TFT LCD Monitor
Product Specification

MODEL: KM-104OFWT

Issue date : 2013-09-16

Prepared by A&K DISPLAY R&D Center
A&K DISPLAY CO.,LTD.

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1. Revision History

Date	Rev. No	Page	Summary
2013-09-16	Rev 0.0	All	1’st issued

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2. Scope

This document is the specification of 10.4" TFT-LCD MONITOR for application of Multi – sync. KM-104OFWT is a High quality TFT-LCD display solution for industrial display device having RoHS conformity.

3. Features

- Max Resolution : SVGA 800x600@60Hz
- Recommend Resolution : SVGA 800x600@60Hz
- Image Screen Input Signal : Analog, DVI
- Flexible Solution of Mechanical Mounting
- On Screen display(OSD)

4. Electrical Specification

4.1 Input Power

4.1.1 Input power is required as

Voltage : 24V DC / 5A

Consumption : 10[W] Max

4.1.2 Power Management

Mode	V-Sync	H-Sync	Video	Power Consumption
ON	Pulse	Pulse	Active	Less than 10 [W]
Stand By	Pulse	No Pulse	Blanked	Less than 1 [W]
Suspend	No Pulse	Pulse	Blanked	Less than 2 [W]
Off	No Pulse	No Pulse	Blanked	Less than 1 [W]

4.2 Input Signal

4.2.1 Analog R,G,B input

Signal : RED, GREEN, BLUE

Polarity : Positive

Level : Analog from 0.714 to 2.5 [VP-P]

Maximum Dot Clock : 165[MHz]

4.2.2 Horizontal Sync

Polarity : (+) or (-) H,V Separate ,Composite sync

Level : TTL Compatible

High : 2.4 ~ 5.0[V]

Low : 0.0 ~ 0.8[V]

Scan Frequency : 15 ~ 80.0[KHz]

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4.2.3 Vertical Sync

Polarity : Positive or Negative H&V Separate

Level : TTL Compatible

High : 2.4 ～ 5.0 Volt

Low : 0.0 ～ 0.8 Volt

Scan Frequency : 55 ～ 75[Hz]

4.2.4 Scanning Mode : Non-Interlaced and Interlaced modes

4.2.5 Digital input

Signal : TMDS(DVI 1.0)

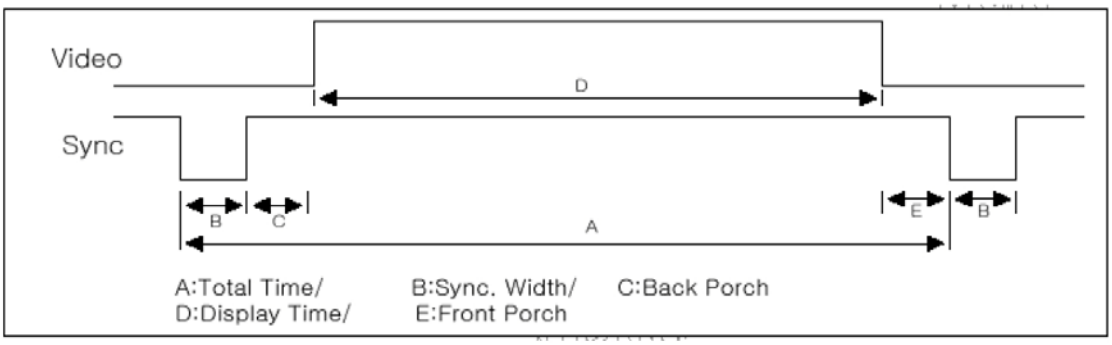
Maximum Dot Clock : 25~165[MHz](WUXGA)

4.3 Display Color : 8bit – 16.7M colors

4.4 Mode & Timing

4.4.1 Preset Mode Timing Chart

① Time Block



4.4.2 Preset Mode Timing Chart

Character	Pixel Freq.	Horizontal Timing				Vertical Timing			
		Sync Polar	Freq.	Total	Active	Sync Polar	Freq.	Total	Active
Mode	MHz		KHz	Pixel	Pixel		Hz	Line	Line
640x350 @70Hz	25.151	P	31.44	800	640	N	70.02	449	350
720x400 @70Hz	28.295	N	31.44	900	720	P	70.02	449	400
640x480 @60Hz	25.175	-	31.47	800	640	-	59.94	525	480
640x480 @67Hz	30.240	-	35.00	864	640	-	66.67	525	480
640x480 @72Hz	31.500	-	37.86	832	640	-	72.81	520	480
640x480 @75Hz	31.500	-	37.50	840	640	-	75.00	500	480
800x600 @56Hz	36.000	-	35.16	1024	800	-	56.25	625	600
800x600 @60Hz	40.000	-	37.88	1056	800	-	60.32	628	600

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5. LCD Panel Specification

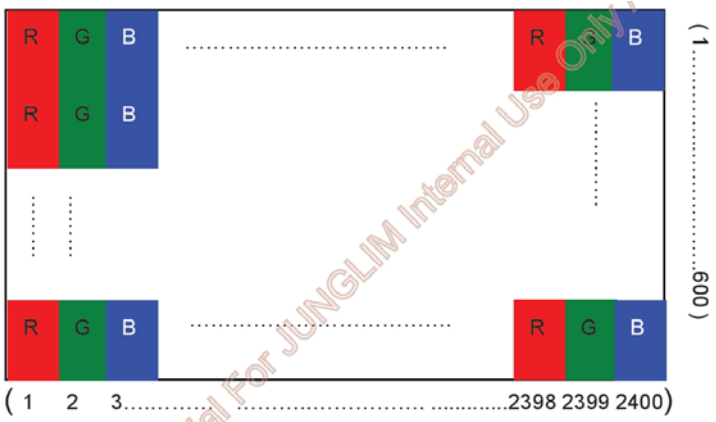
5.1 Screen Specification

Items	Specification	Unit	Note
Screen Size	10.4 diagonal	Inches	
Display Resolution	800RGB(W) x 600(H)	dot	
Overall Dimension	228.4(W) x 175.4(H) x 6.2(D)	mm	Note 1
Active Area	211.2(W) x 158.4(H)	mm	
Pixel Pitch	0.264(W) x 0.264(H)	mm	
Color Configuration	RGB vertical stripe	Pixel	Note 2
Color Depth	16.7M Colors		Note 3
NTSC Ratio	50	%	
Display Mode	Normally White		
Panel Surface Treatment	Anti-Glare, 3H		
Weight	400±20	g	
Panel Power Consumption	0.43	Watt	Note 4
Backlight Power Consumption	2.97	Watt	
Viewing Direction	6 o'clock(gray in version)		

● Panel Maker : AUO ● Model Name : A104SN03.1

Note 1 : Not include backlight cable and FPC. Refer next page to get further information.

Note 2 : Below figure shows dot stripe arrangement.



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Note 3 : The full color display depends on 24-bit data signal (pin 4~27)

Note 4 : Please refer to Electrical Characteristics chapter

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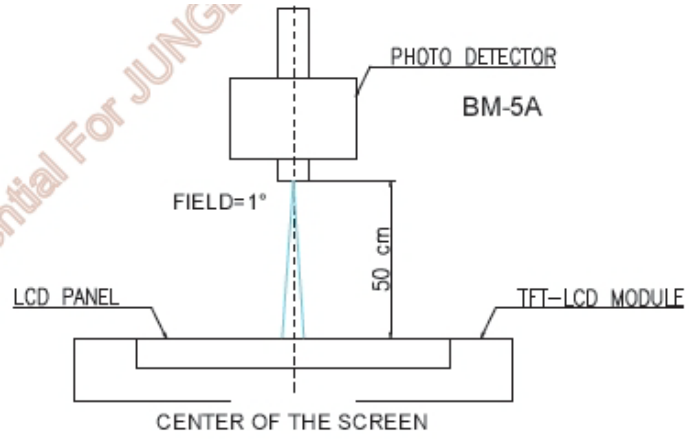
5.2 Optical Specification

All optical specification is measured under typical condition (Note 1, 2)

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Response Time								
Rise		Tr	θ=0°	--	30	7	ms	Note 3
Fall		Tf		--		33	ms	
Contrast ratio		CR	At optimized viewing angle	400	500	--		Note 4
Viewing Angle	Top		CR□10	40	50	--	deg.	Note 5
	Bottom			50	60	--		
	Left			65	75	--		
	Right			65	75	--		
Brightness		Y_L	θ=0°	250	300	--	cd/m^2	Note 6
Chromaticity	White	X	θ=0°	0.28	0.33	0.38		
		Y	θ=0°	0.30	0.35	0.40		
	Red	X	θ=0°	0.550	0.600	0.650		
		Y	θ=0°	0.324	0.374	0.424		
	Green	X	θ=0°	0.306	0.356	0.406		
		Y	θ=0°	0.531	0.581	0.631		
	Blue	X	θ=0°	0.094	0.144	0.194		
		Y	θ=0°	0.043	0.093	0.143		
Uniformity		ΔY_L	%	75	80		–	Note 7

Note 1 : Ambient temperature=25°C, and LED lightbar current Ll=300Ma. To be measured in the dark room.

Note 2 : To be measured on the center area of panel with a viewing cone of 1° by Topcon luminance meter BM-5a, after 15 minutes operation.



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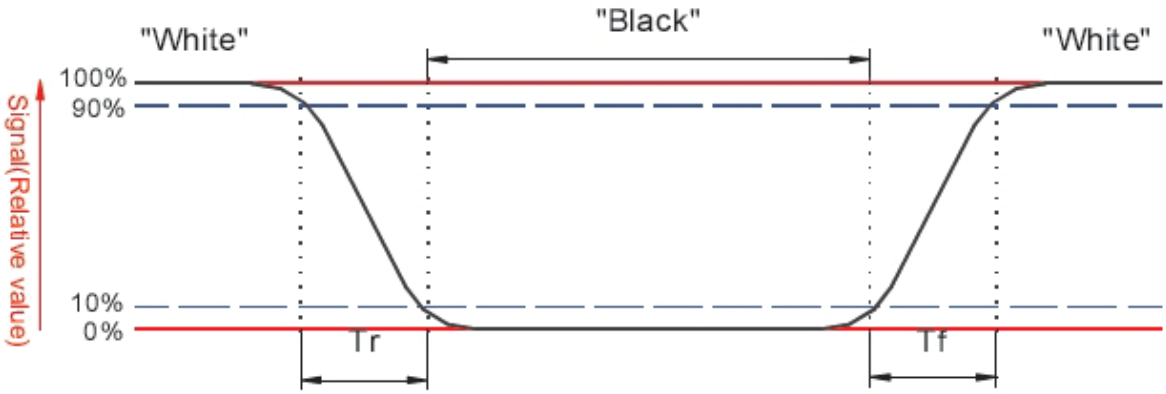
Note 3 : Definition of response time

The output signals of photo detector are measured when the input signals are changed from "black" to "white"(falling time) and from "white" to "black"(rising time), respectively.
The response time is defined as the time interval between the 10% and 90% of amplitudes.
Refer to figure as below.

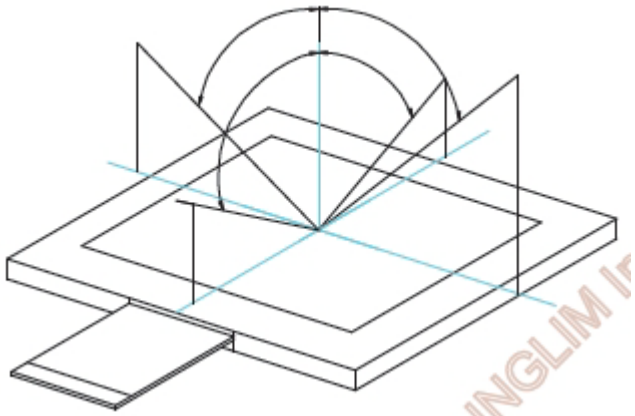


Note 4 : Definition of contrast ratio :

Contrast ratio is calculated with the following formula.

$$\text{Contrast ratio (CR)} = \frac{\text{Photo detector output when LCD is at "White" status}}{\text{Photo detector output when LCD is at "Black" status}}$$

Note 5 : Definition of viewing angle, Refer to figure as below.



Note 6 : Measured at the center area of the panel when all the input terminals of LCD pnel are electrically opened.

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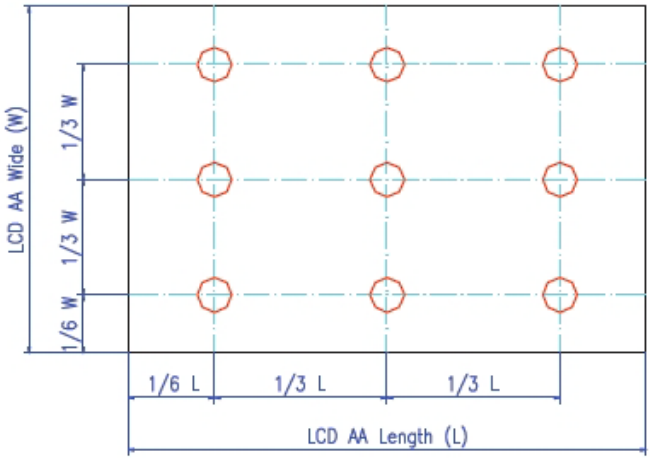
Note 7 : Luminance Uniformity of these 9 points is defined as below :



$$\text{Uniformity} = \frac{\text{minimum luminance in 9 points (1-9)}}{\text{maximum luminance in 9 points (1-9)}}$$

5.3 Backlight Pin Assignment

Recommended connector : JOIN TEK JT1025-1021

Pin no	Symbol	I/O	Description	Remark
1	VLED+	P	Backlight LED anode	
2	VLED-	P	Backlight LED cathode	

5.4 Absolute maximum ratings

Item	Symbol	Conditio	Min.	Max.	Unit	Remark
Power voltage	VDDIO	GND=0	-0.5	5	V	Digital Power Supply
	AVDD	AGND=0	-0.5	15	V	Analog power supply
	VGH	GND=0	-0.3	42	V	Gate driver supply voltage
	VGL		-20	0.3	V	Gate driver supply voltage
	VGH－VGL		-	40	V	Gate driver supply voltage
Input signal voltage	V_I		-0.3	VDDIO+0.3	V	Note 1
	VCOMin		0	5	V	VCOM DC Voltage
Operating	Topa		-10	60	□	
Storage	Tstg		-20	70	□	

Note 1: Functional operation should be restricted under ambient temperature (25□).

Note 2: Maximum ratings are those values beyond which damages to the device may occur. Functional operation should be restricted to the limits in the Electrical Characteristics chapter.

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6. Visual Specification

6.1 Standard Mode & Display Size

Item	Specification	Note
Standard Mode	SVGA 800x600@60 [Hz] Resolution	Recommend Mode
Display Size	211.2mm(H) × 158.4mm(V)	Panel Active Visual Size

6.2 Standard Condition

Item	Specification	Note
Warm up Time	30 minutes after lighting	
Panel Face	None	
Adapter	100~220Vac to 12Vdc	

6.3 Screen image Stabilizing Time

Item	Specification	Note
Video Display Time	After turning30 minutes after lighting power switch on, within 15 seconds	
Display Stability time	After turning power switch on, within 30 seconds	
AC input Voltage Stability	All specifications should be within 10% at 100~240V.	
Environments stability	All specifications should be within 2% at the operating temperature	

6.4 Focus

Focus shall be inspected using the H character pattern with normal and reverse video, after setting by brightness 80 steps & contrast 80 steps. All black/white and white/black transients shall be clearly visible on all points on the screen, and the focus performance shall be uniform across from a viewing distance of 50cm

6.5 Color Spread

The color must not spread on the panel, specially on the 4 side that panel and bezel contact each other.

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6.6 Noise, Jitter, Color lack, Screen shrink, etc.

During the operating there should not show on the screen like a noise, jitter, color lack, screen shrink, etc.

6.7 Residual Image

After 10 hours aging at same pattern, there's no residual image after 2 hours aging.

6.8 Crosstalk

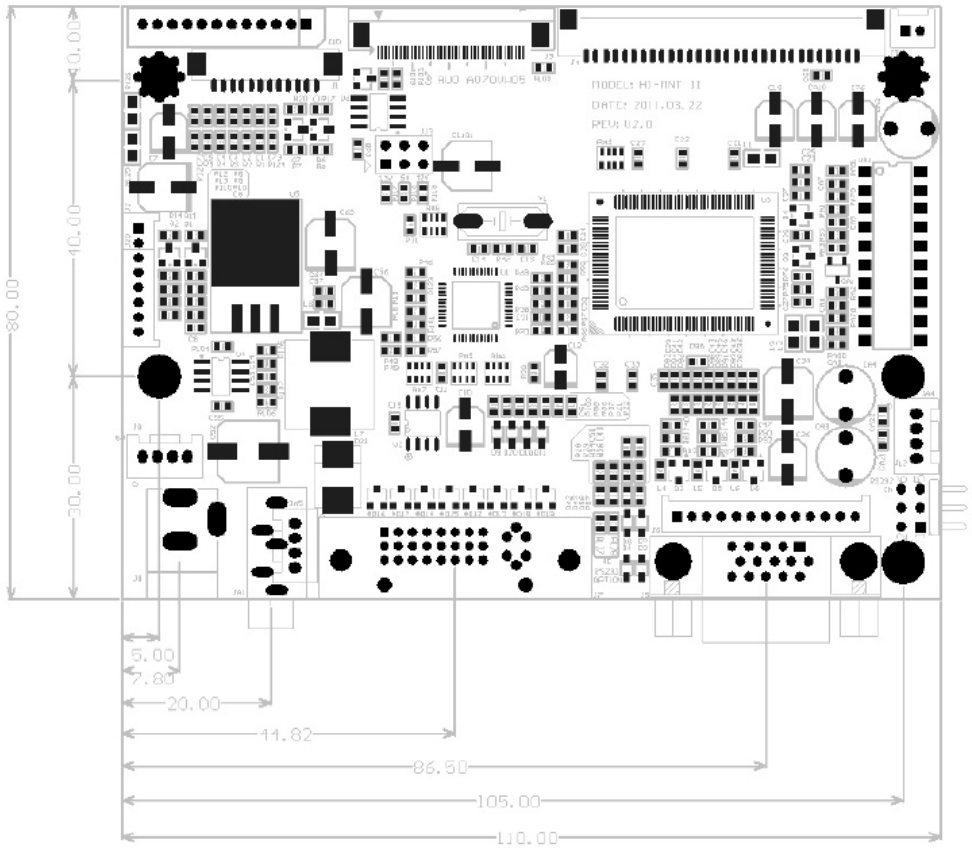
Any boundary line must not be seen on the white pattern.

7. AD Board

This board is main controller board and has following functions.

- Analog to Digital Conversion (R,G,B Gain Control)
- Scaling: input signal to fit Panel's resolution.
- Inverter Power control.
- DC to DC conversion to supply various power to each circuit

7.1 Board Dimension



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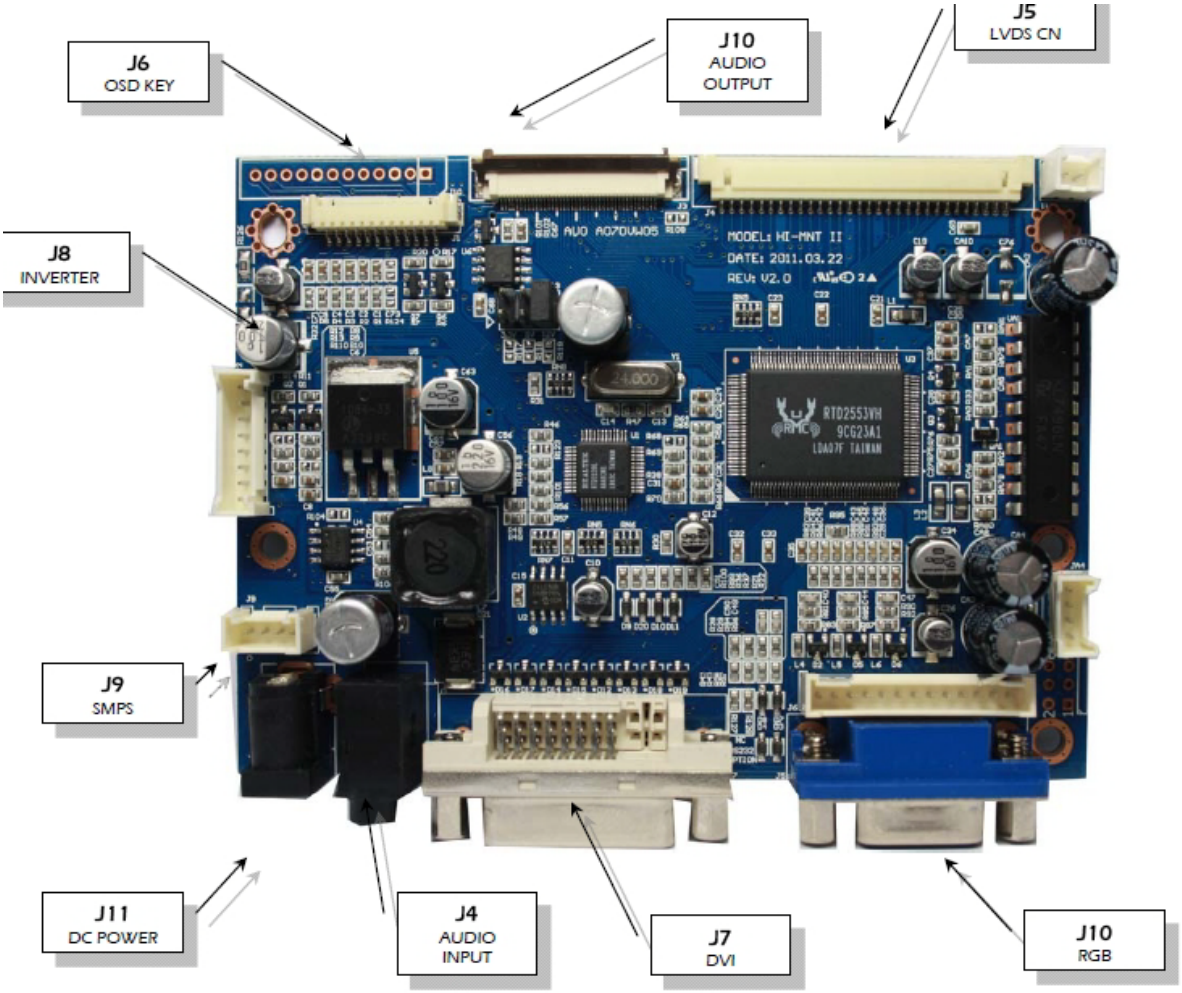
7.2 AD Board connection



Summary:

Reference	Item	Description	Type	Manufacture
J1	Connector	Audio Connector	CKX3-3.5-11	-
J3	Connector	R G B Connector	SMW200-13P-2.0mm	YEONHO
J4	Connector	Audio Output Connector	SMW200-04P-2.0mm	YEONHO
J5	Connector	LVDS Dual Interface Connector	12507WR-30P	YEONHO
J6	Connector	OSD Connector	12505wr-12P	YEONHO
J7	Jack	DVI Jack	DVI-D 24P	-
J8	Connector	Inverter Connector	SMW200-08P-2.0mm	YEONHO
J9	Connector	12V Dc power Input	SMW200-04P-2.0mm	YEONHO
J10	Jack	Analog RGB Input Jack	DSUB-15P	-
J11	Jack	Dc power Jack	2.5ø DC Jack	-
J13	Jack	Panel Power	H-3x2-6p	

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J6: ANALOG RGB INPUT (13P Connector)

Pin No.	Symbol	Description
1	HSYNC	Horizontal Sync
2	GND	Ground
3	VSYNC	Vertical Sync
4	GND	Ground
5	Blue1	Blue analog input
6	GND	Ground
7	Green1	Green analog input
8	GND	Ground
9	Red1	Red analog input
10	NC	No Connection
11	DSCL	Serial Clock Input
12	DSDA	DDC-SDA
13	ST-DET	Cable Connection Detect

JA4: Audio Output Connector

Pin No.	Symbol	Description
1	L	AUDIO L
2	GND	Ground
3	GND	Ground
4	R	AUDIO R

J4: LVDS Dual Interface Connector

Pin No.	Symbol	Description
1	MOD_PWR	Panel Power (12V/18V, 5V or 3.3V)
2	MOD_PWR	Panel Power (12V/18V, 5V or 3.3V)
3	MOD_PWR	Panel Power (12V/18V, 5V or 3.3V)
4	N.C	No Connection
5	N.C	No Connection
6	N.C	No Connection
7	GND	Ground
8	Y3P-EVEN	Positive(+) LVDS differential first 3 data(B port)
9	Y3M-EVEN	Negative(-) LVDS differential first 3 data(B port)
10	YCP-EVEN	Positive(+) LVDS differential first Clock(B port)
11	YCM-EVEN	Negative(-) LVDS differential first Clock(B port)
12	Y2P-EVEN	Positive(+) LVDS differential first 2 data(B port)
13	Y2M-EVEN	Negative(-) LVDS differential first 2 data(B port)
14	GND	Ground
15	Y1P-EVEN	Positive(+) LVDS differential first 1 data(B port)
16	Y1M-EVEN	Negative(-) LVDS differential first 1 data(B port)
17	GND	Ground
18	Y0P-EVEN	Positive(+) LVDS differential first 0 data(B port)
19	Y0M-EVEN	Negative(-) LVDS differential first 0 data(B port)
20	Y3P-ODD	Positive(+) LVDS differential second 3 data(A port)
21	Y3M-ODD	Negative(-) LVDS differential second 3 data(A port)
22	YCP-ODD	Positive(+) LVDS differential second Clock(A port)
23	YCM-ODD	Negative(-) LVDS differential second Clock(A port)
24	GND	Ground
25	Y2P-ODD	Positive(+) LVDS differential second 2 data(A port)
26	Y2M-ODD	Negative(-) LVDS differential second 2 data(A port)
27	Y1P-ODD	Positive(+) LVDS differential second 1 data(A port)
28	Y1M-ODD	Negative(-) LVDS differential second 1 data(A port)
29	Y0P-ODD	Positive(+) LVDS differential second 0 data(A port)
30	Y0M-ODD	Negative(-) LVDS differential second 0 data(A port)

* You can use an even port for 1Ch LVDS

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J1: OSD Connector

Pin No.	Symbol	Description
1	LED-Green	GREEN Color
2	LED-Red	RED Color
3	GND	Ground
4	AUTO	For Auto Switch
5	MENU	For Menu Switch
6	SEL	For Select Switch
7	DOWN	For Down Switch
8	UP	For Up Switch
9	POWER	For Power Switch
10	CDS	For Auto Brightness (Option)
11	IRD	IR DATA
12	5V	IR POWER 5V

J7: DVI-D Input Connector

Pin No.	Symbol	Description
1	TMDS DATA2-	TMDS DATA2 Differential Negative Signal
2	TMDS DATA2+	TMDS DATA2 Differential Positive Signal
3	TMDS DATA2 Shield	Shield for TMDS Channel #2
4	NC	No Connection
5	NC	No Connection
6	DDC Clock	The Data Line for the DDC Interface
7	DDC Data	The Clock Line for the DDC Interface
8	NC	No Connection
9	TMDS DATA1-	TMDS DATA1 Differential Negative Signal
10	TMDS DATA1+	TMDS DATA1 Differential Positive Signal
11	TMDS DATA1 Shield	Shield for TMDS Channel #1
12	NC	No Connection
13	NC	No Connection
14	+5V Power	+5 Volt signal for EDID (Un-powered Monitor)
15	GND(for +5V)	Ground for +5 Volt Power pin, Sync return
16	HPD	Identify the presence of a monitor
17	TMDS DATA0-	TMDS DATA0 Differential Negative Signal
18	TMDS DATA0+	TMDS DATA0 Differential Positive Signal
19	TMDS DATA0 Shield	Shield for TMDS Channel #0
20	NC	No Connection
21	NC	No Connection
22	TMDS CLOCK Shield	Shield for TMDS Clock differential Pair
23	TMDS CLOCK+	TMDS DATA0 Differential Positive Signal
24	TMDS CLOCK-	TMDS DATA0 Differential Negative Signal

J2: Backlight Inverter connector

Pin No.	Symbol	Description
1, 2	VCC	12V
3, 4	VCC	5V
5, 6	GND	Ground
7	ON/OFF	Inverter digital ON(3.3V)/OFF(0V) signal
8	ADJ	DIM-adjustment analog dimming control signal * make sure inverter specification

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J9: SMPS Power input connector

Pin No.	Symbol	Description
1,2	VCC	12V
3,4	GND	Ground

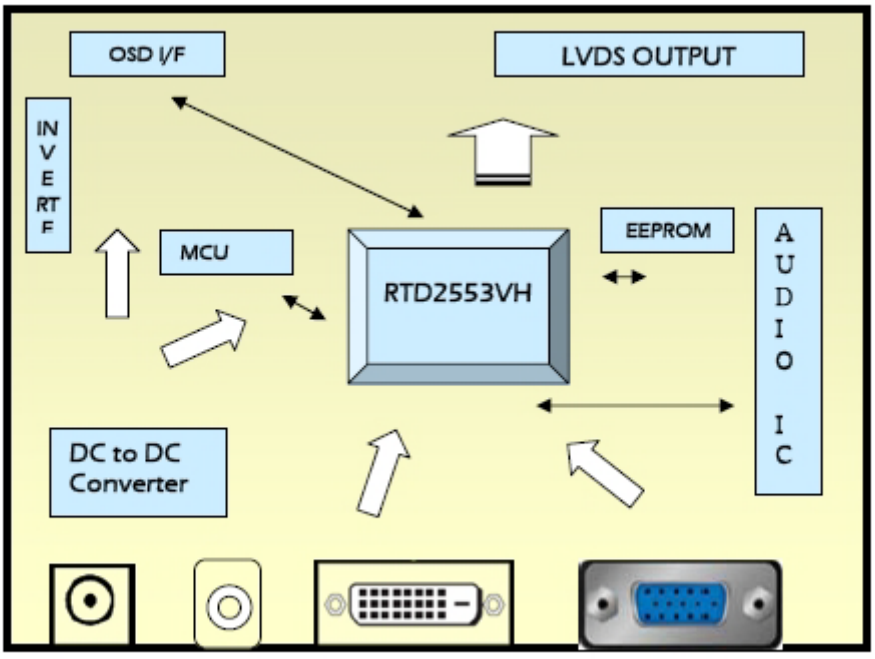
J10: ANALOG RGB INPUT (D-Sub 15P)

Pin No.	Symbol	Description
1	Red1	Red analog input
2	Green1	Green analog input
3	Blue1	Blue analog input
4	GND	Ground
5	GND	Ground
6	GND	Ground
7	GND	Ground
8	GND	Ground
9	NC	Not connected
10	GND	Ground
11	GND	Ground
12	DSDA	DDC-SDA
13	HSYNC	Horizontal Sync
14	VSYNC	Vertical Sync
15	DSCL	Serial Clock Input

J11: DC power Input Jack(12V)

Pin No.	Symbol	Description	Pin No.	Symbol	Description
Center	Vcc	12V	Shell	GND	Ground

7.3 Black Diagram



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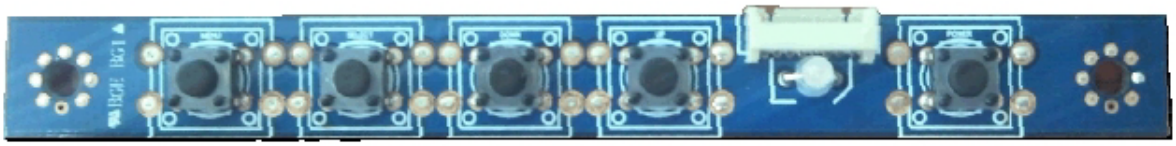
8. User Interface

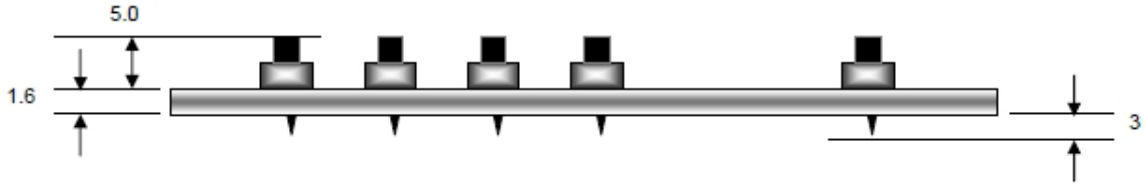
8.1 OSD Control Board

The OSD (On Screen Display) provides certain functions to have clear image and others. This board supports 5 buttons OSD operation as a standard. The control functions defined on OSD operation are as below. (Unit: mm)

Appearance

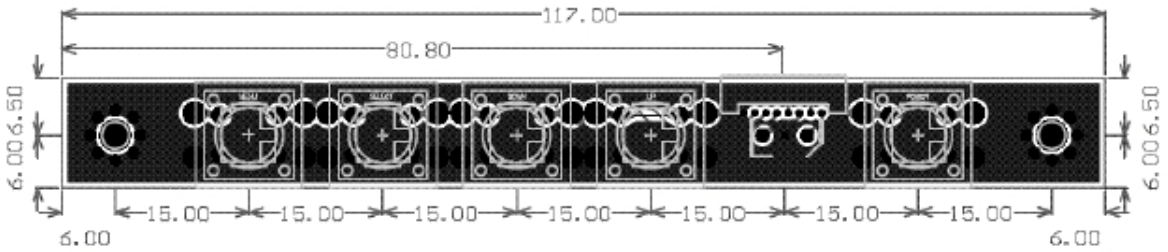


MENU SELECT DOWN UP LED POWER



Board Size (W x H x D) : 112 x 12.5x 10mm

Button	Function	Status	HOT Key
LED	Indicates operation status	Green/ Red/ Amber	On: Green Off: Red No Signal: Amber
POWER	Power on/off	On/Off	Menu, Power : INITIALIZE
MENU	Activate menu / Exit Menu		
SELECT	Menu Select / Source(option)		
DOWN	Cursor control Down / Auto Adjust		
UP	Cursor control Up		



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8.2 OSD Function

- Color: Contrast/Brightness/Color Adjust/Color Temp
  - Contrast : Contrast level Control
  - Brightness: Brightness level Control
  - Color Adjust: R,G,B color level Control
  - Color Temp: Color temperature Select
- Image Setting: Clock, Phase, Gamma, Sharpness
  - Clock: Fine tune the number of sampled data
  - Phase: Fine tune the position of sampled data
  - Gamma: Gamma value Select
  - Sharpness: Scaling performance Select
- Position: H, V position Control
  - H/V position: Image H, V position Control
- OSD Menu: OSD H, V position, OSD Off timer Control
  - OSD H/V position: OSD H,V position Control
  - OSD Off timer: OSD Off timer Control
- Language: OSD language Select
- Misc: Input Source/Reset
  - Input Source : Input signal select (Analog, DVI)
  - Reset: Restore to default Value
- Exit / Back:

Button	Function	Status	HOT Key
LED	Indicates operation status	Green/ Red/ Amber	On: Green Off: Red No Signal: Amber
POWER	Power on/off	On/Off	
MENU	Activate menu / Select Function		
EXIT	Menu Exit / Source(option)		
DOWN	Cursor control Down / Auto Adjust		
UP	Cursor control Up / Auto Color		

	Execute 'Auto Adjust' Function.
	Execute 'Color Adjust' Function.
	Input Signal is over the supporting range
	Input Signal is not present and disconnected cable. This message is not disappeared before power off or activity of input signal.
	Input Signal is not present. This message is disappeared after 5 seconds.
	Execute 'INITIALIZE' Function

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9. Power Adapter

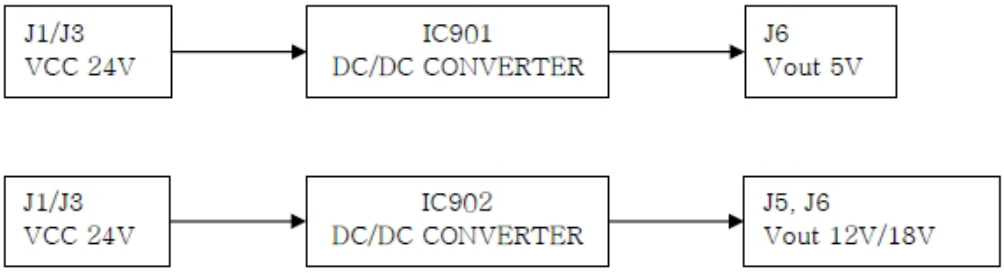
9.1 Input Characteristic

Description	Signal	Unit	Min	Typical	Max.	Remarks
Power In 1	Input Voltage(5V)	Vdc	7V	24V	40V	5V, 12V Dual사용시 Vdc Min18V
Power In 2	Input Voltage(ADJ)	Vdc	4.5V	24V	40V	

9.2 Ouput Characteristic

Description	Signal	Unit	Min	Typical	Max	Remarks
Power out 1	Output Voltage(5V)	Vp-p	4.75V	5V	5.25V	
Power out 2	Output Voltage(ADJ)	Vp-p	11.4V / 17.4V	12V / 18V	12.6V / 18.6V	12V Setting
Power out	Output Current	A		3A		

9.3 Black Diagram



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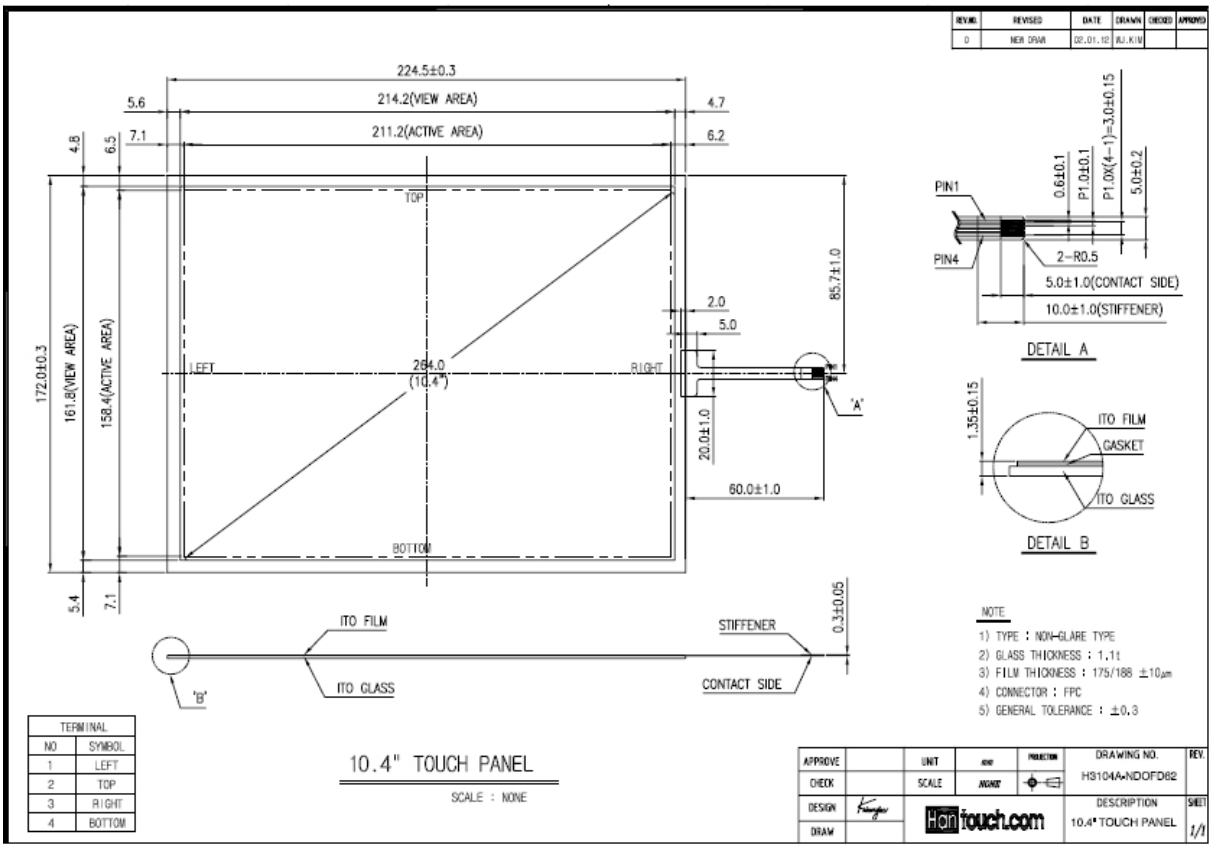
10. Hantouch™ H3104A-NDNBD62-FR(4 Wire Resistive Touch)



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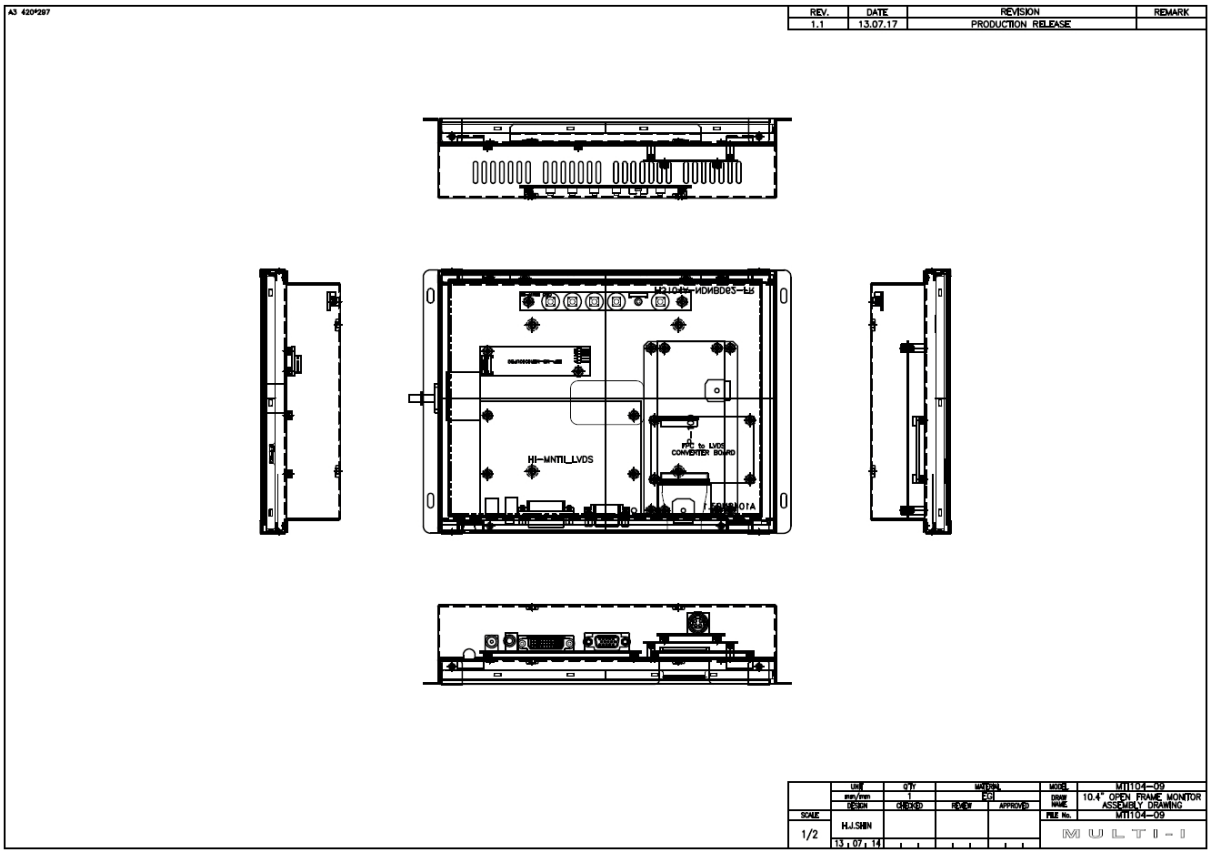
11. Open Frame Mechanical Drawing



12. Brief Product Specification

Display		
	Screen Size	10.4 inches diagonal
	Outline Dimension	228.4mm(W) x 175.4(H) x 6.2(D)
	Colors	8-bit, 16,777,216 colors
	Resolution	800 x 600 High Resolution
	Pixel Pitch	0.264(W) x 0.264(H)
Supported Signals		
	Analog PC	H.Freq: 31.43~88.8KHz, V.Freq.: 56.25~75.03Hz
	DVI	clock freq : 20Mhz ~ 250Mhz
	Plug & Play	DDC 1/2B
Input		
	Analog	15pin D-SUB
	DVI	DVI
	AUDIO	Stereo Phone Jack
OSD		
	Languages	Multi-Language
	Image Adjustment	Brightness / Contrast / Sharpness / Color / Hue
		Color Temperature
		Picture Mode Select
		Image Aspect Ratio
	PC Function	Auto Adjustment, Auto Color
		Frequency Adjustment
		Phase Adjustment
		H/V Position Adjustment
Power		
	Source	DC 24V, 5A
	Consumption	10W

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