TFT LCD MONITOR
PRODUCT SPECIFICATION

MODEL: WDD216OEAKTU03

ISSUE DATE: 2014-05-20

Prepared by KORTEK R&D CENTER

KORTEK CORPORATION

RoHS
Compliant
2002/95/EC

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1. Revision History

Date	Rev. No	Page	Summary
2014-05-22	Rev0.0	All	1'st issued

2. Scope

This document is the specification of 21.5" TFT-LCD MONITOR for application of Multi –sync.

WDD216OEAKTU03is a High quality TFT-LCD display solution for industrial display device having RoHS conformity.

3. Features

- Native Resolution: FHD (1920 * 1080 @60Hz) Recommend (1920 * 1080 @ 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 **:** DC + 12[V] / 4.16[A]

Consumption**:** 45[W] Max

4.1.2 Power Management

Mode	V-Sync	H-Sync	Video	Power Consumption
ON	Pulse	Pulse	Active	Less than 45[W]
Stand By	Pulse	No Pulse	Blanked	Less than 4.5[W]
Suspend	No Pulse	Pulse	Blanked	Less than 4.5[W]
Off	No Pulse	No Pulse	Blanked	Less than 4.5[W]

※ Transition among the states shall not require any manual display adjustment unless otherwise noted. There is no restriction on any combination of state transition. It is recommended that the display wait for about 2 seconds before transitions from "on "state to avoid unintentionally entering a power saving state during resolution or frequency is being changed

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 [V_{P-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]

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)

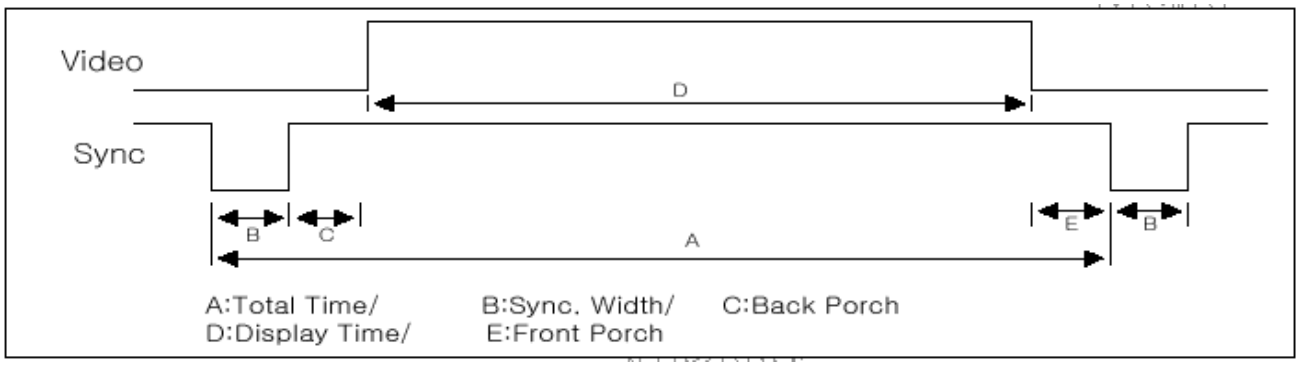
Maximum Dot Clock: 25~165[MHz](USXGA+)

4.3 Display Color : 16,777,216 colors

4.4 Mode & Timing

4.4.1 Preset Mode Timing Chart

① Time Block



② Detail Timing VESA Standard

Description		Mode1	Mode2	Mode3	Mode4	Mode5	Mode6	Mode7	Mode8	Mode9
		720	640		800		1024		1280	
		400	480		600		768		1024	
H	Freq [KHz]	31.649	31.469	37.500	37.879	46.875	48.363	60.023	63.938	79.976
	A[Pixels]	31.778	31.778	26.667	26.400	21.333	20.667	16.660	15.630	12.504
	B [Pixels]	3.813	3.813	2.032	3.200	1.616	2.092	1.219	1.037	1.067
	C [Pixels]	1.907	1.907	3.810	2.200	3.232	2.462	2.235	2.296	1.837
	D [Pixels]	25.422	25.422	20.317	20.000	16.162	15.754	13.003	11.852	9.481
	E [Pixels]	0.636	0.636	0.508	1.000	0.323	0.369	0.203	0.444	0.119
	Pol	NEG	NEG	NEG	POSI	POSI	NEG	POSI	POSI	POSI
V	Freq [KHz]	70.087	59.941	75.000	60.317	75.000	60.004	75.029	60.020	75.025
	A [Lines]	14.268	16.683	13.333	16.579	13.333	16.666	13.328	16.661	13.329
	B [Lines]	0.064	0.064	0.080	0.106	0.064	0.124	0.050	0.047	0.038
	C] [Lines]	1.112	1.049	0.427	0.607	0.448	0.600	0.466	0.594	0.475
	D [Lines]	12.711	15.253	12.807	15.840	12.800	15.880	12.796	16.005	12.804
	E [Lines]	0.381	0.317	0.019	0.026	0.021	0.062	0.017	0.016	0.013
	Pol	POSI	NEG	NEG	POSI	POSI	NEG	POSI	POSI	POSI
Pixel Clock [MHz]		28.322	25.175	31.500	40.000	49.500	65.000	78.750	108.000	135.000

4.4.2 Supply Video Timing Chart (VESA) ■ : **Native Mode**

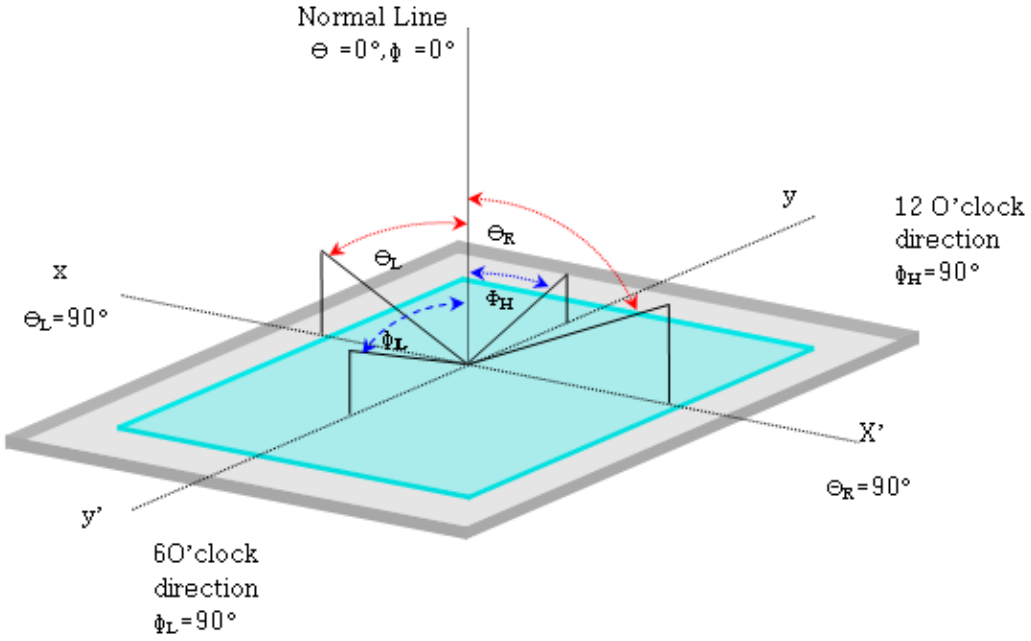
Resolution	Refresh Rate	H Frequency	Main Frequency	Remark
720 x 400	70 Hz	31.5 kHz	28.322 MHz	Text Mode
640 x 480	60 Hz	31.5 kHz	25.175 MHz	n/a
800 x 600	60 Hz	37.9 kHz	40.000 MHz	VESA
1024 x 768	60 Hz	48.4 kHz	65.000 MHz	VESA
1280 X 768	60 Hz	47.7 KHz	79.500 MHZ	VESA
1280 x 1024	60 Hz	64.0 kHz	108.00 MHz	VESA
	75 Hz	80.0 kHz	135.00 MHz	VESA
1600 x 900	60 Hz	55.9 kHz	118.25 MHz	VESA
1600 X 1200	60 Hz	75.0 kHz	162.0 MHz	VESA
1366 x 768	60 Hz	47.7 kHz	85.50 MHz	VESA
1920 x 1080 (*)	60 Hz	66.6 kHz	138.50 MHz	VESA

5. LCD Panel Specifications

5.1 Screen Specification

Item	Specification	Unit	Remark	Note
Display Area	476.64 (H) x 268.11 (V)	mm		
Driver Element	a-Si TFT active matrix	Dot		
Display Colors	16,7M	Color		
Number of Pixel	1,920 x 1,080	Pixel		
Pixel Arrangement	RGB Vertical Stripe			
Pixel Pitch	0.2475 (H) x 0.2475 (W)	mm		
Display Mode	Normally Black			
Viewing Angle	89/89/89/89 (U/D/L/R)	Degrees	CR≥10	①
Weight	1,800 (Max.)	g	Max.	
Contrast Ratio	Typ = 3,000:1		Center of Screen	② ④ ⑤
Response Time	On/Off = 25 ms		Typ.	③
White Luminance	Typ = 250 cd/m^2	Cd/m^2	Center of Screen	④ ⑤
Brightness Uniformity	Typ = 20 %	%		⑥
Dimensions	495.6(W) × 292.2(H) × 10.6(D)	mm		

◎ Vendor Name: AUO

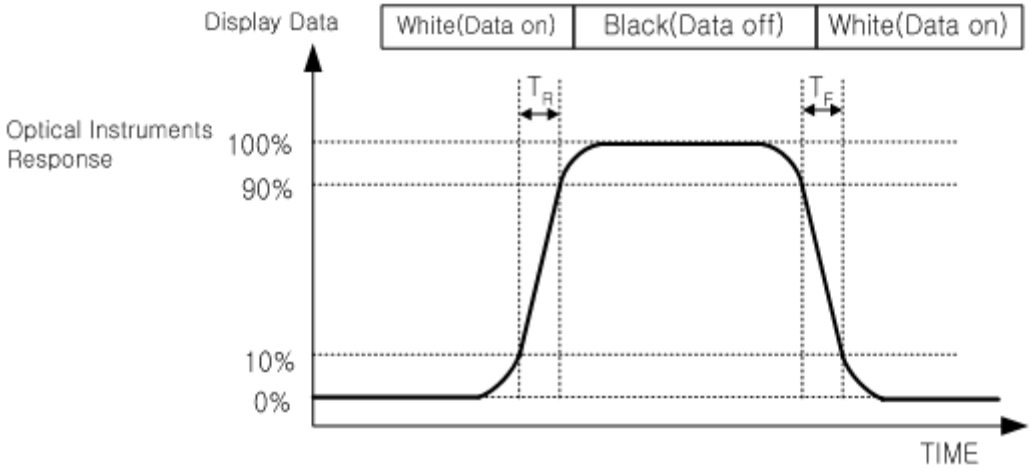


① Viewing Angle

Hor.	θ_L	CR≥10 (at center of screen)	Right	89	Degree
	θ_R		Left	89	
Ver.	ϕ_H		Up	89	
	ϕ_L		Down	89	

② Contrast Ratio (CR): Ratio of gray max. (G max.), gray min. (G min.) at the center point of panel.

$$CR = \frac{\text{Luminance of all pixels White}}{\text{Luminance of all pixels black}}$$



③ Response Time: Sum of T_R, T_F

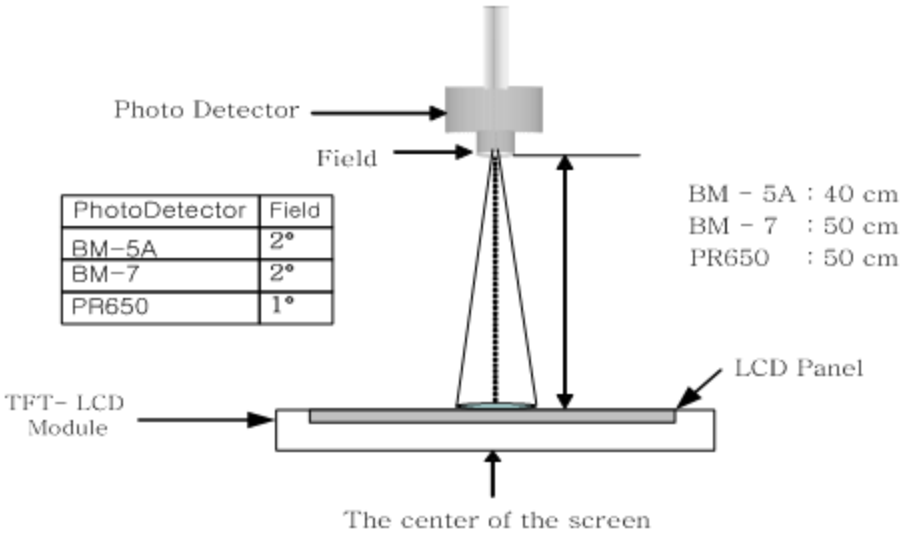
④ Luminance of White (Center of Screen)

Y_L = 250 cd/m^2 (Typ.)

⑤ Optical characteristics measurement

5.2 Test Equipment Setup

After stabilizing and leaving the panel alone at a given temperature for 30 min, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room 30 min after lighting the back-light. This should be measured in the center of screen. A single lamp current: 6.5[㎃] Environment condition: Ta = 25 ±2 [℃]

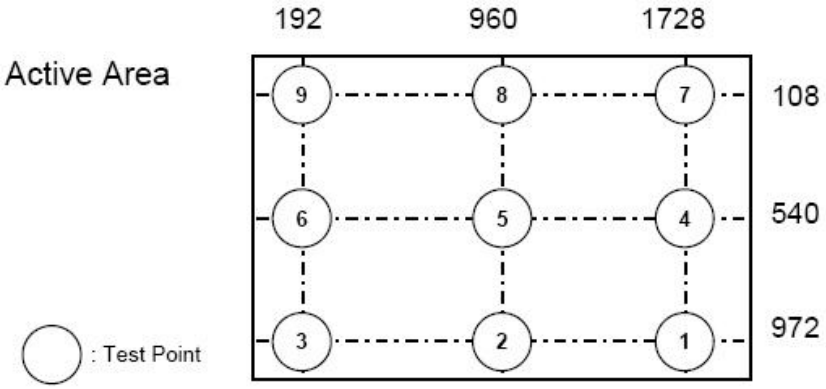


⑥ Brightness uniformity (9 points)

Buni = 100*(Bmax-Bmin)/ Bmax

Bmax : Maximum brightness, Bmin : Minimum brightness

Definition of test point



5.1 Back Light Unit

The Back-light system is an edge-lighting type with LED BAR

Item	Symbol	min	Typ.	Max	Unit
LED Operation Current	IR_{LED}	-	60	63	[mA]
Light Bar Operation Voltage (for reference)	V_{LB}	51	54.4	57.8	[Volt]
BLU Power consumption (for reference)	P_{BLU}		13.1	14.6	[Watt]
LED life Time	LT_{LED}	30,000	-	-	Hour

5.2 CIE Coordinates (Color Chromaticity)

Item	**Color chromaticity (CIE 1931)**	
	X(Typ.)	Y(Typ.)
Red	0.645 ± 0.03	0.334 ± 0.03
Green	0.313 ± 0.03	0.636 ± 0.03
Blue	0.154 ± 0.03	0.044 ± 0.03
White	0.313 ± 0.03	0.329 ± 0.03

*** Actual Optical data of sample**

21.5 INCH		**Monitor**	Panel spec
White Color	**x**	**0.320**	0.313
	y	**0.347**	0.329
Luminance(cd/m2)		**230**	250

5.3 Absolute Maximum Rating

5.3.1 Absolute rating of environment

ITEM	Symbol	Min	Max	Unit	Note
Storage temperature	T_{STG}	-20	60	℃	(1)
Operating temperature (Surface of Glass temperature)	T_{OPR}	0	50	℃	(1)
Shock (non - operation)	S_{NOP}	-	50	G	(2),(4)
Vibration (non – operating)	V_{NOP}	-	1.5	G	(3),(4)

* Note

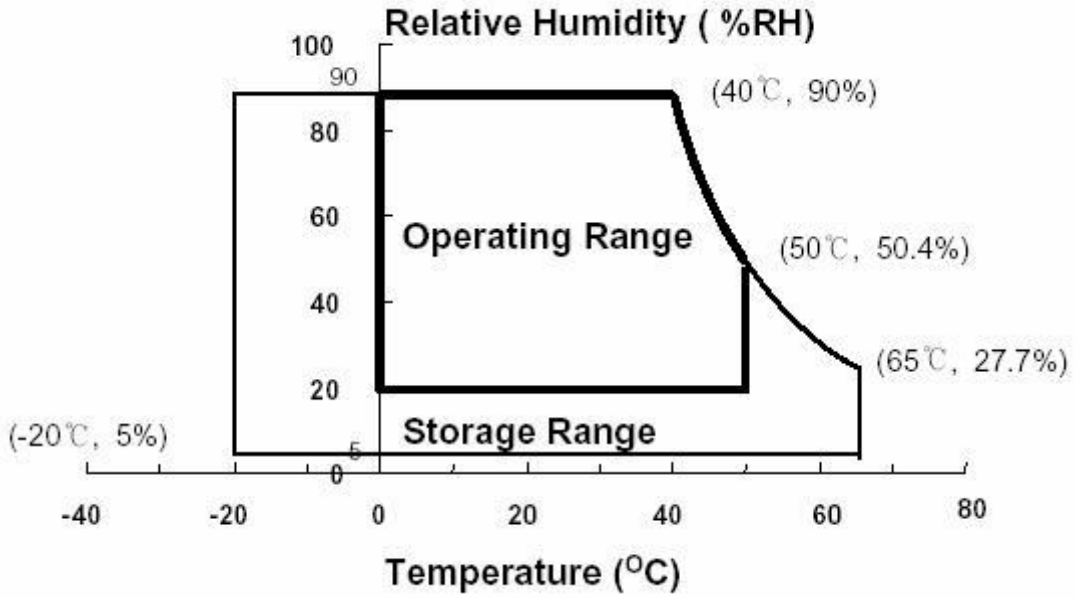
(1) Temperature and relative humidity range are shown in the figure below, 90% RH Max. (40 ℃ ≥ Ta)

(2) 11ms, sine wave, one time for ±X, ±Y, ±Z axis.

(3) 10-300Hz, Sweep rate 10min, 30min for X, Y, Z axis.

(4) At testing Vibration and Shock, the fixture in holding the Module to be tested have to be hard and rigid enough so

that the Module would not be twisted or bent by the fixture.



6. Visual Specification

6.1 Standard Mode & Display Size

Item	Specification	Note
Standard Mode	FHD 1920* 1080 @ 60 [Hz] Resolution	Recommend Mode
Display Size	476.64 (H) x 268.11 (V)	Panel Active Visual Size

6.2 Standard Condition

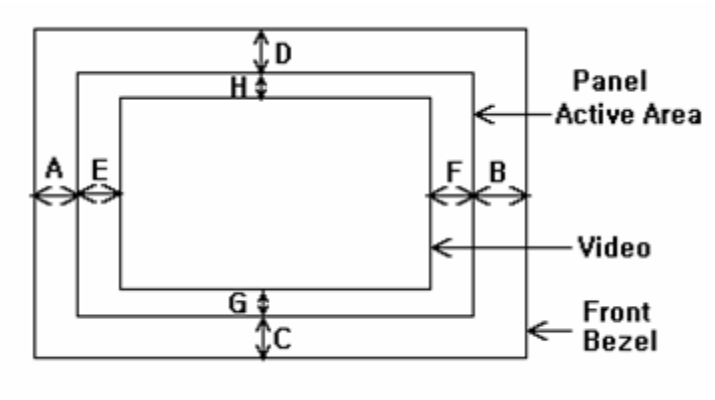
Item	Specification	Note
Warm up Time	30 minutes after lighting	
Panel Face	None	
AC / DC Adapter	100 ~ 220Vac to 12Vdc	

6.3 Screen image Stabilizing Time

Item	Specification	Note
Video Display Time	After turning 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	

Note) All kinds of specification should be satisfied after 30 minutes from turning power switch on.

6.4 H & V Centering : 1920 × 1080 , 60Hz



|A-B| and |C-D| ≤ 1.0[mm], |E-F| and |G-H| ≤ 1.0[mm]

6.5 Focus

Focus shall be inspected by using both normal H-character pattern and reversed one, after adjusting the brightness to 80 steps and contrast to 80 steps by the OSD. The intersection between black and white character s should be clearly visible at all the points on the screen, and the focus performance shall be evaluated from a viewing distance of 50cm

6.6 Color Spread

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

6.7 Noise, Jitter, Color lack, Screen shrink, and etc.

During the operations, there should not be a noise, jitter, color lack, screen shrink, etc. on the screen.

6.8 Residual Image

After 10 hours' aging at the same pattern, video pattern will be changed for the residual image inspection. The image sticking should disappear after 2 hours have passed.

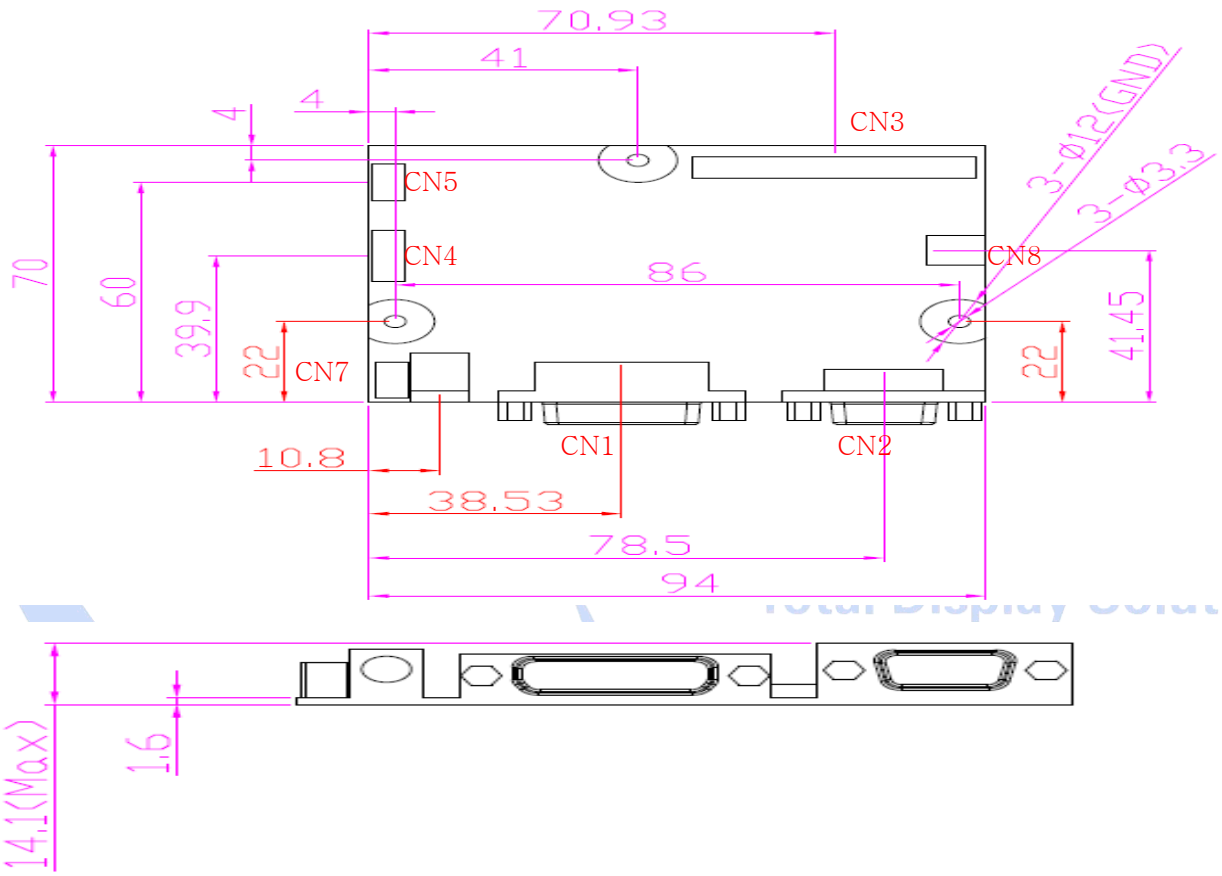
6.9 Crosstalk

Crosstalk shall be investigated visually by a white box pattern. Any cross talk effect must not be seen on the white area.

7. A/D Board

This document is the specification of WIND Board for application of Multi –sync monitor. WIND is a High quality TFT-LCD display solution for industrial display device having RoHS conformity.

7.1 A/D Board Dimension



7.2 A/D Board connection

Symbol	Description	Parts Number	Manufacture
CN5	OSD KEY		
CN3	LVDS_OUT (8 bit Single and Dual)		
CN4	6 Pin Inverter control		
CN7	4 Pin External Power		
CN1	DVI INPUT		
CN2	RGB Input		
CN8	Touch PWR		

7.2.1 CN5: OSD Key

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1,2	Ground	3	LED Green	4	LED Red	5	Down
6	Select	7	Menu	8	Auto	8	Up

7.2.2 CN3 : LVDS_OUT

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	POWER(+VCC)	7	GND	13	TXE2N	19	TXE0N	25	TXO2P
2	POWER(+VCC)	8	TXE3P	14	GND	20	TXO3P	26	TXO2N
3	POWER(+VCC)	9	TXE3N	15	TXE1P	21	TXO3N	27	TXO1P
4	POWER(+VCC)	10	TXECP	16	TXE1N	22	TXOCP	28	TXO1N
5	POWER(+VCC)	11	TXECN	17	GND	23	TXOCN	29	TXO0P
6	GND	12	TXE2P	18	TXE0P	24	GND	30	TXO0N

7.2.3 CN2 : Analog R, G, B Input

Pin	Function	Pin	Function	Pin	Function
1	Red	6	Red ground	11	Reserved
2	Green	7	Green ground	12	DDC SDA
3	Blue	8	Blue ground	13	HSYNC (horizontal sync)
4	Reserved	9	-	14	VSYNC (vertical sync)
5	Ground	10	Sync Ground	15	DDC SCL

7.2.4 CN1 : DVI Input

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	T.M.D.S DATA 2-	7	DDC DATA	13	T.M.D.S DATA 3+	19	T.M.D.S DATA 0/5 SHIELD	C1	ANALOG RED
2	T.M.D.S DATA 2+	8	ANALOG VERT. SYNC	14	+5V POWER	20	T.M.D.S DATA 5-	C2	ANALOG GREEN
3	T.M.D.S DATA 2/4 SHIELD	9	T.M.D.S DATA 1-	15	GND	21	T.M.D.S DATA 5+	C3	ANALOG BLUE
4	T.M.D.S DATA 4-	10	T.M.D.S DATA 1+	16	HOT PLUG DETECT	22	T.M.D.S CLOCK SHIELD	C4	ANALOG HORZ SYNC
5	T.M.D.S DATA 4+	11	T.M.D.S DATA 1/3 SHIELD	17	T.M.D.S DATA 0-	23	T.M.D.S CLOCK+	C5	ANALOG GROUND
6	DDC CLOCK	12	T.M.D.S DATA 3-	18	T.M.D.S DATA 0+	24	T.M.D.S CLOCK-		

7.2.5 CN7: Power 4pin

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	+12V	2	+12V	3	GND	4	GND

7.2.6 CN4 : Inverter Control

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1,2	VDD	+12V	3,4	GND	GND
5	INV	Backlight on/off	6	ADIM	DIMMING CTRL

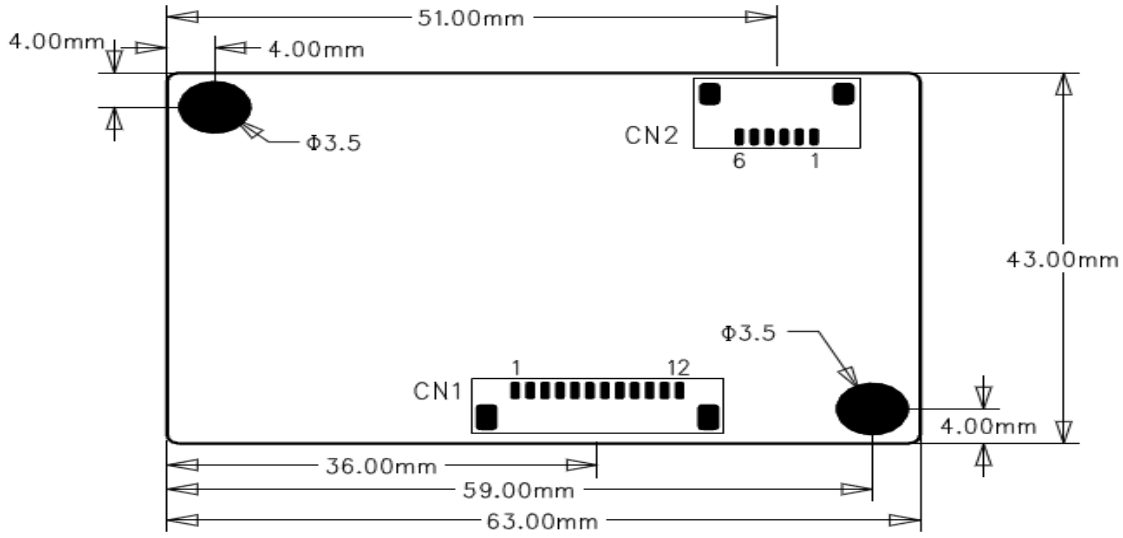
7.2.7 CN8 : Touch power

Pin	Signal	Pin	Signal	Pin	Signal
1	+5V	2	GND	3	+12V

8. LED Driver Specification

This board generates DC +60 [V] from DC +12[V], and This DC used to turn on LED

8.1 LED Driver Dimension



8.2 LED Driver Input Connector CN1 : 12505 WR-12A00 (Yeon Ho)

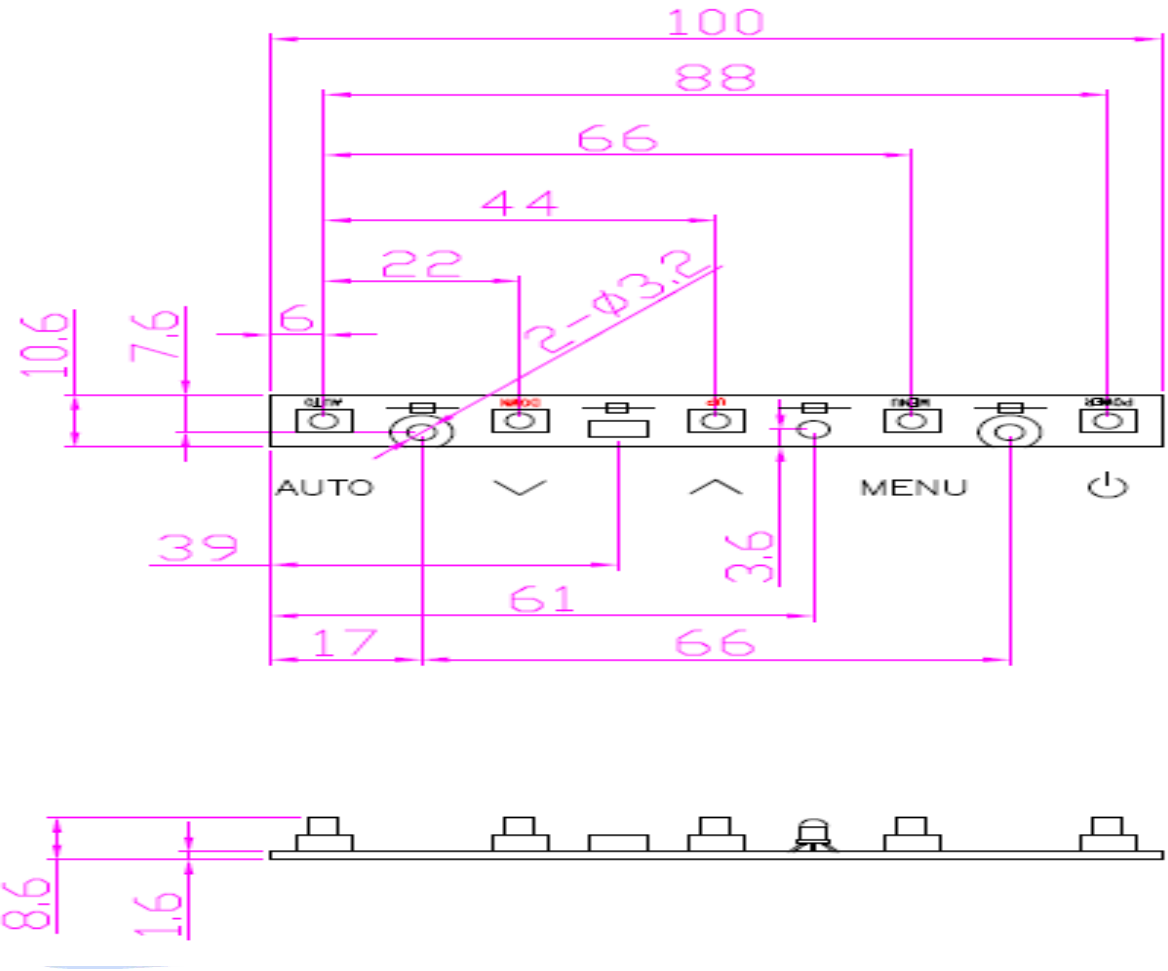
Pin No	Symbol	Description
1,2,3	Vin	Input : +11~13V
4,5,7,8,12	GND	GND
11	Dim control	0V: Max Brightness, 5V: Min Brihtness
9	On/ Off	Lamp Turn on & Off (5V: On, 0V: Off)

8.3 LED Driver Output Connector : CN2 : 12507WR-06 (Yeon Ho)

Pin No.	Symbol	REMARK
1	RTN1	Feedback 1 (Return 1)
2	RTN2	Feedback 2 (Return 2)
3,4	V_LED	System Output
5	RTN3	Feedback 3 (Return 3)
6	RTN4	Feedback 4 (Return 4)

9. User Interface

9.1 OSD Key Dimension



9.2 Key Functions

※This table is based on OSD S/W presented by KORTEK.

Group	Pin No	Pin Name	Description	Note
Keypad	Pin 1	Power	Monitor Power ON/OFF	
	Pin 2	MENU		
	Pin 3	Up	Up key.	
	Pin 4	Down	Down key.	
	Pin 5	Auto	Auto Adjust Hot Key.	

9.3 OSD Menu Structure

9.3.1 Input selection

This menu can select input (DVI or D-SUB).

9.3.2 Color Setting

This menu can control brightness, contrast,

Color temp and setting user color.

9.3.3 Image setting

This menu can control Sharpness, H.position and V.position of picture.

When input mode is analog mode(D-SUB), This menu can control clock , phase.

9.3.4 OSD Menu

This menu can control OSD H.POS,OSD V.POS, OSD Timer and OSD Rotate.

9.3.5 Special

This menu can control Auto Config, Scale, Select XVGA, DPMS,

Information(Scale, DPMS, OSD Rotate, Input, Input Timing, Version).

You can control Auto Config in analog mode

9.4 Function(OSD) Menu Actions

ITEM	Action	Note
PC/DVI	- Analog/DVI Input Select	Dual Input B'D (Option)
Auto	- Automatically Adjust Screen's Geometric, Position, Phase to Optimal Condition.	PC Source Only
Contrast	- Tuning menu of Screen's CONTRAST	
Brightness	- Tuning menu of Screen's BRIGHTNESS	
H Position	- Tuning Horizontal Position of screen	PC Source Only
V Position	- Tuning Vertical Position of screen	PC Source Only
Clock(H-Size)	- Tuning menu of Screen's Clock(H-Size)	PC Source Only
Phase	- Tuning menu of Screen's Phase (* It is used to remove jitter Noise, Bad Focus)	PC Source Only
Scale	- Change Aspect Ration of Image (* One to one, Full Image)	TBD(Option Menu)
Color Mode	- Tuning menu of Screen's R, G, B Color Gain.	
Sharpness	- Tuning menu of Screen's Sharpness.	
Select	- Select Alternative mode	
Information	- Show Information of Input Signal	
Memory recall	- Return to default value	

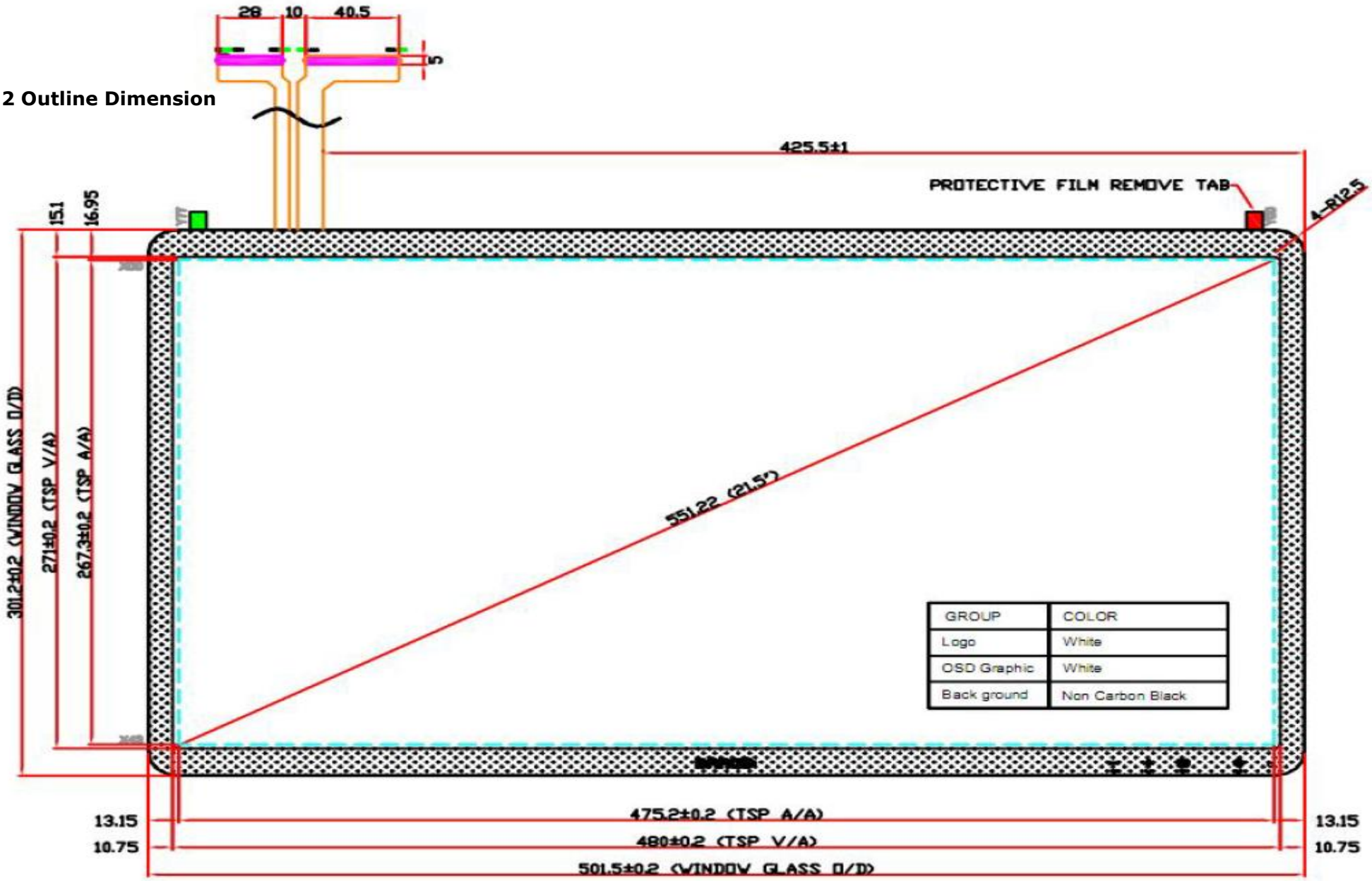
10.Touch Integrations

This specification applies to standard, Projected Capacitive Touch (PCT) screen supplied by Kortek.

10.1 General Specification

Technology		Projected Capacitive Touch
Material		Glass 1.8T + Sensor 0.4T
Touch Inputs		10
Accuracy		±1.5 mm
Linearity		±1 mm
Scan speed		10 Touch ≥ 100Hz
Response Time		Max 25ms
Light Transmission		89±3%
Voltage		5V
Current		39mA
Power Consumption		0.195W
Interface		USB 2.0, HID protocol
		VID 0x2965, PID 0x5023
Resolution		4096x4096 (12bit)
Operating Temperature	Touchscreen	-20℃ ~ 85℃
	Controller	-20℃ ~ 85℃
Operating Humidity		20% ~ 90%, No condensation on surface.
Reliability		Abides by Kortek regulations.
ESD		IEC 61000-4-2 : Air 27kV / Contact 10kV

10.2 Outline Dimension

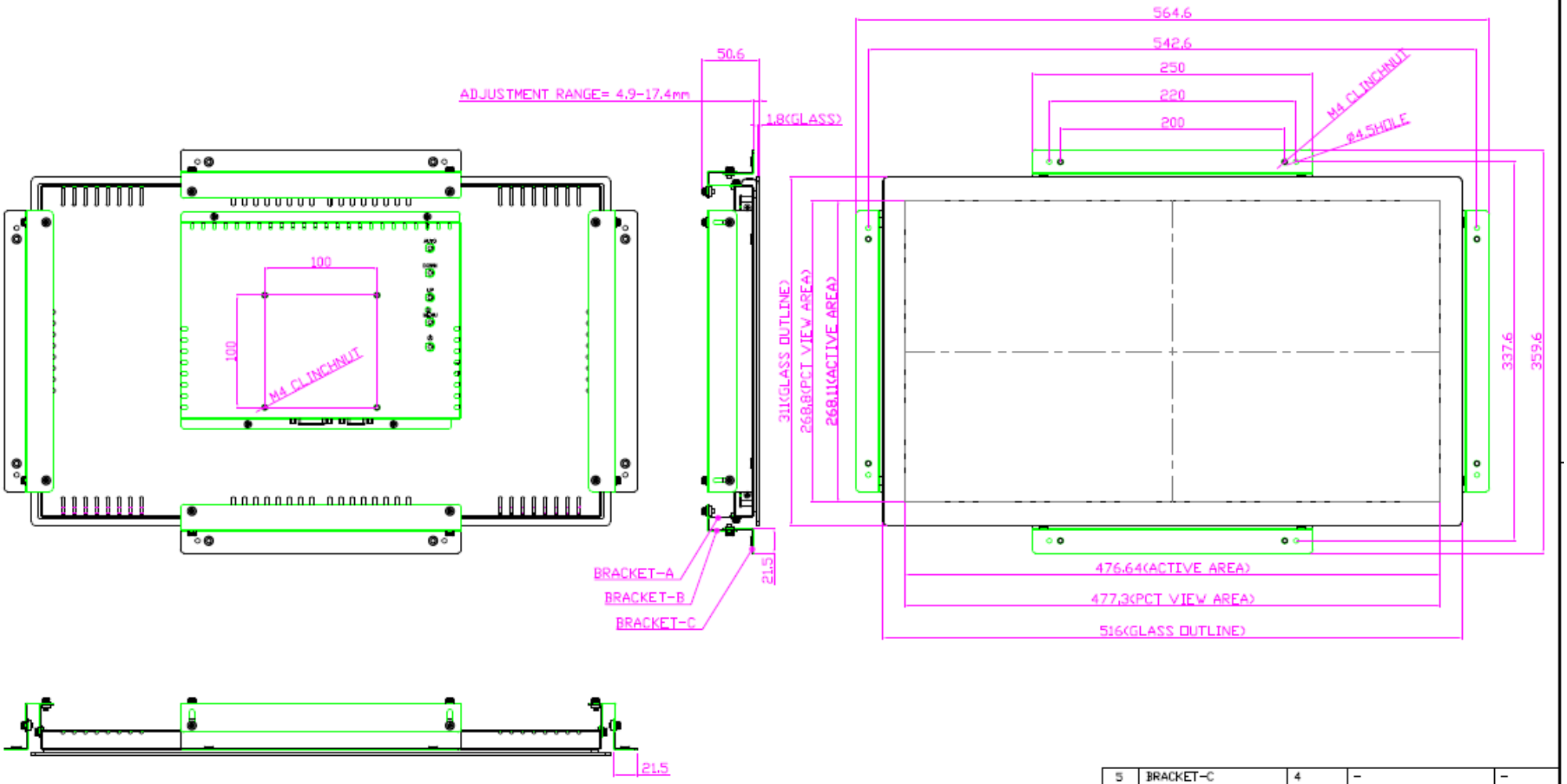


ERP CODE	–

REV.	DATE	ECO NO	DESCRIPTION OF CHANGE	DRAWN	APPROVAL
0	140516	–	INITIAL DRAWING	S.J	K.C LEE

11. Mechanical Specification

11.1 Outline Dimension



NOTE

1. NO HARMFUL ON THE SURFACE

NO.	ITEM(DESCRIPTION)	Q'TY	DWG NO.(ERP NO.)	REMARKS
5	BRACKET-C	4	–	–
4	BRACKET-B	4	–	–
3	BRACKET-A	4	–	–
2	BKT COVER	1	–	–
1	BKT BASE	1	–	–

DIMENSION TOLERANCES				DATE	NAME
LENGTH		HOLE DIAMETERS			
UNDER 5.9	±0.1	UNDER 12.69	±0.13		
6.0 ~ 29.9	±0.2	12.70 OVER	±0.25		
30.0 ~ 119.9	±0.3	ANGLE			
120.0 ~ 399.9	±0.5	UNDER 29.9	±0.5°		
400.0 ~ 999.9	±0.8	30.0 ~ 49.9	±0.3°		
1000.0 OVER	±1.2	50.0 OVER	±0.2°		

DWG.	140516	S.J	
CHEC.		–	
APP.		K.C LEE	

THIRD ANGLE PROJECTION

TITLE	ASS'Y ECOIN215PCT,WIND,KTK	
REF.		SCALE
DWG.NO	–	1:1
MATERIAL	UNIT	SHEET
–	mm	1/1

본 부품은 ROHS 규제 물질에 대한 코텍의 기준을 만족함.
(THIS PART COMPLIES WITH KORTEK'S STANDARD FOR ROHS)