control signal :** Use for specific panel model.
13. **SPDIF Audio output :** This port support SPDIF audio output from the HDMI audio source inputted.
14. **Ambient light sensor connection :** 3 ways connector provides interface for ambient light sensor connection by using Kit 70220-3.
15. **Backlight status input :** 2 ways connector provides interface for connection with the specific panel type which support the panel with backlight status monitoring function.
16. **HDMI input :** Plug the HDMI cable to the connector P2 (HDMI 1.4) on the controller board.
17. **Reserved for Audio adaptor board P/N 416940020-3:** The audio add-on board gives the audio input and output signal connection. It is an optional and reserved part only, can be unconnected if not using audio. It requires an audio cable P/N 426451800-3 to connect SDM-1920-LVDS (CN14) to the Audio Add-on Board (CN2).
CAUTION : The Audio Add-on Board P/N 416940020-3 can only operate with 12VDC power input environment.
18. **Reserved for Audio extend cable :** The audio extend cable P/N 426009700-3 designs for connection between audio add on board P/N 416940020-3 and the controller. It is an optional and reserved part only, can be unconnected if not using audio.
19. **Additional panel power input :** Provide additional (+10V/+12V/+18V) panel power input for driving high power consumption panels.
20. **Power Input:** 12V/24VDC is required, this should be a regulated supply. The power rating is depending on the panel, SDM module and backlight used. Although the controller provides power regulation for the LCD power this does not relate to the power supplied to the backlight driver.
If an unregulated power supply is provided to an inverter/backlight driver any fluctuations in power may affect operation, performance and lifetime of the inverter and or backlight tubes.

- 21. External panel power input :** Allow to supply external power to the panel separately for max 3.3V (7A) or 5V (7A) or 10V (5A) or 12V (5A) or 18V (3.5A) via PP4 power input connector. Corresponding jumper setting of JA3, JA5 & JA6 are required for each panel power input by referring to page 13.
- **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/driver for panel backlighting produces significantly higher voltages (the inverter/driver 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:** Connect the inverter/Backlight driver (if it is not built-in the panel) to the inverter/backlight connector of the LCD panel.
2. **LVDS interface panels:** The controller board supports LVDS interface panel. Plug the cable to J3 for driving FHD 60Hz panel. And make sure the matching panel timings and correct jumper settings by referring to the panel support table and jumper settings table in page 12-16.
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. For IR daisy chain connection, use RJ-11 cable to connect all monitors with IR in and IR out connectors.
7. **Jumpers & Inverter & Panel voltage:** Particularly pay attention to the settings of JA3, JA5, JA6, JA9, JA10, JB2 and JB3. JB2 & JB3 are used for inverter/backlight control (read inverter/backlight specification and information on the jumper table to define the correct settings). JA3 & JA5 & JA6 is used for panel voltage input (read panel specification and information on the jumper table to define the correct settings). JA9 and JA10 is used for controlling voltage input to SDM module. Since all SDM modules are 12V input so JA9 must be short (JA10=open) for "Regulator" if the input voltage (PP2, PP5, PP6 and PP7) is 24V.
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, PP5, PP6 and PP7. You can consider to use Digital View mating power cable P/N 426013710-3, 1000mm for PP5 connection. (Note: If the DC input is 24V, please set JA9=short, JA10=open to prevent damage the SDM module.)
10. **External panel power input :** Plug power cable : P/N 426013710-3 for external panel power input (3.3 (max 7A) / 5V (max 7A) / 10V (max. 5A) / 12V (max 5A) / 18V (max3.5)) for PP4 connection.
11. **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.

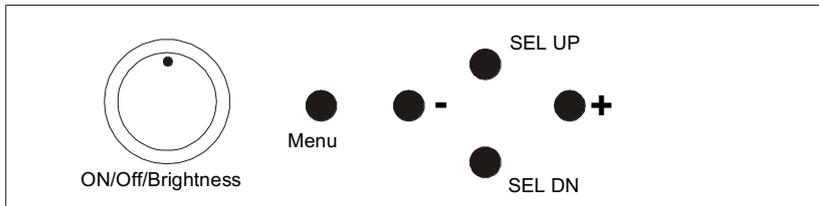
OPERATION

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

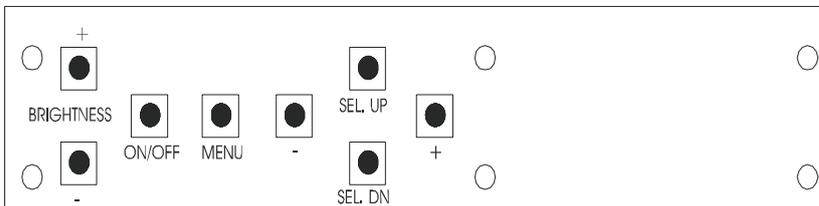
NOTE: By way of explanation the following refers to a set of sample buttons that may be obtained as an option. In addition to power on/off and connection for backlight brightness the controller provides an On Screen Display of certain functions which are controlled by 5 momentary type buttons (analog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



Digital type

12V / 24VDC power input :
Digital 10K Type OSD
mount uses
P/N 416100520-3 or up

OSD

	<p>Picture :</p> <p>Picture Setting ▶</p> <p>Contrast [0~100] Default 50: Increase/decrease panel contrast level, total: 100 steps</p> <p>Black Level [0~100] Default 50 : Increase/decrease panel brightness level, total: 100 steps</p> <p>Hue [0~100] Default 50 : Increase/decrease Hue level, total: 100 steps</p> <p>Saturation [0~100] Default 50 : Increase/decrease saturation, total: 100 steps</p> <p>Color Temperature ▶</p> <p>5000K</p> <p>6500K</p> <p>7500K (Default)</p> <p>9300K</p> <p>User ▶</p> <p>R [0~255] : Red Gain</p> <p>G [0~255] : Green Gain</p> <p>B [0~255] : Blue Gain</p> <p>Aspect / Size ▶</p> <p>4:3 : scaling format in 4:3</p> <p>Fill Screen : Default Enable full screen expansion for lower resolution Image</p> <p>16:9 : scaling format in 16:9</p> <p>1:1 : Display the exact image resolution on the screen without image expansion.</p> <p>Brightness [0~100] : Default 100 : Backlight brightness adjustment</p> <p>Input Source ▶ Select the input video signal</p> <p>HDMI</p> <p>SDM</p>
---	--



Utilities :

Menu language : English / French / Spanish

Setup ▶

Auto power : OFF / ON

ON – Enable soft power off function if absence of input signals
OFF – Disable soft power function

Auto Source Seek : On/Off (Default On) : Select Auto source select enable or disable.

Image Orientation ▶ Set the image orientation on screen

Normal

H-Flip

V-Flip

HV-Flip

Gamma : 1.8 / 2.0 / 2.2 / 2.4 / 2.6 (Default 2.2)

FailOver On/Off (Default OFF)

OSD ▶

OSD Time Out : ON / 5 Sec / 15 Sec / 30 Sec (Default) / 45 Sec / 60 Sec : Adjust the OSD menu timeout period

Transparent : 0% / 25% (Default) / 50% / 75% / 100% : Set OSD transparency

Reset to Factory Defaults ▶ Restore back to factory default values.
Are you sure ? Yes / No

Software Update (USB) : Firmware upgrade

Hotkey ▶

Hotkey 1 : Volume / Black Level / Contrast / Input Source / Aspect/Size / Saturation / Image Orientation / Brightness / Auto Picture Setup / Off

Hotkey 2 : Volume / Black Level / Contrast / Input Source / Aspect/Size / Saturation / Image Orientation / Brightness / Auto Picture Setup / Off

Brightness Setup :

Invert : OFF / ON : Invert for the backlight brightness

Control : D/A / PWM : Selection for voltage level dimming control / PWM dimming control

Frequency(Hz) : 100 ~ 440Hz in a step of 20

Min Level : 0 ~ 50% : Default the minimum backlight adjustment.

Light Detector : OFF / ON



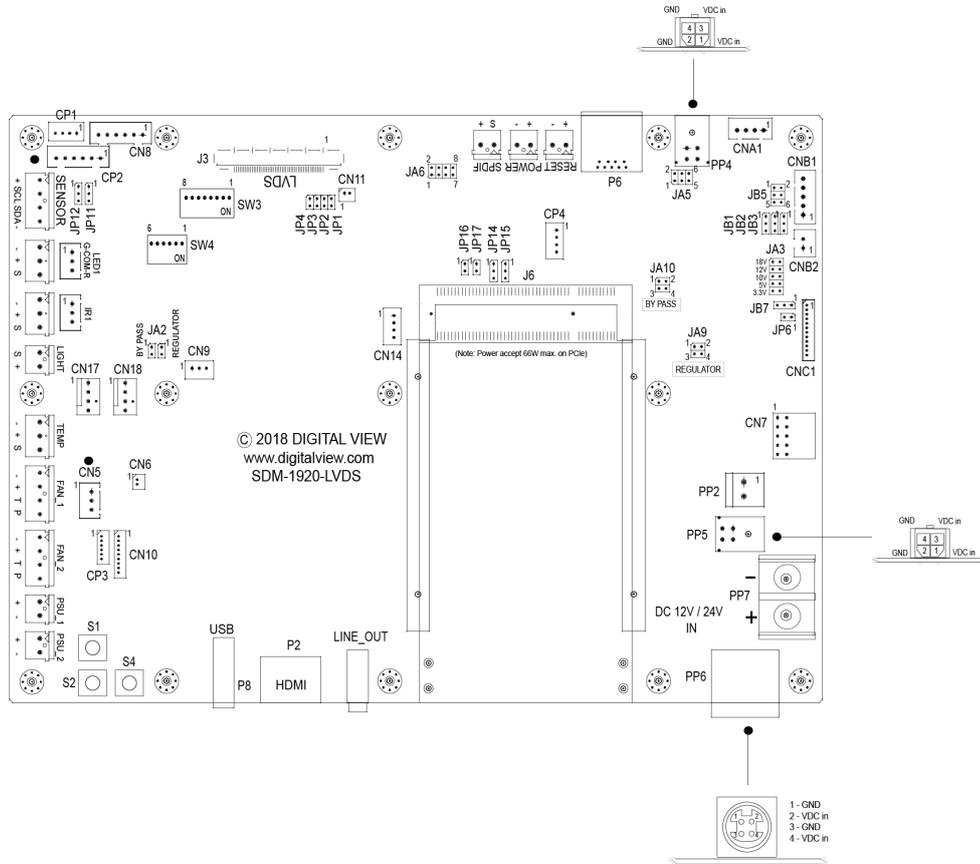
Audio :

Volume [0~100] : Default 50 : Increase/decrease volume level, total: 100 steps

Effective on Firmware E1.14.00.00 SDM or up

CONNECTORS, PINOUTS & JUMPERS

The various connectors are:



Summary: Connectors

Ref	Purpose	Description
CN5	Reserved for external temperature sensor	JST 3-way, B3B-XH-A (Matching type : XHP-3)
CN6	Reserved for light sensor	DF13 2 ways (Matching type : DF13-2S-1.25C)
CN7	Audio board connector	Dual pin socket 5x2, 0.1" pitch right angle (Matching audio add-on board P/N 416940020-3)
CN8	RS-232 serial control	JST 6-way, B6B-XH-A (Matching type : XHP-6)
CN9	Ambient light sensor connector	JST 3-way, B3B-PH-K (Matching type : PHR-3)
CN10	Reserved for Fan & backlight power monitoring connector	Hirose DF13-9P-1.25 DSA (Mating type : DF13-9S-1.25C)
CN11	SPDIF Audio output	JST B2B-ZR (Matching type : ZHR-2) (Matching extend cable P/N 426007400-3)
CN14	Audio line out (Unbalanced stereo)	JST B4B-ZR (Matching type : ZHR-4) (Use audio cable P/N 426451800-3 to connect with audio add-on board P/N 416940020-3)
CN17	Fan 1 connector	FAN connector, MKL-DP3-04W3-4
CN18	Fan 2 connector	FAN connector, MKL-DP3-04W3-4
CNA1	Auxiliary power output	JST 4-way, B4B-XH-A (Matching type : XHP-4) (Matching cable P/N 426040200-3)
CNB1	Backlight inverter	JST 5-way, B5B-XH-A (Matching type : XHP-5) (Matching cable P/N 426058300-3)
CNB2	Backlight status input connector	JST 2 way, B2B-XH-A (Matching type : XHP-2)
CNC1	OSD control	Hirose DF13A-12P-1.25H (Mating type : DF13-12S-1.25C) (Matching OSD switch mount cable P/N 426122200-3 (150mm) or 426122210-3 (250mm))
CP1	Reserved	JST B4B-ZR (Matching type : ZHR-4) (Use audio cable P/N 426451800-3 to connect with audio add-on board P/N 416940020-3)
CP2	Reserved	JST 6-way, B6B-XH-A (Matching type : XHP-6)
CP3	Reserved	Hirose DF13-6P-1.25DSA or compatible

Specifications subject to change without notice

CP4	Reserved	JST B4B-ZR (Use audio cable P/N 426451800-3 to connect with audio add-on bard P/N 416940020-3) (Matching type : ZHR-4)
IR1	Infra-red sensor connection	JST 3-way, B3B-XH-A (Matching type : XHP-3)
J3	LVDS 1	JAE FI-RE51S-HF (Matching type : FI-RE51HL)
J6	SDM I/O connector	Foxconn 2EGL4997-B2DM-4F
LED1	Power LED connection	JST 3-way, B3B-XH-A (Matching type : XHP-3)
P2	HDMI (1.4)	HDMI connector
P6	Touch screen connection	USB Type A
P8	USB connector	USB Type A
PP2	Power input (alternative)	DC power Molex 2 pin 0.156" pitch
PP4	External panel power input	Molex 43045-0400 compatible (Matching connector type : Molex 43025-0400 compatible) (Matching power cable : P/N 426013710-3)
PP5	12V/24VDC input power	Molex 43045-0400 compatible (Matching connector type : Molex 43025-0400 compatible) (Matching power cable : P/N 426013710-3)
PP6	12V/24VDC input power	4-way PWR DIN Jack, MDP-JRM-04
PP7	12V/24VDC input power	Terminal block, ETB5302202002
S1	Reset button	Tact switch button
S2	Reserved	Tact switch button
S4	Config Menu button	Tact switch button
RESET	Reset (SDM)	2-way Terminal Block 3.81mm pitch
POWER	Power on/off (SDM)	2-way Terminal Block 3.81mm pitch
LED	Power LED connection (same as LED1)	3-way Terminal Block 3.81mm pitch
IR	IR sensor connection (same as IR1)	3-way Terminal Block 3.81mm pitch
SPDIF	SPDIF out	2-way Terminal Block 3.81mm pitch
SENSOR	I2C sensor connection	4-way Terminal Block 3.81mm pitch
LIGHT	Light sensor connection (same as CN6)	2-way Terminal Block 3.81mm pitch
TEMP	Temperature sensor connection (same as CN5)	3-way Terminal Block 3.81mm pitch
FAN_1	Fan 1 connection (same as CN17)	4-way Terminal Block 3.81mm pitch
FAN_2	Fan 2 connection (same as CN18)	4-way Terminal Block 3.81mm pitch
PSU_1	Voltage 1 sensor connection	2-way Terminal Block 3.81mm pitch
PSU_2	Voltage 2 sensor connection	2-way Terminal Block 3.81mm pitch
LINE_OUT	Audio line out	3.5mm stereo jack
SW3	Panel selection	8-way DIP Switch
SW4	Function selection	6-way DIP Switch

Summary: Jumpers setting

Ref	Purpose	Note
JA2	Fans Power select	24V Power input – By Pass (Open), Regulator (Short) 12V Power input – By Pass (Short), Regulator (Open)
JA3	Panel power voltage select CAUTION: Incorrect setting can damage panel	See panel voltage setting table 1
JA5	Panel power voltage select CAUTION: Incorrect setting will cause panel damage	See panel voltage setting table 1
JA6	Panel power voltage select CAUTION: Incorrect setting will cause panel damage	See panel voltage setting table 1
JA9	SDM power selection (Regulator) CAUTION: Incorrect setting will cause SDM module damage	24V Power input : 1-2 short, 3-4 short 12V Power input : 1-2 open, 3-4 open
JA10	SDM power selection (By Pass) CAUTION: Incorrect setting will cause SDM module damage	24V Power input : 1-2 open, 3-4 open 12V Power input : 1-2 short, 3-4 short
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' = Backlight ON 2-3 = control signal 'low' = Backlight ON
JB5	Backlight control type selection	1-2 = VR/Digital switch mount control 3-4 = Analog backlight brightness - voltage range 0~5V 5-6 = PWM (Pulse Width Modulation) brightness
JB7	Backlight control voltage on CNB1 pin 4 (Function when JB5 sets 1-2 closed)	Open = For OSD switch mount control (Default) 1-2 = 0V 2-3 = 3.3V / 5V controlled by JB1
JP1	Factory use	Default Open
JP2	Reserved	Reserved
JP3	Reserved	Reserved
JP4	Reserved	Reserved
JP6	Input power control	Short = External switch control and fix the board ON Open = Switch mount control
JP11	Debug mode	1-2 = Scalar <-> IP-60 (Default)
JP12		2-3 = Scalar <-> Debug mode
JP14	Serial connection mode	1-2 = RS-232 (from SDM) (Default)
JP15		2-3 = RS-232 (from USB)
JP16	Reserved	Default Open
JP17	Reserved	Default Open

Table 1 : Panel and SDM module voltage setting table :

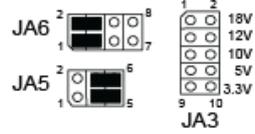
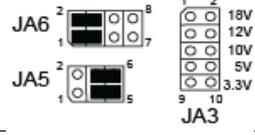
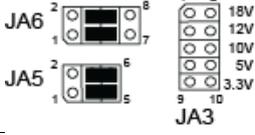
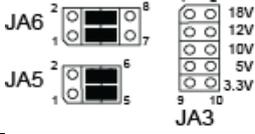
Input voltage via PP2 / PP5 / PP6 / PP7	Panel Voltage	JA3	JA5	JA6	JA9 (Regulator)	JA10 (Bypass)	Jumper on board
12VDC	3.3V	3V3 closed	1-3 & 2-4	1-3 & 2-4	OPEN	CLOSE	
	5V	5V closed	1-3 & 2-4	1-3 & 2-4	OPEN	CLOSE	
	12V	OPEN	1-3 & 2-4	5-7 & 6-8	OPEN	CLOSE	

CAUTION: Incorrect setting can damage panel & controller

Input voltage via PP2 / PP5 / PP6 / PP7	Panel Voltage	JA3	JA5	JA6	JA9 (Regulator)	JA10 (Bypass)	Jumper on board
24VDC**	3.3V	3V3 closed	1-3 & 2-4	1-3 & 2-4	CLOSE	OPEN	
	5V	5V closed	1-3 & 2-4	1-3 & 2-4	CLOSE	OPEN	
	10V	10V closed	1-3 & 2-4	3-5 & 4-6	CLOSE	OPEN	
	12V	12V closed	1-3 & 2-4	3-5 & 4-6	CLOSE	OPEN	
	18V	18V closed	1-3 & 2-4	3-5 & 4-6	CLOSE	OPEN	

CAUTION: Incorrect setting can damage SDM module, panel and controller

** Ensure that the backlight supports 24V operation prior to connecting a 24VDC input. Because CNA1 pin 1 and CNB1 pin 2 will output 24VDC if input 24VDC via PP7, PP6, PP5 or PP2.

Input voltage via PP4	Input voltage via PP2 / PP5 / PP6 / PP7	Panel Voltage	JA3	JA5	JA6	Jumper on board
3.3 / 5 / 10 / 12 / 18VDC*	12V / 24VDC (Please also refer to the correct setting on JA9 and JA10)	3.3V	OPEN	3-5 & 4-6	1-3 & 2-4	
		5V	OPEN	3-5 & 4-6	1-3 & 2-4	
		10V	OPEN	3-5 & 4-6	3-5 & 4-6	
		12V	OPEN	3-5 & 4-6	3-5 & 4-6	
		18V	OPEN	3-5 & 4-6	3-5 & 4-6	

* Maximum current for 3.3V, 5V = 7A, Maximum current for 10V, 12V = 5A, Maximum current for 18V = 3.5A

JA3, JA5, JA6, JA9 and JA10 location on board : (Please pay attention to the jumper settings on JA3, JA5, JA6, JA9 and JA10 which are red in color)

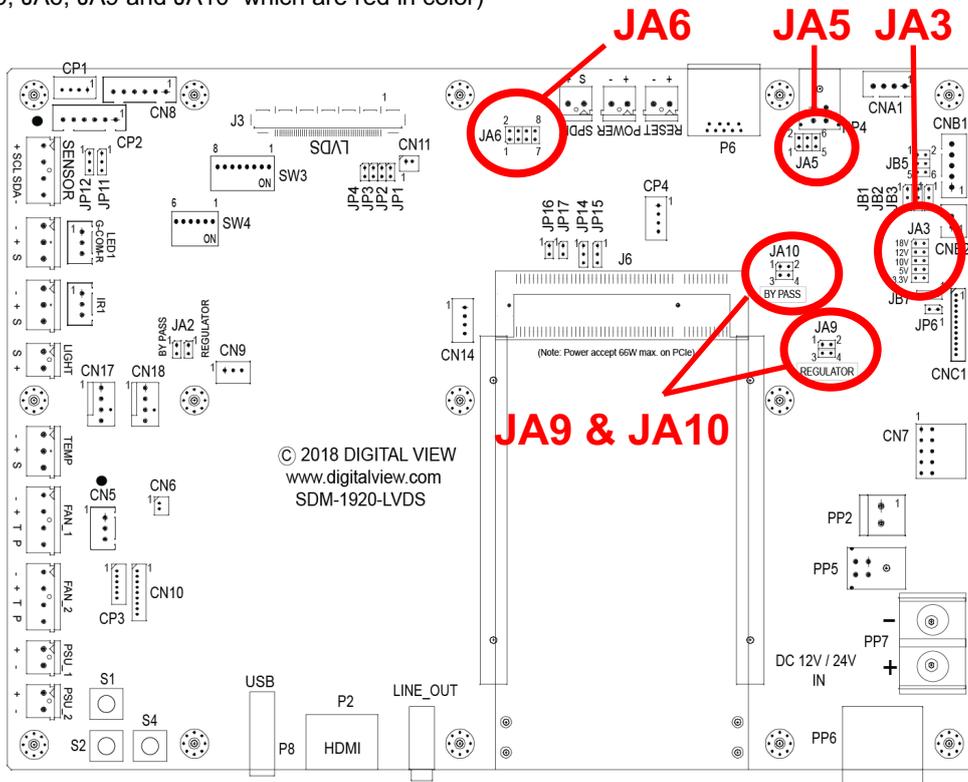


Table 2 : DIP Switch selection – SW3

Pos #1	Pos #2	Pos #3	Pos.#4	Description	Panel resolution
For WUXGA panels					
OFF	ON	ON	OFF	LG LM260WU1-SLB1	1920x1200
ON	ON	ON	OFF	LG LM240WU2-SLA1	1920x1200
OFF	OFF	OFF	OFF	Sharp LQ445D3LZ19	1920x1080
ON	OFF	OFF	OFF	Samsung LTA460H2-L02	1920x1080
OFF	ON	OFF	OFF	Sharp LQ170M1LZ04	1920x1200
ON	ON	OFF	OFF	Samsung LTA700HH-LH1 (1 st trial testing)	1920x1080
OFF	OFF	ON	OFF	Samsung LTA700HH-LH1 (2 nd trial testing)	1920x1080
OFF	OFF	ON	ON	AU Optronics P645HW03 V0 (1920x1080)	1920x1080
OFF	OFF	ON	ON	AU Optronics P645HW03 V0	1920x1080
For UXGA panels					
OFF	OFF	OFF	OFF	Fujitsu FLC59UXC8V-02A	1600x1200
ON	OFF	OFF	OFF	Samsung LTM213U6-L01	1600x1200
For WXGA panels					
OFF	OFF	OFF	OFF	LG LC420W02-A4	1366x768
ON	OFF	OFF	OFF	Sharp LQ315T3LZ24	1366x768
ON	ON	OFF	OFF	Samsung LTA320W2-L01 / LTA230W1-L02	1366x768
ON	ON	ON	ON	NEC NL12876BC26-21 / Samsung LTM170W1-L01	1280x768
OFF	ON	ON	ON	CHI MEI N154I4-L01	1280x800
OFF	OFF	ON	OFF	AU Optronics M190PW01	1440x900
OFF	OFF	ON	ON	Sharp LQ072K1LA03	1280x768
For SXGA panel					
OFF	OFF	OFF	OFF	Sharp LQ181E1LW31	1280x1024
ON	OFF	OFF	OFF	AU Optronics M170EN05	1280x1024
For XGA panel					
OFF	OFF	OFF	OFF	Sharp LQ150X1LGN2A	1024x768
				Sharp LQ150X1LGB1	1024x768
For SVGA panel					
OFF	OFF	OFF	OFF	Sharp LQ121S1DG11/41	800x600
				Toshiba LTM08C351	800x600
For WVGA panel					
OFF	OFF	OFF	OFF	NEC NL8048BC24-01	800x480
ON	OFF	OFF	OFF	Kyocera TCG085WV1AB-G00	800x480
ON	OFF	ON	OFF	Sharp LQ070Y3LG4A	800x480
For VGA panel					
OFF	OFF	OFF	OFF	Sharp LQ104V1DG51	640x480
ON	OFF	OFF	OFF	Sharp LQ104V1DG21	640x480
ON	OFF	ON	OFF	Kyocera TCG075VG2AC-G00	640x480
Others					
OFF	ON	OFF	OFF	AU Optronics M201EW02 V8	1680x1050
ON	OFF	OFF	ON	Samsung LTM201M1-L01	1680x1050

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
ON	OFF	OFF	UXGA
OFF	ON	OFF	SXGA
ON	ON	OFF	WXGA
OFF	OFF	ON	XGA
ON	OFF	ON	SVGA
OFF	ON	ON	VGA
ON	ON	ON	WVGA / Others

Pos. #8	Reserved

Table 3 : DIP switch selection – SW4

Pos. #	Function	Description
1	Reserved	Reserved
2	Panel pixel format	OFF : Double Pixel ON : Single Pixel
3	Panel selection	Default ON : Single / Double pixel LVDS panel (controlled by SW4 position 2)
4	LVDS data mapping select (Refer to Table 2)	If SW4 position 5 = OFF (8 bit) OFF : Mapping B ON : Mapping A Please adjust to get the correct picture. See as Appendix I for details of mapping of A and B. If SW4 position 5 = ON (10 bit) OFF : JEIDA (LVDS panel) ON : VESA (LVDS panel) Please adjust to get the correct picture. See as Appendix I for details of mapping of VESA and JEIDA.
5	Output LVDS display mode selection	OFF : 8 bit ON : 10 bit
6	Reserved	Reserved

Support "Resolution default by EDID" for different resolution panel.

The controller will set the preferred timing based off the dip switch setting (SW3 position 1-7) selection, but also be able to go higher to 1920x1200. For example, if the panel is a 1024x768 and the dip switch setting are set for 1024x768. The preferred EDID resolution should be 1024x768. It should also have the capability to set the max resolution to 1920x1200.

* This function is only effective on V1.05.00.00 or later firmware revision.

CN5 – Temperature sensor connector : JST B3B-XH-A (Matching type : XHP-3)

PIN	SYMBOL	DESCRIPTION
1	GND	Ground
2	VDD	+3.3V
3	EX_TMP_SENSOR	Temperature sensor input

CN6 – Light sensor connector : DF13 2-ways (Matching type : DF13-2S-1.25C)

PIN	SYMBOL	DESCRIPTION
1	SENSOR	Light sensor input
2	VDD	+3.3V

CN7 - Audio connector: DIL socket header 5x2 right angle [OPERATE UNDER 12VDC POWER INPUT ENVIRONMENT]

PIN	SYMBOL	DESCRIPTION
1	VCC	Audio board logic power supply, +5V
2	VOLSEL0	Reserved
3	VOLSEL1	Reversed
4	TUNAUSEL	Reserved
5	CLK/CNT	Reserved
6	GND	Ground
7	+12V / +24V	Audio board power supply, +12V / +24V
8	NC	No connection
9	NC	No connection
10	GND	Ground

CN8 – RS-232 serial control: JST B6B-XH-A compatible (Matching type : XHP-6)

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

CN9 – Ambient light sensor connector : JST B3B-PH-K compatible (Matching type : PHR-3)

PIN	SYMBOL	DESCRIPTION
1	GND	Ground
2	VCC_5V	VCC 5V
3	ALSF	Ambient light sensing feedback

CN10 - Fan and backlight power monitoring connector : Hirose DF13-9P-1.25 DSA (Matching type : DF13-9S-1.25C)

PIN	SYMBOL	DESCRIPTION
1	GND	Ground
2	TACH1_IN	Tachometer IN of Fan 1
3	GND	Ground
4	TACH2_IN	Tachometer IN of Fan 2
5	GND	Ground
6	PS_V1_IN	Power sense input 1
7	GND	Ground
8	PS_V2_IN	Power sense input 2
9	AUX	Reserved

CN11 – SPDIF audio output connector : JST B3B-PH-K compatible (Matching type : PHR-3)

PIN	SYMBOL	DESCRIPTION
1	SPDIF	SPDIF Digital audio output
2	GND	Ground

CN14 –Analog (Stereo) audio out connector: JST B4B-PH-K compatible (Matching type : PHR-4)

PIN	SYMBOL	DESCRIPTION
1	GND	GND
2	AUDIO LOUT	HDMI LEFT OUT
3	GND	GND
4	AUDIO ROUT	HDMI RIGHT OUT

CN17 - Fan 2 connector

PIN	SYMBOL	DESCRIPTION
1	GND	Ground
2	+12V	+12V power supply for Fan
3	TACH1IN	RPM status
4	PWM1	Reserved

CN18 - Fan 2 connector

PIN	SYMBOL	DESCRIPTION
1	GND	Ground
2	+12V	+12V power supply for Fan
3	TACH2IN	RPM status
4	PWM2	Reserved

CNA1 - Auxiliary power output: JST B4B-XH-A (Matching type : XHP-4)

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

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

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

CNB2 – Backlight status input inverter connector: JST B2B-XH-A compatible (Matching type : XHP-2)

PIN	SYMBOL	DESCRIPTION
1	BL_STATUS	Backlight status (Normal = High)
2	GND	Ground

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

PIN	SYMBOL	DESCRIPTION
1	PSWIN	Power Button A = ON/OFF Button in
2	SW_ON	Power Button B = ON/OFF Button out
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.

CP1 – Reserved

CP2 – Reserved

CP3 – Reserved

CP4 - Reserved

IR1 – Infra-Red sensor connector: JST B3B-XH-A compatible (Matching type : XHP-3)

PIN	SYMBOL	DESCRIPTION
1	GND	Ground
2	STDBY_Vcc	Stand by voltage
3	IR Data	IR data

J3 – LVDS output connector: JAE FI-RE51S-HF compatible (Matching type : JAE FI-RE51HL)

PIN	SYMBOL	DESCRIPTION
1	VLCD_HV	Panel power supply (+10V / 12V / 18V) (selected by JA3, JA5 & JA6)
2	VLCD_HV	Panel power supply (+10V / 12V / 18V) (selected by JA3, JA5 & JA6)
3	VLCD_HV	Panel power supply (+10V / 12V / 18V) (selected by JA3, JA5 & JA6)
4	VLCD_HV	Panel power supply (+10V / 12V / 18V) (selected by JA3, JA5 & JA6)
5	VLCD_HV	Panel power supply (+10V / 12V / 18V) (selected by JA3, JA5 & JA6)
6	VLCD_LV	Panel power supply (3,3V/5V) (selected by JA3, JA5 & JA6)
7	VLCD_LV	Panel power supply (3,3V/5V) (selected by JA3, JA5 & JA6)
8	VLCD_LV	Panel power supply (3,3V/5V) (selected by JA3, JA5 & JA6)
9	VLCD_LV	Panel power supply (3,3V/5V) (selected by JA3, JA5 & JA6)
10	VLCD_LV	Panel power supply (3,3V/5V) (selected by JA3, JA5 & JA6)
11	GND	Ground
12	GND	Ground
13	GND	Ground
14	GND	Ground
15	GND	Ground
16	OP1	-
17	OP2	-
18	OP3	-
19	OP4	-
20	GND	Ground
21	GND	Ground
22	LVDS_OUT1_A4+	Positive differential LVDS data bit A4
23	LVDS_OUT1_A4-	Negative differential LVDS data bit A4
24	LVDS_OUT1_A3+	Positive differential LVDS data bit A3
25	LVDS_OUT1_A3-	Negative differential LVDS data bit A3
26	GND	Ground
27	LVDS_OUT1_AC+	Positive LVDS clock for A channel
28	LVDS_OUT1_AC-	Negative LVDS clock for A channel
29	GND	Ground
30	LVDS_OUT1_A2+	Positive differential LVDS data bit A2
31	LVDS_OUT1_A2-	Negative differential LVDS data bit A2
32	LVDS_OUT1_A1+	Positive differential LVDS data bit A1
33	LVDS_OUT1_A1-	Negative differential LVDS data bit A1
34	LVDS_OUT1_A0+	Positive differential LVDS data bit A0
35	LVDS_OUT1_A0-	Negative differential LVDS data bit A0
36	GND	Ground
37	LVDS_OUT1_B4+	Positive differential LVDS data bit B4
38	LVDS_OUT1_B4-	Negative differential LVDS data bit B4
39	LVDS_OUT1_B3+	Positive differential LVDS data bit B3
40	LVDS_OUT1_B3-	Negative differential LVDS data bit B3
41	GND	Ground
42	LVDS_OUT1_BC+	Positive LVDS clock for B channel
43	LVDS_OUT1_BC-	Negative LVDS clock for B channel
44	GND	Ground
45	LVDS_OUT1_B2+	Positive differential LVDS data bit B2
46	LVDS_OUT1_B2-	Negative differential LVDS data bit B2
47	LVDS_OUT1_B1+	Positive differential LVDS data bit B1
48	LVDS_OUT1_B1-	Negative differential LVDS data bit B1
49	LVDS_OUT1_B0+	Positive differential LVDS data bit B0
50	LVDS_OUT1_B0-	Negative differential LVDS data bit B0
51	GND	Ground

J6 – SDM I/O connector
LED1 – Status LED connector: JST 3-way, B3B-XH-A compatible (Mating type : XHP-3 or compatible)

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

P2 – HDMI connector

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	CEC	CEC
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	CEC/GND	Ground
18	+5V	+5 V Power (max 50 mA)
19	HPDET	Hot Plug Detect

P6 – USB connector

PIN	SYMBOL	DESCRIPTION
1	+5V	USB +5V power (max 500mA)
2	DATA-	USB differential data minus
3	DATA+	USB differential data plus
4	GND	Ground

P8 – USB connector

PIN	SYMBOL	DESCRIPTION
1	+5V	USB +5V power (max 500mA)
2	DATA-	USB differential data minus
3	DATA+	USB differential data plus
4	GND	Ground

PP2 – Alternate 12V/24VDC input power supply - DC power Molex 2 pin 0.156" pitch compatible

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

PP4 – External panel power input- Molex 43045-0400 compatible (Mating type : Molex 43025-0400 or compatible)

PIN	DESCRIPTION
1	External panel power
2	Ground
3	External panel power
4	Ground

PP5 – 12V/24VDC input power supply - Molex 43650-0200 compatible (Mating type : Molex 43645-0200 or compatible)

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

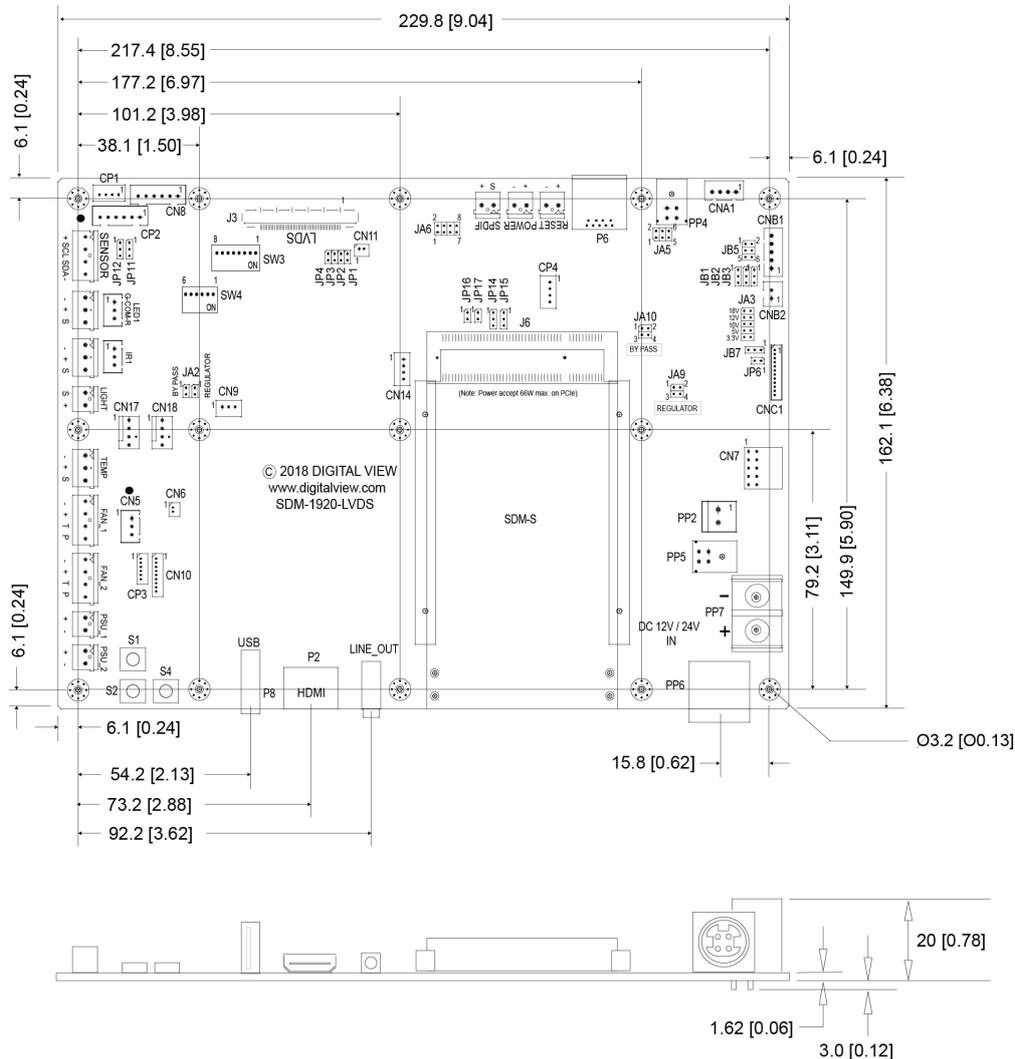
PP6 – Alternate 12V/24VDC input power: 4-way PWR DIN Jack MDP-JRM-04

PIN	DESCRIPTION
1	Ground
2	External panel power
3	Ground
4	External panel power

PP7 – Alternate 12V/24VDC input power: Terminal block ETB5302202002

PIN	DESCRIPTION
1	External panel power
2	Ground

CONTROLLER DIMENSIONS



Unit in mm

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/SDM-1920-LVDS-lcd-controller>

We can offer custom board layout. Please contact your local support for information.

The maximum thickness of the controller is 20mm with or without video add-on board (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

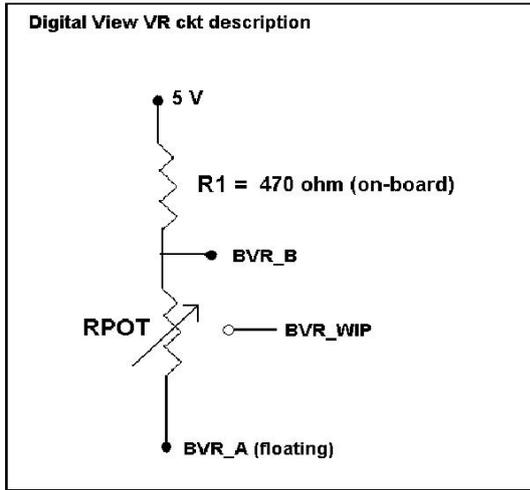
PIN	DESCRIPTION
4	VR WIP
5	VR A

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)

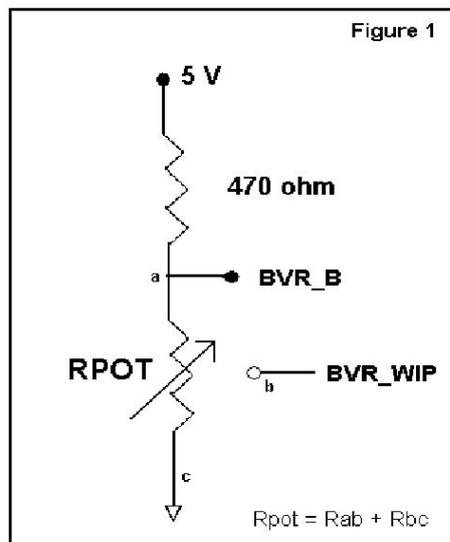
$$BVR_WIP = 5 \times (Rbc/10.47)$$

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.
- Found "Loading" message displayed on screen message at DVI input indicates the unstable DVI source detected (especially connected to DVI splitter) causing flashing image.
- No image found when non-matching video system signal input.

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.

SPECIFICATIONS

Panel compatibility	Compatible with 1920x1200, 1920x1080, 1680x1050, 1600x1200, 1440x900 1366x768, 1280x1024, 1024x768, 800x600 & 640x480 resolutions of TFT LCD panels. A specified BIOS and some factory adjustment may be required for individual panel timings.
No. of colours	Up to 3 x 10 bit providing 1.06 billion colors.
Panel power	DC 3.3V, 5V, 10V, 12V, 18V
Panel signal	LVDS
Vertical refresh rate	60Hz at 1920x1200, 60Hz at 1920x1080, 60Hz at UXGA and up to 75Hz other lower resolution
Display clock maximum	165MHz
ADC clock maximum	195 MHz
DVI differential input clock maximum	165MHz
Graphics formats	Standard VESA VGA, SVGA, XGA, SXGA, WXGA, UXGA, WUXGA Other special formats through specified BIOS and factory adjustment.
Graphics auto mode detect	VGA, SVGA, XGA, SXGA, WXGA, UXGA & WUXGA interlaced and non-interlaced
Video inputs	HDMI SDM
Functions display	On screen display (OSD) of functions
OSD menu functions	Image controls: Contrast, Black level, Hue, Saturation, Color temperature. Other features: Image position, Clock, Phase, Auto Picture Setup, Aspect/Size, Backlight brightness adjustment, Input source select, OSD menu transparency, OSD time out, Reset to Factory Defaults, Image orientation, Software update(USB), Auto Source Seek, Failover, Backlight Invert, Backlight control (D/A or PWM), Backlight Frequency, Minimum backlight level adjustment, Volume control.
OSD menu controls available	Power On/Off Backlight brightness (for voltage control backlight driver only) OSD Menu OSD Select up OSD Select down Setting + Setting -
Control interface	Buttons, RS-232, Remote control
Settings memory	Settings are stored in non volatile memory
PC Connectivity	VGA / SVGA / XGA / SXGA / UXGA / WUXGA analog or digital
Controller dimensions	229.8 mm x 162 mm (9" x 6.38")
Power consumption	10w approx. (not including panel power and SDM power consumption)
Power load maximum	The controller has an overall 3Amp current limit.
Input voltage	12V/24VDC +/- 5%
Power protection	Fuse fitted (Resettable)
Storage temperature limits	-40°C to +70°C
Operating temperature limits	0°C to +60°C
Use of memory on board	- 1 pc SRAM - MCU & RAM (MSD8220LB) on U11, 128Mbytes which is a volatile memory : SRAM for OSD and RAM for frame buffer. - 1 pc Flash - (GD25Q64) on U3, 64Mbits which is a non-volatile memory for system program. - 1 pc EEPROM - (24C02N) on U23, 2KBits which is a non-volatile memory for VGA EDID. - 1 pc EEPROM- (24C128C) on U14, 128Kbits which is a non-volatile memory for System Setting Storage.

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 PORT :

Resolution
640x480 60Hz
640x480 72Hz
640x480 75Hz
800x600 56Hz
800x600 60Hz
800x600 72Hz
800x600 75Hz
1024x768 60Hz
1024x768 70Hz
1024x768 75Hz
1280x768 60Hz
1280x768 75Hz
1280x800 60Hz
1280x800 75Hz
1280x1024 60Hz
1280x1024 75Hz
1360x768 60Hz
1366x768 60Hz
1440x900 60Hz
1440x900 75Hz
1600x1200 60Hz
1600x1200 65Hz
1600x1200 70Hz
1600x1200 75Hz
1680x1050 60Hz
1680x1050 75Hz
1920x1080 60Hz
1920x1200 60Hz

Resolution
480i30
480p60
480p59.94
576i25
576p50
720p60
720p59.94
720p50
720p30
720p29.97
720p25
720p24
720p23.976
1080i30
1080i29.97
1080i25
1080p60
1080p59.94
1080p50
1080p30
1080p29.97
1080p25
1080p24
1080p23.976

Appendix II – RS-232 control protocols

RS-232 Serial control (Baud rate 2400, 8 bits, 1 stop bit and no parity)

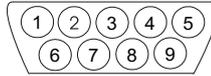
Physical connection :

Controller side
Connector interface : CN8
Mating connector : JST XHP-6

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



Mating face of CN8



Mating face of RS-232 DB9 Male

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

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

Remark :

(1) : RS-232 connection cable, 600mm P/N 4260902-00 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 Display OSD indicator Reset Query	volume
Volume control - on/off (mute)	0x80, "m" "M", "0" "1" "r" "R" "O" "?"	Disable audio output. Enable audio output. Reset Disable audio output without "Mute" symbol Query	"0" - audio off (muted). "1" - audio on. "O" - audio off (without mute symbol)
Back level control	0x81, nn "+" "-" "r" "R" "?" "m" "n" "i", ss, nn "o", ss,	Set brightness = value/increment/decrement Reset Query Current Source Maximum query Minimum query Set, Source, value Query, Source	Brightness. ss - reference by Input main select(0x98) Range : "0""0"- "6""4" Default : "3""2"

Specifications subject to change without notice

© 2019 Digital View Ltd - Version 1.0 (Jun 2019)

SDM-1920-LVDS_manual.doc

Page 27 of 41

Contrast control - all channels	0x82, "a" "A", nn "+" "-" "r" "R" "?" "m" "n" "i", ss, nn "o", ss,	Set all contrast = value/increment/decrement Reset Query Maximum query Minimum query Set, Source, value Query, Source	Contrast All. ss - reference by Input main select(0x98) Range : "0"0-"6"4" Default : "3"2
Color control	0x83, nn "+" "-" "r" "R" "?" "m" "n" "i", ss, nn "o", ss,	Set color = value/increment/decrement Reset Query Maximum query Minimum query Set, Source, value Query, Source	ss - reference by Input main select(0x98) Range : "0"0-"6"4" Default : "3"2
Tint control	0x84, nn "+" "-" "r" "R" "?" "m" "n" "i", ss, nn "o", ss,	Set tint = value/increment/decrement Reset Query Maximum query Minimum query Set, Source, value Query, Source	ss - reference by Input main select(0x98) Range : "0"0-"6"4" Default : "3"2
Phase (tuning) control	0x85, nn "+" "-" "?"	Set dot clock phase = value/increment/decrement Query	Dot clock phase. (In PC mode only)
Image H position	0x86, nnnn "+" "-" "?"	Set img_hpos = value/increment/decrement Query	Image horizontal position. (In PC mode only)
Image V position	0x87, nnnn "+" "-" "?"	Set img_vpos = value/increment/decrement Query	Image vertical position. (In PC mode only)
Sharpness	0x8a, n "+" "-" "r" "R" "?"	Set sharpness = value/increment/decrement Reset Query	Sharpness. (HDMI and Composite Only) Range : "0"0-"6"4" Default : "3"2
Frequency	0x8b, nnnn "+" "-" "?"	Set frequency = Value/increment/decrement Query	Graphic mode H active size (in pixels)
Scaling Mode	0x8c, "0" "1" "9" "A" "r" "R" "?"	Set graphic image scaling mode = value Reset Query	Image expansion on/off. "0" – 1:1 "1" – fill screen "9" – 4:3 "A" – 16:9
Set display orientation	0x8e, n "r" "R"	Set display orientation = value/increment/decrement Reset	"0" – Normal. "1" – Vertical Flip. "2" – Horizontal Flip.

	"?"	Query	"3" – Horizontal & Vertical Flip.
OSD Transparency ⁽¹⁾	0x92, n "+" "-" "r" "R" "?"	Set OSD transparency = value/increment/decrement Reset Query	OSD transparency "0"- 0% "1"- 25% "2"- 50% "3"- 75% "4"- 100%
OSD menu timeout	0x93, nn "+" "-" "r" "R" "?"	Select menu timeout = value/increment/decrement Reset Query	OSD menu timeout value. "0""0" – ON. "0""5" - 5 secs "0""F" - 15 secs "1""E" - 30 secs "2""D" - 45 secs "3""C" - 60 secs
Select OSD language ⁽¹⁾	0x95, n "r" "R" "?"	Select language = English, French, Spanish Reset Query	"0" – English. "2" – French. "3" – Spanish.
Input main select	0x98, nn "+" "-" "r" "R" "?"	Select input main = PC or VIDEO or next available Reset Query	Main selected. "0x46,0x31" SDM "0x48,0x31" HDMI
Auto Source Seek	0x99, "0" "1" "?"	Disable/ Enable Query	"0" – Disable "1" – Enable
Failover off/on selection ⁽¹⁾	0x99, nn , "0" "1" "?"	Set FailOver enable Source Disable/ Enable Query	"nn" = "0x59,0x31" FailOver
Video System ⁽¹⁾ (Composite video only)	0x9b, "0" "1" "2" "3" "r" "R" "S" "s" "?"	Set video system = Auto/NTSC/PAL/SECAM Reset Video State Query Query	Query: "0" – Auto. "1" – NTSC_M_358 "2" – PAL_N_443 "3" – SECAM "4" – NTSC_M_443 "5" - PAL_M_358 "7" – PAL_M_443 "9" – PAL_N_358
Gamma value select	0x9d, n "r" "R" "?"	Select GAMMA value = Value Reset Query	GAMMA value: "5" – 1.8, "7" – 2.0, "2" – 2.2, "A" – 2.4, "C" – 2.6
Auto power off ⁽¹⁾	0x9f, "0" "1" "r" "R" "?"	Set power down option = On/Off Reset Query	"0" – Off. "1" – On.
Hotkey 1 ⁽¹⁾	0xa0, "1", n "r" "R" "?"	Set Hotkey 1= Value Reset Query	"1" – Volume. "2" – Back Level. "3" – Contrast. "4" – Saturation. "5" – Input source. "B" – No function "E" – Aspect/Size "F" – Image Orientation "H" – Brightness "I" – Auto Picture Setup
Hotkey 2 ⁽¹⁾	0xa0, "2", n "r" "R" "?"	Set Hotkey 2= Value Reset Query	"1" – Volume. "2" – Back Level. "3" – Contrast. "4" – Saturation.

			<p>“5” – Input source. “B” – No function “E” – Aspect/Size “F” – Image Orientation “H” –Brightness “1” –Auto Picture Setup</p>
Runtime counter	0xa1, nnnnn “r” “R” “?”	runtime counter value = nnnnn (* 0.5 hour) Reset Query	Runtime = nnnnn.
Colour temperature select	0xb3, n “r” “R” “?”	Select colour temperature = value Reset Query	Main selected. “2” – 6500K. “3” – 5000K. “4” – user defined RGB values “5” – 9300K “6” – 7500K.(Default)
Red level for selected colour temperature	0xb4, nn “+” “-” “r” “R” “?”	Set the level of the red channel for the selected colour temp. = value/increment/decrement Reset Query	Red level for selected colour temperature. Range: “0””0”-“F””F” Default: “8””0”
Green level for selected colour temperature	0xb5, nn “+” “-” “r” “R” “?”	Set the level of the green channel for the selected colour temp. = value/increment/decrement Reset Query	Green level for selected colour temperature. Range: “0””0”-“F””F” Default: “8””0”
Blue level for selected colour temperature	0xb6, nn “+” “-” “r” “R” “?”	Set the level of the blue channel for the selected colour temp. = value/increment/decrement Reset Query	Blue level for selected colour temperature. Range: “0””0”-“F””F” Default: “8””0”
Graphic horizontal resolution enquiry	0xb7	Horizontal resolution (in pixels) in 3 digit hex number	“nnn” = horizontal resolution
Graphic vertical resolution enquiry	0xb8	Vertical resolution (in lines) in 3 digit hex number	“nnn” = vertical resolution
Graphic horizontal sync frequency	0xb9	Horizontal sync frequency (in units of 100Hz) in 3 digit hex number	“nnn” = horizontal frequency
Graphic 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” or “p” interlace or Progressive
OSD turn off	0xbd	Turn off the OSD.	“0” – fail. “1” – successful.
Backlight control	0xe0, nn “+” “-” “=” “R” “r” “?”	Set Backlight = value/increment/decrement Display OSD indicator Reset Query	Backlight. Range: D/A : “0””0” ~ “6””4” 100Hz : “0””0” ~ “6””4” 120Hz : “0””0” ~ “6””4” 140Hz : “0””0” ~ “6””4” 160Hz : “0””0” ~ “6””4” 180Hz : “0””0” ~ “6””4” 200Hz : “0””0” ~ “6””4” 220Hz : “0””0” ~ “6””4” 240Hz : “0””0” ~ “6””4” 260Hz : “0””0” ~ “6””4” 280Hz : “0””0” ~ “6””4” 300Hz : “0””0” ~ “6””4” 320Hz : “0””0” ~ “6””4”

			340Hz : "0""0" ~ "6""4" 360Hz : "0""0" ~ "6""4" 380Hz : "0""0" ~ "6""4" 400Hz : "0""0" ~ "6""4" 420Hz : "0""0" ~ "6""4" 440Hz : "0""0" ~ "6""4"
Backlight D/A / PWM	0xe5 "0" "1" "R" "r" "?"	Set : PWM or D/A Reset Query	"0" – PWM "1" – D/A (Default)
OSD turn off	0xbd	Turn off the OSD.	"0" – fail. "1" – successful.
Backlight PWM Frequency	0xe6, nnn "+" "-" "R" "r" "?"	Set Backlight PWM Frequency = value/increment/decrement Reset Query	+/- 20Hz 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 On or Off Reset Query	"0" – Off "1" – On
Minimum Backlight Value	0xee, "0x5C" nn "+" "-" "R" "r" "?"	Set Minimum Backlight value = value / increment / decrement Reset Query	Minimum Backlight value/ Range : D/A : "0""0" ~ "3""2" 100Hz : "0""0" ~ "3""2" 120Hz : "0""0" ~ "3""2" 140Hz : "0""0" ~ "3""2" 160Hz : "0""0" ~ "3""2" 180Hz : "0""0" ~ "3""2" 200Hz : "0""0" ~ "3""2" 220Hz : "0""0" ~ "3""2" 240Hz : "0""0" ~ "3""2" 260Hz : "0""0" ~ "3""2" 280Hz : "0""0" ~ "3""2" 300Hz : "0""0" ~ "3""2" 320Hz : "0""0" ~ "3""2" 340Hz : "0""0" ~ "3""0" 360Hz : "0""0" ~ "3""0" 380Hz : "0""0" ~ "3""0" 400Hz : "0""0" ~ "3""1" 420Hz : "0""0" ~ "3""1" 440Hz : "0""0" ~ "3""1"

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.
Auto-setup	0xc3	Start auto-setup of current vmode.	"0" – fail. "1" – successful.
Command availability	0xc4, n	Check whether a command is available.	"0" – not available. "1" – available.
Auto-calibration	0xc5	Start auto-calibration of gain of the RGB amplifier.	"0" – fail. "1" – successful.
Soft Power On/Off	0xc8, "0" "1" "?"	Soft power off/on query	"0" - Soft power off "1" - Soft power on
Query video input status	0xc9	Query the status of the primary & pip status	"nn,nn" = input status "nn,xx" digit = primary status: "0", "0" : invalid "F", "1" SDM "H" "1" HDMI "xx,nn" = PIP input status: "0", "0": invalid
Query BIOS version	0xcb, "0"	Read BIOS version	BIOS version "VV.YY.ZZ" VV = V0 or E0, V0 = Release version E0 = Engineering Sample YY= Version Number ZZ= Customer Number
Query PCBA number	0xcb, "1"	Read PCBA number	"nnnnn" = PCBA number SDM-1920-LVDS = "41768"
Reset to Factory Defaults	0xce	Reset all parameters to default value	"1" – successful.
Reset to Factory Defaults with (color temp)	0xcf	Reset all parameters for all video modes to default value	"1" - successful.

Effective on Firmware E1.14.00.00 SDM or up

**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).**

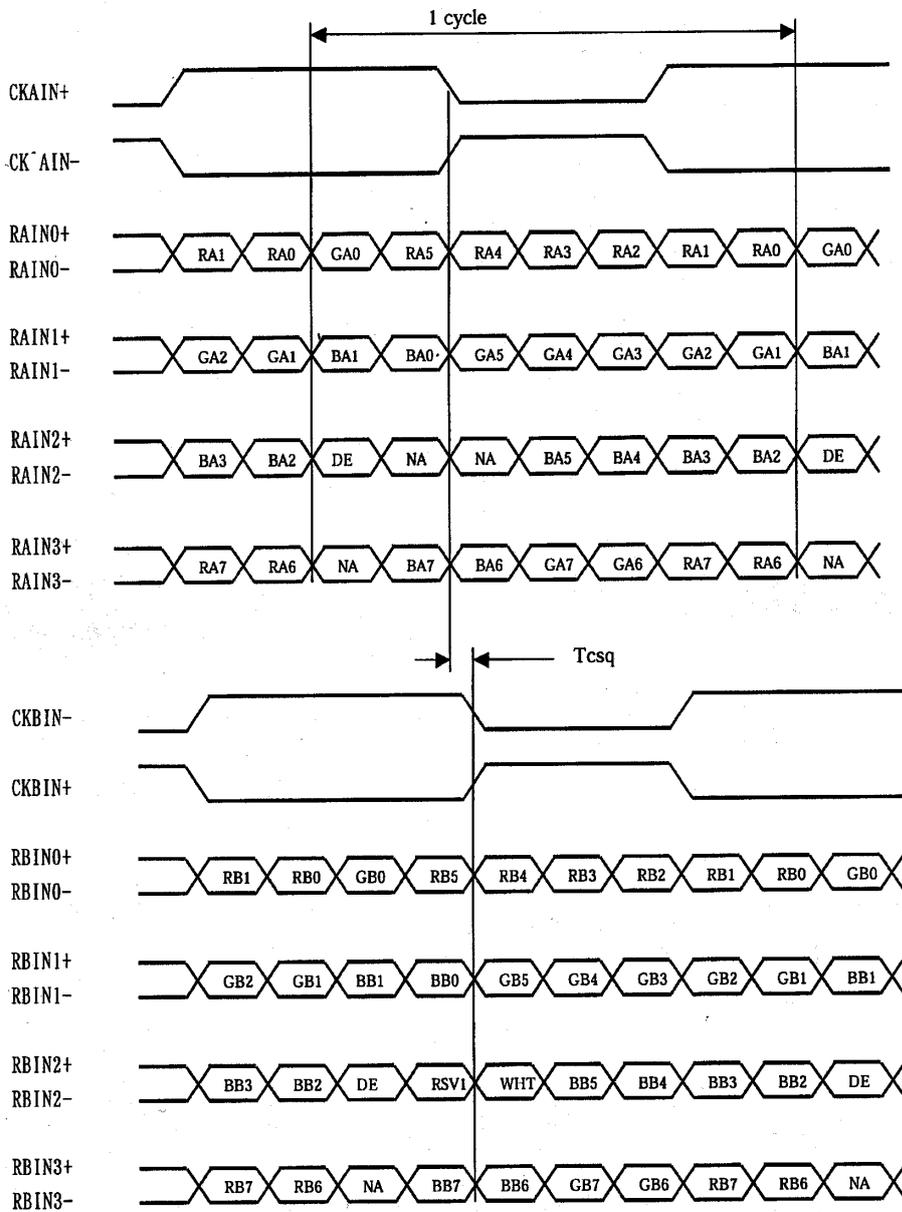
Please refer to the ASCII to Hex convert table below.

Hex to ASCII conversion table

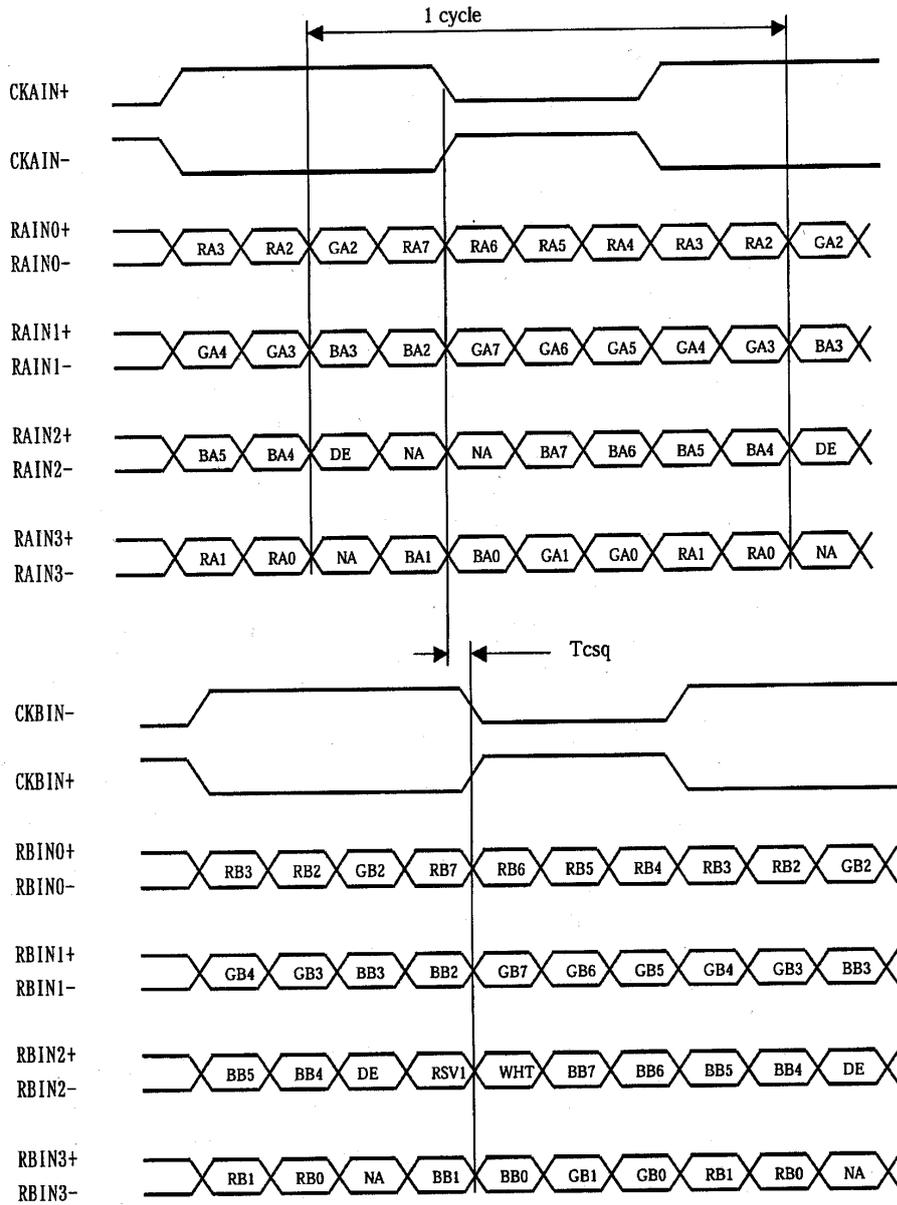
Hex	ASCII	Hex	ASCII	Hex	ASCII	Hex	ASCII
0x30	0	0x41	A	0x61	a	0x2B	+
0x31	1	0x42	B	0x62	b	0x2D	-
0x32	2	0x43	C	0x63	c	0x3F	?
0x33	3	0x44	D	0x64	d		
0x34	4	0x45	E	0x65	e		
0x35	5	0x46	F	0x66	f		
0x36	6	0x47	G	0x67	g		
0x37	7	0x48	H	0x68	h		
0x38	8	0x49	I	0x69	i		
0x39	9	0x4A	J	0x6A	j		
		0x4B	K	0x6B	k		
		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 – Mapping definition

- Definition of Mapping A :

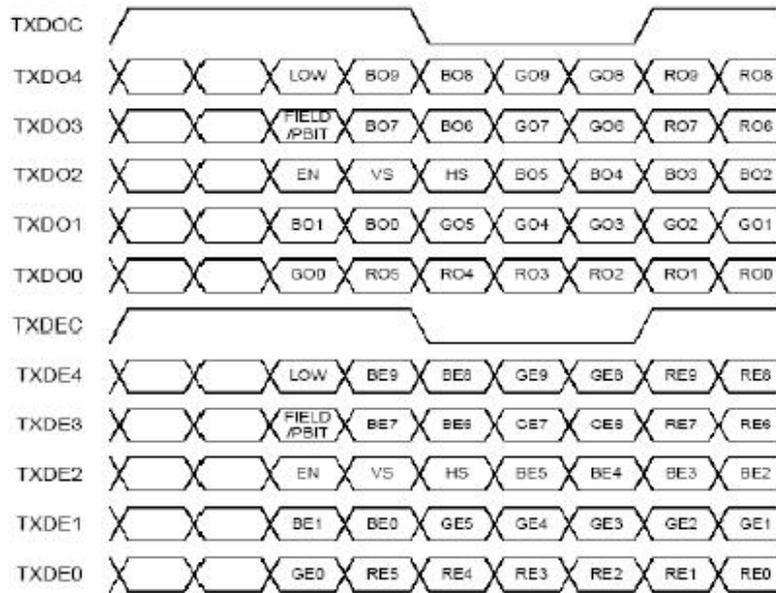


- Definition of Mapping B :



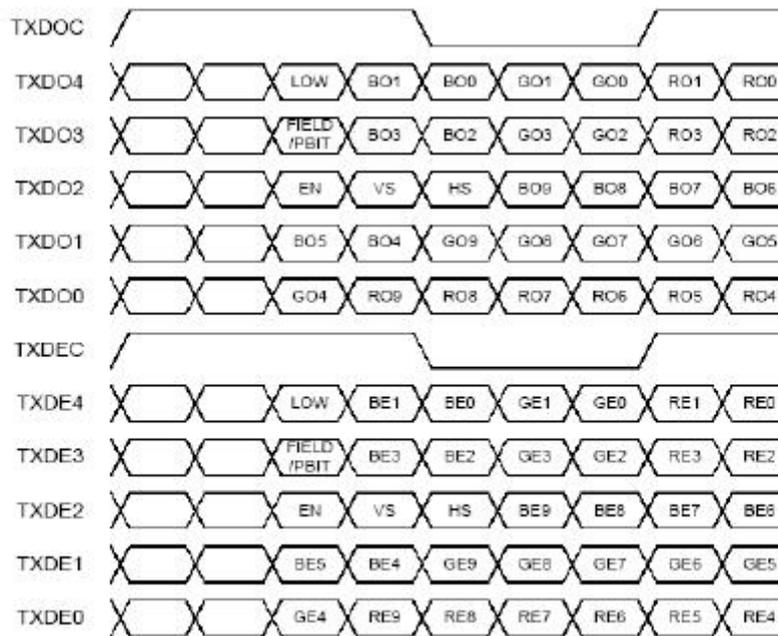
- Definition of VESA :

DPort Output Pair	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
DB[7:6] / TXDEC							
DB[3:2] / TXDE0	GE0	RE5	RE4	RE3	RE2	RE1	RE0
DB[5:4] / TXDE1	BE1	BE0	GE5	GE4	GE3	GE2	GE1
DB[9:8] / TXDE2	EN	VS	HS	BE5	BE4	BE3	BE2
DG[3:2] / TXDE3	field/prg	BE7	BE6	GE7	GE6	RE7	RE6
DG[5:4] / TXDE4	low	BE9	BE8	GE9	GE8	RE9	RE8
DG[7:6] / TXDO0	GO0	RO5	RO4	RO3	RO2	RO1	RO0
DG[9:8] / TXDO1	BO1	BO0	GO5	GO4	GO3	GO2	GO1
DR[5:4] / TXDO2	EN	VS	HS	BO5	BO4	BO3	BO2
DR[7:6] / TXDO3	field/prg	BO7	BO6	GO7	GO6	RO7	RO6
DR[9:8] / TXDO4	low	BO9	BO8	GO9	GO8	RO9	RO8
DR[3:2] / TXDOC							



- Definition of JEIDA :

DPort Output Pair	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
DB[7:6] / TXDEC							
DB[3:2] / TXDE0	GE4	RE9	RE8	RE7	RE6	RE5	RE4
DB[5:4] / TXDE1	BE5	BE4	GE9	GE8	GE7	GE6	GE5
DB[9:8] / TXDE2	EN	VS	HS	BE9	BE8	BE7	BE6
DG[3:2] / TXDE3	field/prg	BE3	BE2	GE3	GE2	RE3	RE2
DG[5:4] / TXDE4	low	BE1	BE0	GE1	GE0	RE1	RE0
DG[7:6] / TXDO0	GO4	RO9	RO8	RO7	RO6	RO5	RO4
DG[9:8] / TXDO1	BO5	BO4	GO9	GO8	GO7	GO6	GO5
DR[5:4] / TXDO2	EN	VS	HS	BO9	BO8	BO7	BO6
DR[7:6] / TXDO3	field/prg	BO3	BO2	GO3	GO2	RO3	RO2
DR[9:8] / TXDO4	low	BO1	BO0	GO1	GO0	RO1	RO0
DR[3:2] / TXDOC							



Appendix IV – DV remote control unit work for SDM-1920-LVDS

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.
MUTE BUTTON (Mute icon)	Switch to mute on/off mode.
SEL UP (▲) / SEL DN (▼)	In OSD menu, pressing this button to select the items.
+ / - BUTTON	In OSD menu, pressing this button to adjust the settings.
OSD BACK BUTTON	Use to display the OSD menu and go to the previous OSD screen.
OSD NEXT BUTTON	Use to display the OSD menu and go to the next OSD screen.
AV/TV BUTTON	Use to select the input source. (HDMI / SDM)
VOLUME (-/+) BUTTON	Press the "+" button to increase the volume and the "-" to decrease the volume.
HDMI	Press this button in the non OSD menu display mode to select HDMI 1 source.

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
- SDM-1920-LVDS

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
14/06/2018	1.0	All	Draft