

TFT LCD MONITOR PRODUCT SPECIFICATION

MODEL: KTS270DPE02



Prepared by KORTEK R&D CENTER

KORTEK CORPORATION



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1. Revision History

Date	Rev. No	Page	Summary
2014-12-18	Rev0.0	All	1'st issued



2. Scope

This document is the specification of 22" TFT-LCD MONITOR for application of Multi -sync. KTS270DPE02 is a High quality TFT-LCD display solution for industrial display device having RoHS conformity.

3. Features

- Native Resolution: FHD (1,920 * 1,080 @60Hz) Recommend (1,920 * 1,080 @60Hz)
- Image Screen Input Signal: Analog, DVI, DP
- 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: 50[W] Max

4.1.2 Power Management

Mode	V-Sync	H-Sync	Video	Power Consumption
ON	Pulse	Pulse	Active	Less than 50[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 between states shall not require any manual display adjustment otherwise noted. There is no restriction on any combination of state transition. It is recommended that the display wait for about 2 seconds before transition. From "on" to avoid unintentionally entering a power saving state during change resolution or frequency.

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 Digital input

Signal: TMDS(DVI 1.0)

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

4.2.3 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]

4.2.4 Vertical Sync

Polarity: Positive or Negative H&V Separate

Level: TTL Compatible

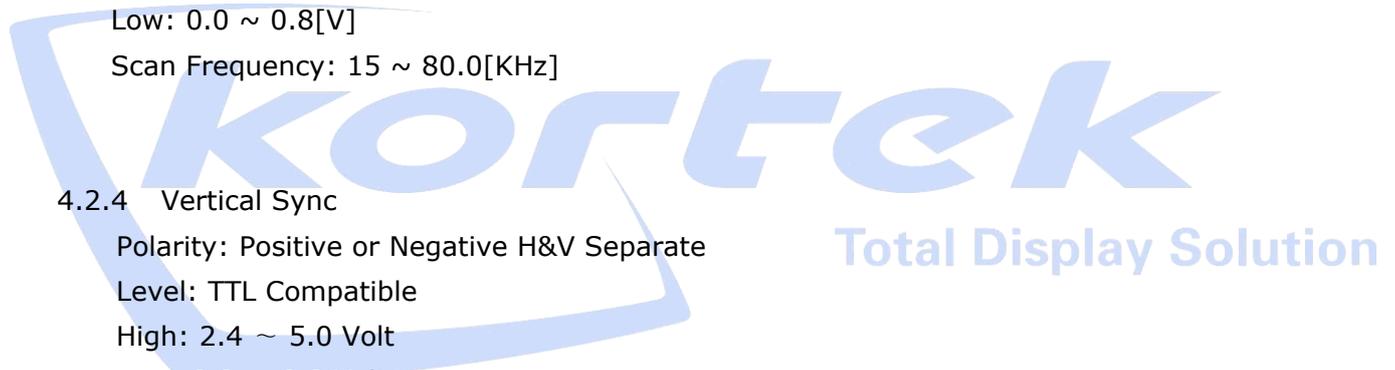
High: 2.4 ~ 5.0 Volt

Low: 0.0 ~ 0.8 Volt

Scan Frequency: 55 ~ 75[Hz]

4.2.5 Scanning Mode : Non-Interlaced and Interlaced modes

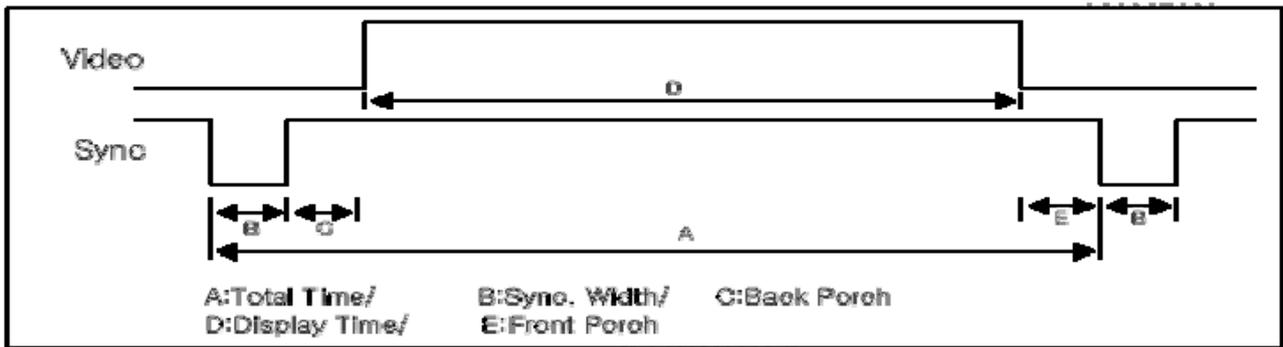
4.3 Display Color : 16,777,216 colors



4.4 Mode & Timing

4.4.1 Preset Mode Timing Chart

① Time Block



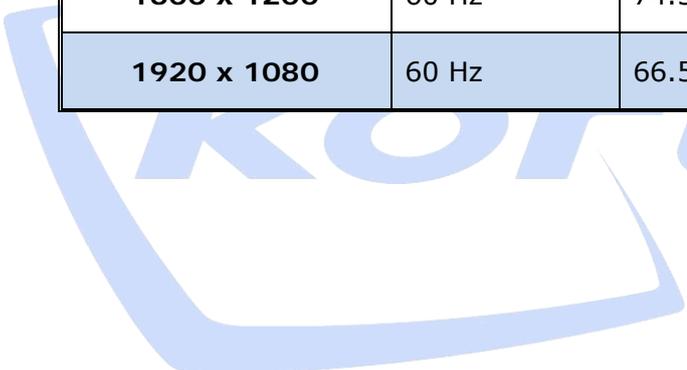
② Detail Timing VESA Standard

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
	PoI	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
	PoI	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
	75 Hz	37.5 kHz	31.500 MHz	VESA
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 1024	60 Hz	64.0 kHz	108.00 MHz	VESA
	75 Hz	80.0 kHz	135.00 MHz	VESA
1366 x 768	60 Hz	47.7 kHz	85.50 MHz	VESA
1600 x 1200	60 Hz	74.53 kHz	161.0 MHz	VESA
1920 x 1080	60 Hz	66.58 kHz	173.0 MHz	VESA


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5. LCD Panel Specifications

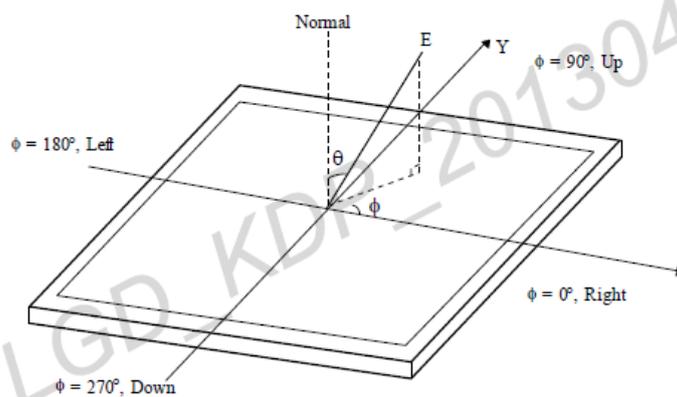
5.1 Screen Specification

Item	Specification	Unit	Remark	Note
Display Area	597.6 (H) x 336.15(V) mm (Typ.)	mm		
Driver Element	a-Si TFT active matrix	Dot		
Display Colors	16,78M (RGB 8-bit)	Color		
Number of Pixel	1,920 x 1,080	Pixel		
Pixel Arrangement	RGB Vertical Stripe			
Pixel Pitch	0.311(H) x 0.311(W)	mm		
Display Mode	VA Mode, Normally Black			
Viewing Angle	R/L 178, U/D 178	Degrees	CR=10	①
Weight	2,180g (typ.)	g		
Contrast Ratio	Typ = 3000:1		Center of Screen	② ④ ⑤
Response Time	On/Off = 12 ms		Typ.	③
White Luminance	Typ = 300cd/m ²	cd/m ²	Center of Screen	④ ⑤
Brightness Uniformity	Typ = 80 % (Max.)	%		⑥
Dimensions	613.6 (W) x 356.85 (H) x 10.0(D) (Max)	mm		

© Vendor Name: AUO

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<Dimension of viewing angle range>

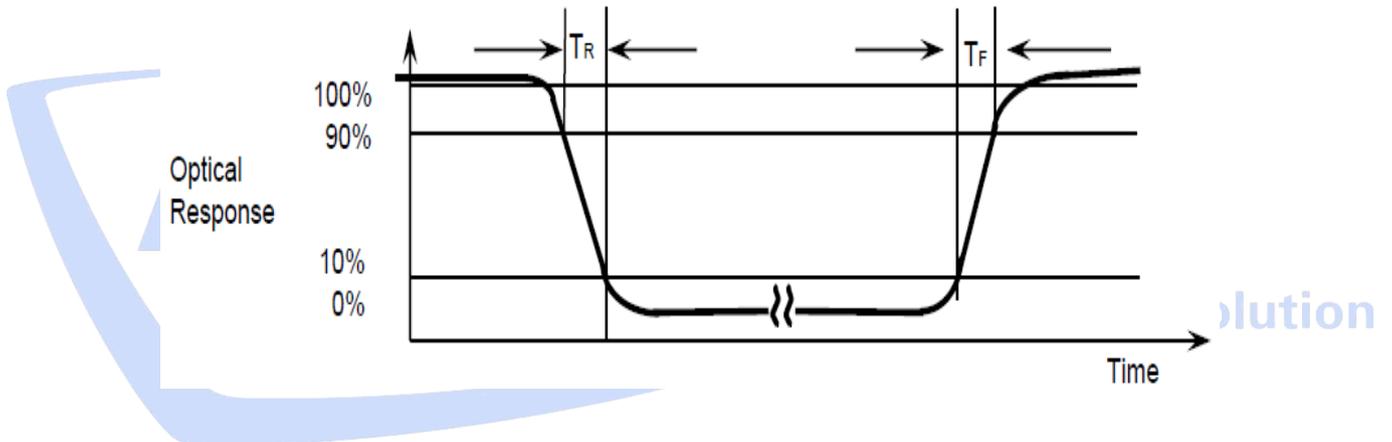


① Viewing Angle

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

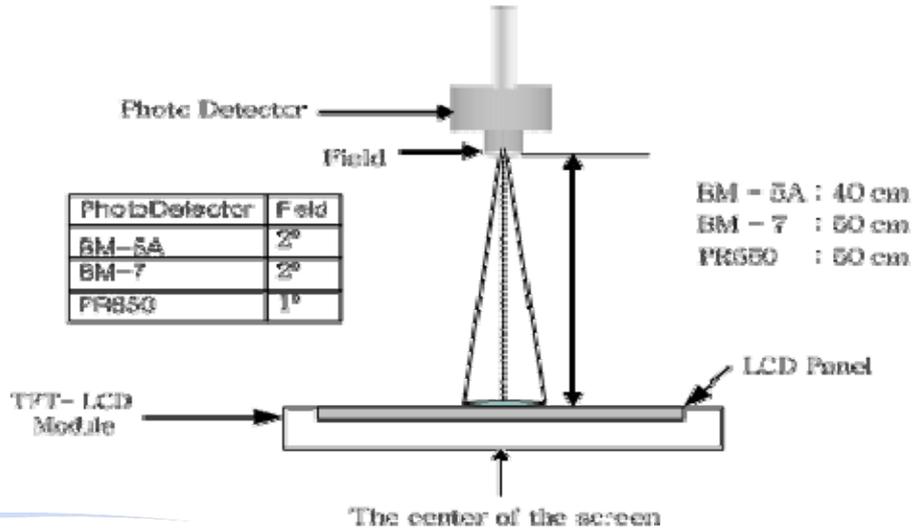
④ Luminance of White (Center of Screen)

$$Y_L = 300 \text{ cd/m}^2 \text{ (Typ.)}$$

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[mA] Environment condition: $T_a = 25 \pm 2 [^{\circ}\text{C}]$



⑥ Brightness uniformity (9 points)

$$B_{uni} = 100 * (B_{max} - B_{min}) / B_{max}$$

B_{max}: Maximum brightness, B_{min}: Minimum brightness

Definition of test point.



5.3 Back Light Unit

Parameter guideline for LED driving is under stable conditions at 25 °C (Room Temperature):

Symbol	Description	Min.	Typ.	Max.	Unit	Note
IRLED1	LED Forward Current	-	110	115.5	[mA]	Note 1
IRLED2						
IRLED3						
IRLED4						
VLB	Light Bar Operation Voltage (for reference)	44.25	49.5	54	[Volt]	Note 2
PBLU	BLU Power Consumption (for reference)	-	21.78	24.95	[Watt]	Note 3
LTLED	LED Life Time (Typical)	30,000	-	-	[Hour]	Note 4

Each module consists of 60 pcs LED (4 strings x 15 pcs / string)

Note 1: The specified current is 100% duty of LED chip input current, IRLED1,2,3,4 define as per strings LED current.

Note 2: The value showed is one string operation voltage.

Note 3: $PBLU = VLED * (IRLED1 + IRLED2 + IRLED3 + IRLED4)$

Note 4: Definition of life time: Brightness becomes to 50% of its original value. The minimum life time of LED unit is on the condition of IRLED = 110mA and 25±2°C (Room Temperature).

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5.4 CIE Coordinates (Color Chromaticity)

Item	Color chromaticity (CIE 1931)	
	X(Typ.)	Y(Typ.)
Red	0.645 ±0.05	0.330 ±0.05
Green	0.315 ±0.05	0.620 ±0.05
Blue	0.154 ±0.05	0.064 ±0.05
White	0.313 ±0.05	0.329 ±0.05

5.5 Absolute Maximum Rating

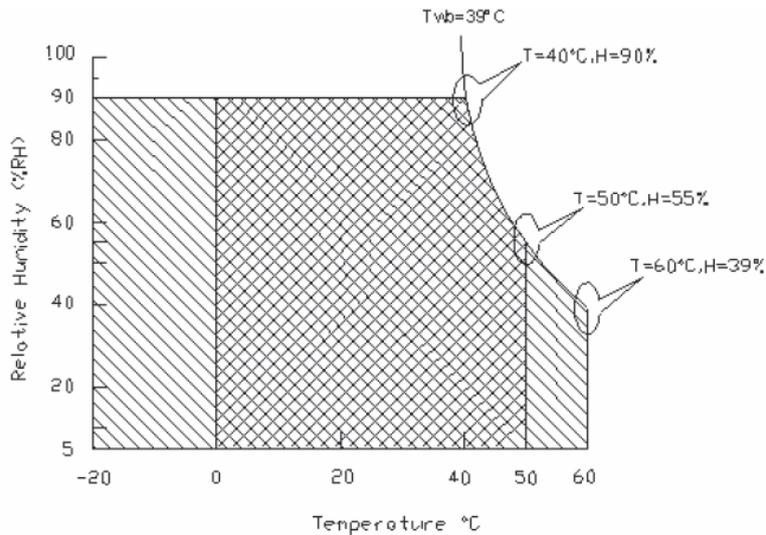
5.5.1 Absolute rating of environment

Item	Symbol	Min	Max	Unit
Operating Temperature	TOP	0	+50	[°C]
Operation Humidity	HOP	5	90	[%RH]

Storage Temperature	TST	-20	+60	[oC]
Storage Humidity	HST	5	90	[%RH]

Note : Temperature and relative humidity range are shown as the below figure.

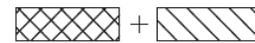
1. 90% RH Max ($T_a \leq 39^\circ\text{C}$)
2. Max wet-bulb temperature at 39°C or less. ($T_a \leq 39^\circ\text{C}$)
3. No condensation



Operating Range



Storage Range



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6. Visual Specification

6.1 Standard Mode & Display Size

Item	Specification	Note
Standard Mode	FHD 1,920*1080 @ 60 [Hz]Resolution	Recommend Mode
Display Size	597.6 (H) x 336.15 (V) mm (Typ.)	Panel Active Visual Size

6.2 Standard Condition

Item	Specification	Note
Warm up Time	30 minutes after lighting	
Panel Face	None	

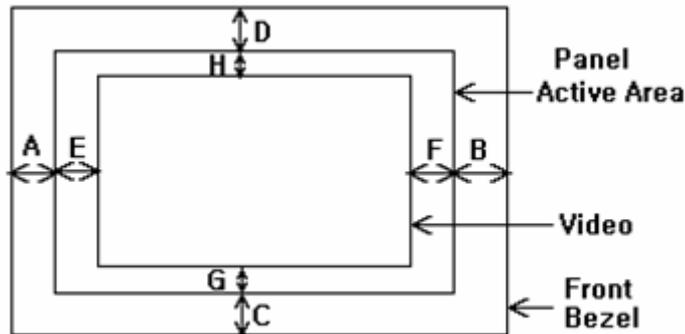
6.3 Screen image Stabilizing Time

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 : 1,920 × 1,080, 60Hz



$$|A-B| \text{ and } |C-D| \leq 1.0[\text{mm}], |E-F| \text{ and } |G-H| \leq 1.0[\text{mm}]$$

6.5 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

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

6.8 Residual Image

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

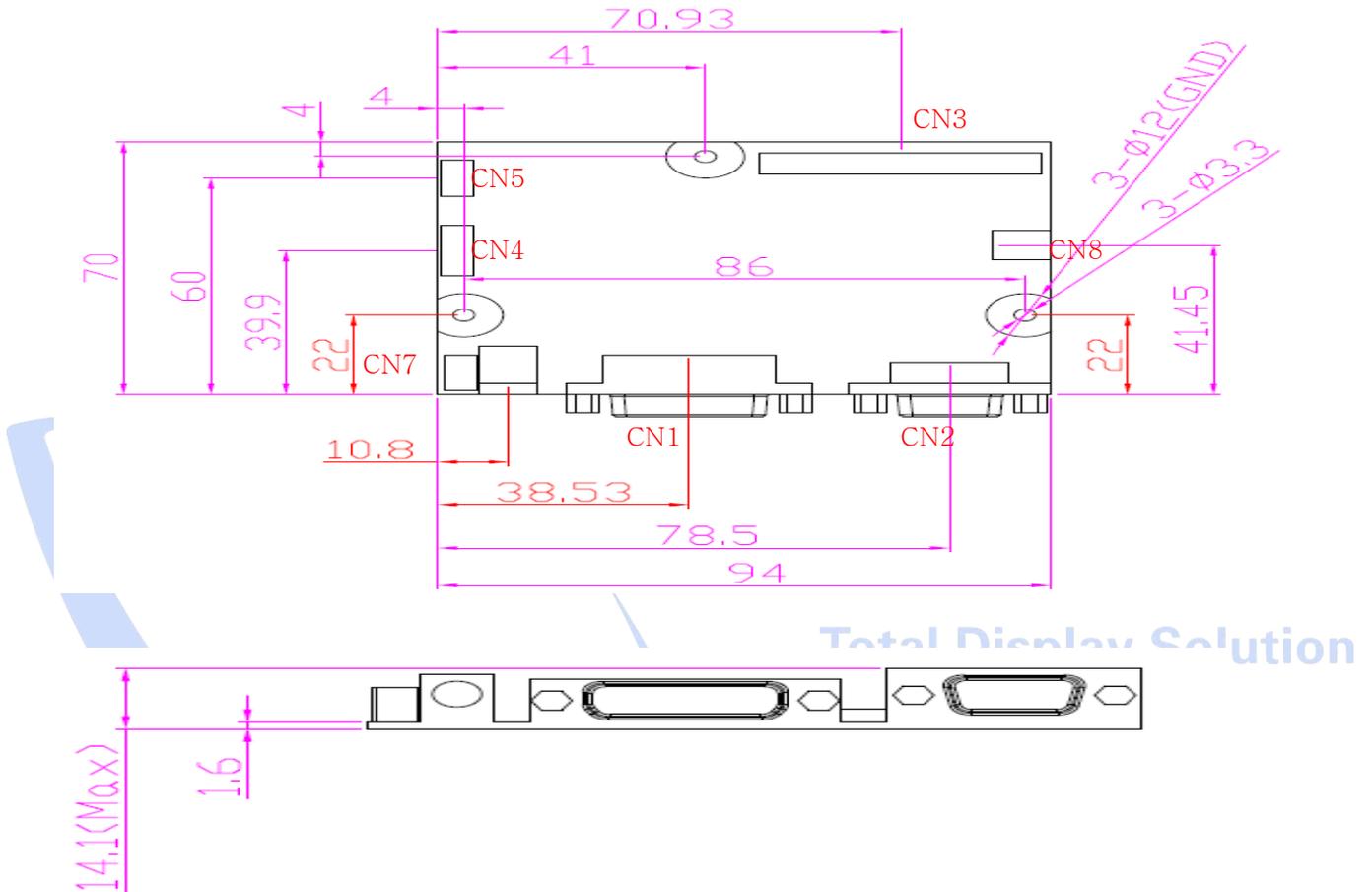
6.9 Crosstalk

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

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
1	LED	2	KEY	3	GND

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	VSYSN (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

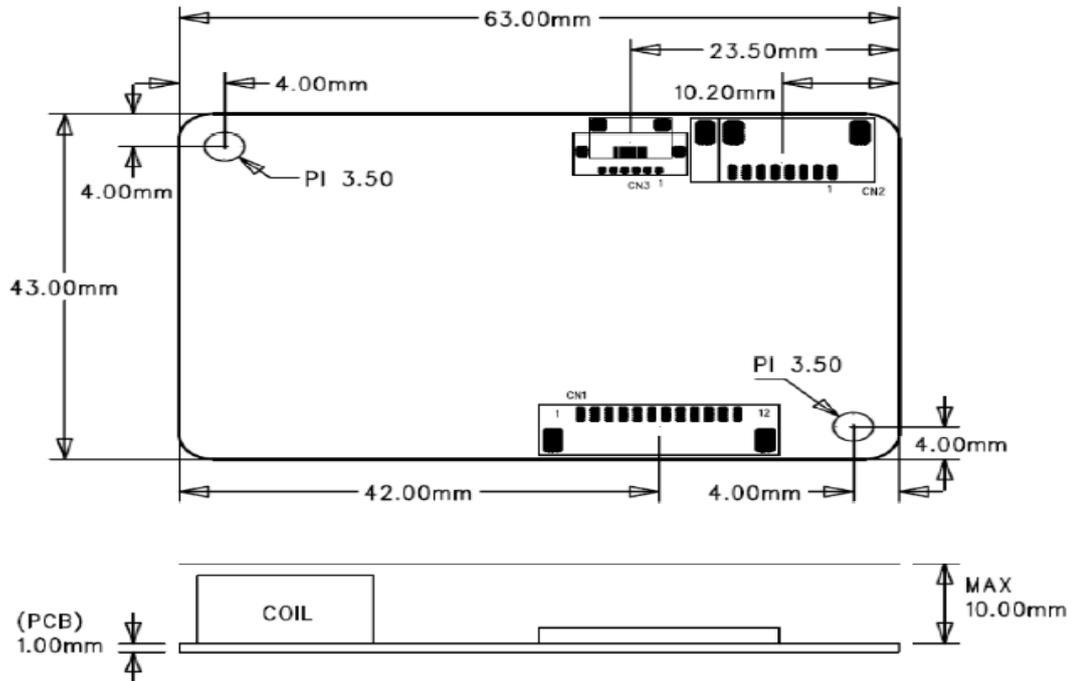
7.2.7 CN8 : Touch power

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



8. LED Driver Specification

8.1 LED Driver Dimension



8.2 LED Driver Input Connector : 12505WR-12A (Yeon Ho) or Equivalent

Pin No	Symbol	Description
1,2,3	Vin	Input : 24V(typ.)
4,5,7,8,10,12	GND	GND
6	NC	No Connection
9	On/ Off	LED DRIVER ON/OFF Control
11	DIM	0V(MAX) ~ 5V(MIN)

8.3 LED Driver Output Connector : 12507WR-06L (Yeon Ho) or Equivalent

Pin No.	Symbol	REMARK
1	FB1	Feedback 1 (Return 1)
2	FB2	Feedback 2 (Return 2)
3	VOUT	System Output
4	VOUT	System Output
5	FB3	Feedback 3 (Return 3)
6	FB4	Feedback 4 (Return 4)

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

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 2.8T + Sensor 0.4T + Glass 2.8T	
Multi Touch(Points)	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°C ~ 85°C
	Controller	-20°C ~ 85°C
Operating Humidity	20% ~ 90%, No condensation on surface.	
Reliability	Abides by Kortek regulations.	
ESD	IEC 61000-4-2 : Air 20kV / Contact 10kV	

