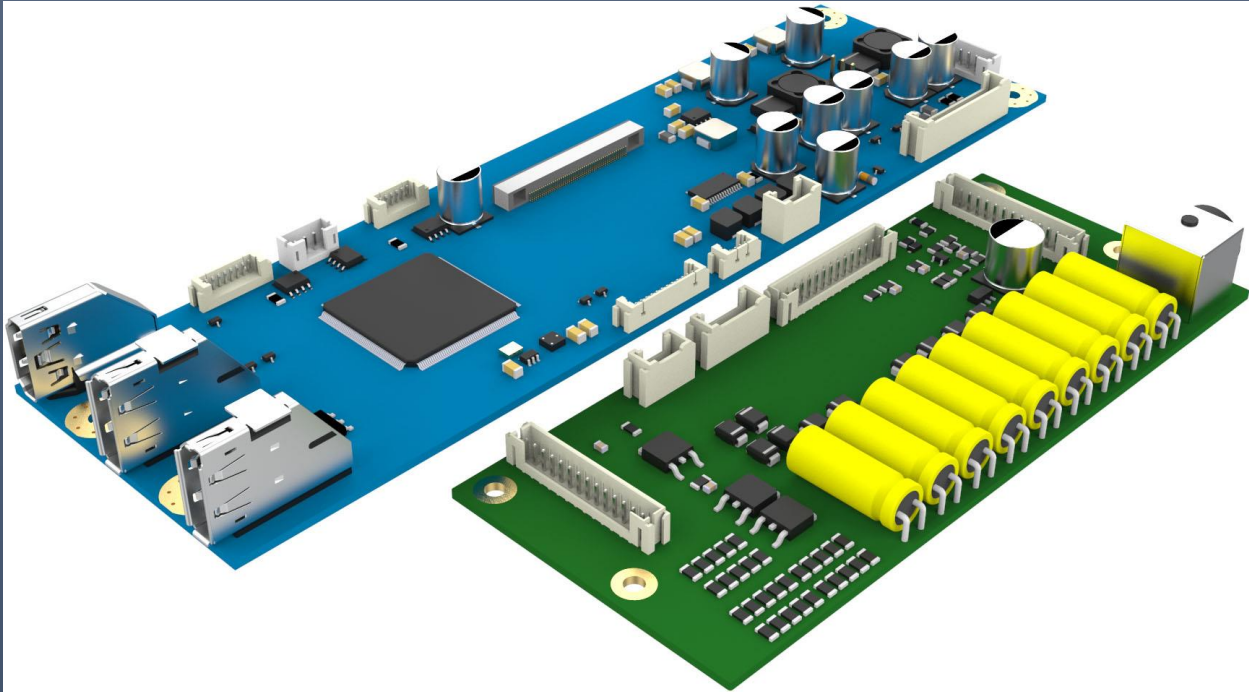


Data Sheet



Model Name : Titan2
: OLED supportable AD

Part No.: *TTN2 - xxx....xxx*
(xxx...xxx : Target OLED display Model No.)

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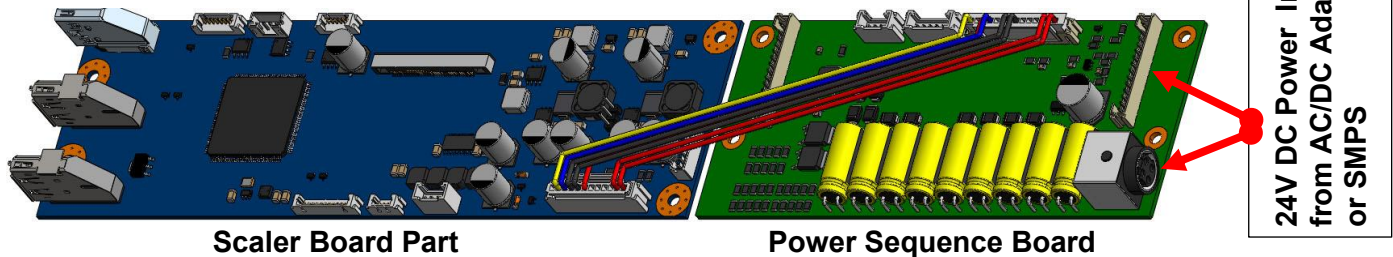
1. Design Concept

This solution consists of two parties – Scaler Board and Power Sequence Board like below picture. This product model has been designed an adoption of below technical points based on 4K supportable AD Board.

Firmware - for execution by Automatic and Manual user's menu on OSD menu

- Off-RS : the terms of Off-RS execution can be adjusted in every 4 Hrs (default)
- JB : the terms of JB execution can be adjusted in every 2000 Hrs (default)

Hardware - A separated Power Sequence Board upfront position on power Input port



In case of this Power Sequence Board, it allows to use any user's Power Supply Unit.

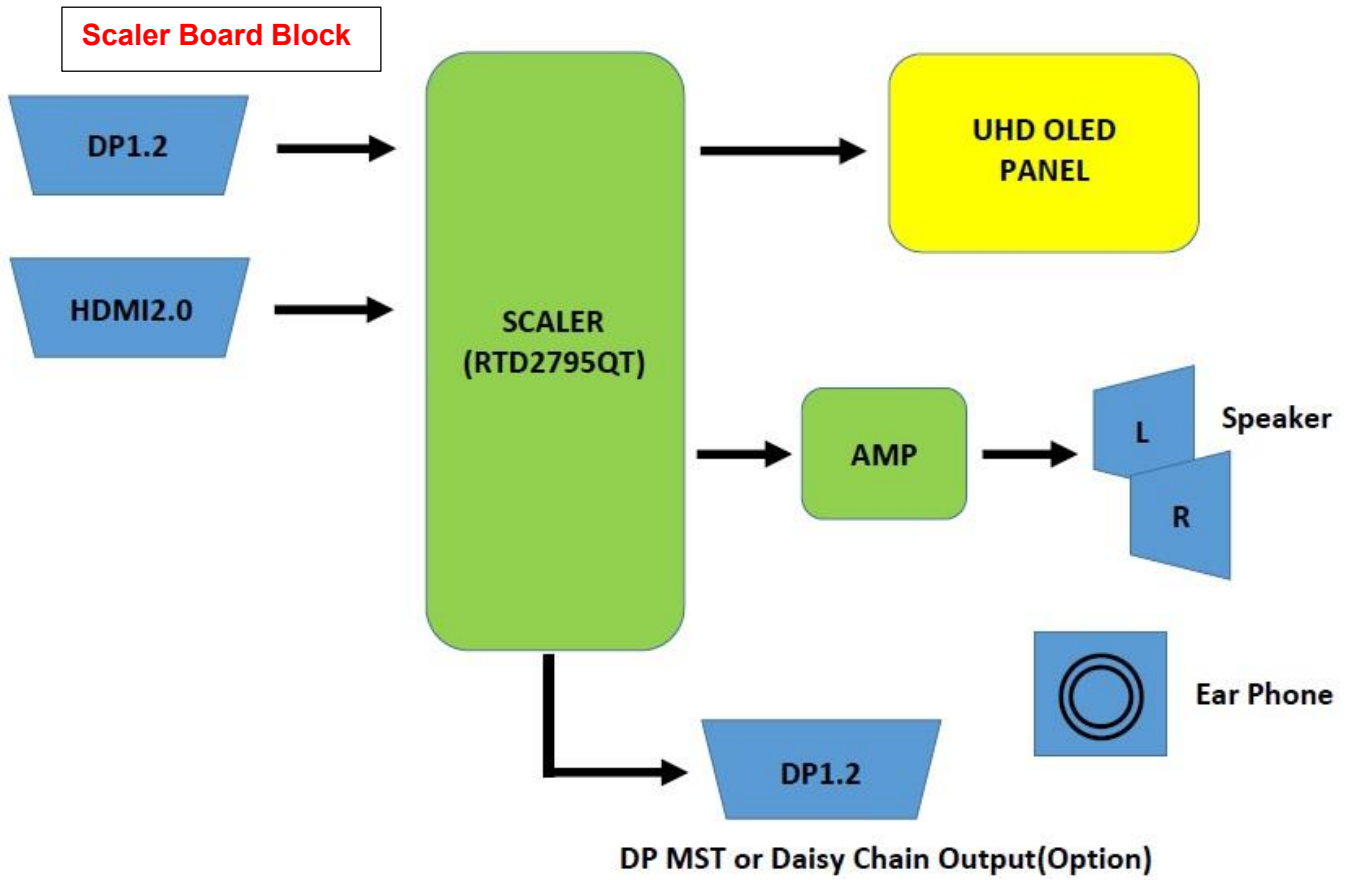
- AC/DC Adaptor : DC 24V out, $\geq 13A$
- SMPS : DC 24V out, $\geq 13A$ or DC 24V out, $\geq 12A$ and DC 12V out, 1A

2. Spec Summary

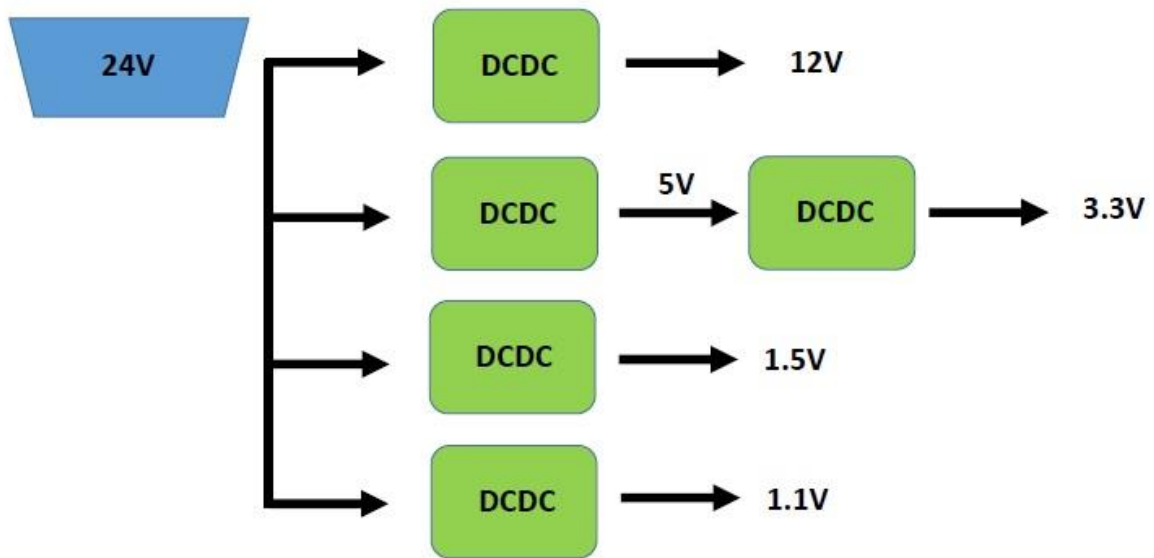
- **Minimized form factor (60mm width) for LG transparent OLED Module**
- **UHD(3840x2160, 4096x2160) resolution display format.**
- Up scaling from VGA, SVGA, XGA, SXGA,, UXGA to UHD VESA Standard Mode.
- Provides up to 30-bit color and e-DP 8-lane(HBR) / 4-lane(HBR2) Interface
- HDMI connector/**HDMI 2.0 /4K2K@60Hz - 1Port**
- DP connector/**DP1.2/4K2K@60Hz - 1Port**
- **HDCP 2.2 support**
- OSD/Display Rotation Function
- Overdrive / Over scan Function
- 6 Color control
- PCM(Precise Color management)
- Sharpness/Hue/Color Support
- Gamma Control
- Response time Control
- Remote Control
- UART for RS232 Control
- DP MST (Multi Stream, up to FHD 4 EA) or Daisy chain Output – Option
- Video Wall (up to 5 x 5 screens) - Option
- Speaker 10Wx 2ch

In case of Vx1 type, 16 lanes (120Hz vertical frequency) type TFT-LCD modules, this driving board can be integrated with an optional FRC board separately ("FRC-OLED" / Novatek NT20A08 model).

2. Block Diagram

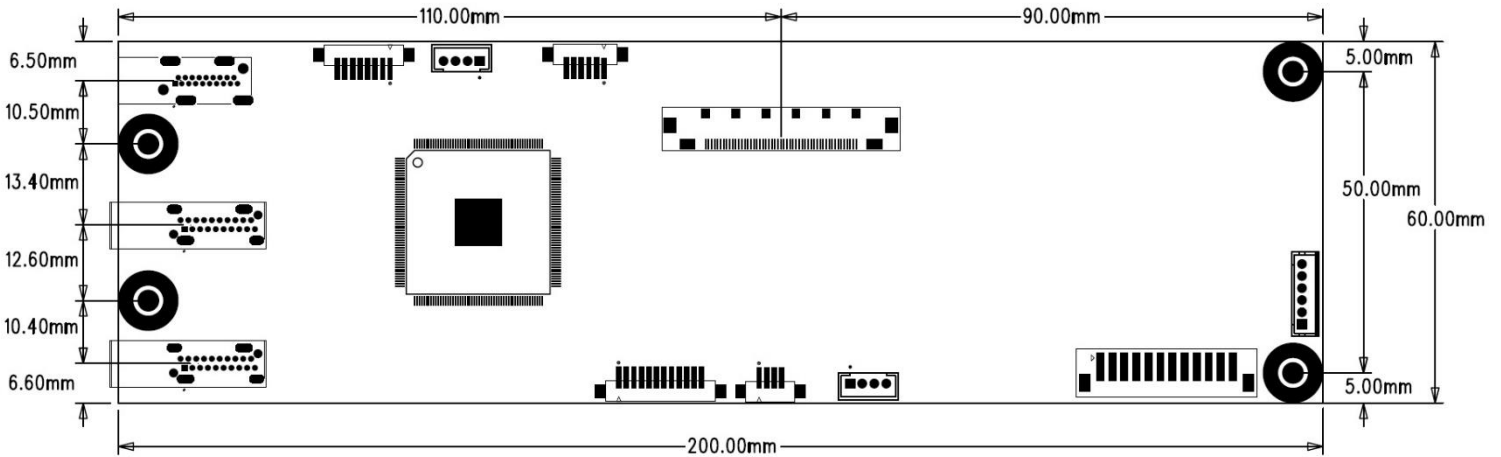


Power Sequence Board Block

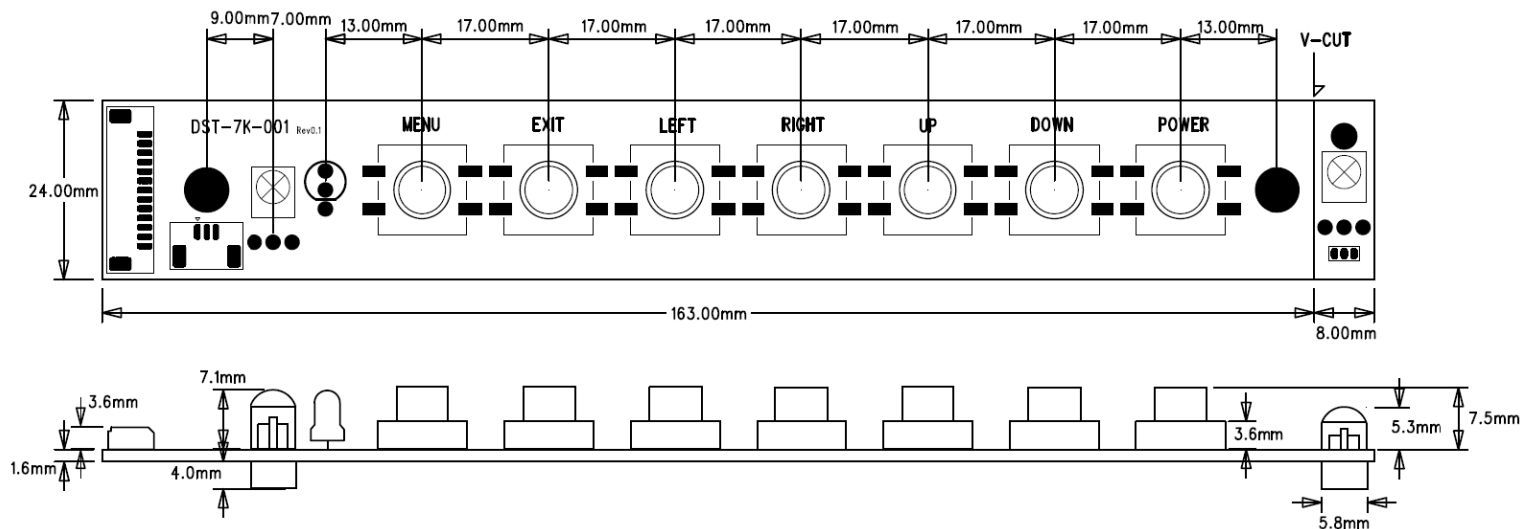


3. Board Dimensional Drawing and Picture

3.1 Main Board Drawing (unit : mm, 200 x 60 x 22.15)

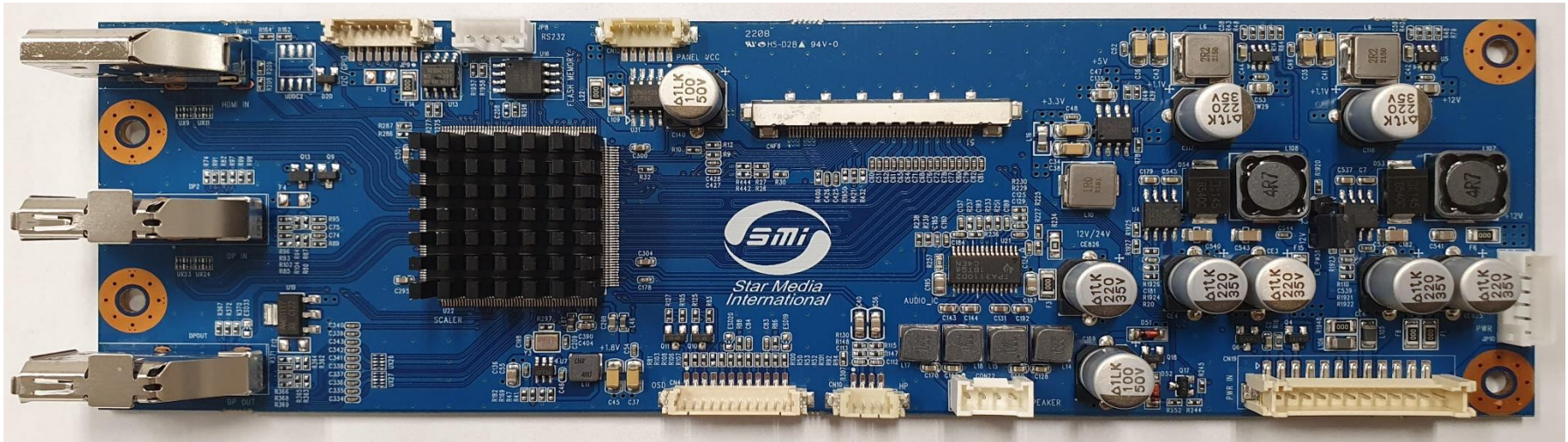


3.2 OSD Board Dimensional Drawing (unit : mm, 150 x 16 x 1.6)

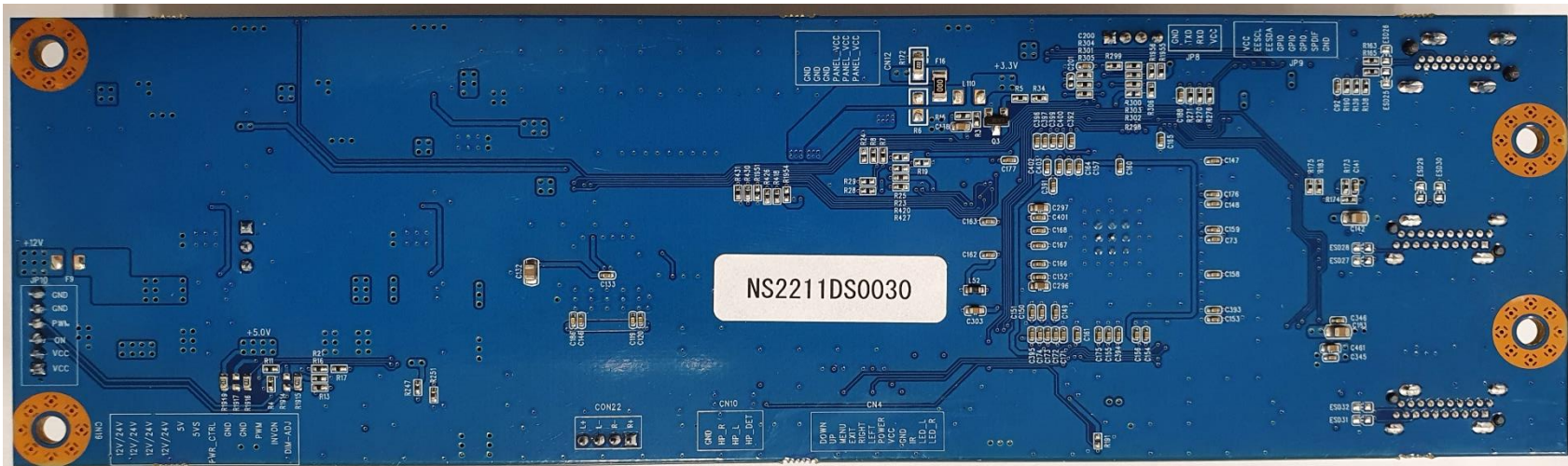


3.3 Pictures

Front view :



Rear view :

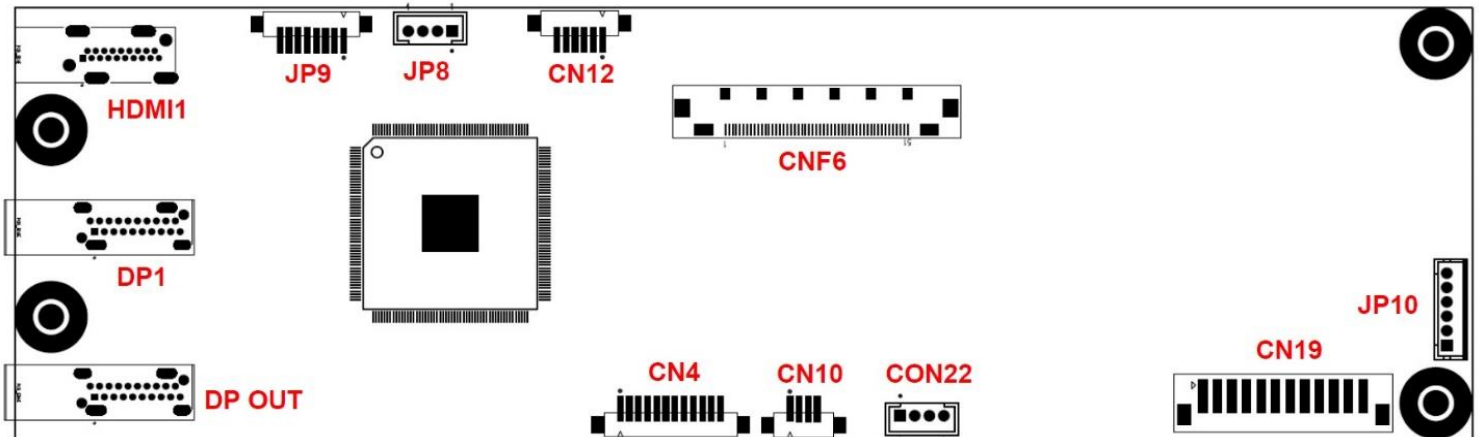


4. Connectors and Pin Information for Scaler Board

4.1 Connector Summary

Con No.	Item	Description	Type	Manufacture
CNF6	Wafer	For eDP or V-by-1 Output	FI-RE51S-HF	JAE or equivalent
CN4	Wafer	For OSD Key Pad	12505WS-12	Yeon-Ho or equivalent
CN10	Wafer	For Headphone Output	12505WS-04	Yeon-Ho or equivalent
CN19	Wafer	For Inverter or SMPS	SMW200-H12G	Yeon-Ho or equivalent
CON22	Wafer	For Speaker	20010WS-04	Yeon-Ho or equivalent
JP8	Wafer	For RS232 Control	20010WS-04	Yeon-Ho or equivalent
JP9	Wafer	For I2C Control, wafer	12505WR-08	Yeon-Ho or equivalent
JP10	Wafer	For Inverter or SMPS	20010WS-06	Yeon-Ho or equivalent
HDMI1	HDMI Jack	For HDMI 2.0 Input	2007435-2	TE Connectivity or equivalent
DP1	DP Jack	For DP1.2 Input	3VD21203-H7U0-4H	FOXCONN or equivalent
DPOUT	DP Jack	For DP Output, Daisy Chain	3VD21203-H7U0-4H	FOXCONN or equivalent
CN12	Wafer	For Panel Vcc	12505WR-06	Yeon-Ho or equivalent

All Connector Numbers on the PCB drawing



4.2 Pin Map Details (pin assignment)

4.2.1 CNF6 : for V-by-1 Output,

Wafer / When user adopts this connector for the Vx1 interface only

Pin No	Symbol	Description
1~4	LCD_VDD	VDD For LCD Module
5~8	LCD_VDD or GND	VDD For LCD Module or Ground
9	N.C	No Connection
10	OFF_RS	
11	AC_DET	
12	ERROR_DET	
13	I2C_SDA	I2C Data Line
14	I2C_SCL	I2C Clock Line
15~19	N.C	No Connection
20	EVDD_DET	
21	Bit Select	Bit Selection(10bit Only)
22~23	NC	No Connection
24	GND	Ground
25	Vby1_HPDP	Hot Plug Detection
26	Vby1_PLL_LCOK	Lock Detection
27	GND	Ground
28	VB1_TX0P	V by One Positive data input Lane 0
29	VB1_TX0N	V by One Negative data input Lane 0
30	GND	Ground
31	VB1_TX1P	V by One Positive data input Lane 1
32	VB1_TX1N	V by One Negative data input Lane 1
33	GND	Ground
34	VB1_TX2P	V by One Positive data input Lane 2
35	VB1_TX2N	V by One Negative data input Lane 2
36	GND	Ground
37	VB1_TX3P	V by One Positive data input Lane 3
38	VB1_TX3N	V by One Negative data input Lane 3
39	GND	Ground
40	VB1_TX4P	V by One Positive data input Lane 4
41	VB1_TX4N	V by One Negative data input Lane 4
42	GND	Ground
43	VB1_TX5P	V by One Positive data input Lane 5
44	VB1_TX5N	V by One Negative data input Lane 5
45	GND	Ground
46	VB1_TX6P	V by One Positive data input Lane 6
47	VB1_TX6N	V by One Negative data input Lane 6
48	GND	Ground
49	VB1_TX7P	V by One Positive data input Lane 7
50	VB1_TX7N	V by One Negative data input Lane 7
51	GND	Ground

4.2.2 CN4 : for OSD Control Key, Wafer

Pin No	Symbol	Description	Remarks
1	LED Green Key	LED drive for Green Color	
2	LED Red_Key	LED drive for RED Color	
3	IR_Key	IR Receiver	
4	GND	Ground	
5	3.3V_Key	3.3V	
6	PWR_Key	POWER key	
7	Select_Key	Select key	
8	Up_Key	Up key	
9	Down_Key	Down_Key	
10	Right_Key	Right key	
11	Left_Key	Left key	
12	Menu_Key	Menu/Exit key	

4.2.3 CN10 : for Audio Output, Head Phone Jack

Pin No	Symbol	Description	Pin No	Symbol	Description
1, 4	DET	Detection	3	R	Audio Right Input Signal
2	L	Audio Left Input Signal	5	GND	Ground

4.2.4 CN19 : for Inverter/LED Driver or SMPS, wafer

Pin No	Symbol	Description	Remarks
1	NC	No Connection	
2	EVDD_ON	EVDD PWR ON	0V (Off), 3.3V(On)
3	12V_EN	12V PWR Enable	0V (Off), 3.3V(On)
4, 5	GND	Ground	
6	DETECT	AC_PWR_DETECT	0V (Off), 3.3V(On)
7	NC	No Connection	
8	NC	No Connection	
9, 10, 11, 12	24V	24V In	24V ± 5%

4.2.5 CN22 : for Speaker, wafer

Pin No	Symbol	Description	Pin No	Symbol	Description
1	SP_R+	Audio Right Speaker Output Positive	3	SP_L-	Audio Left Speaker Output Negative
2	SP_R-	Audio Right Speaker Output Negative	4	SP_L+	Audio Left Speaker Output Positive

4.2.6 JP8 : for RS232 Control, wafer

Pin No	Symbol	Description	Remarks
1	STB_5V	5V Power	
2	RXD	Signal For RX	
3	TXD	Signal for TX	
4	GND	Ground	

4.2.7 JP9 : for I²C Control(Master), wafer

Pin No	Symbol	Description	Remarks
1	5V	5V Power	
2	SCL	Signal for SCL	
3	SDA	Signal for SDA	
4	GPIO_OPN1	GPIO Option 1	
5	GPIO_OPN2	GPIO Option 2	
6	GPIO_OPN3	GPIO Option 3	
7	GPIO_OPN4	GPIO Option 4	
8	GND	Ground	

4.2.8 JP10 : for LED Driver Control Power

Pin No	Symbol	Description	Remarks
1	+24	+12V/+24V DC Power Supply	
2	+24	+12V/+24V DC Power Supply	
3	EN	Backlight ON/OFF	
4	ADJ	PWM/Analog Dimming	
5	GND	Ground	
6	GND	Ground	

4.2.9 HDMI1 : for HDMI Input, HDMI Jack

Pin No	Symbol	Description
1	RX2+	HDMI DATA2 Differential Positive Signal
2	GND	Ground
3	RX2-	HDMI DATA2 Differential Negative Signal
4	RX1+	HDMI DATA1 Differential Positive Signal
5	GND	Ground
6	RX1-	HDMI DATA1 Differential Negative Signal
7	RX0+	HDMI DATA0 Differential Positive Signal

8	GND	Ground
9	RX0-	HDMI DATA0 Differential Negative Signal
10	RXC+	HDMI CLOCK Differential Positive Signal
11	H_CABLE_DET_2	HDMI_CABLE_DETECT_2
12	RXC-	HDMI CLOCK Differential Negative Signal
13,14	NC	NO CONNECTION
15	HDMI_SCL	HDMI Clock Line
16	HDMI_SDA	HDMI Data Line
17	GND	Ground
18	HDMI_DDC5V	5V Power Supply
19	HDMI_HOT_PLUG	HDMI Hot Plug
20,21, 22	GND	Ground

4.2.10 DP1 : for DP Input, DP Jack

Pin No	Symbol	Description
1	LANE3-	Negative Signal for Main Link 3
3	LANE3+	Positive Signal for Main Link 3
4	LANE2-	Negative Signal for Main Link 2
6	LANE2+	Positive Signal for Main Link 2
7	LANE1-	Negative Signal for Main Link 1
9	LANE1+	Positive Signal for Main Link 1
10	LANE0-	Negative Signal for Main Link 0
12	LANE0+	Positive Signal for Main Link 0
13	CONFIG1	Pull down resister 100KR
14	CONFIG2	Pull down resister 100KR
15	AUX CH+	Positive Signal for Auxiliary Channel
17	AUX CH-	Negative Signal for Auxiliary Channel
18	HPD	Hot Plug Detection
19	RETURN	NO Connection
20	PWR OUT	3.3V
2, 5, 8, 11, 16, 21, 22, 23, 24	GND	Ground

4.2.11 DP OUT : for DP Output, DP Jack (Daisy Chain : Option)

Pin No	Symbol	Description
1	LANE0+	Positive Signal for Main Link 0
3	LANE0-	Negative Signal for Main Link 0
4	LANE1+	Positive Signal for Main Link 1
6	LANE1-	Negative Signal for Main Link 1
7	LANE2+	Positive Signal for Main Link 2
9	LANE2-	Negative Signal for Main Link 2
10	LANE3+	Positive Signal for Main Link 3
12	LANE3-	Negative Signal for Main Link 3
13	CONFIG1	Pull down resister 100KR
14	CONFIG2	Pull down resister 100KR
15	AUX CH+	Positive Signal for Auxiliary Channel
17	AUX CH-	Negative Signal for Auxiliary Channel
18	HPD	Hot Plug Detection
19	RETURN	No Connection
20	PWR OUT	3.3V
2, 5, 8, 11, 16, 21, 22, 23, 24	GND	Ground

4.2.12 CN12 for Panel VCC, wafer

Pin No	Symbol	Description	Remarks
1	GND	Ground	
2	GND	Ground	
3	GND	Ground	
4	+12V	Panel VCC	
5	+12V	Panel VCC	
6	+12V	Panel VCC	

5. Applicable Graphic Mode

The microprocessor measures the H-sync, V-sync and V-sync/H-sync polarity for RGB inputs, and uses this timing information to control all of the display operation to get the proper image on a screen. This board can detect all VESA standard and MAC Graphic modes shown on the table below and provide more clear and stable image on a screen. Refer to below RGB & DVI Input format

Resolution	Pixel Freq.	Horizontal Timing				Vertical Timing			
	Sync Polar	Freq.	Total	Active	Sync Polar	Freq.	Total	Active	
	MHz	KHz	Pixel	Pixel		Hz	Line	Line	
640x350 @70Hz	25	P	31.430	800	640	N	70.000	449	350
720x400 @70Hz	28	N	31.430	900	720	P	70.000	449	400
640x480 @60Hz	25	N	31.469	800	640	N	59.940	525	480
640x480 @60Hz	25	N	31.469	800	640	N	59.940	525	480
640x480 @67Hz	30	N	35.000	864	640	N	66.667	525	480
640x480 @72Hz	31	N	37.861	832	640	N	72.809	520	480
640x480 @75Hz	31	N	37.500	840	640	N	75.000	500	480
832x624 @75Hz	57	N	49.726	1152	832	N	74.551	667	624
800x600 @56Hz	36	P	35.156	1024	800	P	56.250	625	600
800x600 @60Hz	40	P	37.879	1056	800	P	60.317	628	600
800x600 @72Hz	50	P	48.077	1040	800	P	72.188	666	600
800x600 @75Hz	49	P	46.875	1056	800	P	75.000	625	600
1024x768 @60Hz	65	N	48.363	1344	1024	N	60.005	806	768
1024x768 @60Hz	64	N	48.780	1312	1024	N	60.001	813	768
1024x768 @70Hz	75	N	56.476	1328	1024	N	70.070	806	768
1024x768 @75Hz	80	N	60.241	1328	1024	N	74.927	804	768
1024x768 @75Hz	78	P	60.023	1312	1024	P	75.030	800	768
1280x768 @60Hz	79	P	47.780	1664	1280	P	59.870	798	768
1280x1024 @60Hz	10	P	63.981	1688	1280	P	60.020	1066	1024
1280x1024 @75Hz	13	P	79.976	1688	1280	P	75.025	1066	1024
1360X768 @60Hz	85	P	47.712	1792	1360	P	60.015	795	768
1600x1200 @60Hz	16	N	74.479	2160	1600	P	59.967	1242	1200
1680x1050 @60Hz	14	N	65.160	2256	1680	P	59.944	1087	1050
1920x1080 @60Hz	17	N	67.061	2576	1920	P	59.983	1118	1080
1920X1200@60Hz	19	N	74.508	1292	1920	P	59,990	1242	1200
2560X1440@60Hz		N	88.7		2560				1440
2560X1600@60Hz		N	98.7		2560				1600
3840X2160@60Hz		N	135		3840				2160
4096X2160@60Hz		N	135		4096				2160

6. OSD Board Menu Tree

The On Screen Display consists of following menu.

These can be activated by selection from Remote Controller or OSD Key pad manually.

6.1 Summarized Table

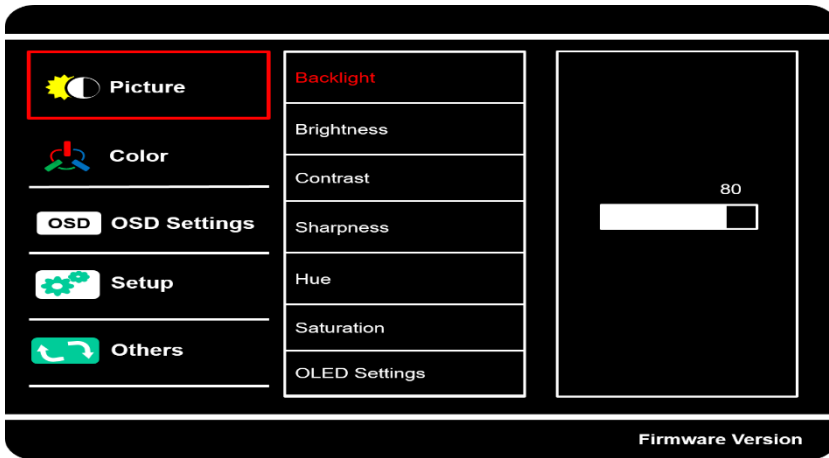
Main Menu	Sub Menu	Control	
Picture	Backlight (Not Support)	0 ~ 100	
	Brightness	0 ~ 100	
	Contrast	0 ~ 100	
	Sharpness	0 ~ 4	
	Hue	0 ~ 100	
	Saturation	0 ~ 100	
	OLED Settings	OLED OFF-RS Off, On OLED JB Off, On	
Color	Color Temp	9300K, 7500K, 6500K, 5800K, SRGB, User Define	
	Red	0 ~ 100	
	Green	0 ~ 100	
	Blue	0 ~ 100	
	Color Effect	Standard, Game, Movie, Photo, Vivid	
	Gamma	Off, 1.8, 2.0, 2.2, 2.4	
OSD Settings	Language	English, 中文, Español, Français, Deutsch, Italiano, Nederlands, Русский	
	Horizontal	0 ~ 100	
	Vertical	0 ~ 100	
	Transparency	0 ~ 100	
	OSD Time Out	0 ~ 100	
	OSD Rotate	0, 90, 270, 180	
Setup	Input	Auto Select, DP1, DP2, HDMI 1, HDMI 2	
	Mute	Off, On	
	Volume	0 ~ 100	
	DP Format	DP 1.1, DP 1.2	
	DP MST	Off, DP1, DP2	
	Clone Mode	Off, On	
	Reset		
Other	Display Size	Full Screen, AUTO, 4:3, 5:4, 1:1	
	Display Rotate	0, 180	
	Overdrive	Off, On	
	Video Wall Settings	Video Wall	Off, On
		Display Number	1 ~ 25
		Horizontal Number	1 ~ 5
		Vertical Number	1 ~ 5
		RS232 ID	1 ~ 25
	*Light Sensor	Off, On	
*Fan Controls	Fan Status Off, On, Auto		

		Fan PWM1	0 ~ 100
		Fan PWM2	0 ~ 100
		Fan PWM3	0 ~ 100
		Fan PWM4	0 ~ 100
		ShutDown	Off, On
		ShutDown Temp	60 ~ 85
		Temperature	Temp1 ~ Temp5
	*Self Check		Off, On
	*ALCW (some AUO Panels Only)		Off, On
Service	Backlight >> PWM RES		8Bit>>256, 12Bit>>4095
	>> Control		Liner, Curve

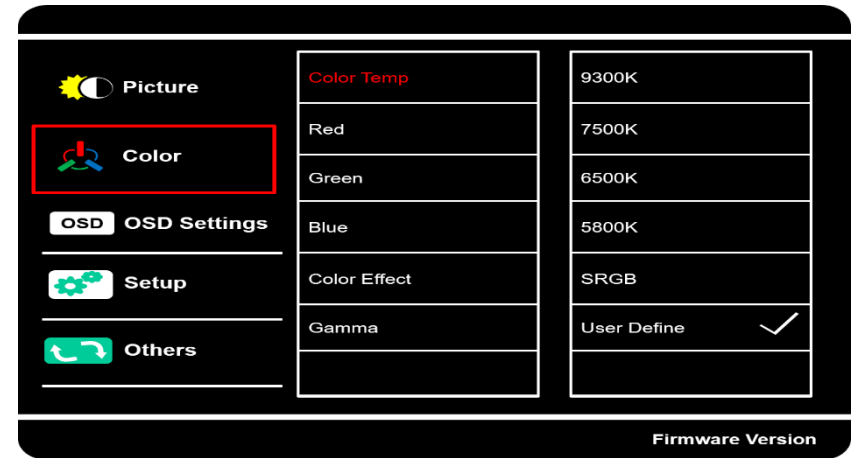
[Note] the “ * ” is an **Option Sub Menu**

6.2 UI Design shape by the orders of Menu Tree

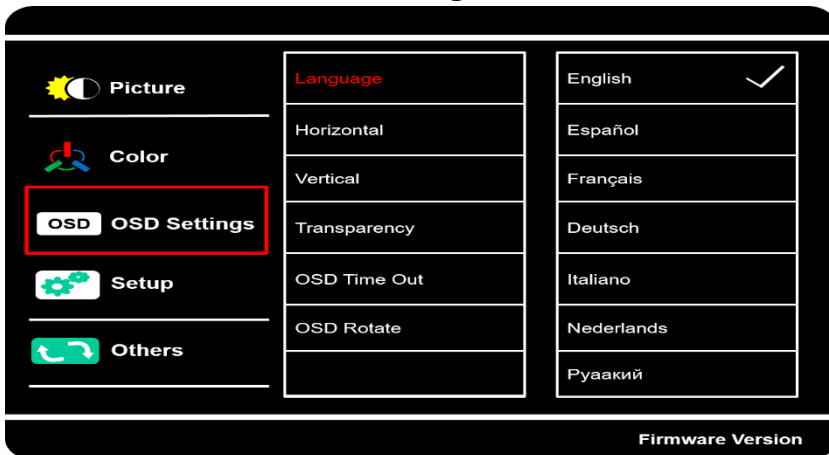
Main menu – 1 : Picture



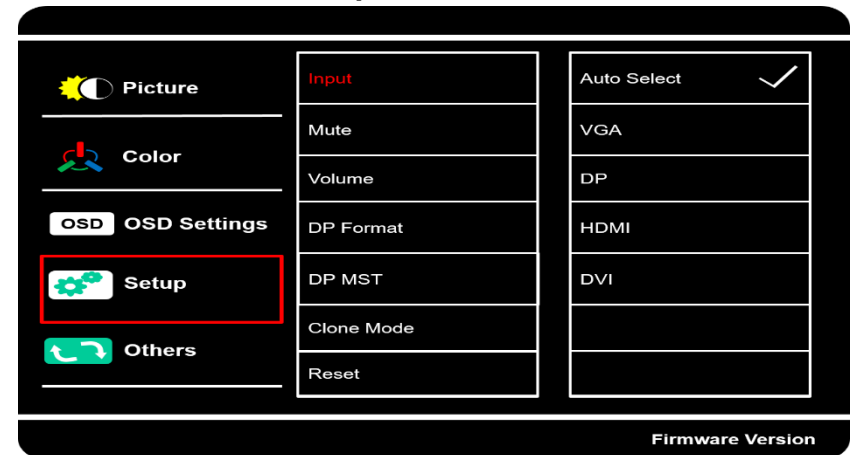
Main menu – 2 : Color



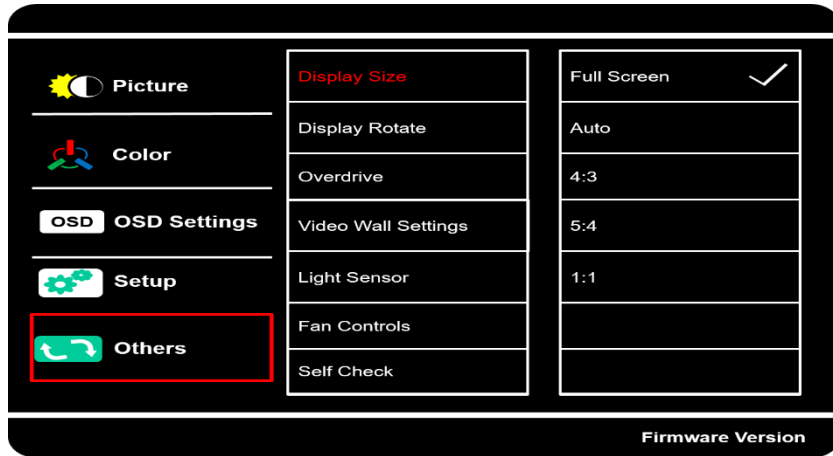
Main menu – 3 : OSD Settings



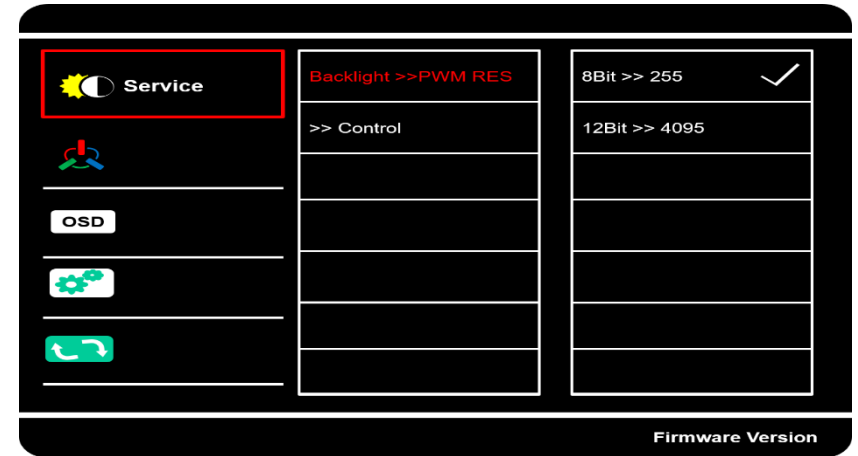
Main menu – 4 : Setup



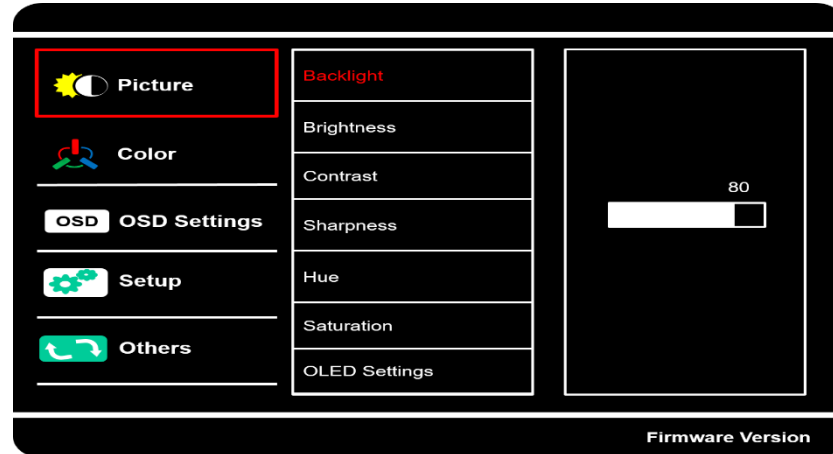
Main menu – 5 : Others



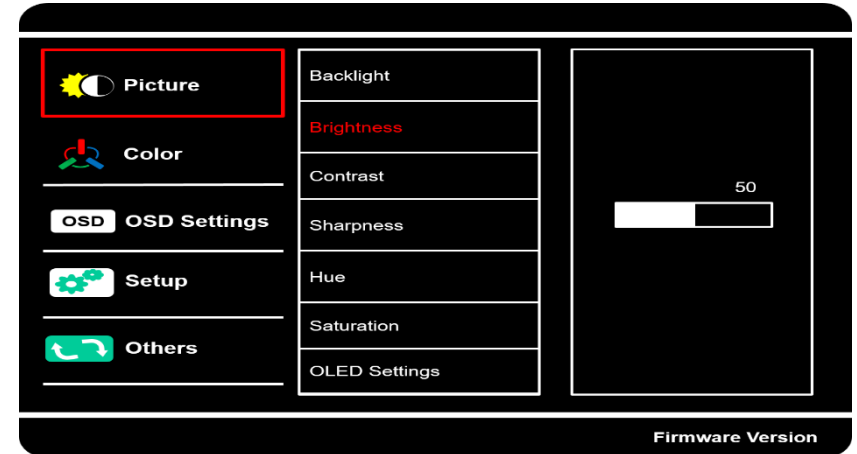
Service menu – : Service



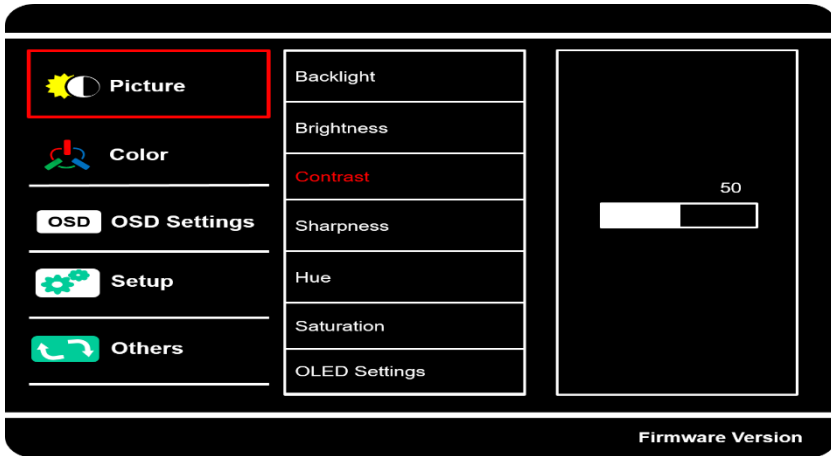
Submenu – 1-1 : Picture – Backlight (Not Support)



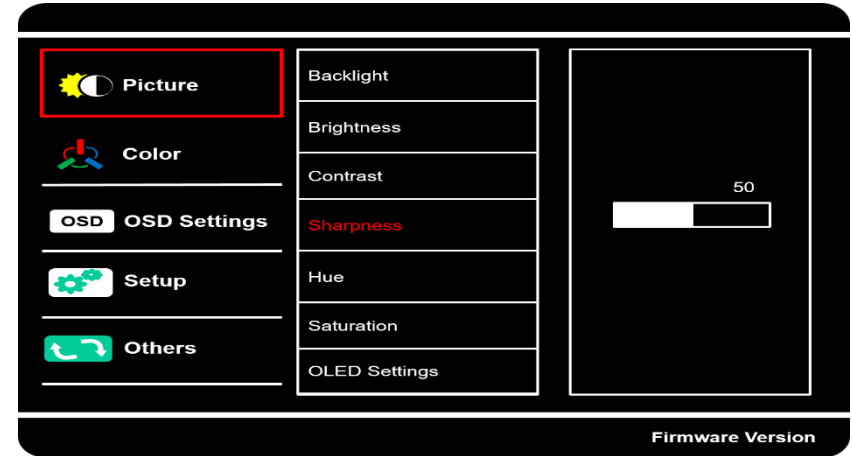
Submenu – 1-2 : Picture – Brightness



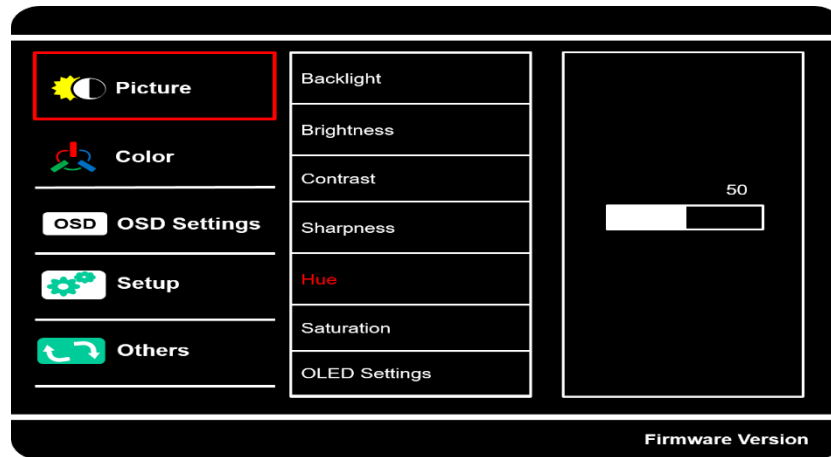
Submenu – 1-3 : Picture – Contrast



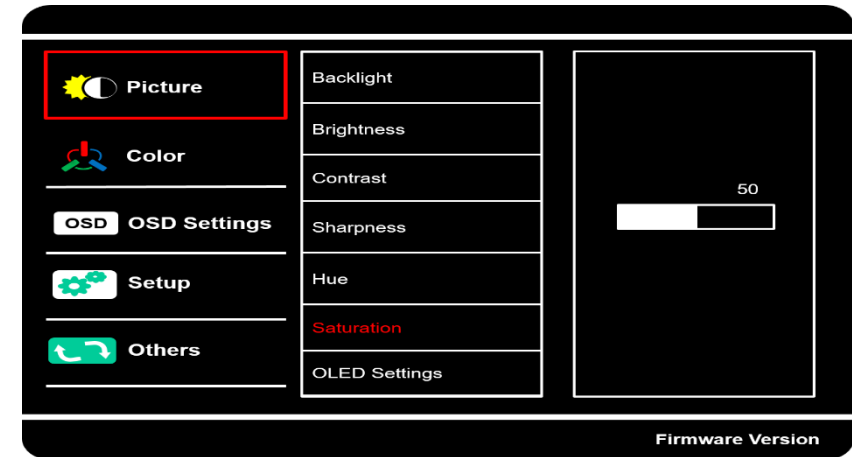
Submenu – 1-4 : Picture – Sharpness



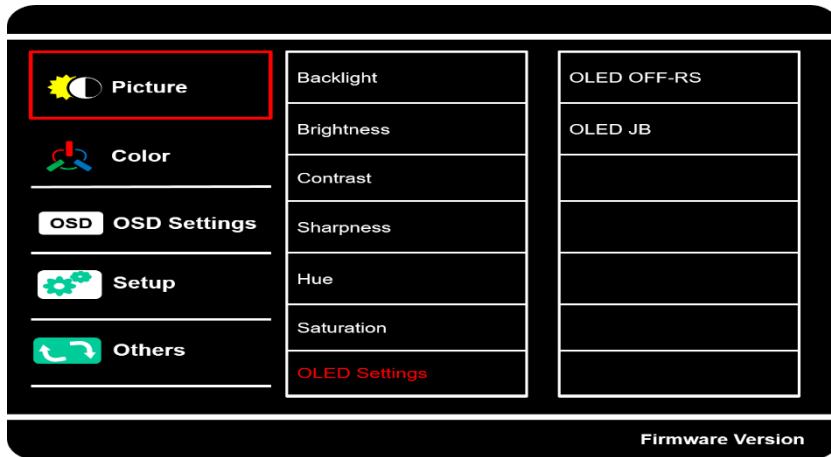
Submenu – 1-5 : Picture – Hue



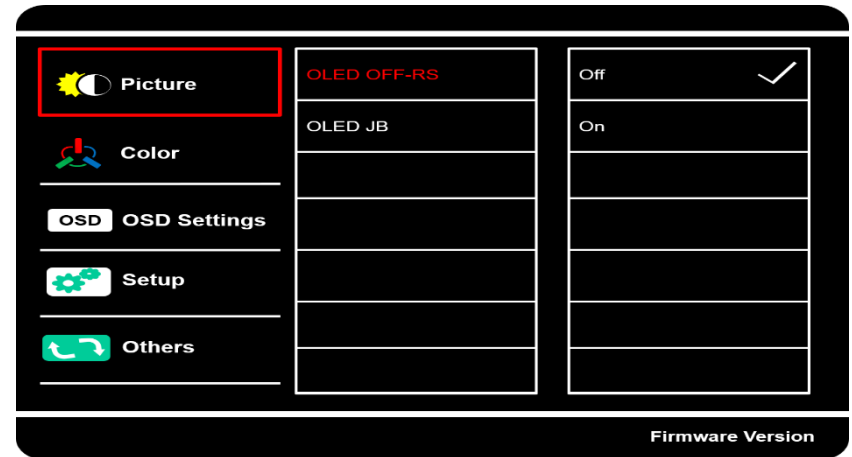
Submenu – 1-6 : Picture – Saturation



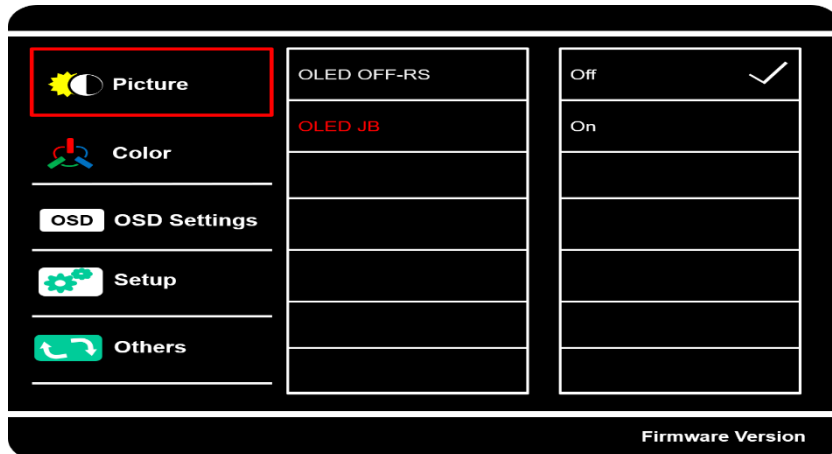
Submenu – 1-7 : Picture – OLED Settings



Submenu – 1-7-1 : Picture – OLED Settings
– OLED OFF-RS



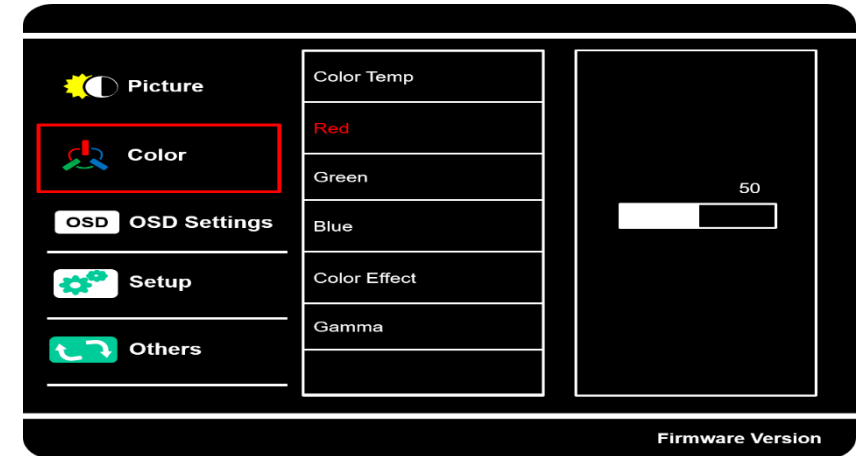
Submenu – 1-7-2 : Picture – OLED Settings
– OLED JB



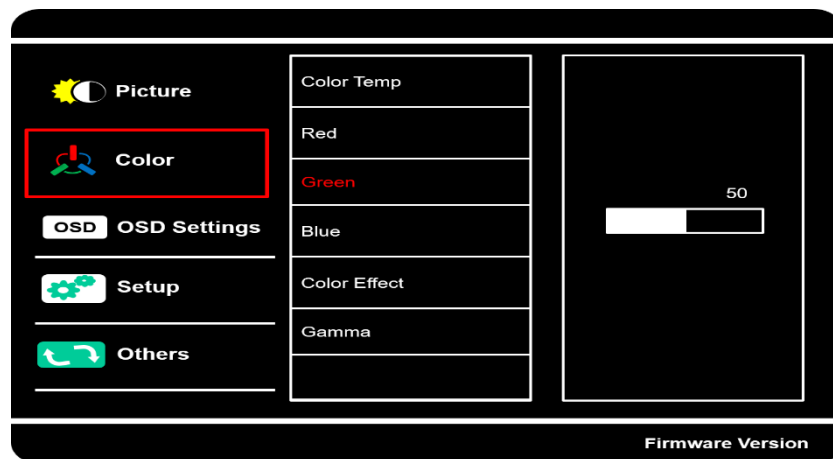
Submenu – 2-1 : Color – Color Temp



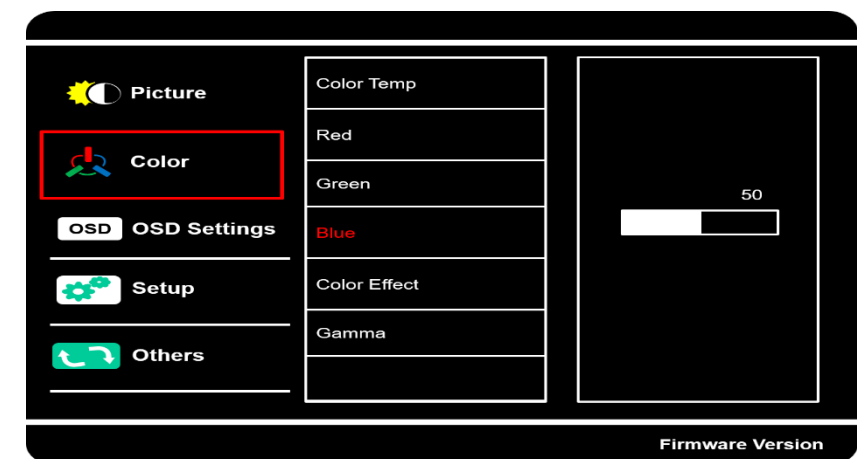
Submenu – 2-2 : Color – Red



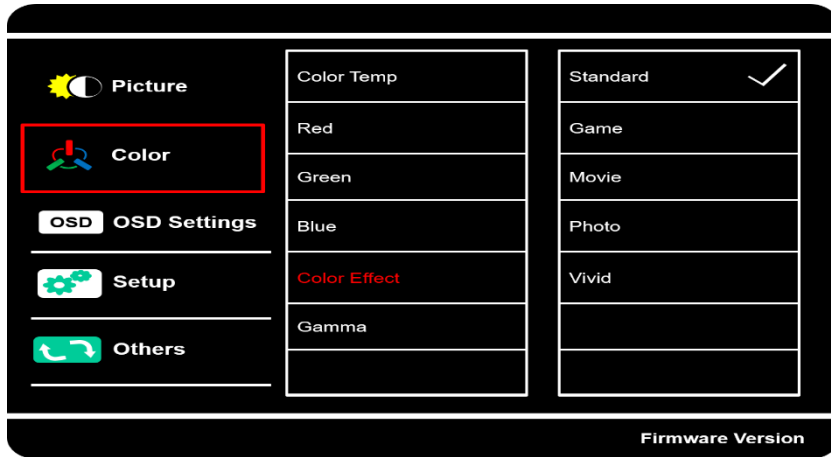
Submenu – 2-3 : Color – Green



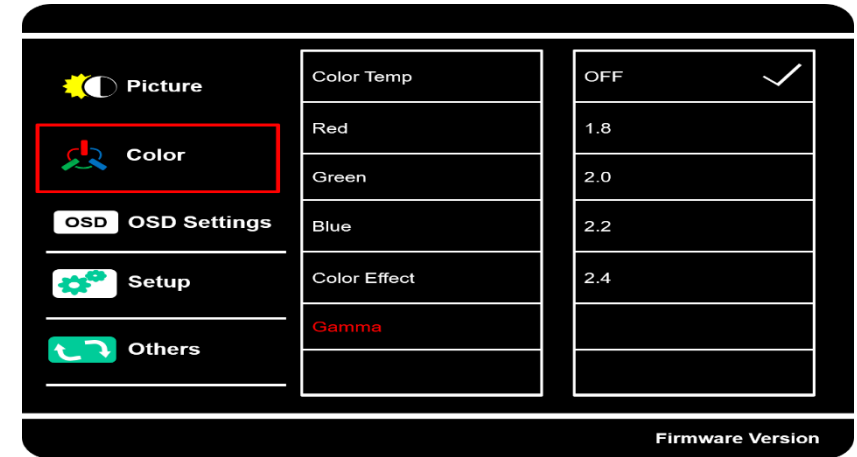
Submenu – 2-4 : Color – Blue



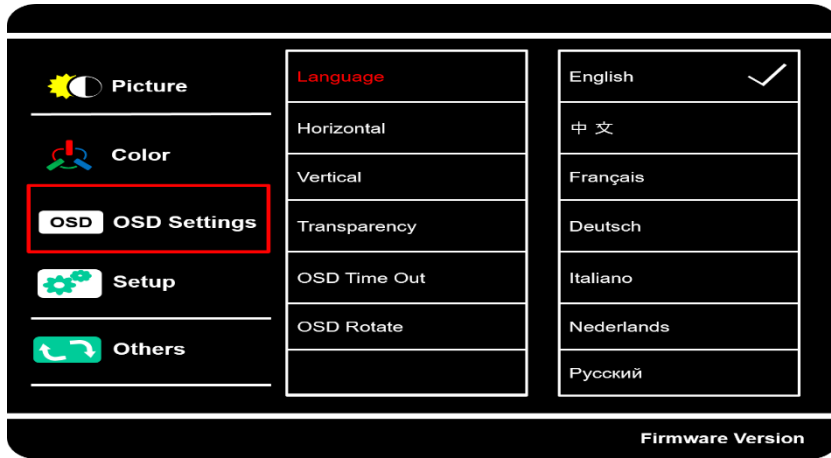
Submenu – 2-5 : Color – Color Effect



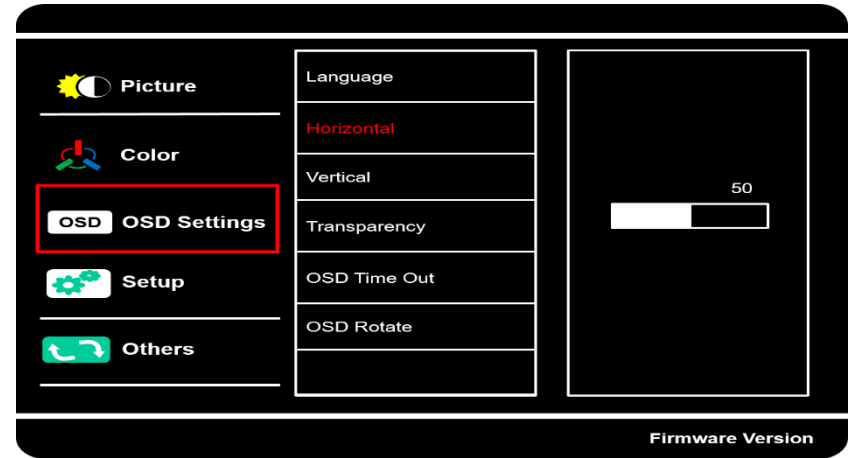
Submenu – 2-6 : Color – Gamma



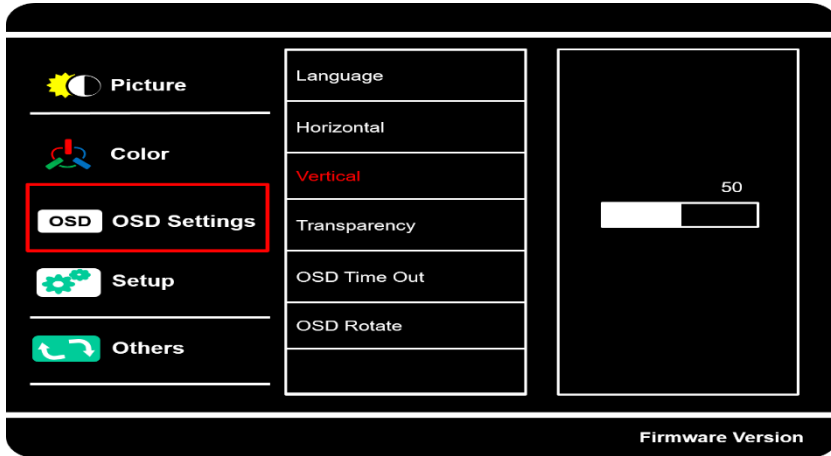
Submenu – 3-1 : OSD Settings – Language



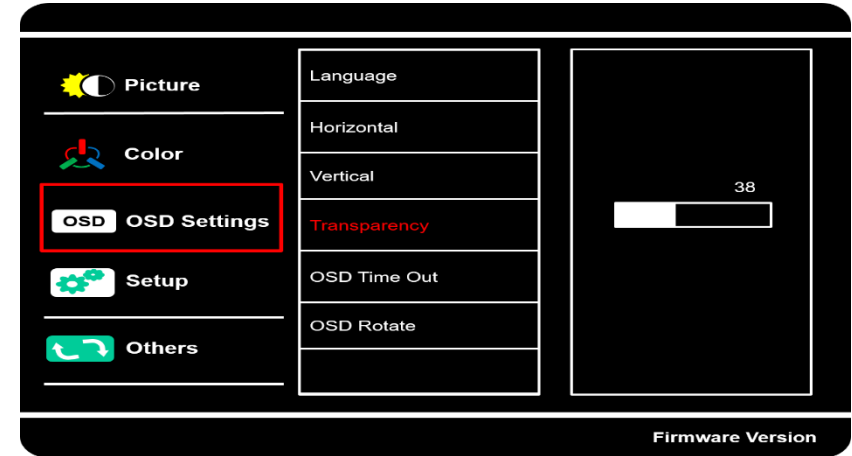
Submenu – 3-2 : OSD Settings – Horizontal



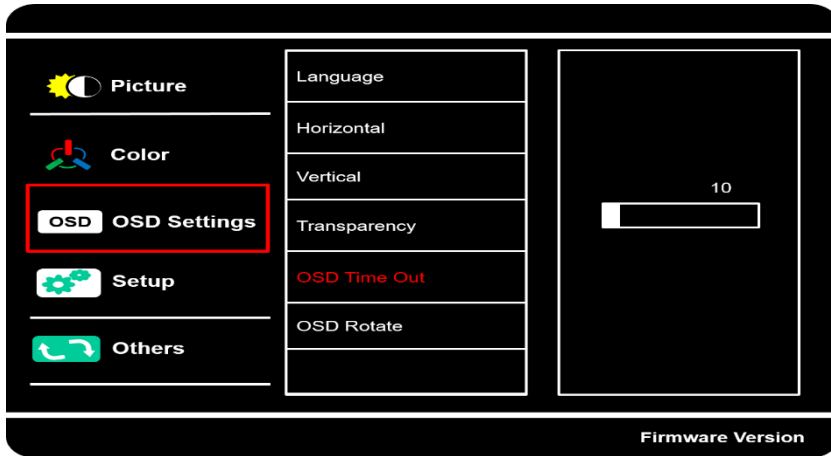
Submenu – 3-3 : OSD Settings – Vertical



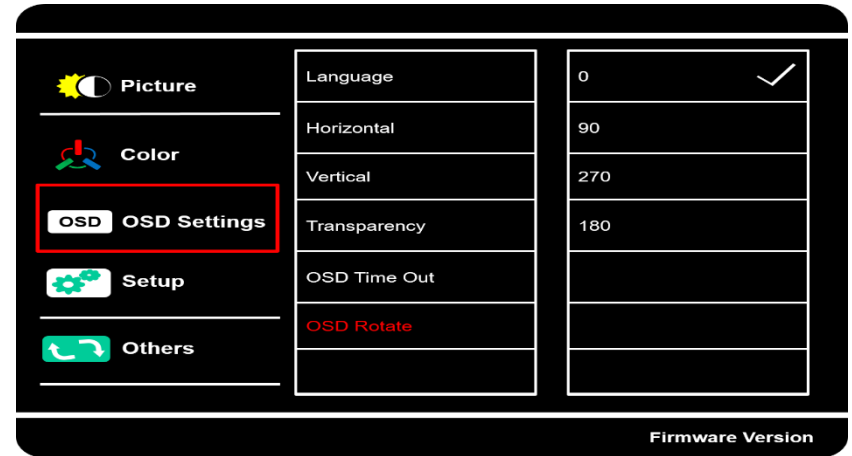
Submenu – 3-4 : OSD Settings – Transparency



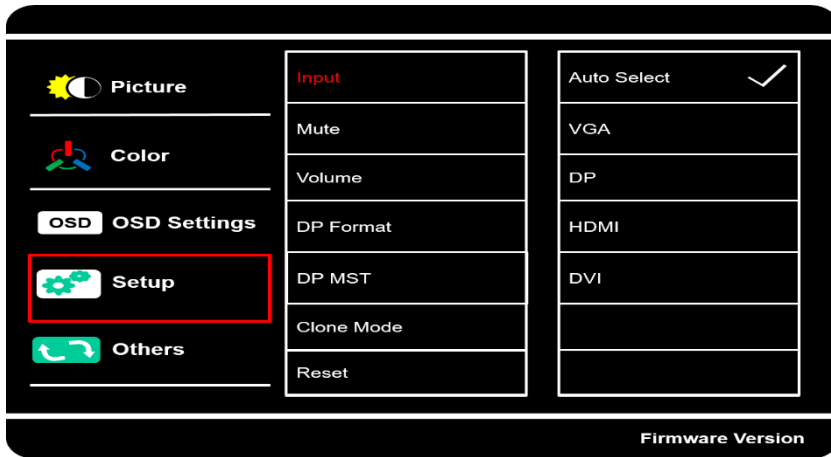
Submenu – 3-5 : OSD Settings – OSD Time Out



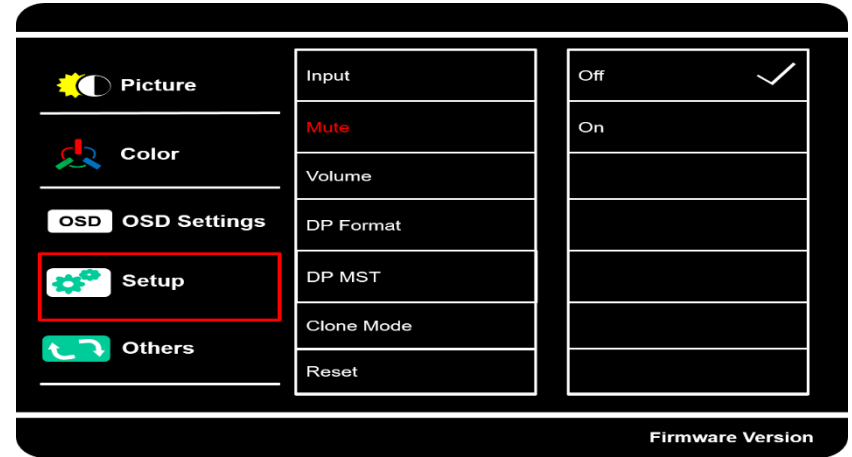
Submenu – 3-6 : OSD Settings – OSD Rotate



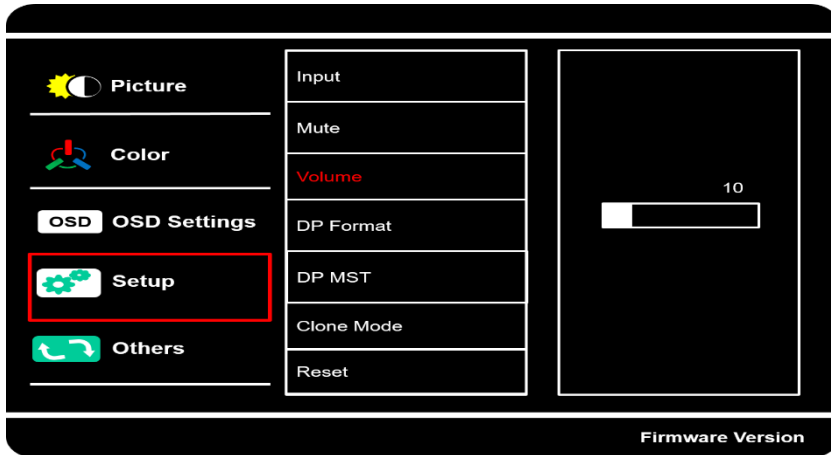
Submenu – 4-1 : Setup – Input



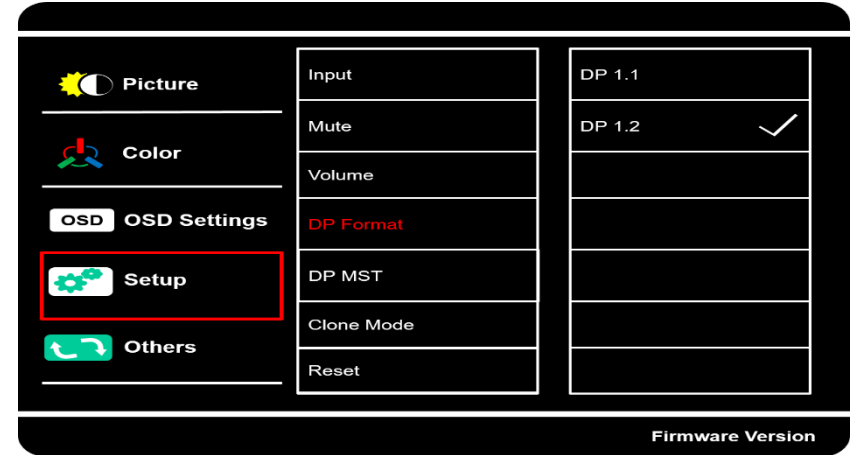
Submenu – 4-2 : Setup – Mute



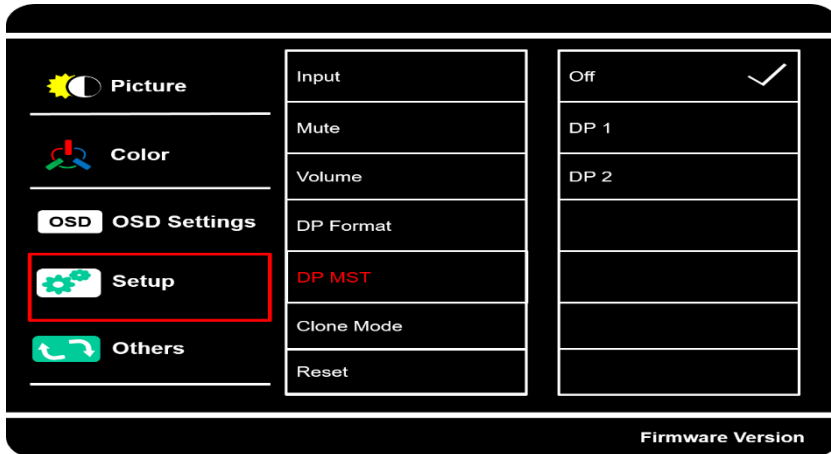
Submenu – 4-3 : Setup – Volume



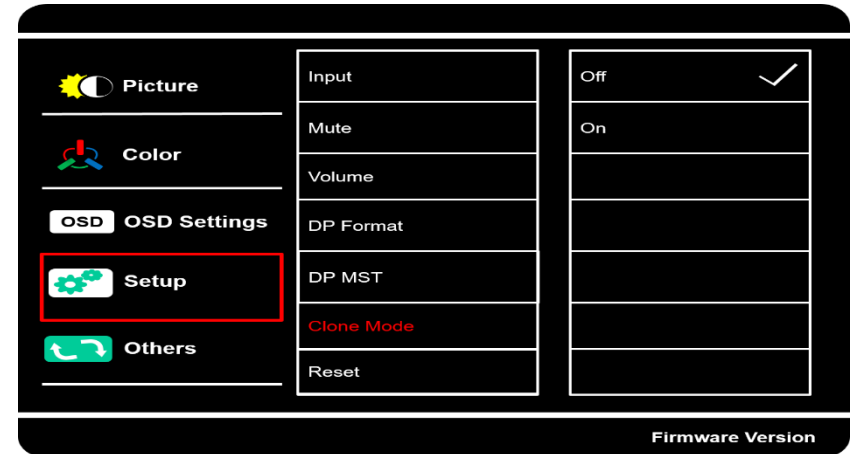
Submenu – 4-4 : Setup – DP Format



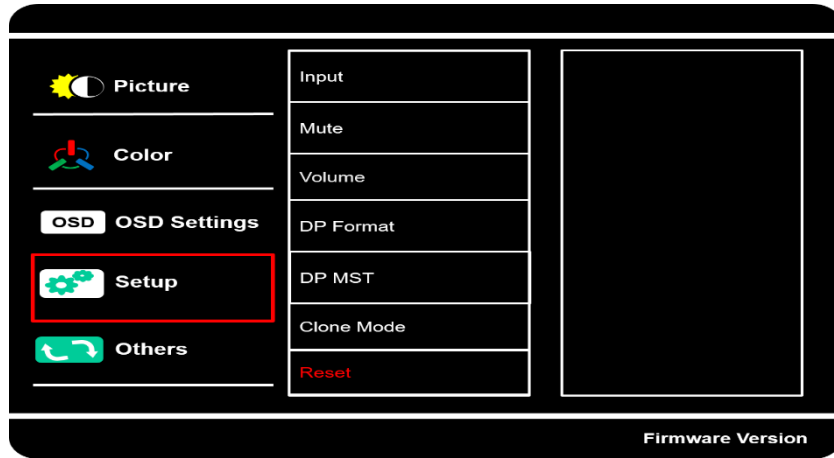
Submenu – 4-5 : Setup – DP MST



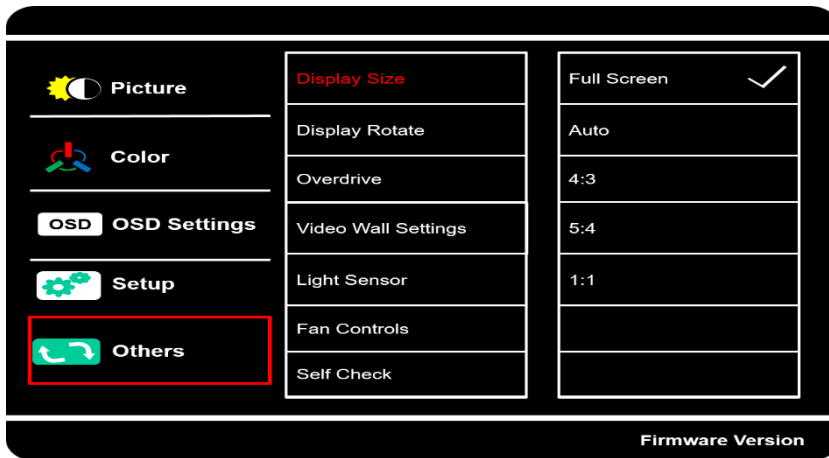
Submenu – 4-6 : Setup – Clone Mode



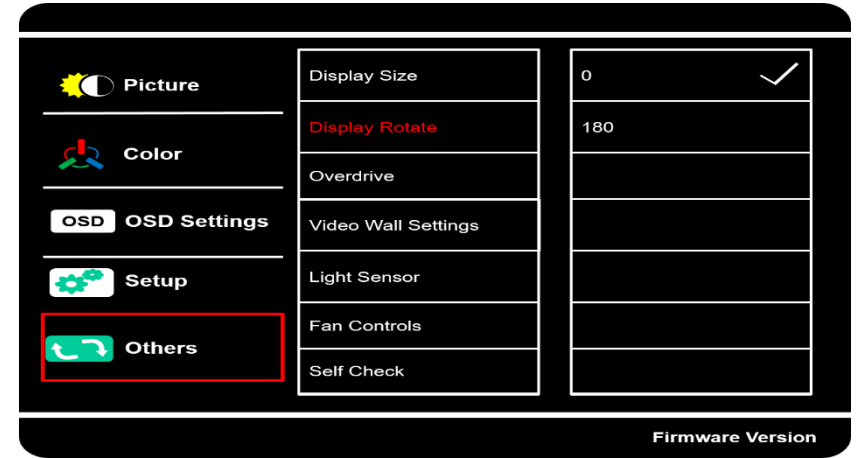
Submenu – 4-7 : Setup – Reset



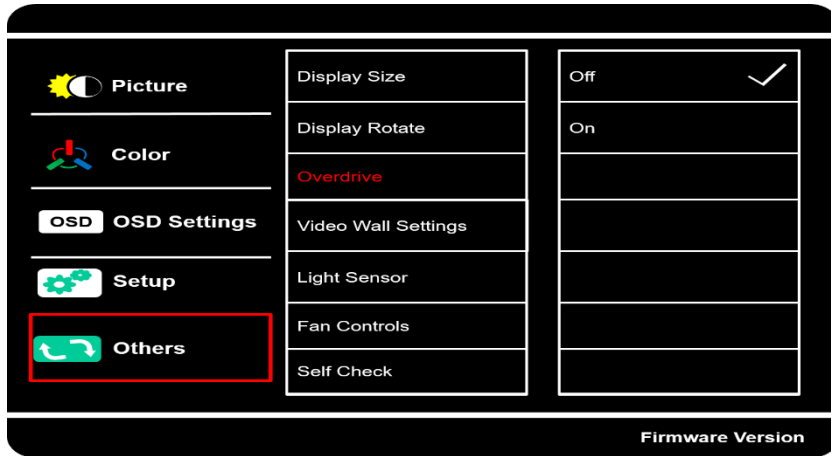
Submenu – 5-1 : Others – Display Size



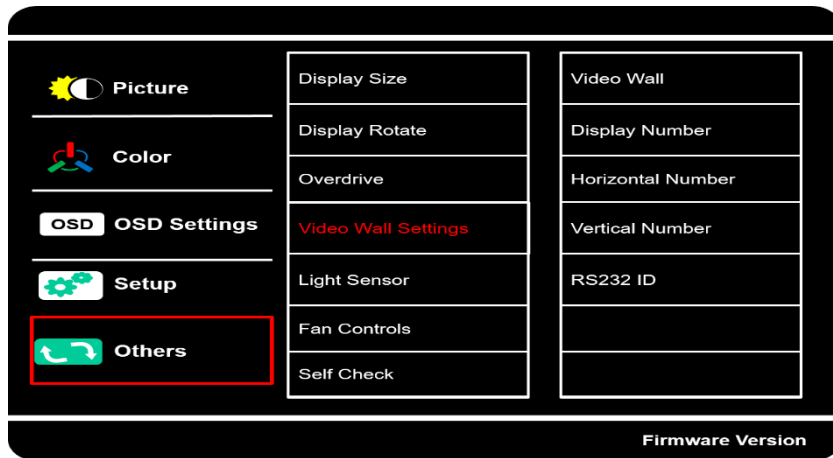
Submenu – 5-2 : Others – Display Rotate



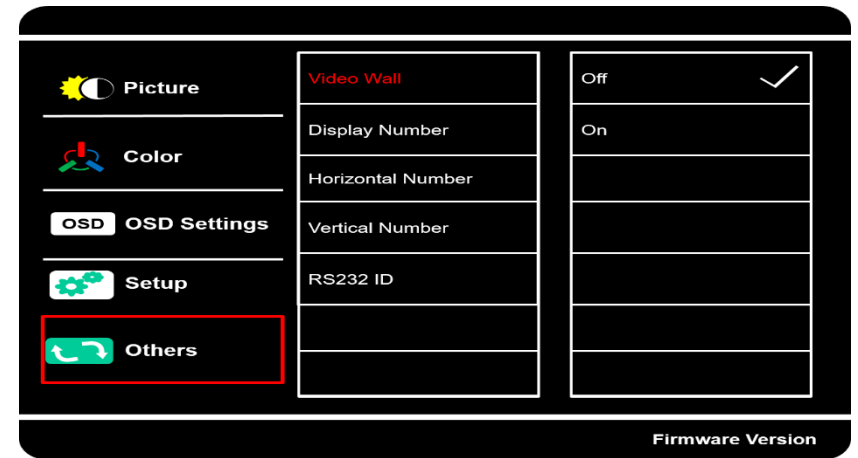
Submenu – 5-3 : Others – Overdrive



Submenu – 5-4 : Others – Video Wall Settings

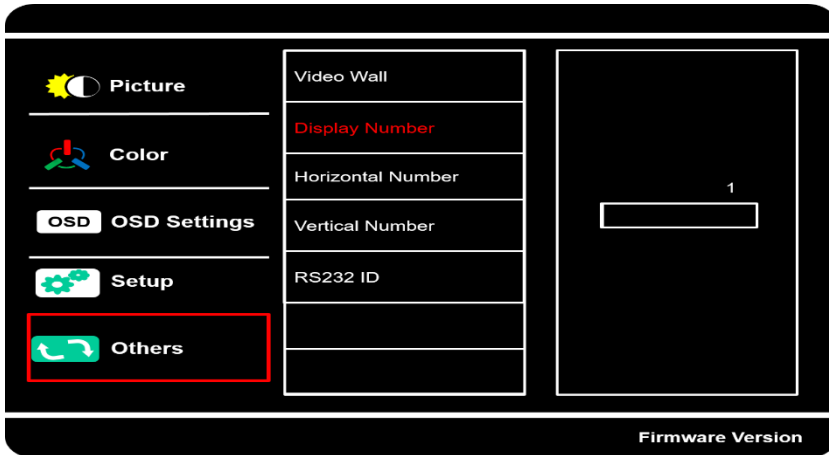


Submenu – 5-4-1 : Others – Video Wall Settings

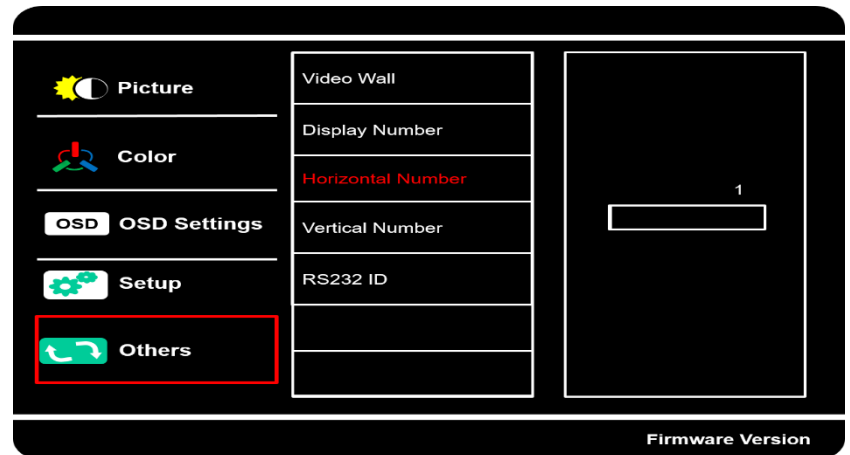


– Video Wall

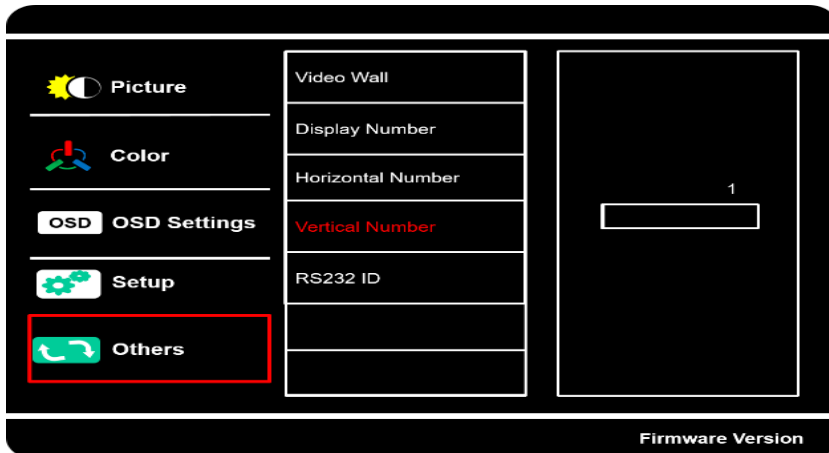
**Submenu – 5-4-2 : Others – Video Wall Settings
– Display Number**



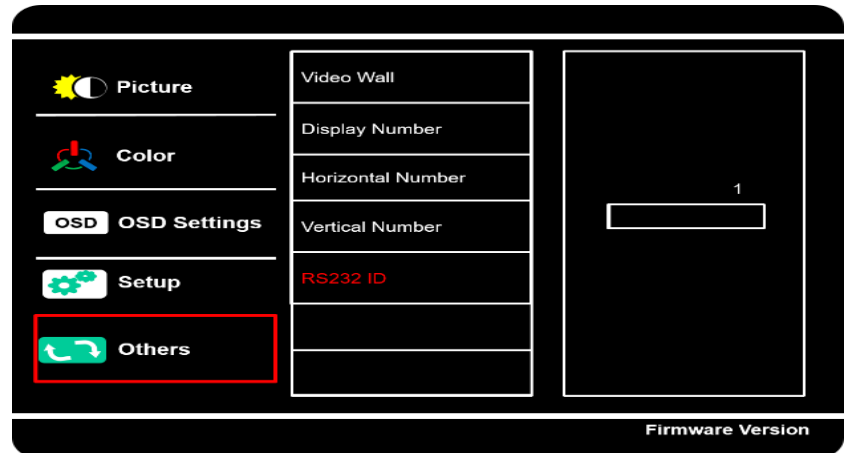
**Submenu – 5-4-3 : Others – Video Wall Settings
– Horizontal Number**



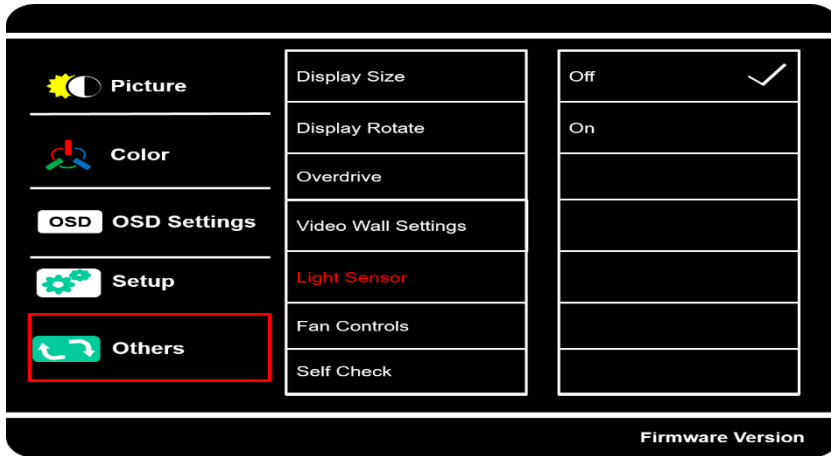
**submenu – 5-4-4 : Others – Video Wall Settings
– Vertical Number**



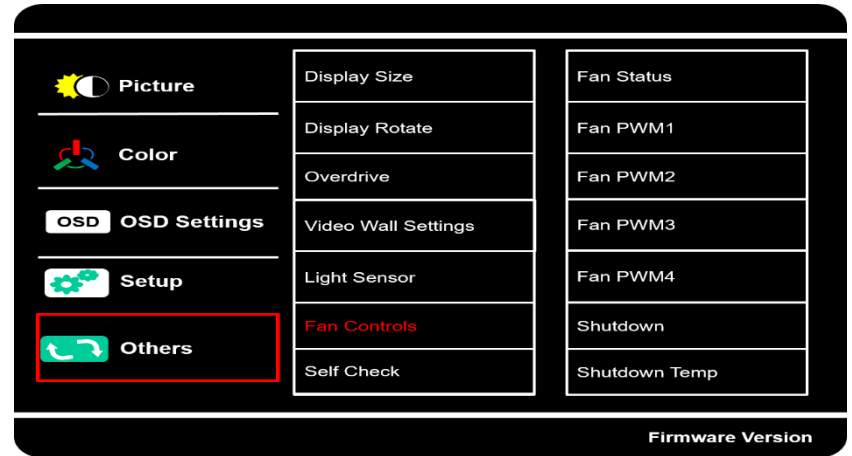
**Submenu – 5-4-5 : Others – Video Wall Settings
– RS232 ID**



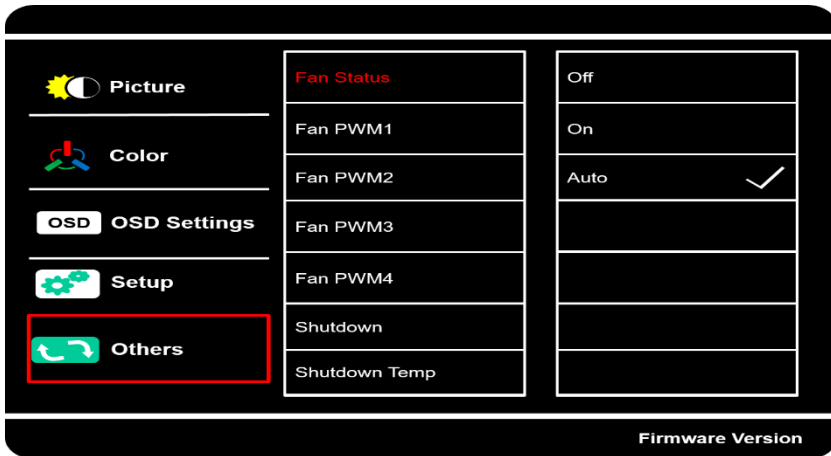
Submenu – 5-5 : Others – Light Sensor



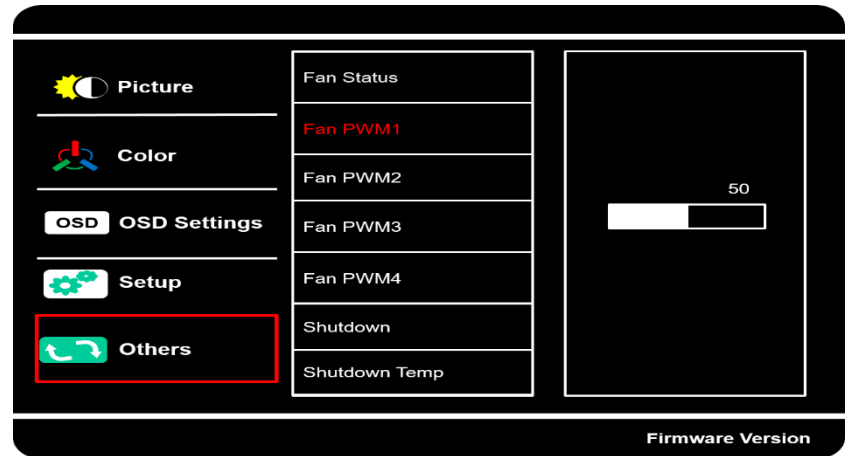
Submenu – 5-6 : Others – Fan Controls



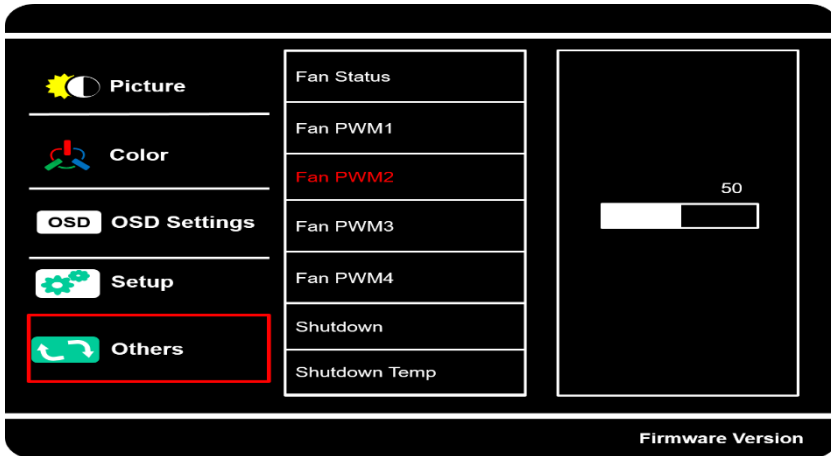
Submenu – 5-6-1 : Others – Fan Controls – Fan Status



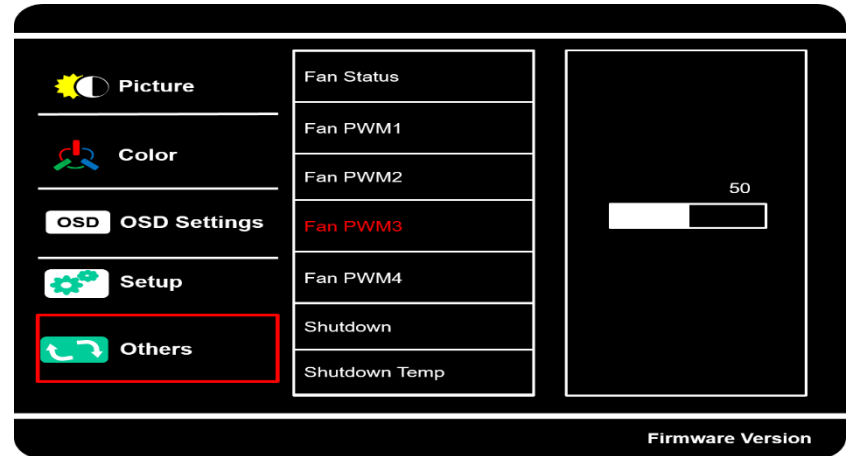
Submenu – 5-6-2 : Others – Fan Controls – Fan PWM1



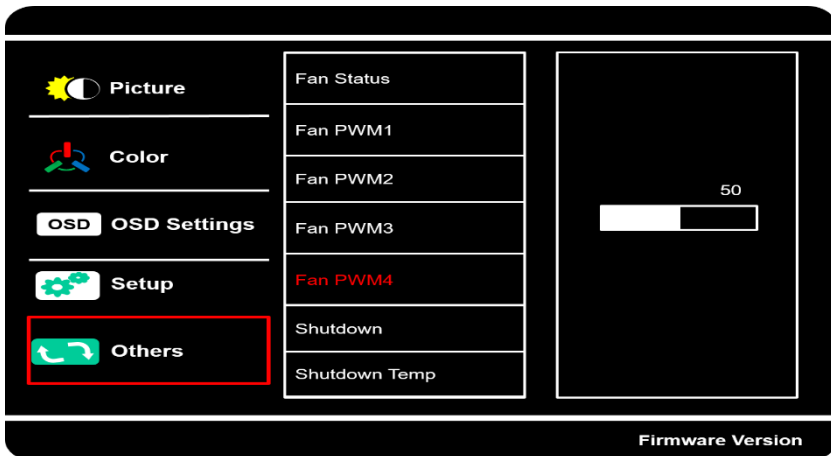
**Submenu – 5-6-3 : Others – Fan Controls
– Fan PWM2**



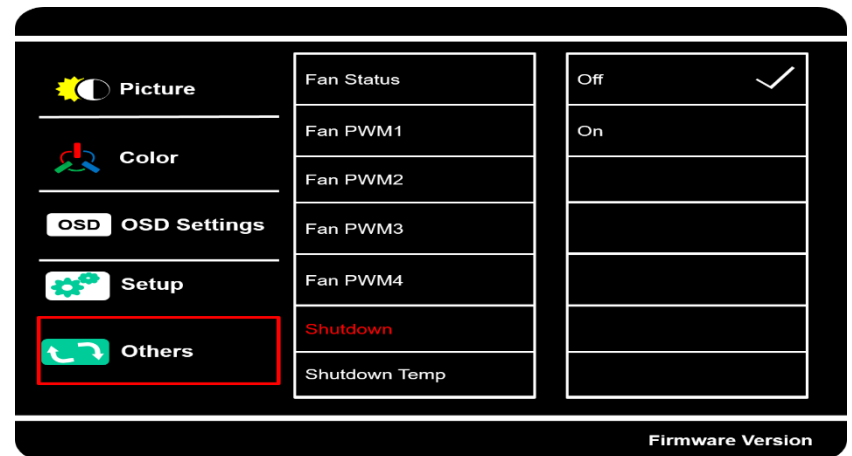
**Submenu – 5-6-4 : Others – Fan Controls
– Fan PWM3**



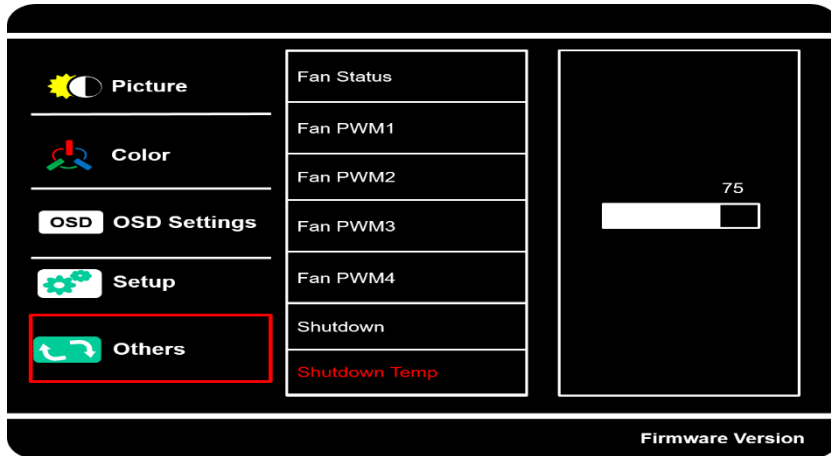
**Submenu – 5-6-5 : Others – Fan Controls
– Fan PWM4**



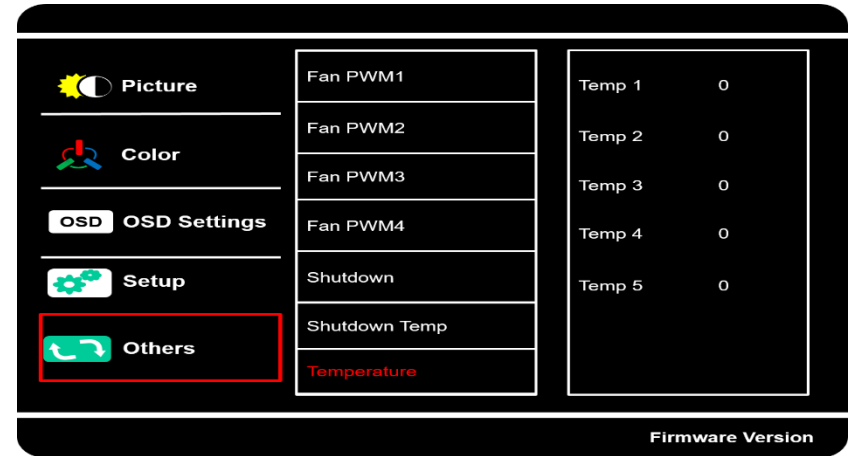
**Submenu – 5-6-6 : Others – Fan Controls
– Shutdown**



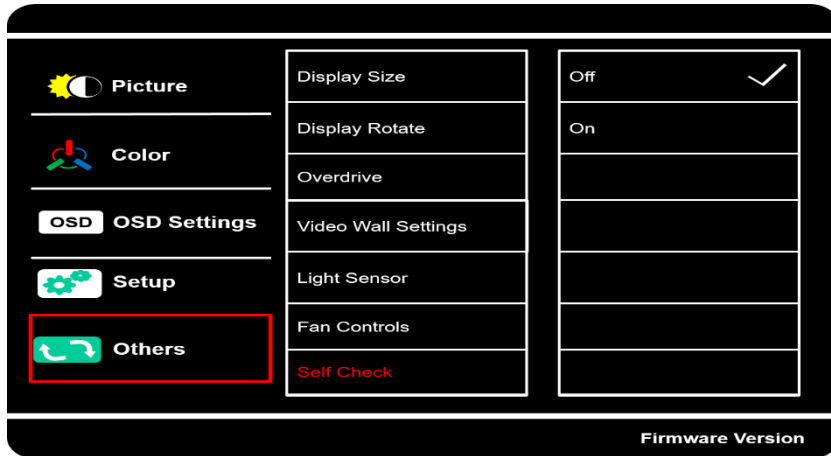
**Submenu – 5-6-7 : Others – Fan Controls
– Shutdown Temp**



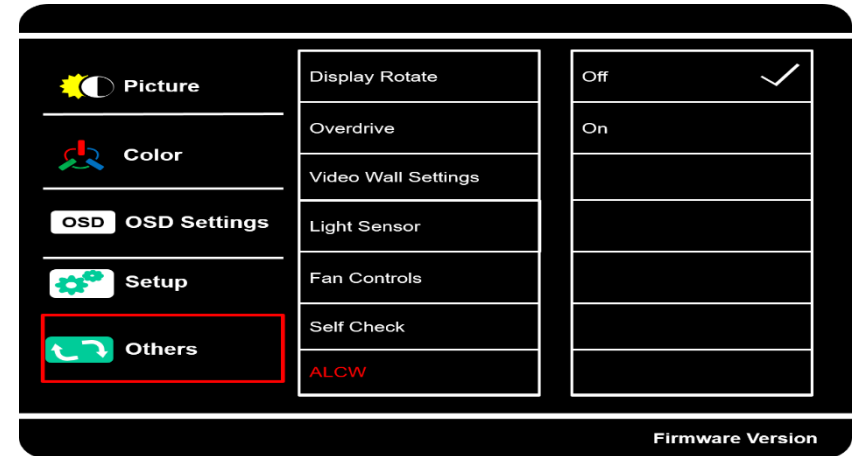
**Submenu – 5-6-8 : Others – Fan Controls
– Temperature**



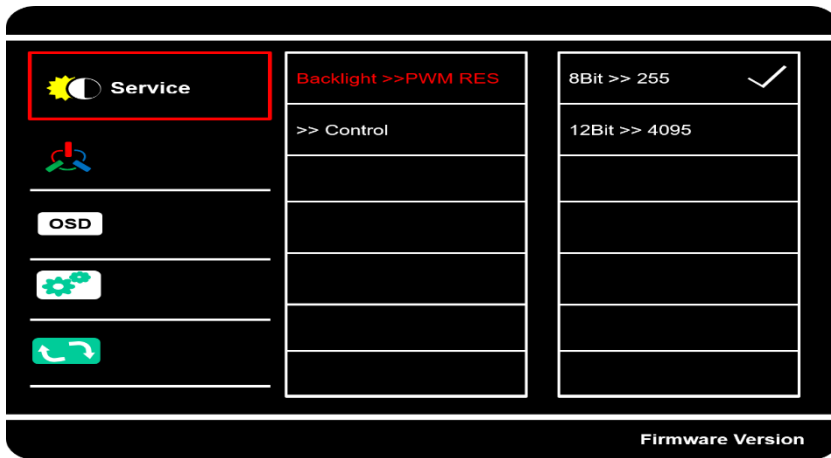
Submenu – 5-7 : Others – Self Check



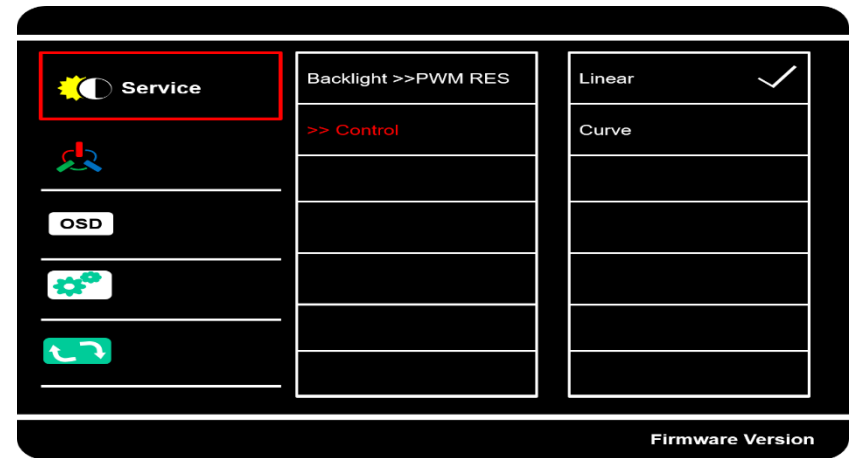
Submenu – 5-8 : Others – ALCW



Service Menu – 1 : Backlight PWM Resolution



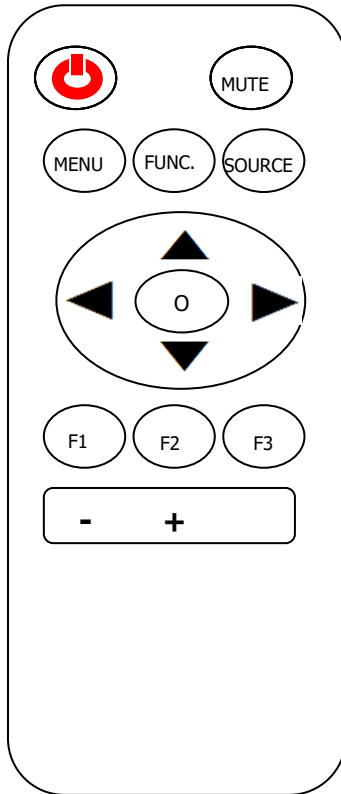
Service Menu – 2 : Backlight Control



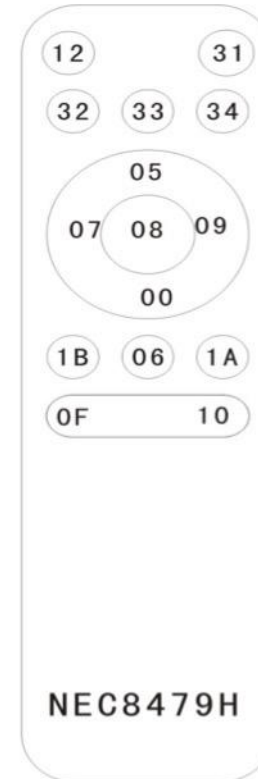
7. Remote Controller

Distance at 7 meters max and 30 degree (left/right) max

- Part Number : VRC1340
- Format : NEC
- Custom code : 8479 (Hex)



Data Code (Hex)



8. RS232 Communication

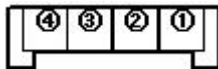
8.1 Communication Parameters

- Baud rate :9600 bps
- Data length : 8 bits
- Parity bit : None
- Stop bit : 1 bit
- Communication : ASCII CODE

8.2 Physical connection :

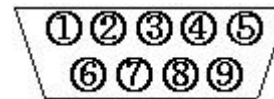
Controller side:
 Connector interface: CN11
 Mating connector: DB9 Female or
 20010HS-04, Yeon-Ho

PIN#	Description
1	Ground
2	RS-232 Tx Data
3	RS-232 Rx Data
4	Power 5V



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

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



8.3 RS-232 Serial Protocols

Video Wall Disable (Normal)

Tx Format : [Command1] [Command2] [Space] [0] [0] [Space] [DataH] [DataL] [CR]
 ; ASCII : [Space] = 0x20 , [CR] = 0x0D, [0] = 0x30, [a] = 0x61, [A] = 0x41

Rx OK Format : [Command2] [Space] [0] [0] [Space] [O] [K] [DataH] [DataL] [x] [CR]
 ; OK

Rx NG1 Format : [Command2] [Space] [0] [0] [Space] [N] [G] [0] [1] [x] [CR]
 ; NG01 : illegal command

Rx NG2 Format : [Command2] [Space] [0] [0] [Space] [N] [G] [0] [2] [x] [CR]
 ; NG02 : unknown command /data

Video Wall Enable

Tx Format : [Command1] [Command2] [Space] [0] [0] [Space] [DataH] [DataL] [Space] **[RS232 ID H]**
[RS232 ID L] [CR]

; ASCII : [Space] = 0x20 , [CR] = 0x0D, [0] = 0x30, [a] = 0x61, [A] = 0x41

Rx OK Format : [Command2] [Space] [0] [0] [Space] [O] [K] [DataH] [DataL] [Space] **[RS232 ID H]**
[RS232 ID L] [x] [CR]
 ; OK

Rx NG1 Format : [Command2] [Space] [0] [0] [Space] [N] [G] [0] [1] [Space] **[RS232 ID H]** **[RS232 ID L]**
 [x] [CR]

; NG01 : illegal command

Rx NG2 Format : [Command2] [Space] [0] [0] [Space] [N] [G] [0] [2] [Space] **[RS232 ID H]** **[RS232 ID L]**
 [x] [CR]

; NG02 : unknown command /data

Serial Command and Protocol

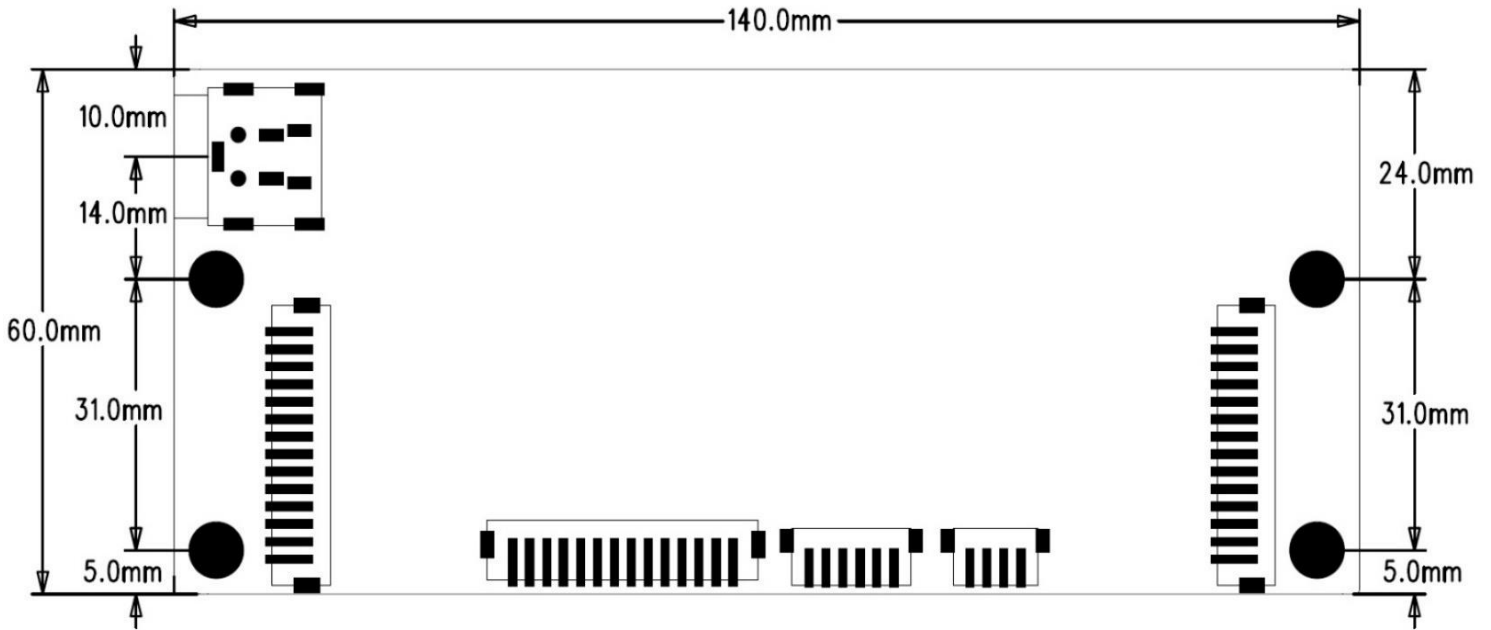
Command Set	Command	Acknowledgement	Comments
Power (ka)			
Power On	ka 00 01(CR)	a 00 OK01x	01
Power Off	ka 00 00(CR)	a 00 OK00x	00
Power Status	ka 00 ff(CR)	a 00 OK01x (On) a 00 OK00x (Off)	read
P1 Input selection (k1)			
P1	k1 00 01(CR)	1 00 OK01x (AUTO)	01 : AUTO (AUTO)
	k1 00 02(CR)	1 00 OK02x (DP1)	02 : DP1 (D0 :DP)
	k1 00 03(CR)	1 00 OK03x (DP2)	03 : DP2 (D1 :DP)
	k1 00 04(CR)	1 00 OK04x (HDMI1)	04 : HDMI1 (D2 :HDMI)
	k1 00 05(CR)	1 00 OK05x (HDMI2)	05 : HDMI2 (D3 :HDMI)
Status	k1 00 ff(CR)	1 00 OK01x (AUTO) 1 00 OK02x (DP1) 1 00 OK03x (DP2) 1 00 OK04x (HDMI1) 1 00 OK05x (HDMI2)	read
Screen Mute (kd)			
Screen Mute ON (Picture off)	kd 00 01(CR)	d 00 OK01x (Mute ON)	01
Screen Mute OFF (Picture on)	kd 00 00(CR)	d 00 OK00x (Mute OFF)	00
Status	kd 00 ff(CR)	d 00 OK01x (Mute ON) d 00 OK00x (Mute OFF)	read
Audio Mute (ke)			
Audio Mute	ke 00 01(CR)	e 00 OK01x (Mute On)	01 : Mute On
	ke 00 00(CR)	e 00 OK00x (Mute Off)	00 : Mute Off
Status	ke 00 ff(CR)	e 00 OK01x (Mute On) e 00 OK00x (Mute Off)	read
Audio Volume (kf)			
Volume control	kf 00 00(CR)	f 00 OK00x (Volume = 0, Min.)	00 (Hex , Decimal)
(0~100%) (Default = 10%)	kf 00 0A(CR)	f 00 OK0Ax (Volume = 10)	0A (0Ah = 10)
00h ~ 64h (Default = 0Ah)	kf 00 32(CR)	f 00 OK32x (Volume = 50)	32 (32h = 50)
	kf 00 64(CR)	f 00 OK64x (Volume = 100, Max.)	64 (64h = 100)
Status	kf 00 ff(CR)	f 00 OK2Fx (Volume = 47)	read
Aspect Ratio (kg)			
Aspect Ratio	kg 00 00(CR)	g 00 OK00x (Full)	00 : Full
	kg 00 01(CR)	g 00 OK01x (16:9)	01 : 16:9
	kg 00 02(CR)	g 00 OK02x (4:3)	02 : 4:3
	kg 00 03(CR)	g 00 OK03x (5:4)	03 : 5:4
	kg 00 04(CR)	g 00 OK04x (1:1)	04 : 1:1
Status	kg 00 ff(CR)	g 00 OK00x (Full) g 00 OK01x (16:9)	read

		g 00 OK02x (4:3) g 00 OK03x (5:4) g 00 OK04x (1:1)	
BackLight (kh) (Not Support)			
0 ~ 100% (Default = 80%)	kh 00 50(CR)	h 00 OK50x (BackLight = 80)	00h ~ 64h (Default = 50h)
Status	kh 00 ff(CR)	h 00 OK50x (BackLight = 80)	read
Contrast (ki)			
0 ~ 100% (Default = 50%)	ki 00 32(CR)	i 00 OK32x (Contrast = 50)	00h ~ 64h (Default = 32h)
Status	ki 00 ff(CR)	i 00 OK32x (Contrast = 50)	read
Brightness (kj)			
0 ~ 100% (Default = 50%)	kj 00 32(CR)	j 00 OK32x (Brightness = 50)	00h ~ 64h (Default = 32h)
Status	kj 00 ff(CR)	j 00 OK32x (Brightness = 50)	read
Sharpness (kk)			
0 ~ 4 (Default = 2)	kk 00 02(CR)	k 00 OK02x (Sharpness = 2)	00h ~ 04h (Default = 02h)
Status	kk 00 ff(CR)	k 00 OK02x (Sharpness = 2)	read
Gamma (kl)			
0 ~ 4 (Default = 0 : OFF)	kl 00 00(CR)	l 00 OK00x(Gamma=Off)	00 : Gamma Off
	kl 00 01(CR)	l 00 OK01x(Gamma=1.8)	01 : Gamma 1.8
	kl 00 02(CR)	l 00 OK02x(Gamma=2.0)	02 : Gamma 2.0
	kl 00 03(CR)	l 00 OK03x(Gamma=2.1)	03 : Gamma 2.2
	kl 00 04(CR)	l 00 OK04x(Gamma=2.2)	04 : Gamma 2.4
Status	kl 00 ff(CR)	l 00 OK00x(Gamma=Off)	read
Temperature (km)			
0 ~ 4	km 00 00(CR)	m 00 OK00x (Temperature = 9300)	00 : 9300
	km 00 01(CR)	m 00 OK01x (Temperature = 7500)	01 : 7500
	km 00 02(CR)	m 00 OK02x (Temperature = 6500)	02 : 6500
	km 00 03(CR)	m 00 OK03x (Temperature = 5800)	03 : 5800
	km 00 04(CR)	m 00 OK04x (Temperature = sRGB)	04 : sRGB
Status	km 00 ff(CR)	m 00 OK02x (Temperature = 6500)	read
Color Effect (kn)			
0 ~ 4 (Default = 0 : Standard)	kn 00 00(CR)	n 00 OK00x (Effect = Standard)	00 : Standard
	kn 00 01(CR)	n 00 OK01x (Effect = Game)	01 : Game
	kn 00 02(CR)	n 00 OK02x (Effect = Movie)	02 : Movie
	kn 00 03(CR)	n 00 OK03x (Effect = Photo) n 00 OK04x (Effect = Vivid)	03 : Photo

	kn 00 04(CR)		04 : Vivid
Status	kn 00 ff(CR)	n 00 OK00x (Effect = Standard)	read
DP Format (k5)			
DP Format	k5 00 00(CR)	5 00 OK00x (DP1.1)	00 : DP1.1
	k5 00 01(CR)	5 00 OK01x (DP1.2)	01 : DP1.2
Status	K5 00 ff(CR)	5 00 OK00x (DP1.1) 5 00 OK01x (DP1.2)	read
DP Format (k6)			
DP MST	k6 00 00(CR)	6 00 OK00x (Off)	00 : Off
	k6 00 01(CR)	6 00 OK01x (DP 1)	01 : DP 1
	k6 00 02(CR)	6 00 OK02x (DP 2)	02 : DP 2
Status	k6 00 ff(CR)	6 00 OK00x (Off) 6 00 OK01x (DP 1) 6 00 OK02x (DP 2)	read
DP Format (k7)			
Clone Mode	k7 00 00(CR)	7 00 OK00x (Off)	00 : Off
	k7 00 01(CR)	7 00 OK01x (On)	01 : On
Status	k7 00 ff(CR)	7 00 OK00x (Off) 7 00 OK01x (On)	read
LEFT KEY	mk 00 02(CR)	k 00 OK02x	02h
RIGHT KEY	mk 00 03(CR)	k 00 OK03x	03h
DOWN KEY	mk 00 04(CR)	k 00 OK04x	04h
UP KEY	mk 00 05(CR)	k 00 OK05x	05h
SELECT KEY (ENTER KEY)	mk 00 06(CR)	k 00 OK06x	06h

9. Power Sequence Board Dimensional Drawing and Picture

9.1 Dimensional Drawing (unit : mm, 140 x 60 x 18.25)

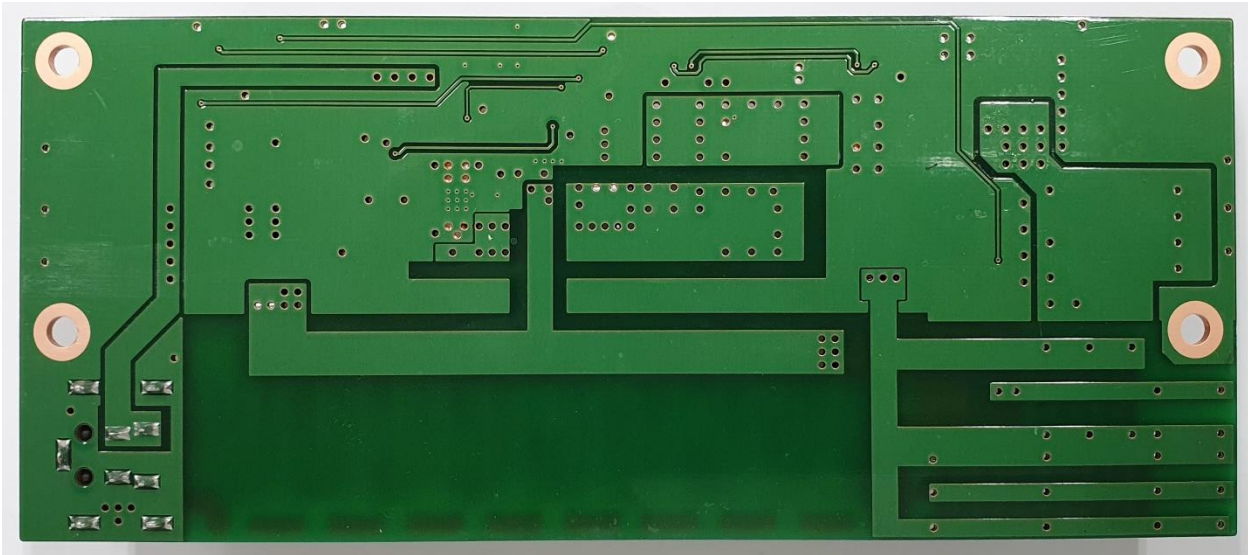


9.2 Pictures

Front view :



Rear view :

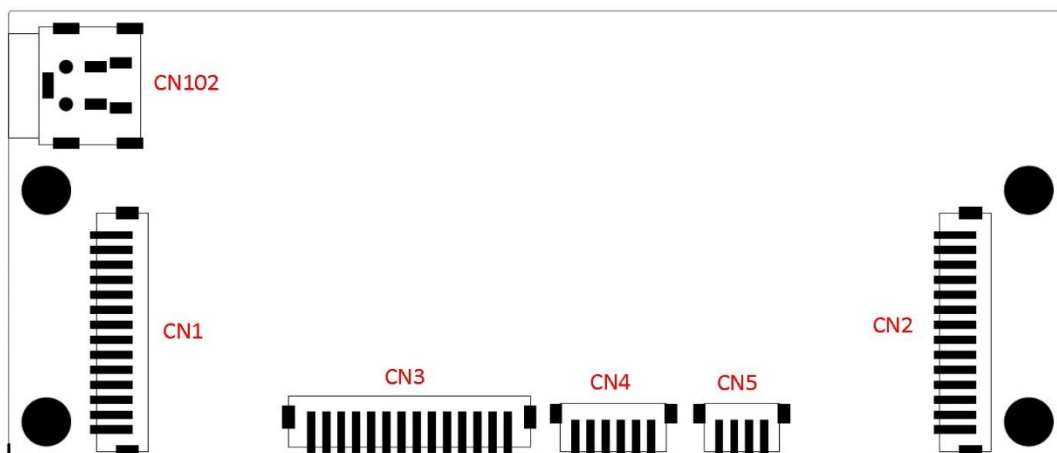


10. Connectors and Pin Information for Power Sequence Board

10.1 Connector Summary

Reference	Item	Description	Type	Manufacture
CN102	DIN Power Jack	For 24V DC Power(Adapter)	DIN-422	GEC or equivalent
CN1	Wafer	For SMPS	20022WS-14	Yeon-Ho or equivalent
CN2	Wafer		20022WS-14	Yeon-Ho or equivalent
CN3	Wafer	For AD Board	20022WS-14	Yeon-Ho or equivalent
CN4	Wafer	-	SMW200-H06G	Yeon-Ho or equivalent
CN5	Wafer	-	SMW200-H04G	Yeon-Ho or equivalent

Connectors' position on PCB



10.2 Pin Map Details (pin assignment)

10.2.1 CN102 : DIN Power Jack / DIN-422

Pin No	Symbol	Description	Remarks
1, 3	GND	Ground	
2, 4	24V	24V Power Input	

10.2.2 CN1 : 20022WS-14 / 2.0mm pitch / Yeon-ho

Pin No	Symbol	Description	Remarks
1~5	24V	24V Power Input	
6~10	GND	Ground	
11~13	NC	No Connection	
14	B/L	Backlight on/off	

10.2.3 CN3 : 20022WS-14 / 2.0mm pitch / Yeon-ho

Pin No	Symbol	Description	Remarks
1~5	24V	24V Power Input	
6~10	GND	Ground	
11	NC	No Connection	
12	Detect	Voltage detect	
13	NC	No Connection	
14	B/L	Backlight on/off	

10.2.4 CN4 : SMW200-H06G / 2.0mm pitch / Yeon-ho

Pin No	Symbol	Description	Remarks
1	RX	RX	
2	TX	TX	
3, 4	GND	Ground	
5, 6	NC	No Connection	

10.2.5 CN5 : SMW200-H04G / 2.0mm pitch / Yeon-ho

Pin No	Symbol	Description	Remarks
1	GND	Ground	
2	TX	TX	
3	RX	RX	
4	NC	No Connection	

10.2.6 CN2 : 2002WS-14 / 2.0mm pitch / Yeon-ho

Pin No	Symbol	Description	Remarks
1~7	EVDD	OLED Panel Power Supply	
8~14	GND	Ground	