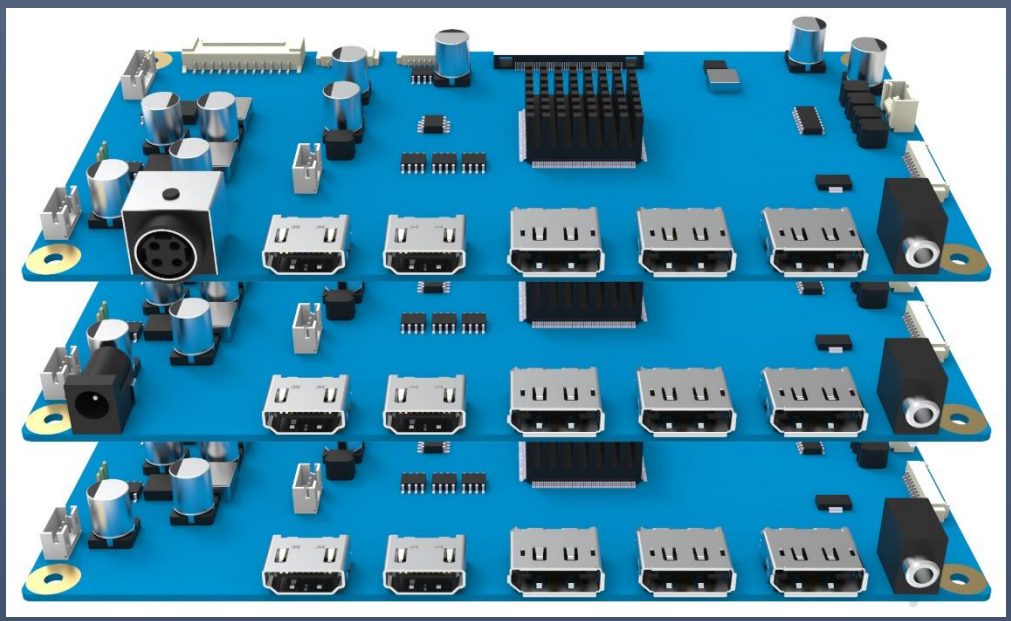
2022

Data Sheet



Model Name : Titan

Part No. : TTN - xxx....xxx

(xxx...xxx : Target LCD Part No.)

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Revision History

PCB Version	Rev. date	Revision Details
0.0	Jul 2018	Engineering Sample
1.0	Apr 2019	Issued the Mass Production version
2.0	Jun 2019	-. Addition of S/PDIF (Optical Audio) -. Changing the eDP circuit -. Addition of ALCW (**A**dvanced **L**ow **C**olor **W**ashout) on the OSD Menu for below AUO models in order to make a precise video image in case of still image (static video image) AUO 43", P430QVN02.0 AUO 55", P550QVF06.3 AUO 75", P750QVN02.1 AUO 85", P850QVN02.1
3.0	Oct 2019	-. Enlarge the PCB size (10 mm) horizontally -. Addition of CN12 (Panel Vcc : Wire Connector type) -. Panel Vcc on the Vx1 & eDP port (CNF6) : Power upgrade (up to 4A) -. Main Power Incoming Pattern : Power upgrade (up to 8A)
3.0	Aug 2020	Adoption of wide Dimming Menu for Marine or Medical Monitors
3.0	Dec 2022	Adoption of Pixel Shift Function (refer to the Addendum)

1. General Description

- **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 2Port**
- DP connector/**DP1.2/4K2K@60Hz 2Port**
- **HDCP 2.2 support**
- OSD/Display Rotation Function
- Overdrive / Over scan Function
- **HDR (High Dynamic Rendering) / Optional Support**
- 6 Color control
- PCM(Precise Color management)
- Sharpness/Hue/Color Support
- Gamma Control
- Color Effect Function
- 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 FRC board separately (“NT-13F” / Novatek NT72334TBG model or “20A08” / MStar MST6M60FV model) - Option

● Special Feature

Pixel Shift Function (Optional support)

It is to minimize the Burn-in issue that occurs when a still image persists.
In case of still images, pixel-shift must be performed continuously without any manual scheduling function. That is enough through only the adoption by On/Off function of Pixel-Shift, refer to the Addendum (Chapter9).

Fashion Designed GUI (Graphic User Interface)

Titan perform the fashionable designed OSD Menu (GUI).

Extended panel power support range

The power circuit of Vcc has been sufficiently adopted for wide range up to 4A level by enlarged pattern design on the PCB.

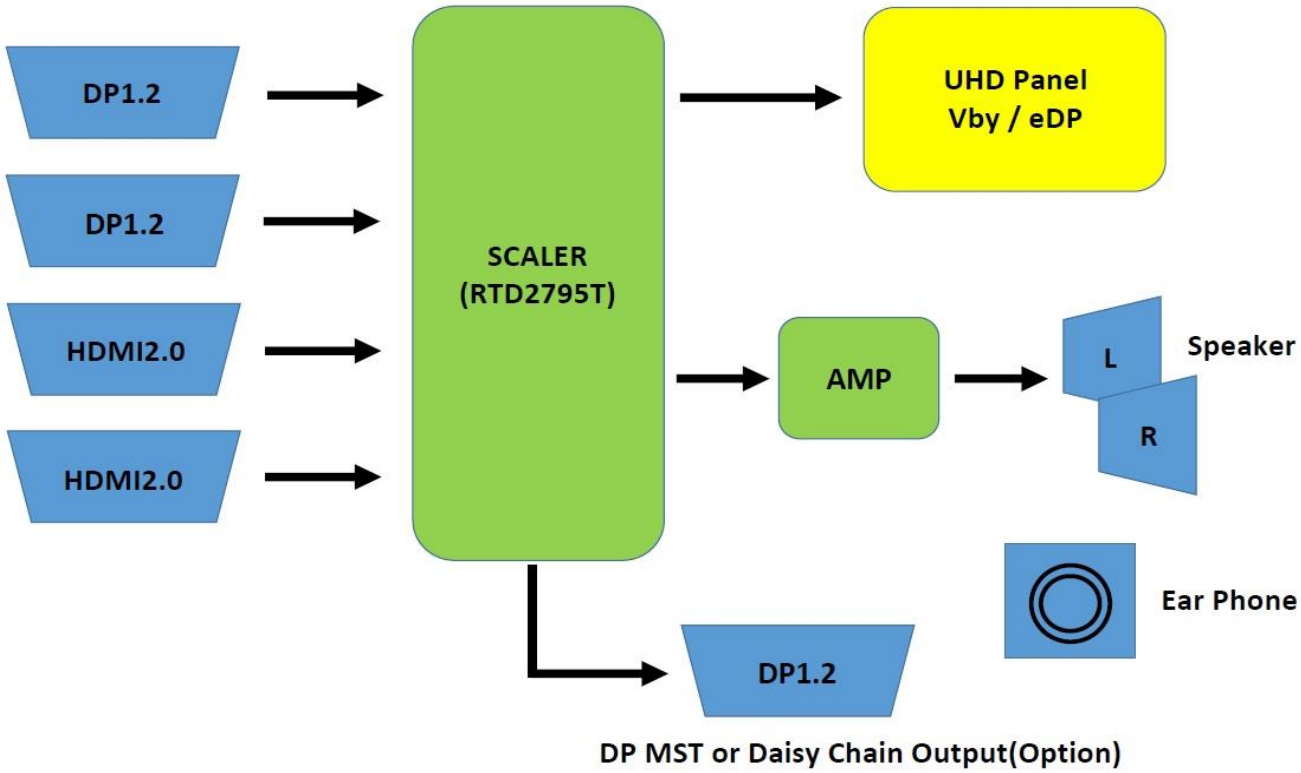
Various Languages

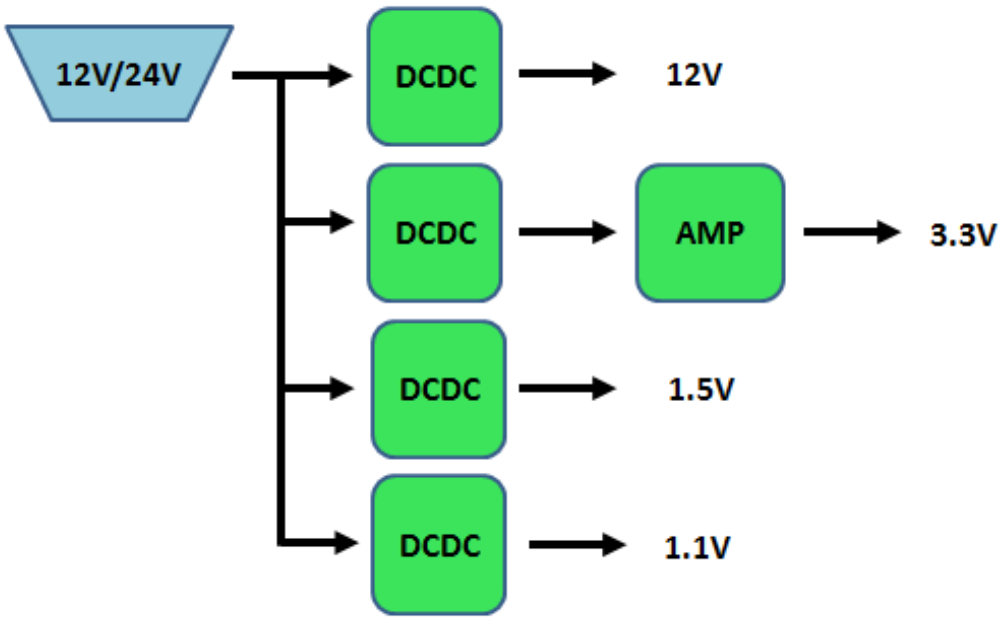
Total 9 kinds of languages can be provided depending on customer’s choice

Wide Dimming Support

-. Supportable Contrast Ratio : 5000 : 1
-. Custom designed wide range type LED Driver Models are available (Supplemental Option)
-. Total 12 channels by 2 chip solution or Total 24 channels by 4 chip solution (200mA/Channel)

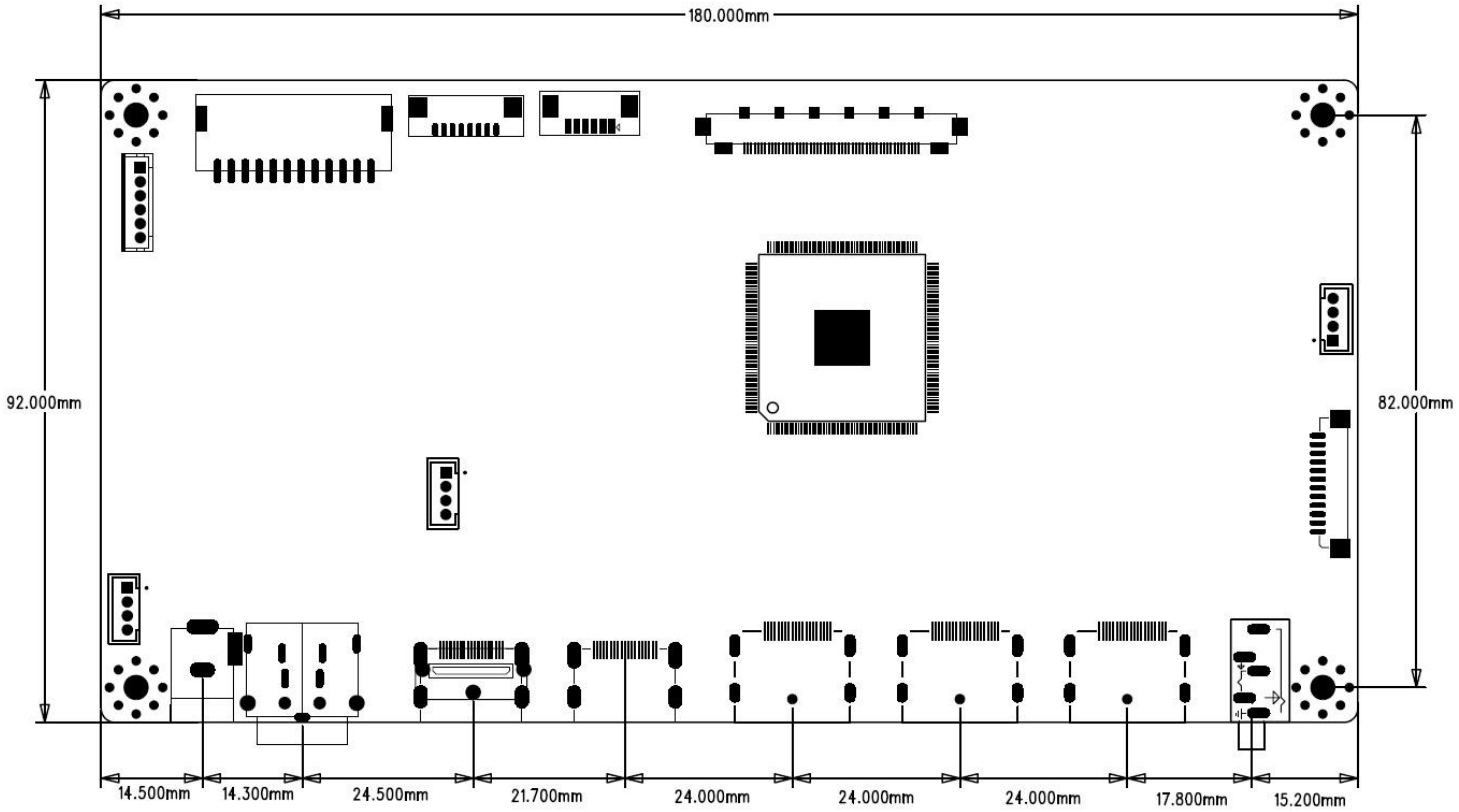
2. Block Diagram



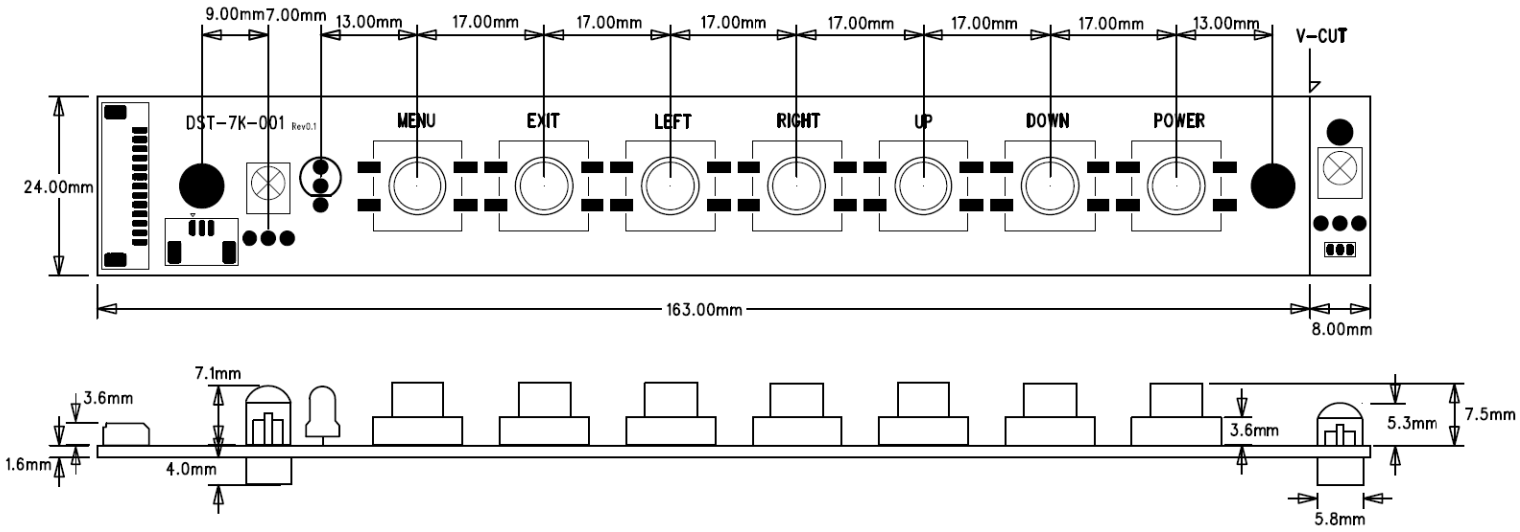


3. Board Dimensional Drawing

3.1 Main Board Drawing (unit : mm, 180 x 92 x 1.6)

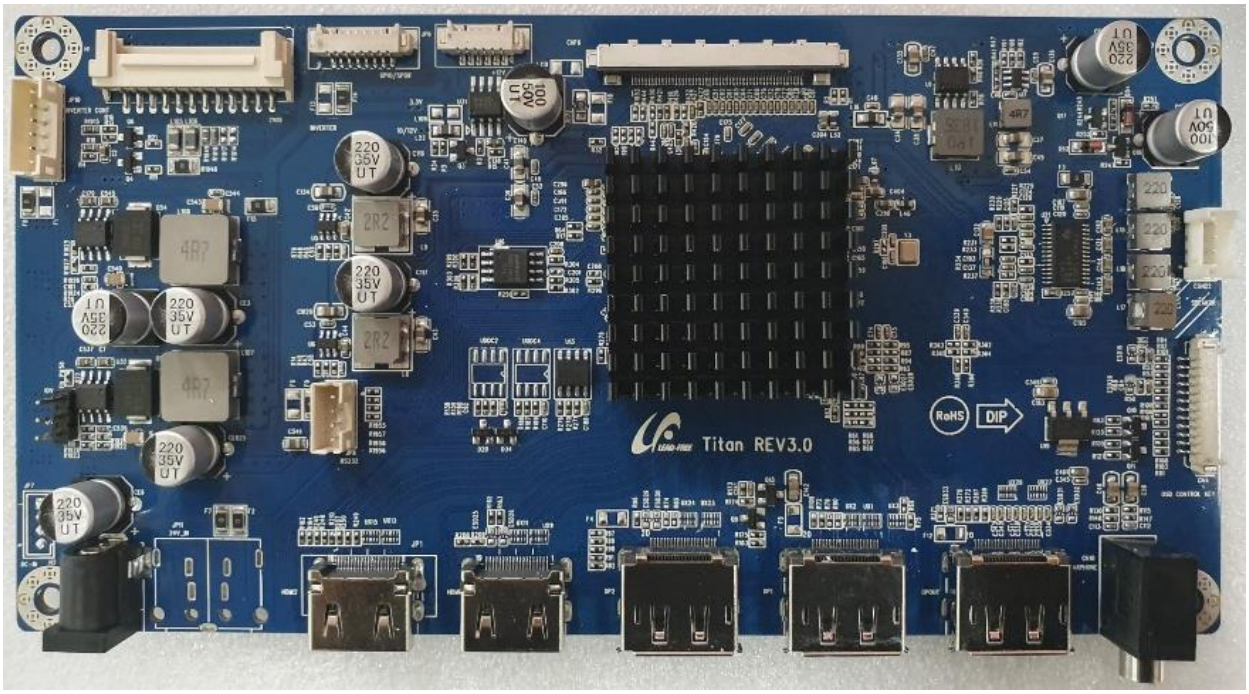


3.2 OSD Board Dimensional Drawing (unit : mm, 150 x 16 x 1.6)

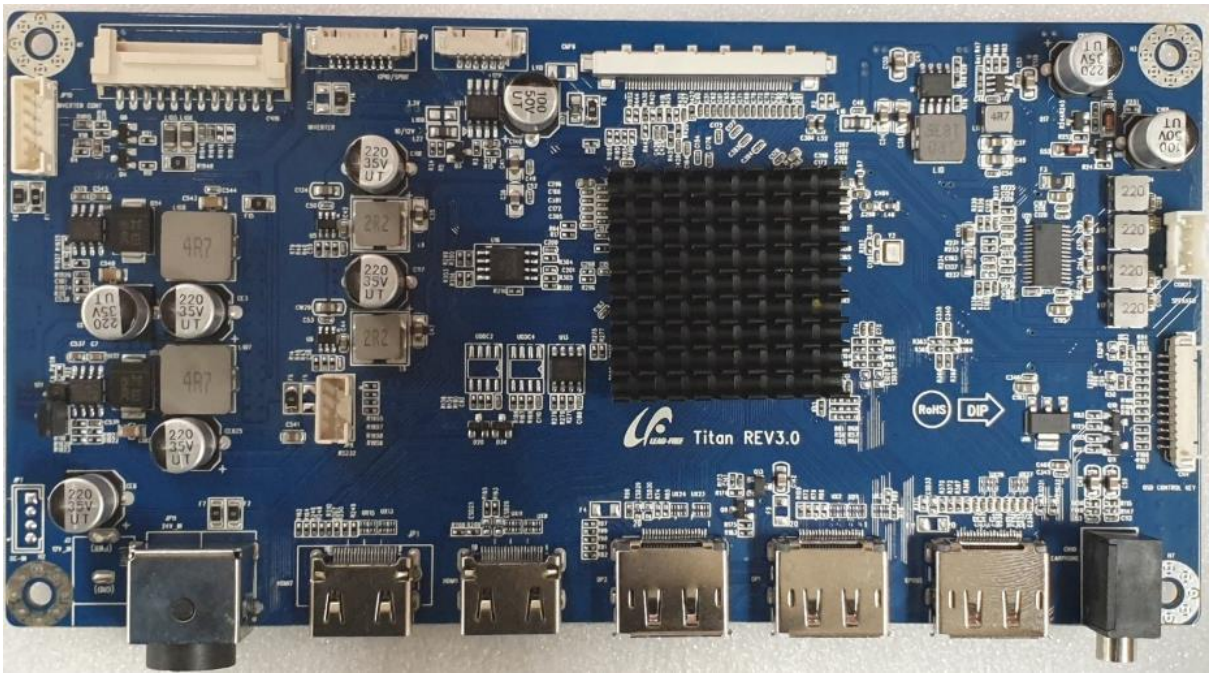


3.3 Pictures

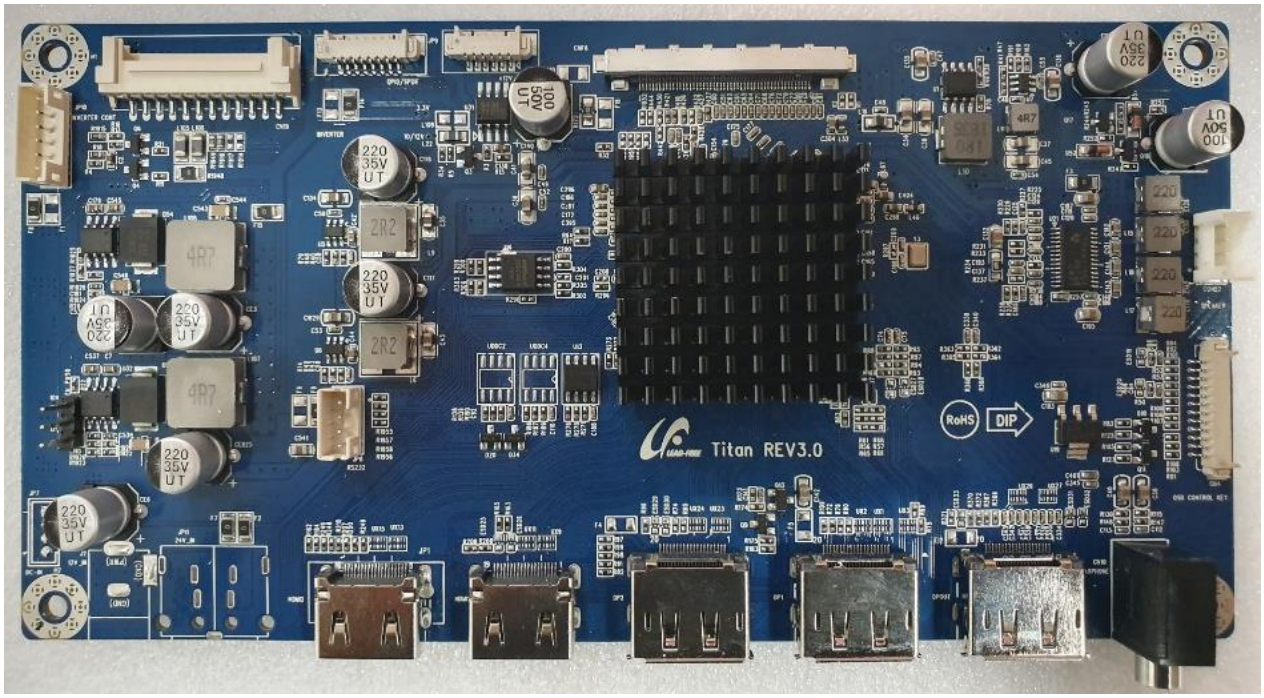
Front view ： 12V Adaptor type (Barrel Jack)



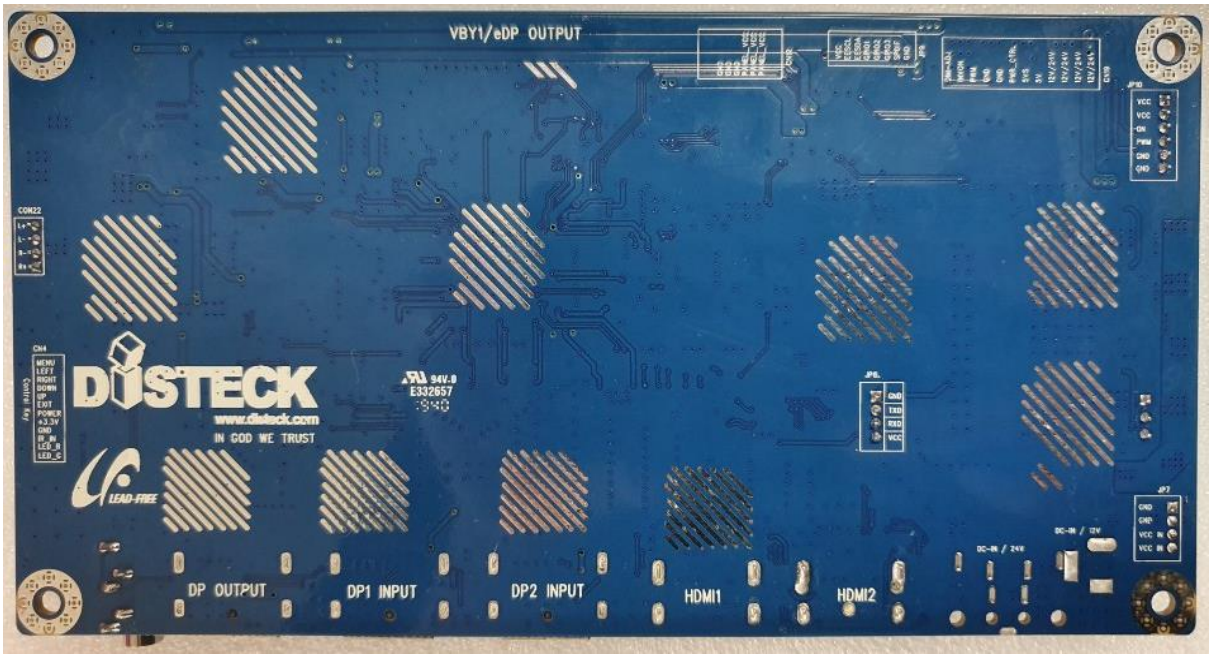
Front view ： 24V Adaptor type (4 holes DIN Jack)



Front view : SMPS adoption type (ordinary wire connection with the CN19)



Rear view : there is no mounted any component

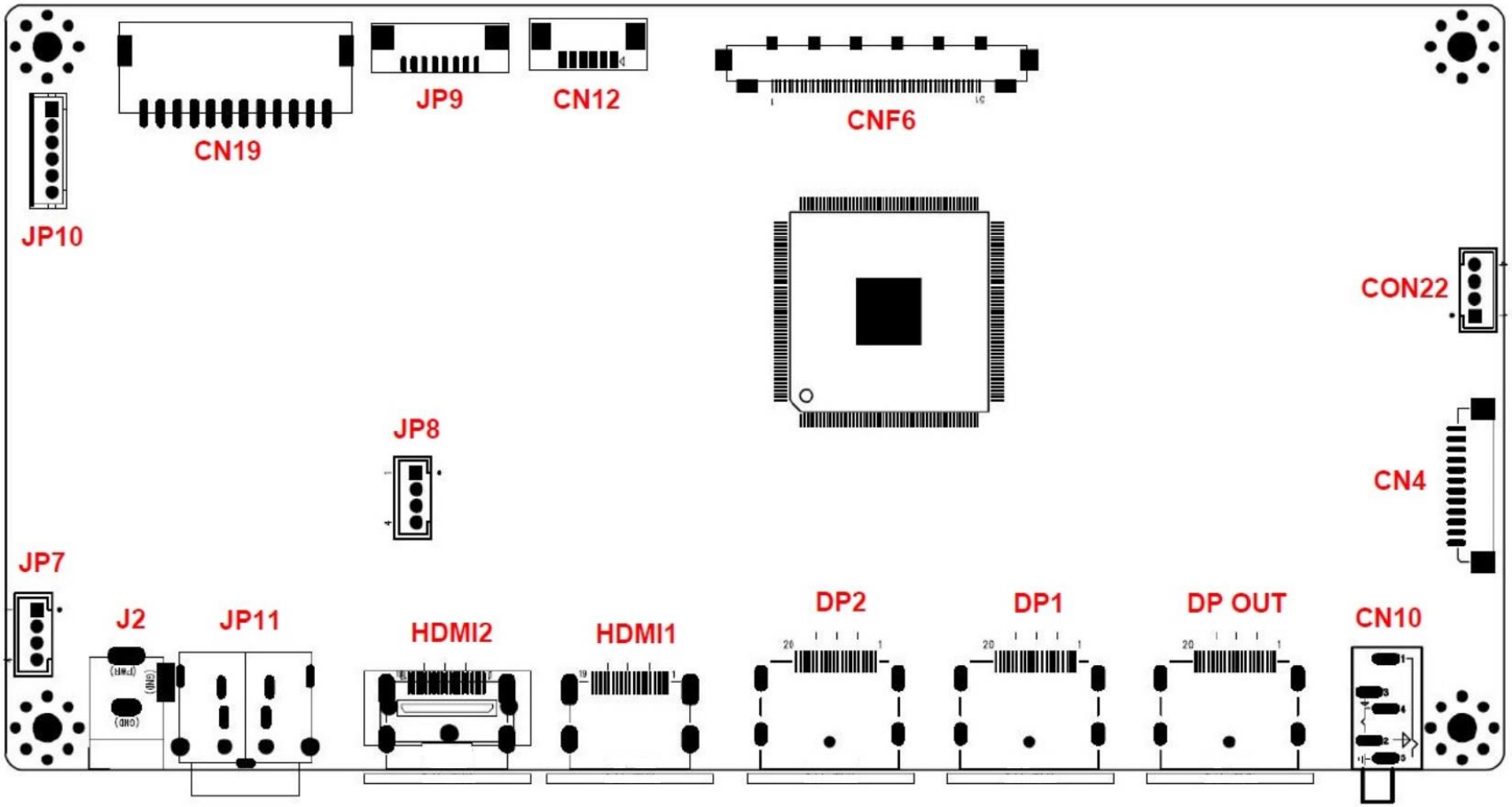


4. Connectors and Pin Information

4.1 Connector Summary

Reference	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	12505WR-12	Yeon-Ho or equivalent
CN10	Phone Jack	For Headphone Output	SJ3501-5 H7	Chang-Chun or equivalent
CN19	Wafer	For Inverter or SMPS	20037WR-12	Yeon-Ho or equivalent
CON22	Wafer	For Speaker	20010WS-04	Yeon-Ho or equivalent
J2	DC Power Jack	For 12V DC Power	DJ05H-250	Chang-Chun or equivalent
JP7	Wafer	For 12V/24V DC Power	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
JP11	DC Power Jack	For 24V DC Power	KJP-4S-S_4P	Chang-Chun or equivalent
HDMI1	HDMI Jack	For HDMI 2.0 Input	51L019S-36DN-A	Freeport or equivalent
HDMI2	HDMI Jack	For HDMI 2.0 Input	51L019S-36DN-A	Freeport or equivalent
DP1	DP Jack	For DP1.2 Input	DPCON_SINK	Molex or equivalent
DP2	DP Jack	For DP1.2 Input	DPCON_SINK	Molex or equivalent
DPOUT	DP Jack	For DP Output, Daisy Chain	DPCON_SINK	Molex 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
1~8	LCD_VDD	VDD For LCD Module
9	N.C	No Connection
10~13	GND	Ground
14~17	N.C	No Connection
18	Vby1_SDA	I2C Data Line
19	Vby1_SCL	I2C Clock Line
20	N.C	No Connection
21	Option_VBY1	Option For AUO Panel
22~24	NC	No Connection
25	Vby1_HPD	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 CNF6 : for e-DP(1.1) Output,

Wafer / when user adopts the eDP interface type panel

Pin No	Symbol	Description
1~8	LCD_VDD	12V, VDD For LCD Module
9	N.C	No Connection
10~13	GND	Ground
14	N.C	No Connection
15	2nd AUX_N	eDP 2nd Negative AUX Channel
16	2nd AUX_P	eDP 2nd Positive AUX Channel
17~21	N.C	No Connection
22	1st AUX_N	eDP 1st Negative AUX Channel
23	1st AUX_P	eDP 1st Positive AUX Channel
24	N.C	No Connection
25	1st HPD	1st Hot Plug Detection
26	2nd HPD	2nd Hot Plug Detection
27	GND	Ground
28	1st LANE0P	eDP 1st Positive data input Lane 0
29	1st LANE0N	eDP 1st Negative data input Lane 0
30	GND	Ground
31	1st LANE1P	eDP 1st Positive data input Lane 1
32	1st LANE1N	eDP 1st Negative data input Lane 1
33	GND	Ground
34	1st LANE2P	eDP 1st Positive data input Lane 2
35	1st LANE2N	eDP 1st Negative data input Lane 2
36	GND	Ground
37	1st LANE3P	eDP 1st Positive data input Lane 3
38	1st LANE3N	eDP 1st Negative data input Lane 3
39	GND	Ground
40	2nd LANE0P	eDP 2nd Positive data input Lane 0
41	2nd LANE0N	eDP 2nd Negative data input Lane 0
42	GND	Ground
43	2nd LANE1P	eDP 2nd Positive data input Lane 1
44	2nd LANE1N	eDP 2nd Negative data input Lane 1
45	GND	Ground
46	2nd LANE2P	eDP 2nd Positive data input Lane 2
47	2nd LANE2N	eDP 2nd Negative data input Lane 2
48	GND	Ground
49	2nd LANE3P	eDP 2nd Positive data input Lane 3
50	2nd LANE3N	eDP 2nd t Negative data input Lane 3
51	GND	Ground

4.2.3 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	

4.2.4 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

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

Pin No	Symbol	Description	Remarks
1	DIM-ADJ	Dimming Adjustment	
2	INVON	Invert Power On, Off	0V (Off), 3.3V(On)
3	PWM	PWM Dimming Control	
4, 5	GND	Ground	
6	PWR_CTRL	Power Control Out (SMPS), NC (Inverter)	0V (Off), 3.3V(On)
7	5VS	5VS In (SMPS), NC(Inverter)	5V ± 1%
8	5V	5V In (SMPS), NC(Inverter)	5V ± 1%
9, 10, 11, 12	24V	24V In or 12V In(SMPS), 24V Out(Inverter)	24V ± 5% 12V ± 3%

4.2.6 CN22 : for Speaker, wafer

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

4.2.7 J2 : for 12V DC Power, Jack

Pin No	Symbol	Description	Remarks
1	FRC Power	12V or 24V For FRC Power	
2, 3	GND	Ground	

4.2.8 JP7 : for 12V /24V DC Power, Jack

Pin No	Symbol	Description	Remarks
1,2	GND	Ground	
3,4	12V/24V	12V/24V Power Input	

4.2.9 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	

4.2.10 JP9 : for I_2C Control(Master), wafer

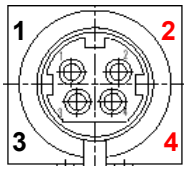
Pin No		Symbol	Description	Remarks
1		5V	5V Power	
2		SCL	Signal for SCL	
3		SDA	Signal for SDA	
4		GPIO_OPN1	GPIO Option 1	
5		GPIO_OPN2	GPIO Option 2	
6		GPIO_OPN3	GPIO Option 3	
7		GPIO_OPN4	GPIO Option 4	
8		GND	Ground	

4.2.11 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	

4.2.12 JP11 : for 24V DC Power, Jack

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



4.2.13 DP1, DP2 : 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

4.2.14 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

4.2.15 HDMI1, HDMI2 : 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

4.2.16 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.

RGB & DIVI 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

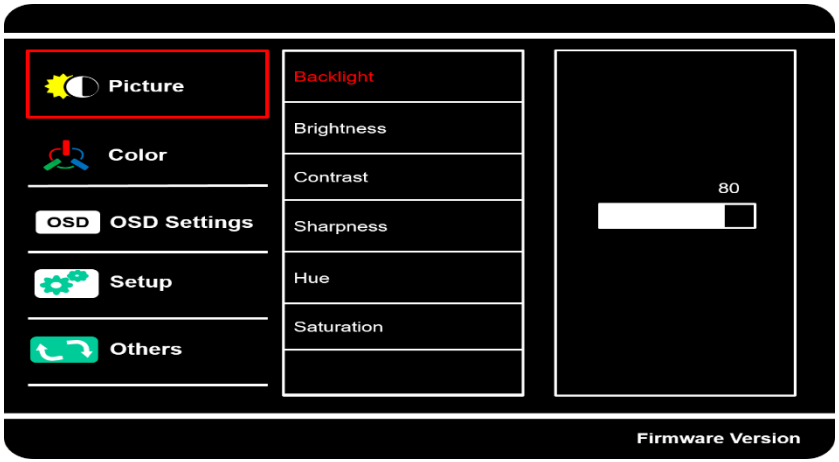
Main Menu	Sub Menu	Control	
Picture	Backlight	0 ~ 100	
	Brightness	0 ~ 100	
	Contrast	0 ~ 100	
	Sharpness	0 ~ 4	
	Hue	0 ~ 100	
	Saturation	0 ~ 100	
Color	Color Temp	9300K, 7500K, 6500K, 5800K, SRGB, User Define	
	Red	0 ~ 100	
	Green	0 ~ 100	
	Blue	0 ~ 100	
	HDR	Off, AUTO	
	Color Effect	Standard, Game, Movie, Photo, Vivid	
	Gamma	Off, 1.8, 2.0, 2.2, 2.4	
OSD Settings	Language	English, 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	

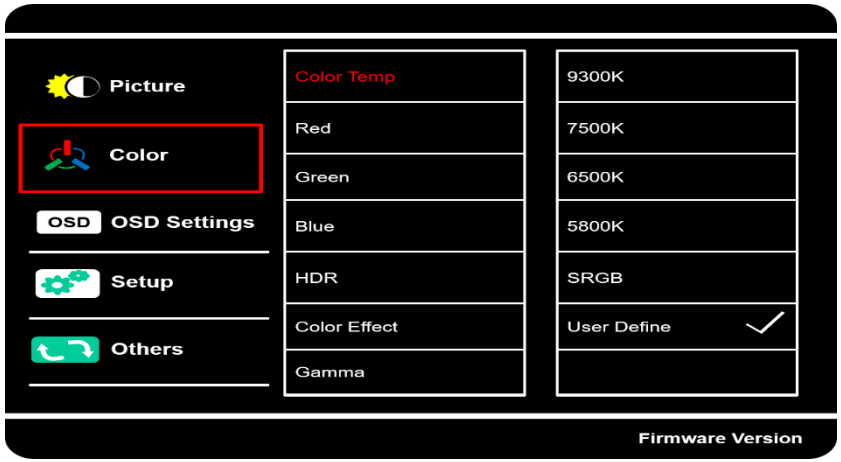
[Note] the " * " is an **Option Sub Menu**

6.2 UI Design shape by the orders of Menu Tree

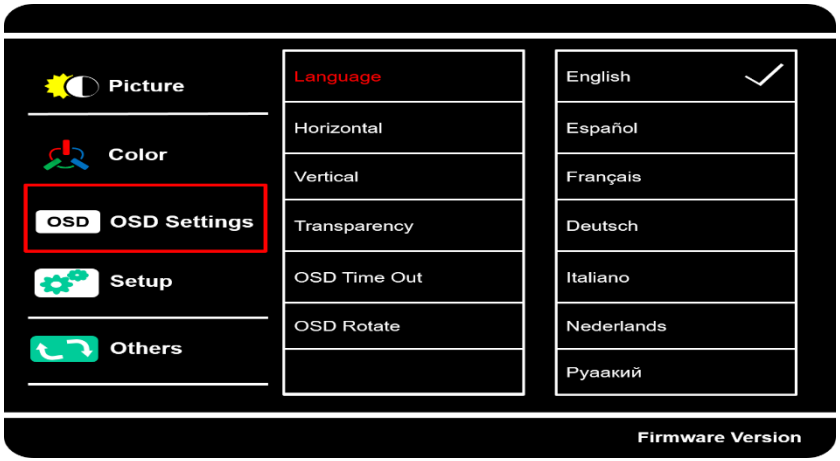
Main menu – 1 ： Picture



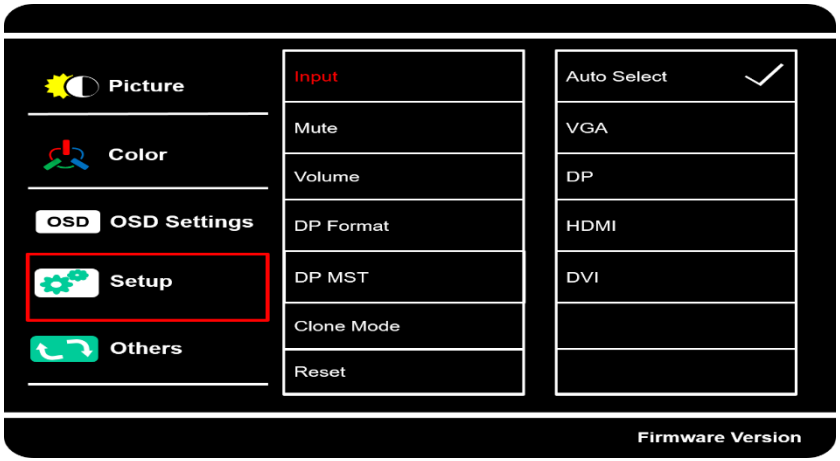
Main menu – 2 ： Color



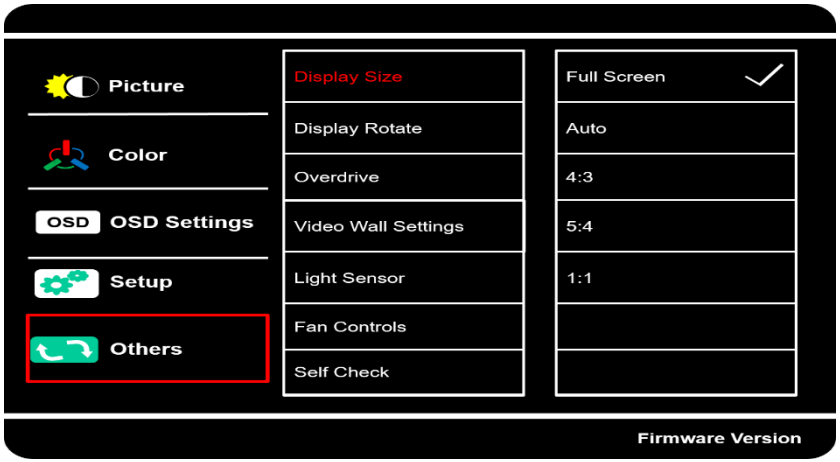
Main menu – 3 ： OSD Settings



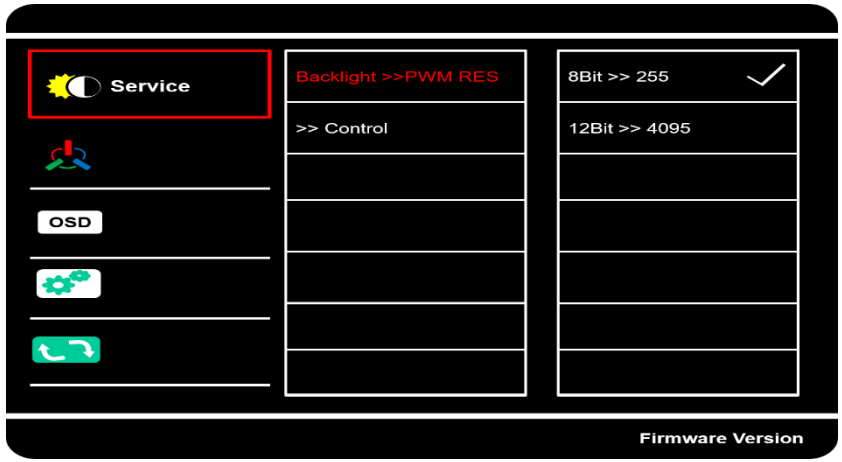
Main menu – 4 ： Setup



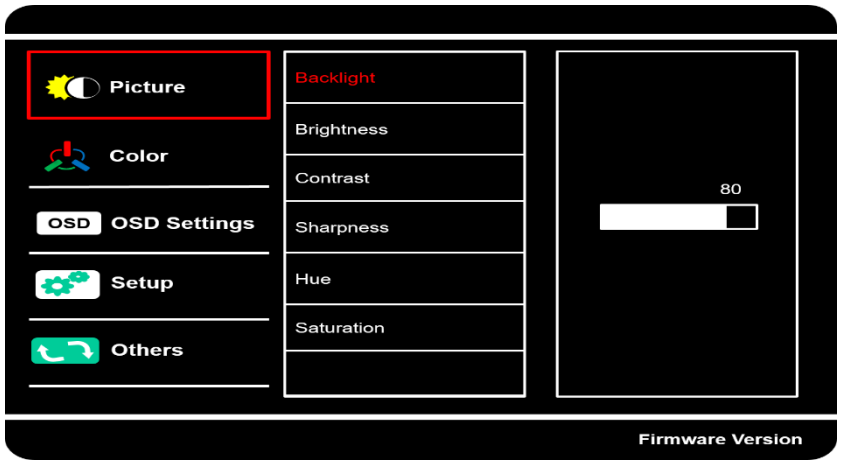
Main menu – 5 ： Others



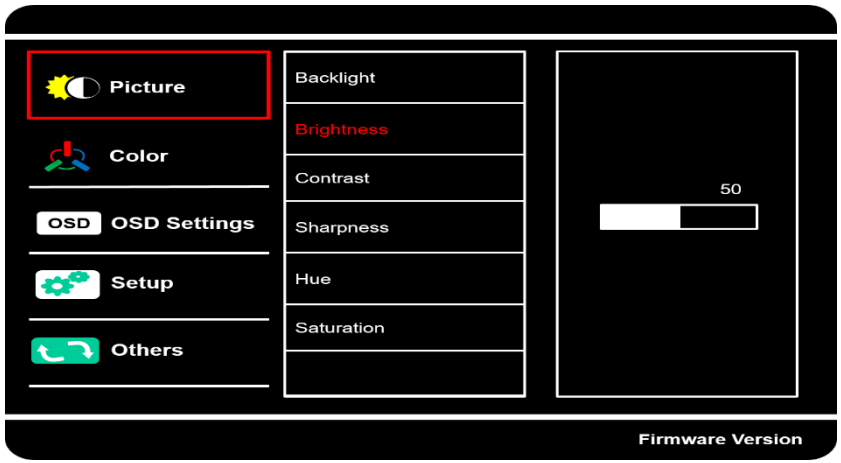
Service menu – ： Service



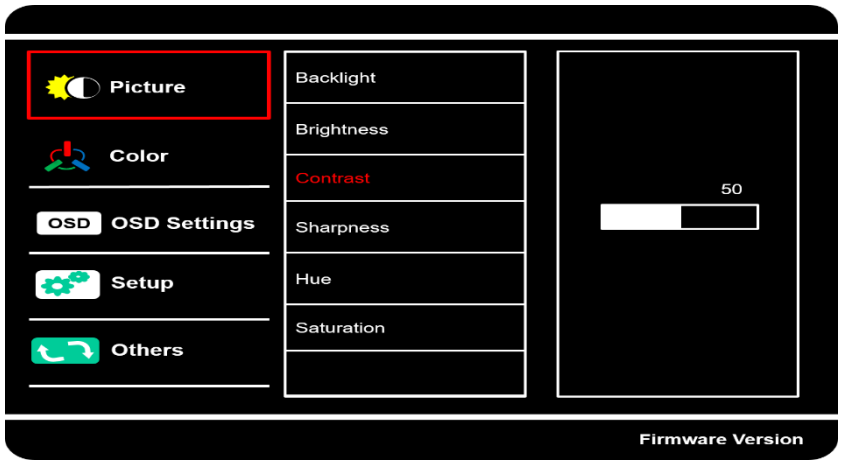
Submenu – 1-1 ： Picture – Backlight



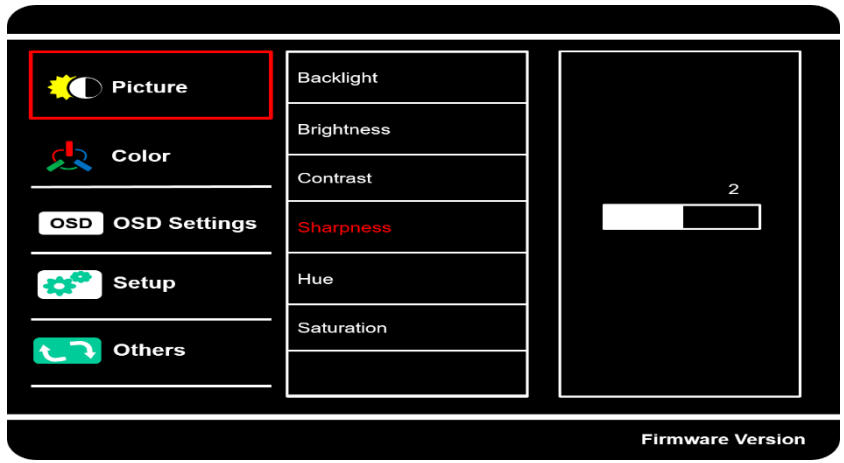
Submenu – 1-2 ： Picture – Brightness



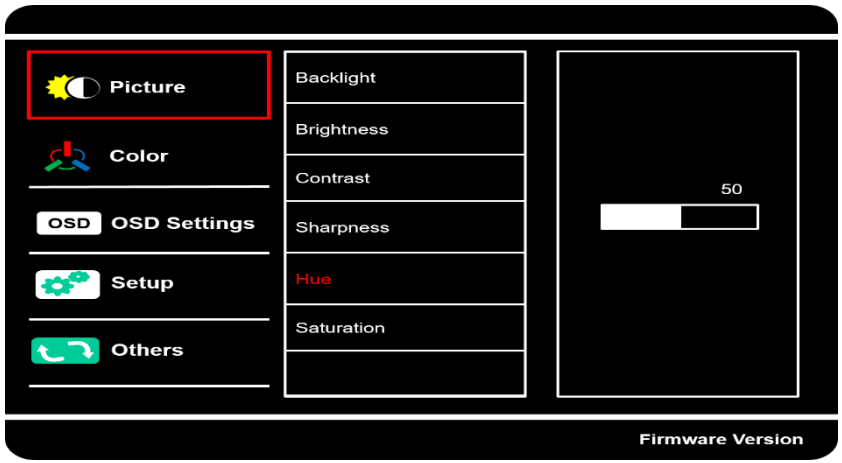
Submenu – 1-3 ： Picture – Contrast



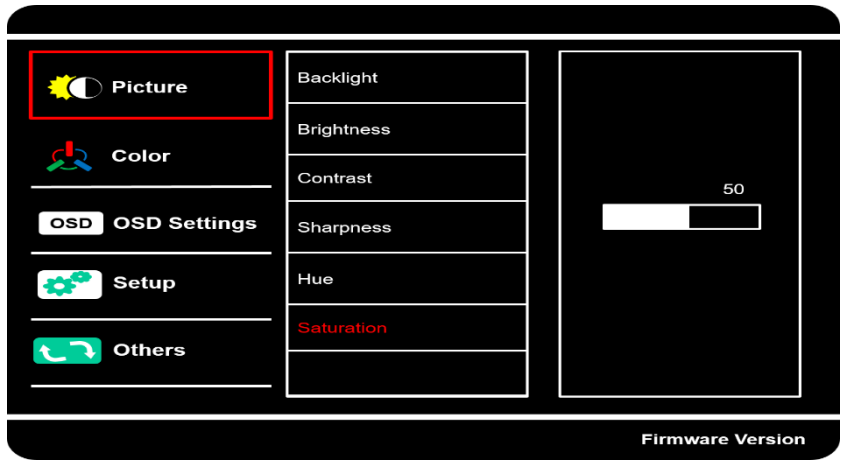
Submenu – 1-4 ： Picture – Sharpness



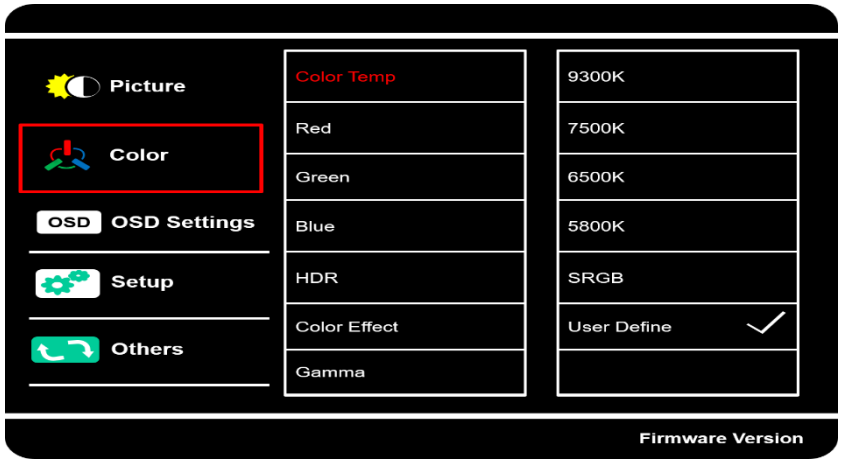
Submenu – 1-5 ： Picture – Hue



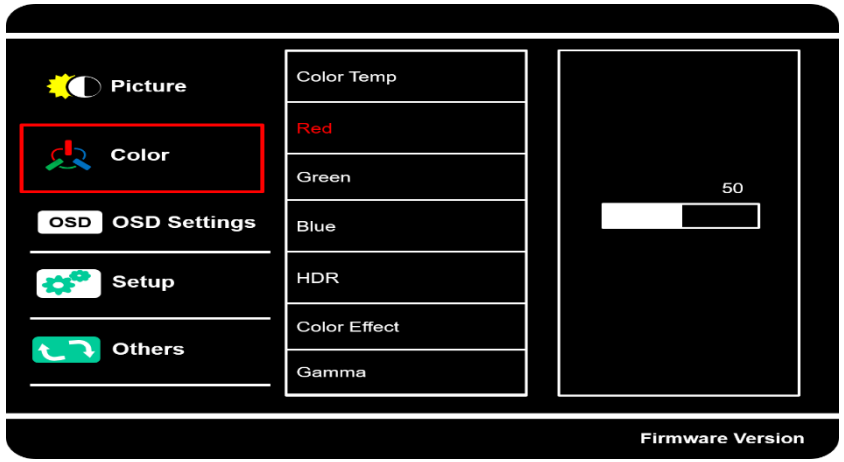
Submenu – 1-6 ： Picture – Saturation



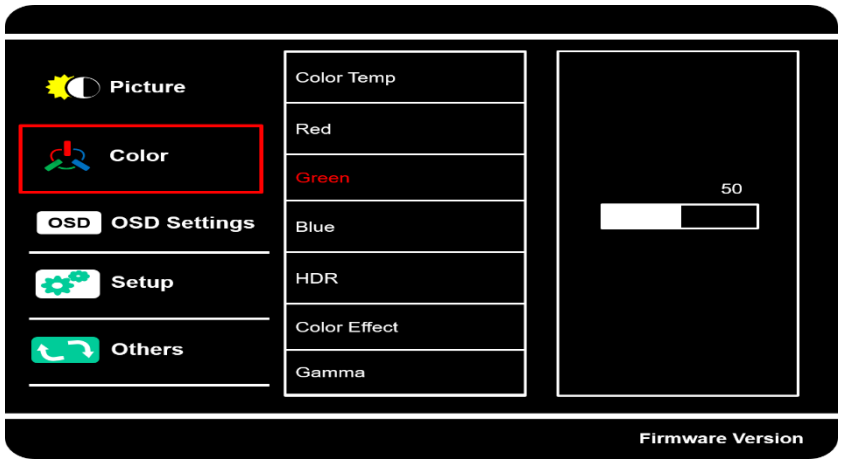
Submenu – 2-1 ： Color – Color Temp



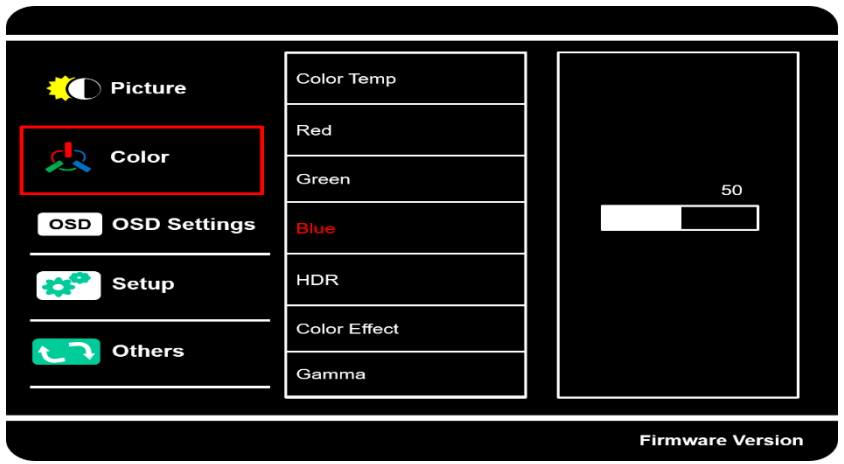
Submenu – 2-2 ： Color – Red



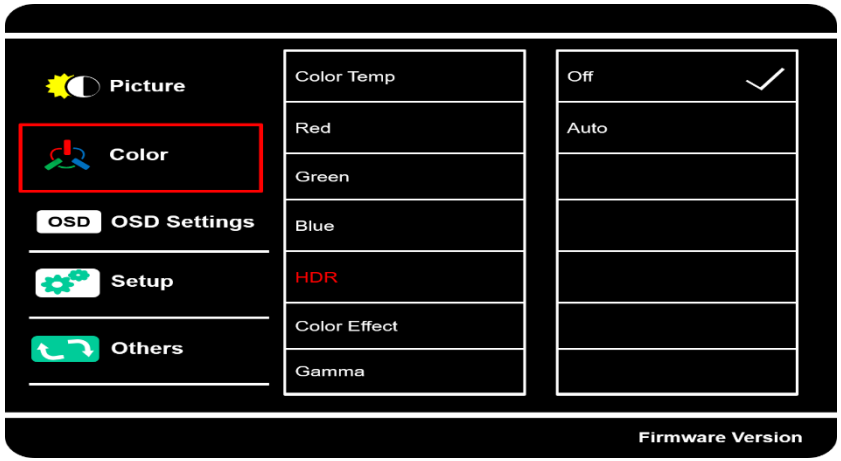
Submenu – 2-3 ： Color – Green



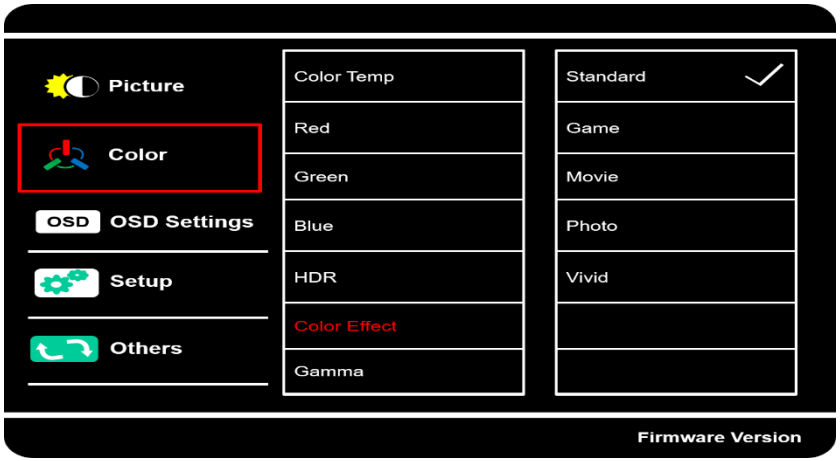
Submenu – 2-4 ： Color – Blue



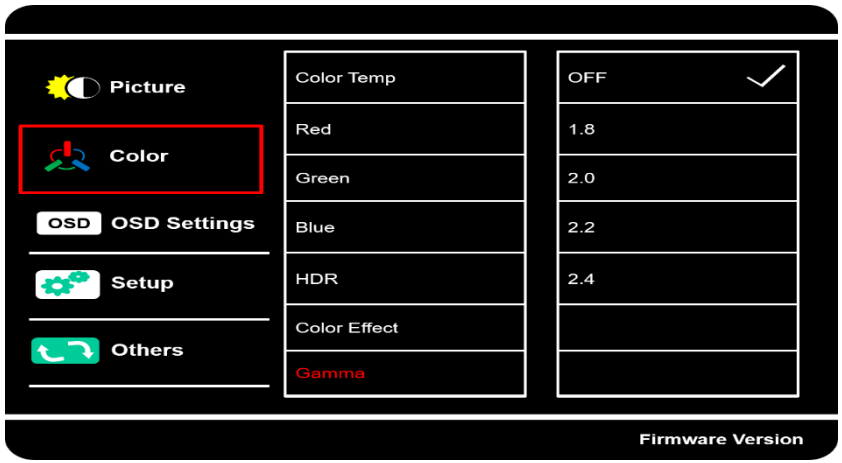
Submenu – 2-5 : Color – Color Effect



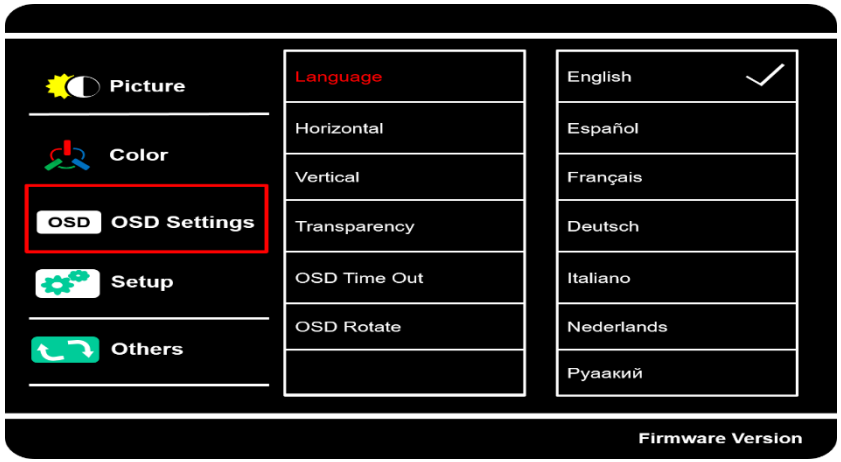
Submenu – 2-6 : Color – Color Effect



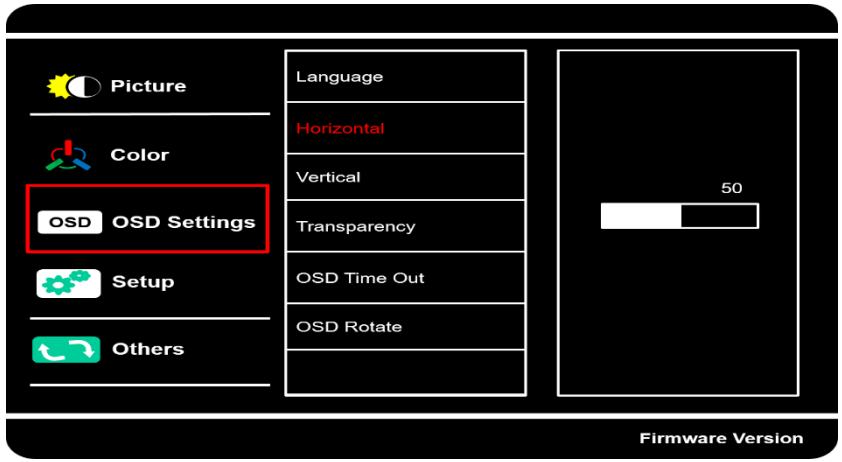
Submenu – 2-7 : Color – Gamma



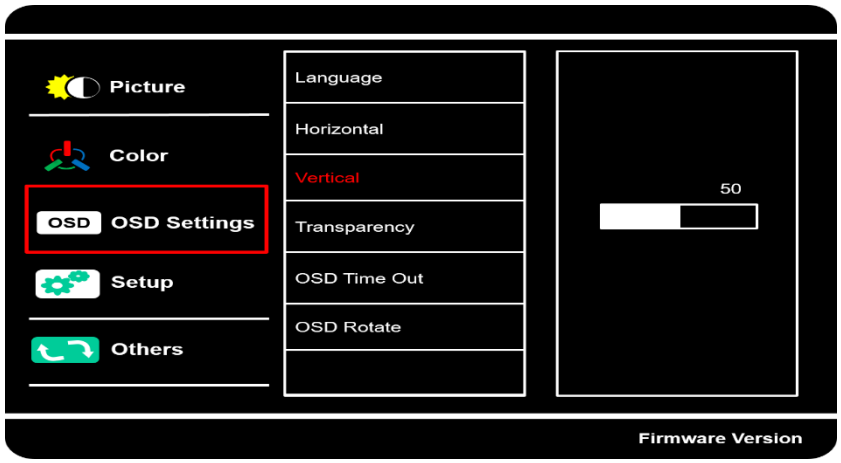
Submenu – 3-1 ： OSD Settings – Language



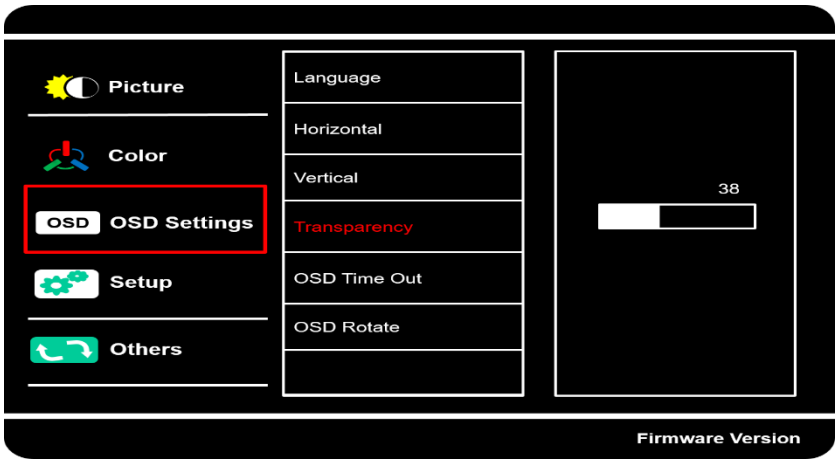
Submenu – 3-2 ： OSD Settings – Horizontal



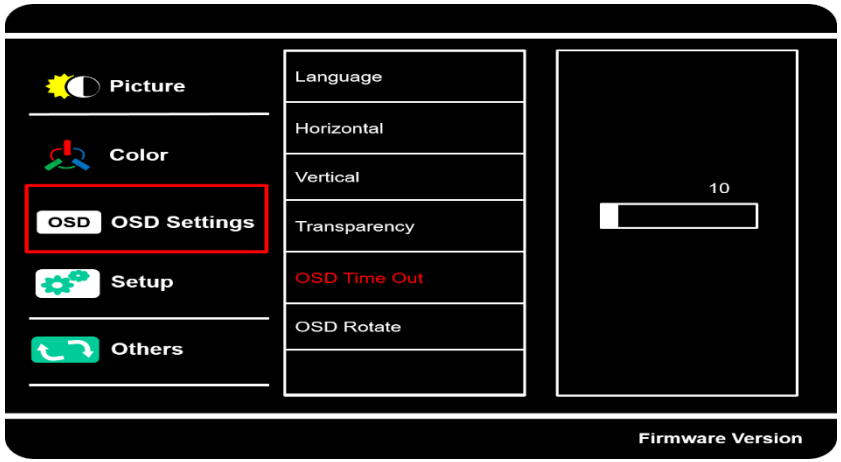
Submenu – 3-3 ： OSD Settings – Vertical



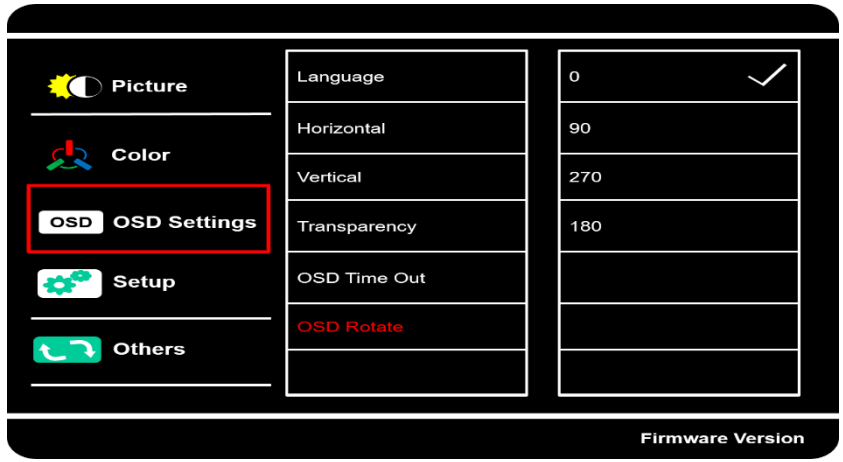
Submenu – 3-4 ： OSD Settings – Transparency



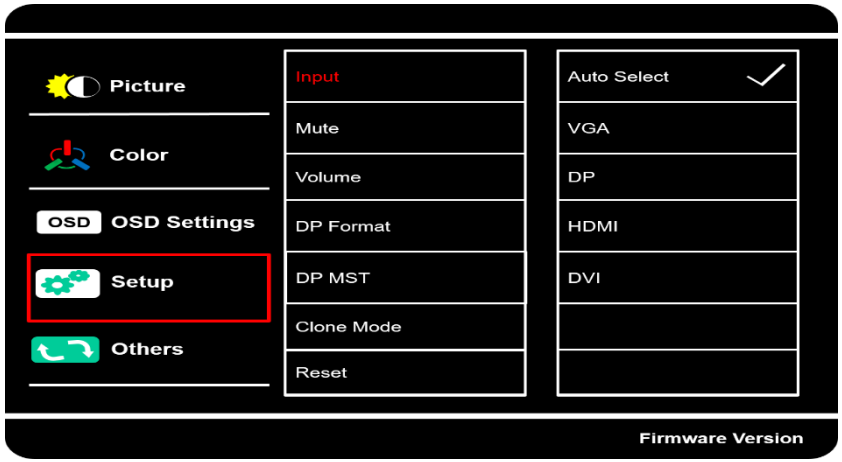
Submenu – 3-5 : OSD Settings – OSD Time Out



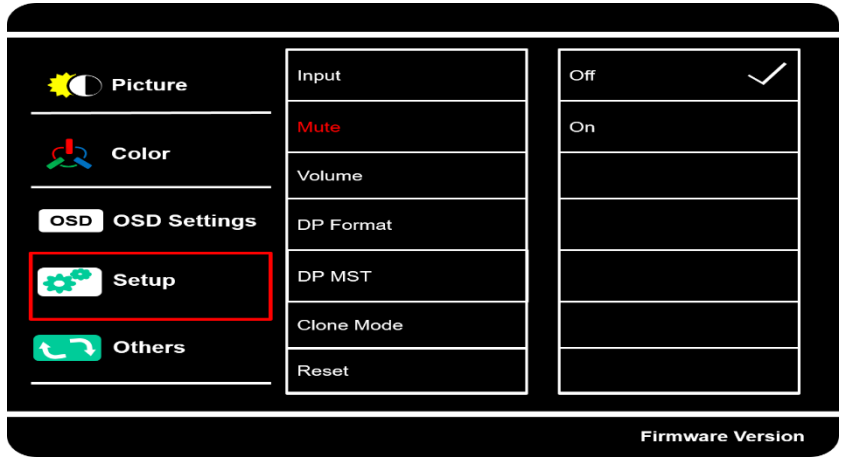
Submenu – 3-6 : OSD Settings – OSD Rotate



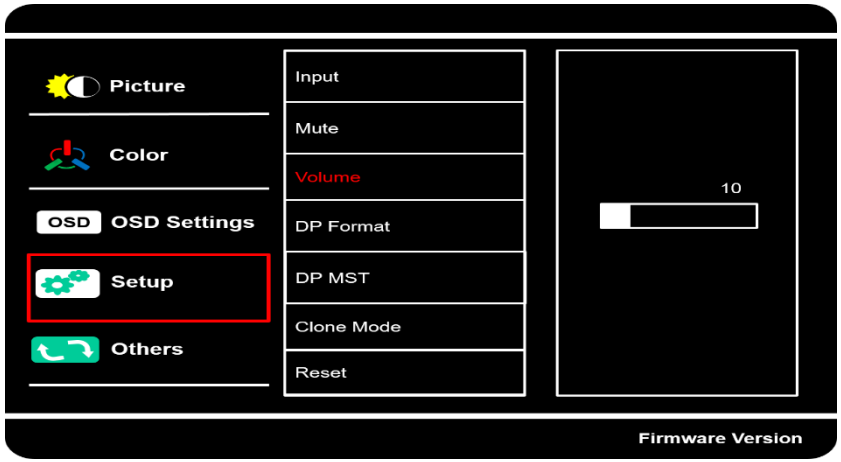
Submenu – 4-1 : Setup – Input



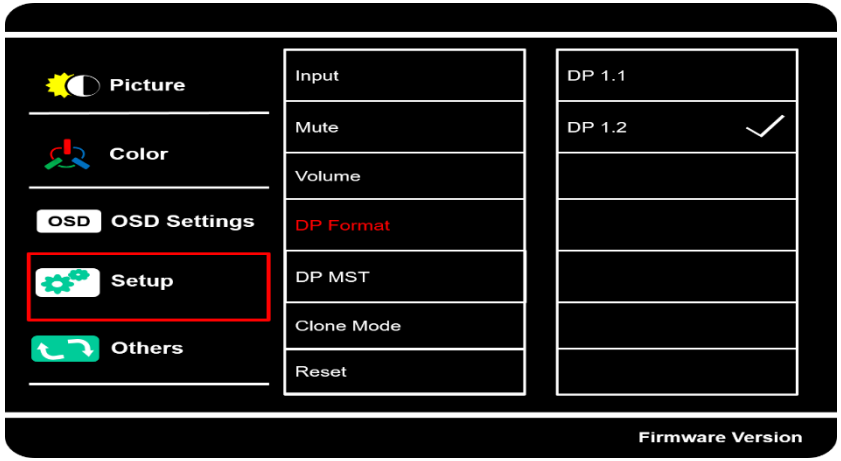
Submenu – 4-2 : Setup – Mute



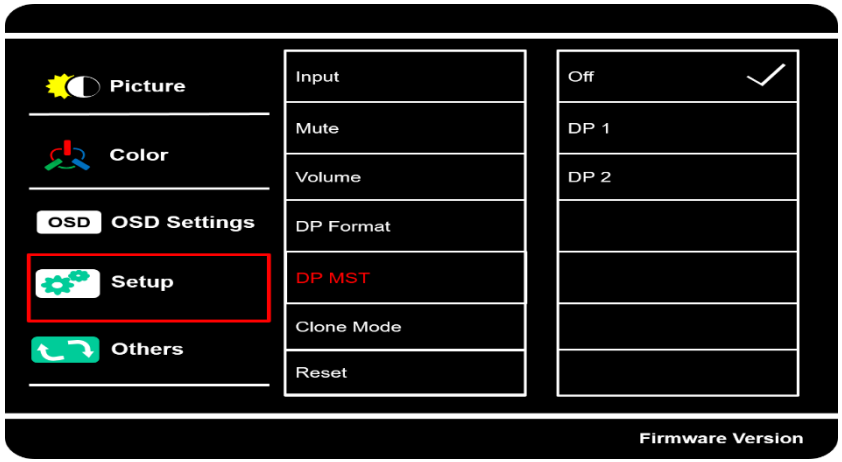
Submenu – 4-3 ： Setup – Volume



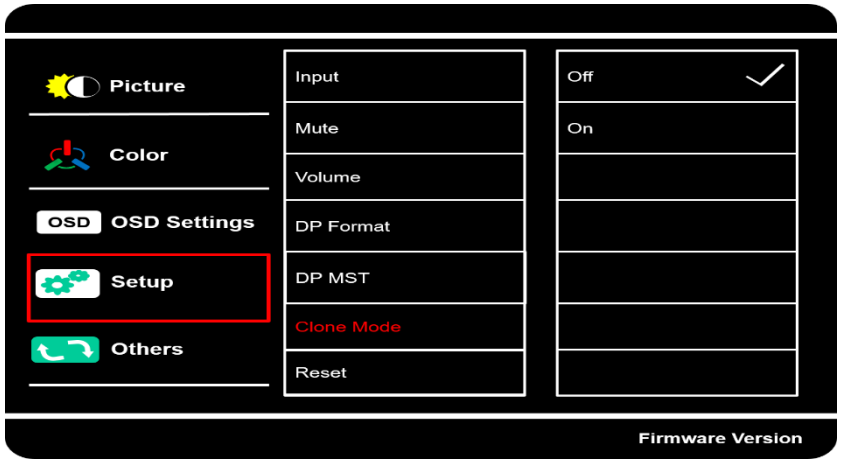
Submenu – 4-4 ： Setup – DP Format



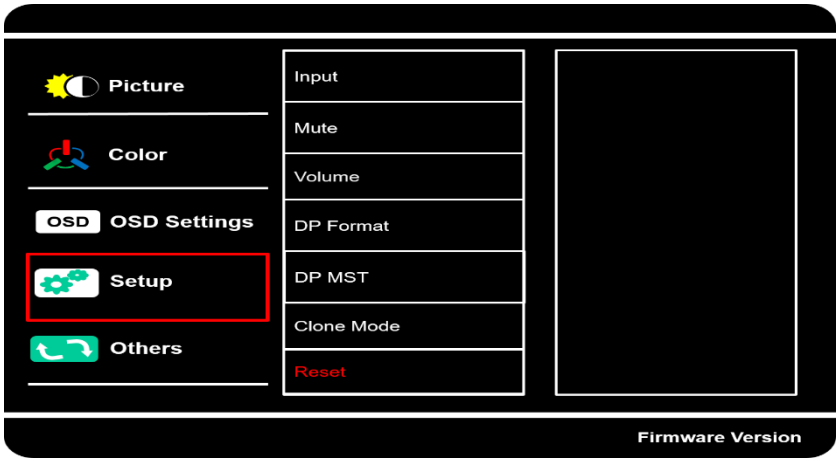
Submenu – 4-5 ： Setup – DP MST



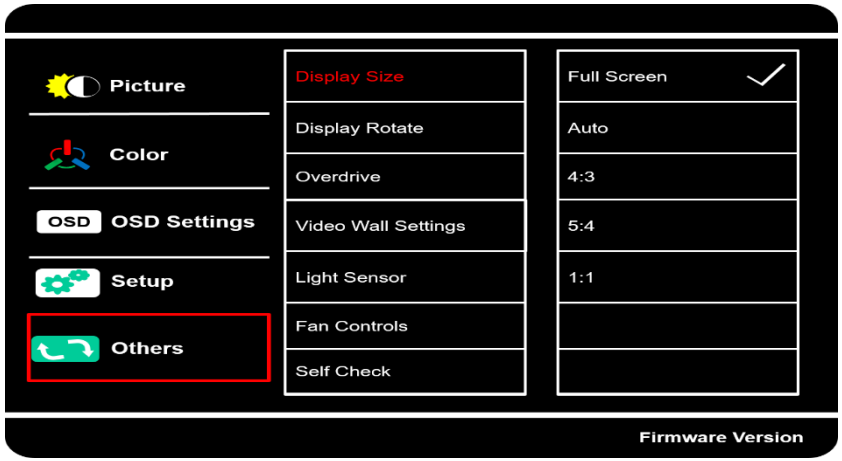
Submenu – 4-6 ： Setup – Clone Mode



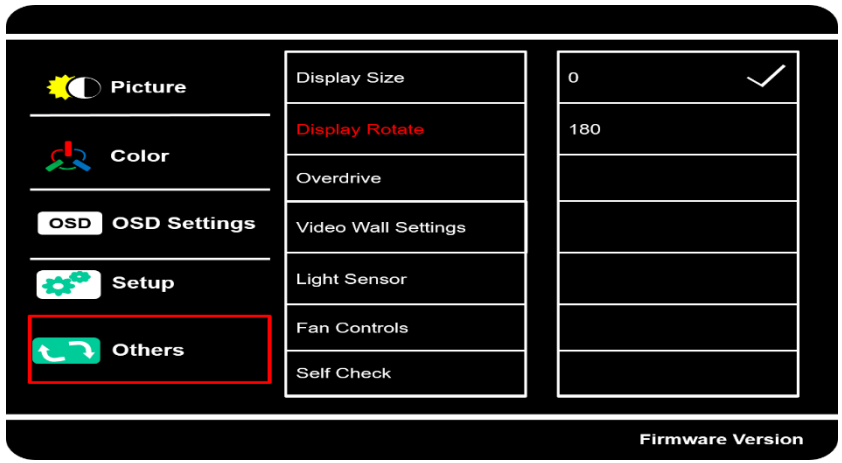
Submenu – 4-7 ： Setup – Reset



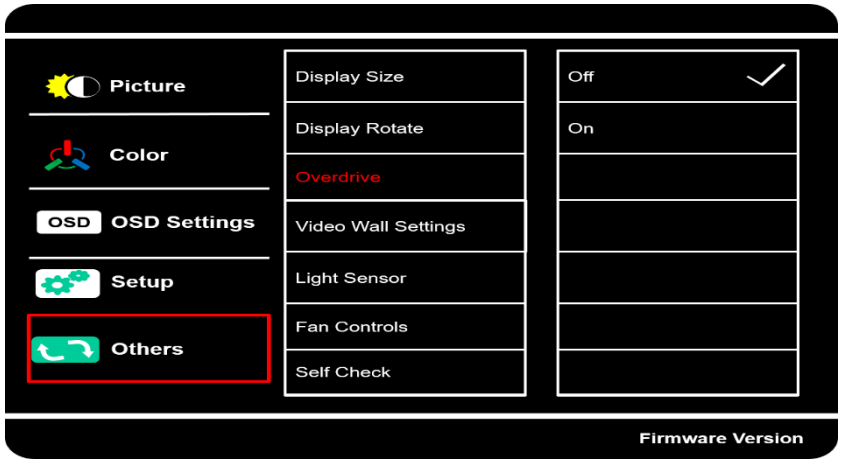
Submenu – 5-1 ： Others – Display Size



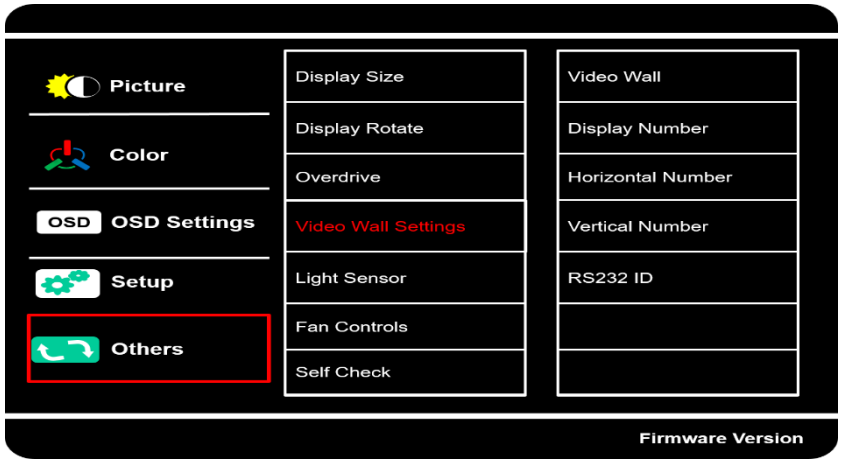
Submenu – 5-2 ： Others – Display Rotate



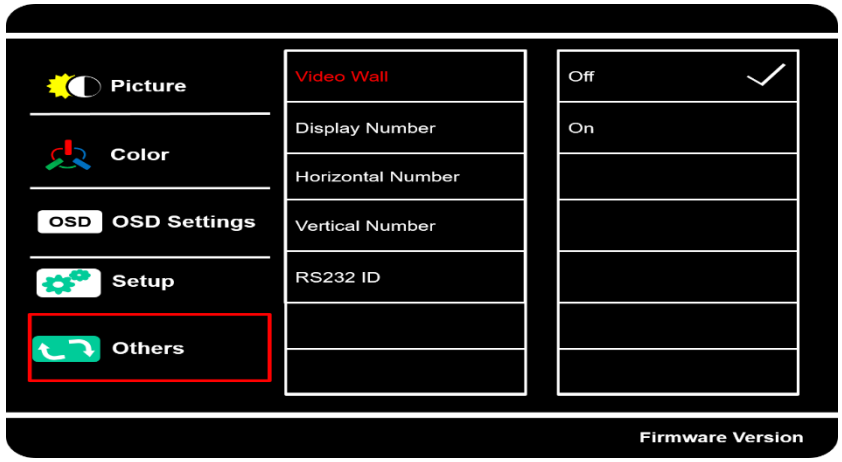
Submenu – 5-3 : Others – Overdrive



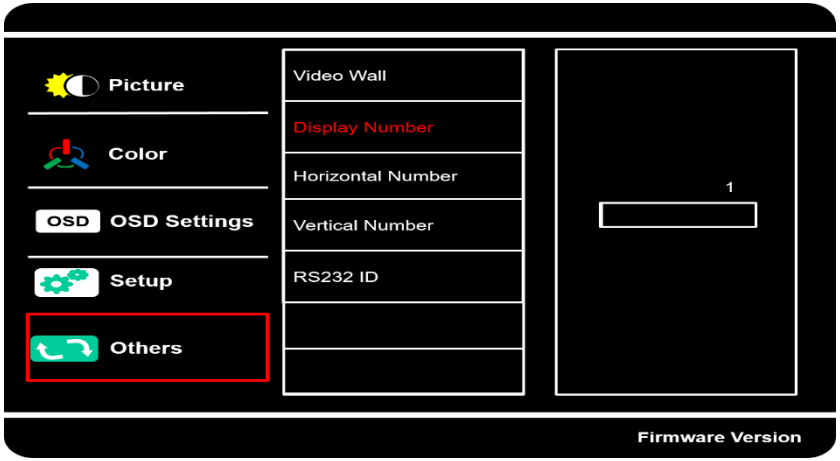
Submenu – 5-4 : Others – Video Wall Settings



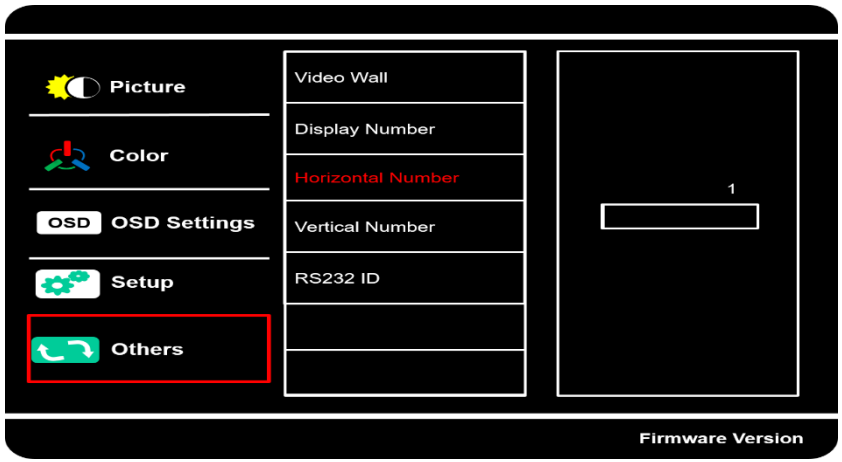
Submenu – 5-4-1 : Others – Video Wall Settings – Video Wall



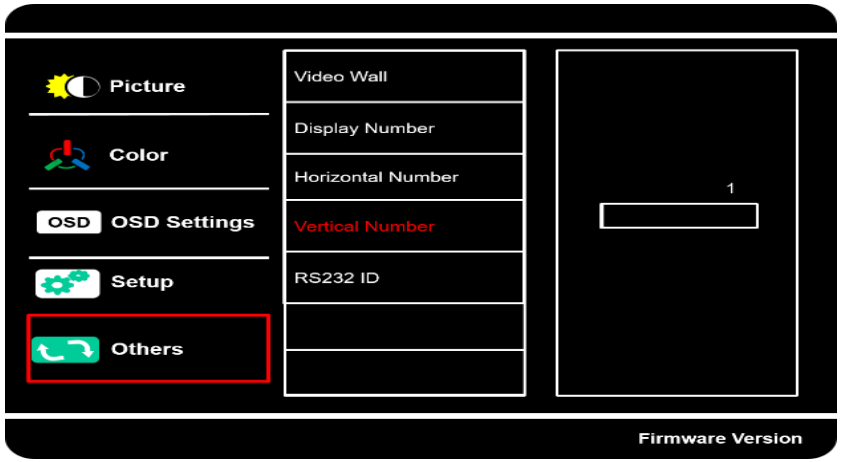
Submenu – 5-4-2 : Others – Video Wall Settings – Display Number



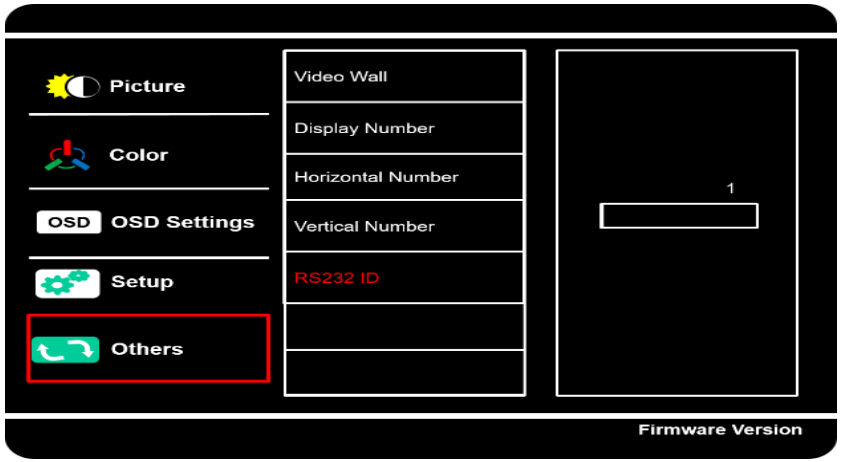
Submenu – 5-4-3 : Others – Video Wall Settings – Horizontal Number



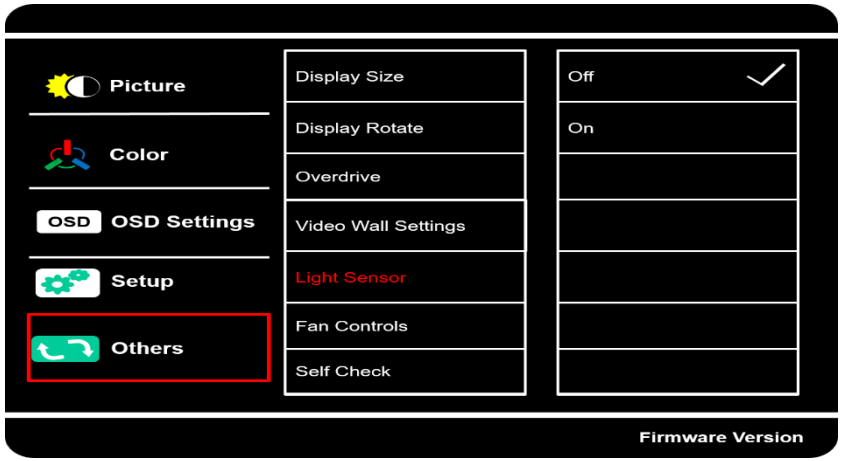
Submenu – 5-4-4 : Others – Video Wall Settings – Vertical Number



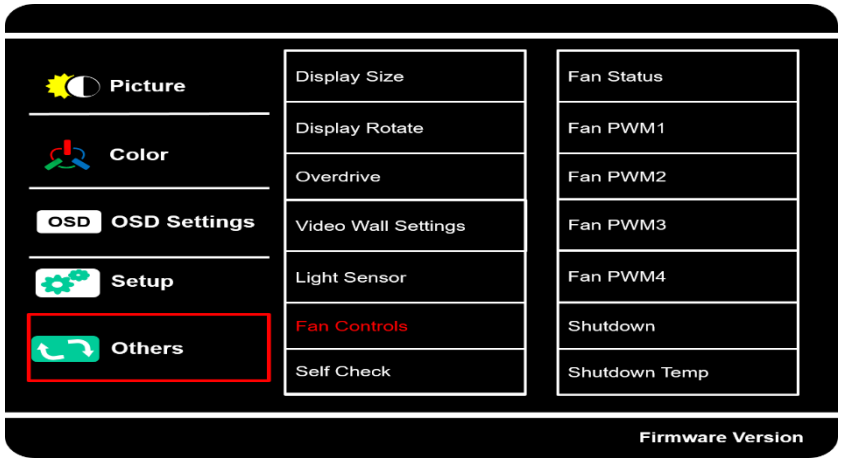
Submenu – 5-4-5 : Others – Video Wall Settings – RS232 ID



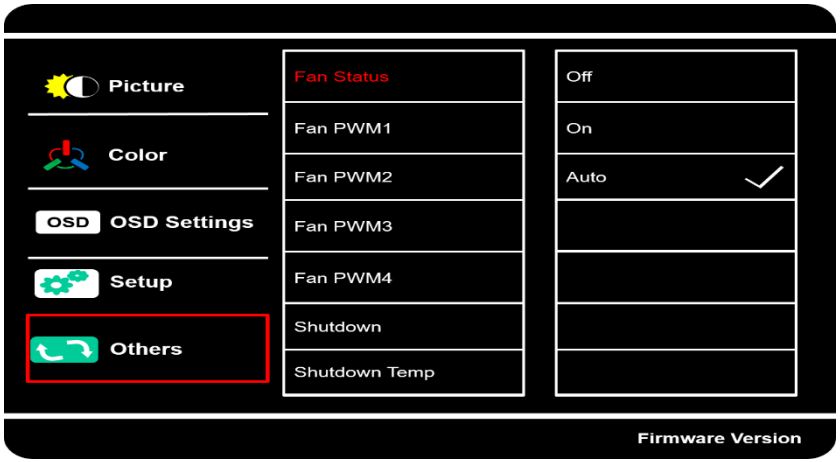
Submenu – 5-5 : Others – Light Sensor



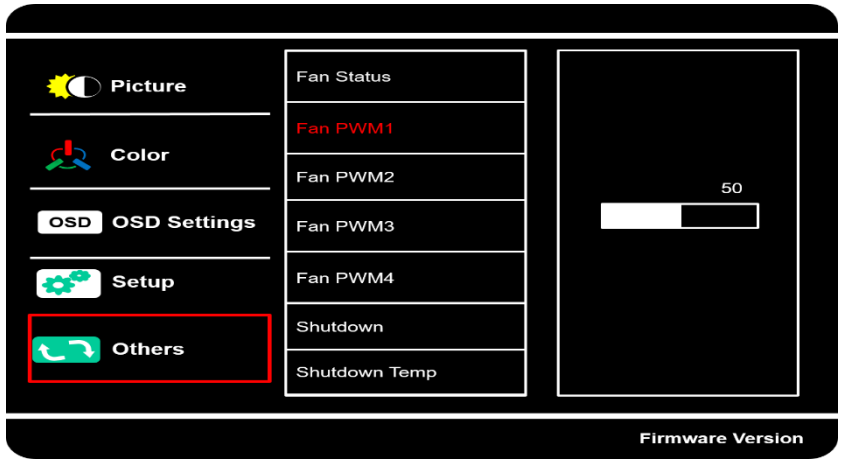
Submenu – 5-6 : Others – Fan Controls



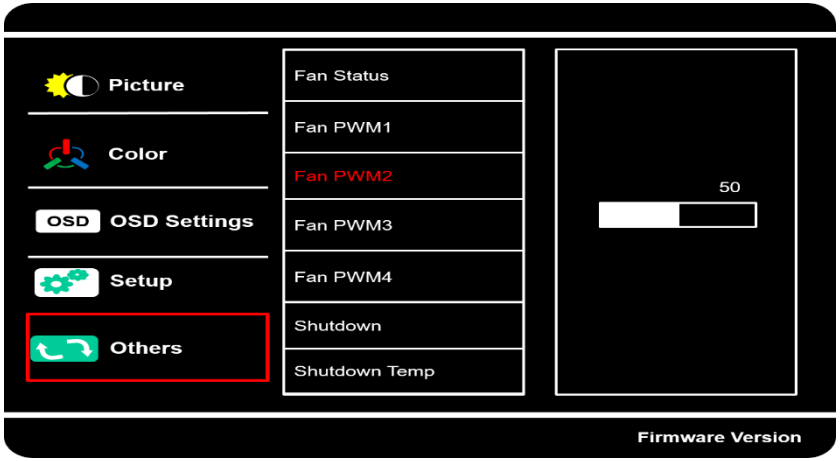
Submenu – 5-6-1 : Others – Fan Controls – Fan Status



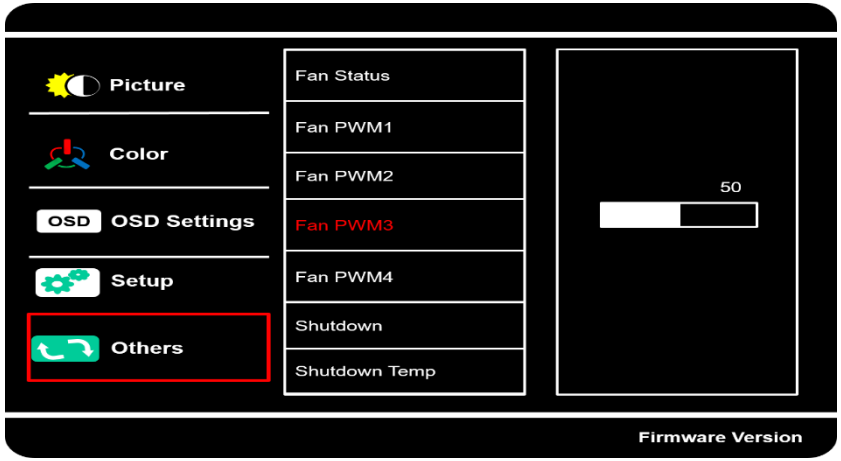
Submenu – 5-6-2 : Others – Fan Controls – Fan PWM1



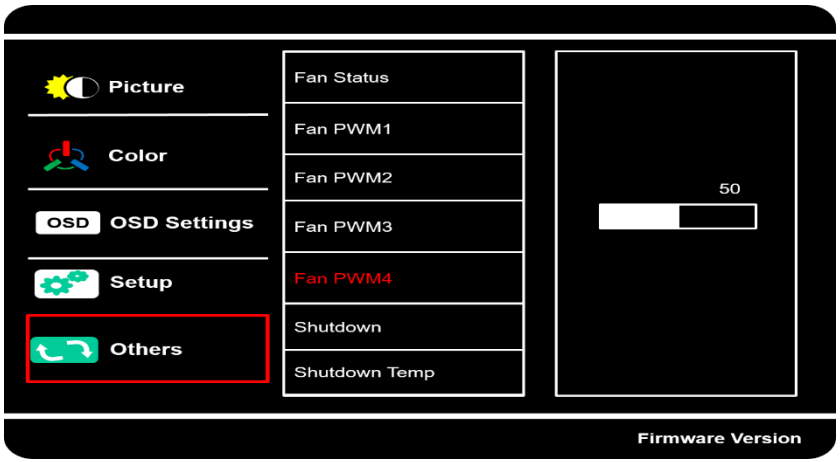
Submenu – 5-6-3 : Others – Fan Controls – Fan PWM2



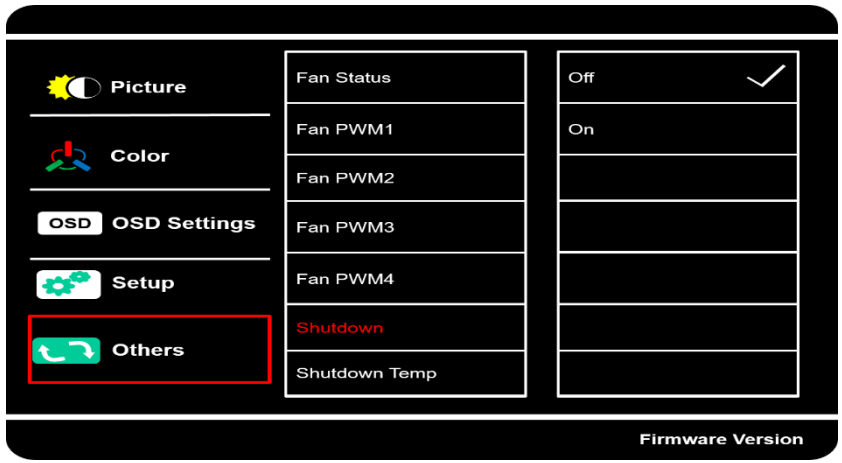
Submenu – 5-6-4 : Others – Fan Controls – Fan PWM3



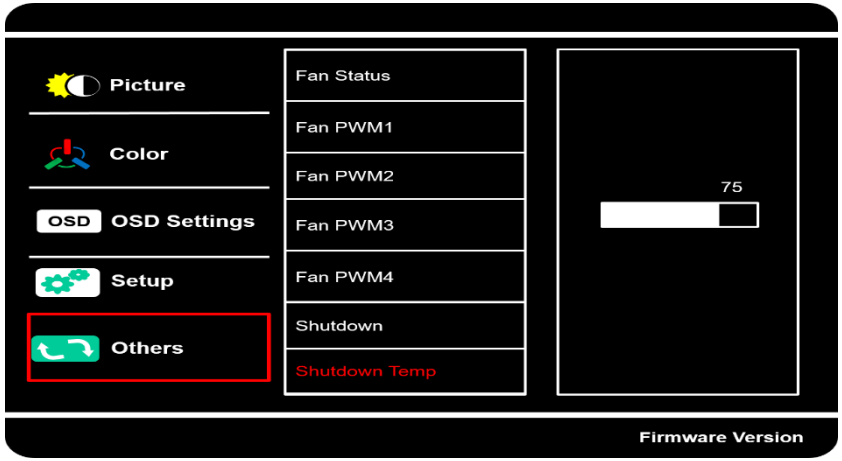
Submenu – 5-6-5 : Others – Fan Controls – Fan PWM4



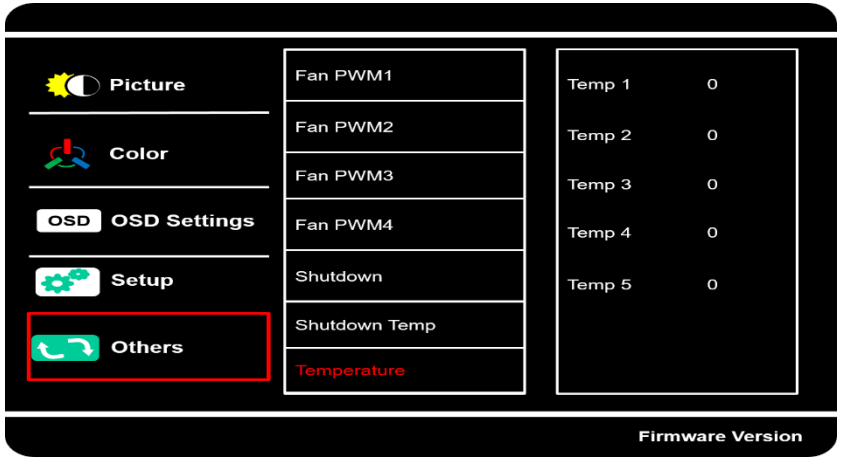
Submenu – 5-6-6 : Others – Fan Controls – Shutdown



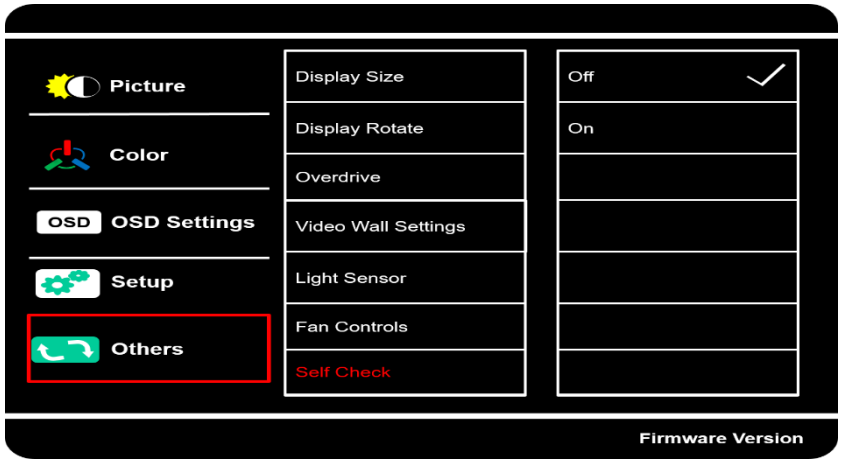
Submenu – 5-6-7 : Others – Fan Controls – Shutdown Temp



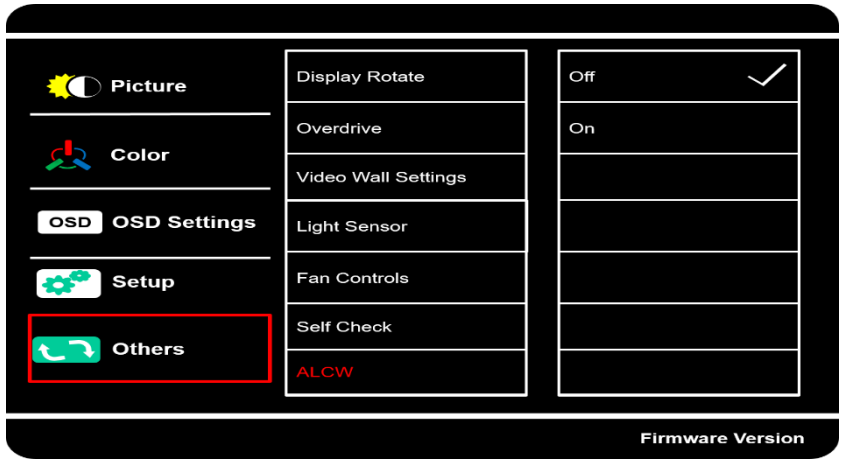
Submenu – 5-6-8 : Others – Fan Controls – Temperature



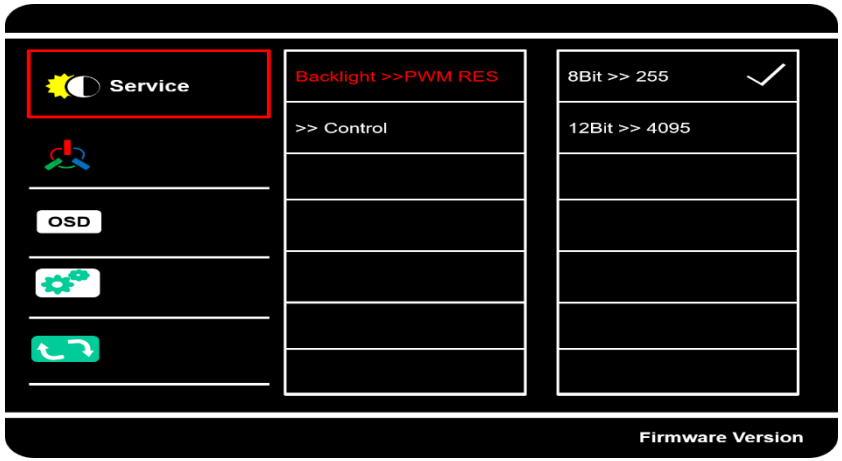
Submenu – 5-7 : Others – Self Check



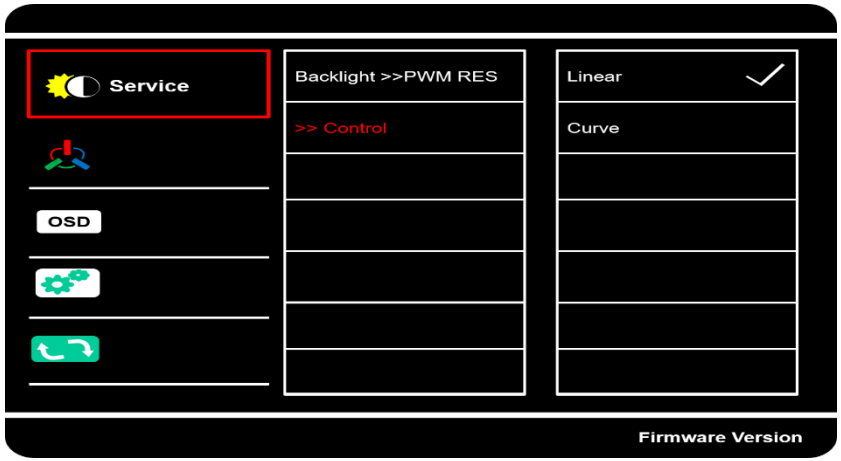
Submenu – 5-8 : Others – ALCW



Service Menu – 1 : Backlight PWM Resolution



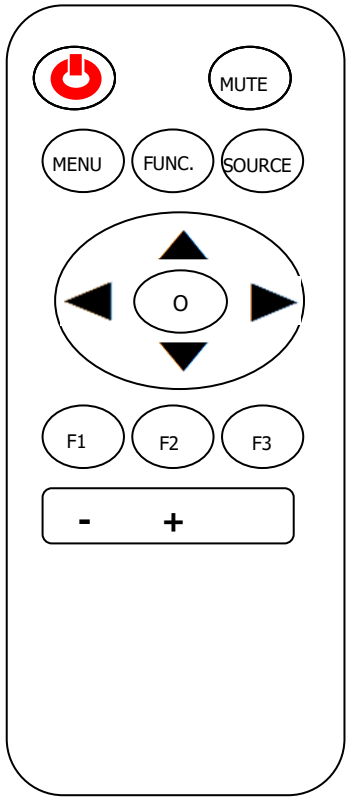
Service Menu – 2 : Backlight Control



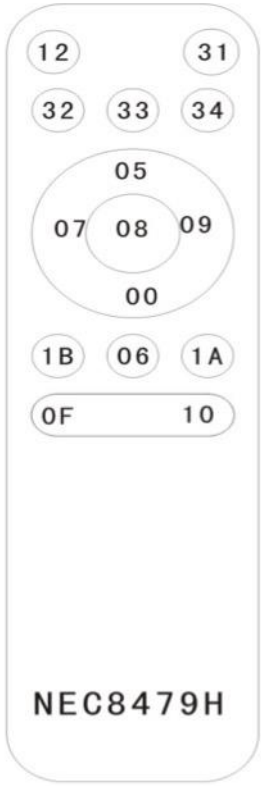
7. Remote Controller

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

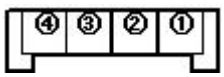
8.1 Communication Parameters

- 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) k1 00 02(CR) k1 00 03(CR) k1 00 04(CR) k1 00 05(CR)	1 00 OK01x (AUTO) 1 00 OK02x (DP1) 1 00 OK03x (DP2) 1 00 OK04x (HDMI1) 1 00 OK05x (HDMI2)	01 : AUTO (AUTO) 02 : DP1 (D0 :DP) 03 : DP2 (D1 :DP) 04 : HDMI1 (D2 :HDMI) 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) ke 00 00(CR)	e 00 OK01x (Mute On) e 00 OK00x (Mute Off)	01 : Mute On 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) kg 00 01(CR) kg 00 02(CR) kg 00 03(CR) kg 00 04(CR)	g 00 OK00x (Full) g 00 OK01x (16:9) g 00 OK02x (4:3) g 00 OK03x (5:4) g 00 OK04x (1:1)	00 : Full 01 : 16:9 02 : 4:3 03 : 5:4 04 : 1:1
Status	kg 00 ff(CR)	g 00 OK00x (Full) g 00 OK01x (16:9)	read

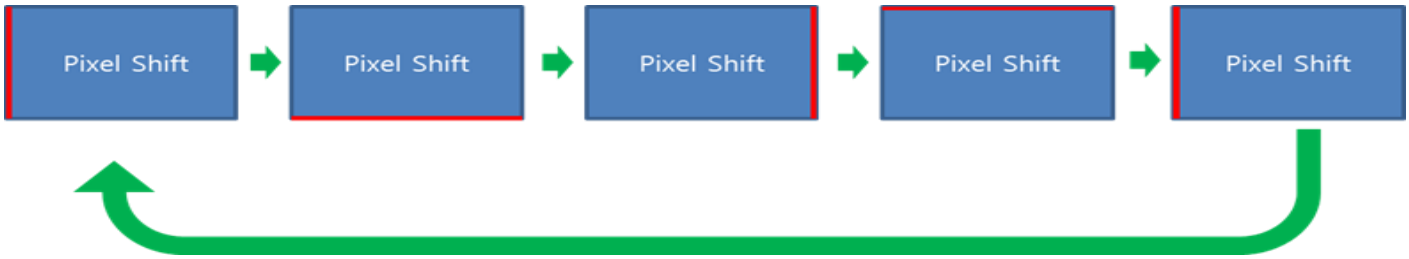
		g 00 OK02x (4:3) g 00 OK03x (5:4) g 00 OK04x (1:1)	
BackLight (kh)			
0 ~ 100% (Default = 80%)	kh 00 50(CR)	h 00 OK50x (BackLight = 80)	00h ~ 64h (Default = 50h)
Status	kh 00 ff(CR)	h 00 OK50x (BackLight = 80)	read
Contrast (ki)			
0 ~ 100% (Default = 50%)	ki 00 32(CR)	i 00 OK32x (Contrast = 50)	00h ~ 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) kl 00 01(CR) kl 00 02(CR) kl 00 03(CR) kl 00 04(CR)	l 00 OK00x(Gamma=Off) l 00 OK01x(Gamma=1.8) l 00 OK02x(Gamma=2.0) l 00 OK03x(Gamma=2.1) l 00 OK04x(Gamma=2.2)	00 : Gamma Off 01 : Gamma 1.8 02 : Gamma 2.0 03 : 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) km 00 01(CR) km 00 02(CR) km 00 03(CR) km 00 04(CR)	m 00 OK00x (Temperature = 9300) m 00 OK01x (Temperature = 7500) m 00 OK02x (Temperature = 6500) m 00 OK03x (Temperature = 5800) m 00 OK04x (Temperature = sRGB)	00 : 9300 01 : 7500 02 : 6500 03 : 5800 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) kn 00 01(CR) kn 00 02(CR) kn 00 03(CR) kn 00 04(CR)	n 00 OK00x (Effect = Standard) n 00 OK01x (Effect = Game) n 00 OK02x (Effect = Movie) n 00 OK03x (Effect = Photo) n 00 OK04x (Effect = Vivid)	00 : Standard 01 : Game 02 : Movie 03 : Photo 04 : Vivid

Status	kn 00 ff(CR)	n 00 OK00x (Effect = Standard)	read
DP Format (k5)			
DP Format	k5 00 00(CR) k5 00 01(CR)	5 00 OK00x (DP1.1) 5 00 OK01x (DP1.2)	00 : DP1.1 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) k6 00 01(CR) k6 00 02(CR)	6 00 OK00x (Off) 6 00 OK01x (DP 1) 6 00 OK02x (DP 2)	00 : Off 01 : DP 1 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) k7 00 01(CR)	7 00 OK00x (Off) 7 00 OK01x (On)	00 : Off 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. Addendum ： Pixel Shift Function (Optional Support)

9.1 Sequence of Pixel Moving

When user select the “On” (Pixel Shift Active Mode below sequence will be continued unlimited loof.



9.2 OSD Menu (Service Menu / Engineering Menu)

- Menu Activation ： calling by OSD Hot Key

  This is the manual for all system integrators, not the final users.
  Therefore the supplied final product do not show this menu as a standard product menu.
  In other words, this is a hidden menu for finish product manufacturers only.

  How can a system integrator go into this menu?
  Press the OSD Buttons continuously – none stop pressing correctly as below

  Menu → Down → Down → Down → Up → Up → Up → Down → Up → Down → Select

- OSD Menu and sequence interval selection

  On/Off : to Select one of both
  Selected the “On” ： 5 Min / 10 Min / 15 Min / 20 Min