



LITEMAX
SSD1515
Spanpixel

Sunlight Readable 15.9" LCD Display

(2nd Edition 10/21/2010)

All information is subject to change without notice.

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RECORD OF REVISION

Version	Date	Description	Remark
V1.0	1/21/2010	Initial Release	

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1.0 GENERAL DESCRIPTION

1.1 OVERVIEW

The SSD1515 is a 15.9 inch color TFT-LCD display with special aspect ratio 16:6.4 and XGA wide resolution 1280 x 512 (1280 horizontal by 512 vertical pixel array). It is Litemax's Spanpixel series product which designed for high brightness 1000 nits sunlight readable display, power efficiency LED backlight system and fanless display. The SSD1515 build in AD board supports input port VGA.

Each pixel is divided into Red, Green and Blue sub-pixels or dots which are arranged in vertical stripes. Gray scale or the brightness of the sub-pixel color is determined with a 8-bit gray scale signal for each dot. It is intended to support display where wide viewing angle, high color saturation, and high color depth.

1.2 FEATURES

- 15.9" SXGA TFT LCD
- LED backlight
- 1000 nits Sunlight Readable
- Long Life Time
- Thin and Light
- DC 12V input

1.3 APPLICATION

- Out/Indoor Display
- Out/Indoor Digital Signage
- Quick Service Restaurant Display Product
- Transportation

1.4 GENERAL SPECIFICATIONS

Model No.	SSD1515
LCD Display	15.9" Wide LED Backlight LCD
Display Area (mm)	376.3 (H) x 150.5 (V)
Display Surface	Non-glare hard coated
Luminance	1000 cd/m ²
Resolution	1280 x 512
Contrast Ratio	1000 : 1 (Typ)
Display Colors	16.7M colors
Pixel Arrangement	RGB (Red, Green, Blue) vertical stripe
Pixel Pitch (mm)	0.294mm
Response Time	5ms (Typ.)
Signal Connector	15 Pin D-sub, 29 Pin DVI
F/R Control Button	Power Switch, Menu, Select (+,-)
OSD Menu	Brightness, Contrast, H/V Position, Color, Phase, Clock, Language, Management
Power Consumption	At maximum luminance and checkered flag pattern 23W (Max)
Option	Touch for customize (Resistive/ Capacitive)

※ Specifications subject to change without notice.

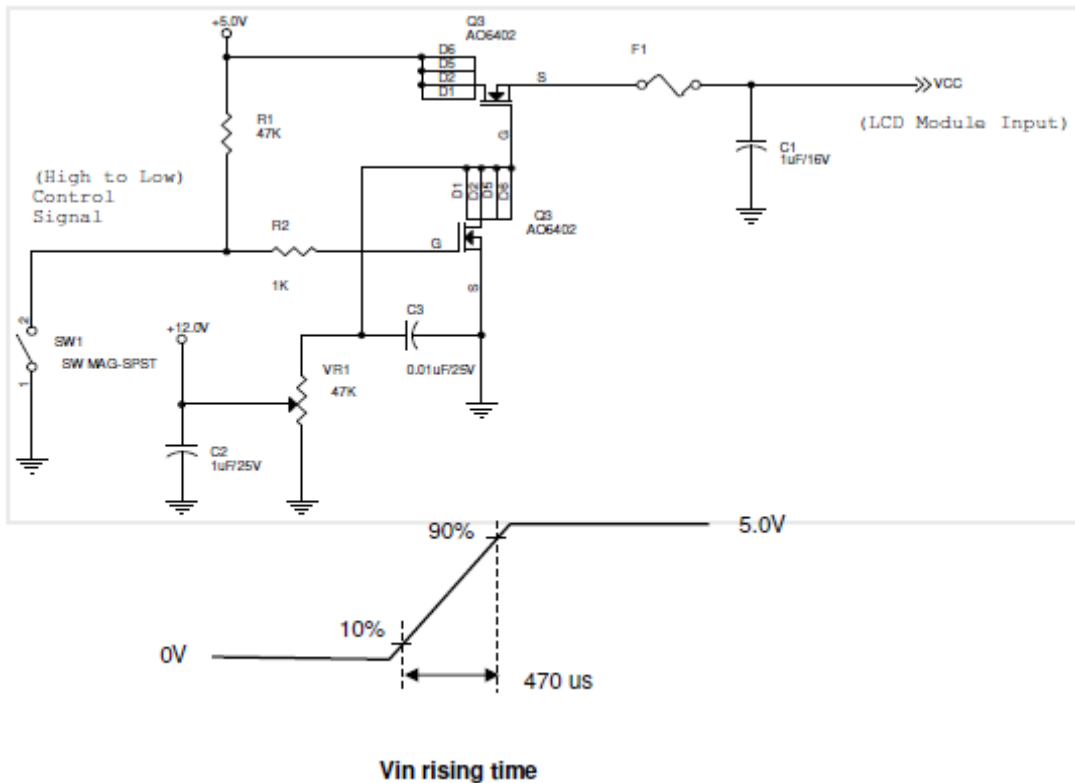
2.0 ELECTRICAL CHARACTERISTICS

2.1 ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
VDD	Logic/LCD Drive Voltage	4.5	5.0	5.5	[Volt]	± 10%
IDD	Input Current	-	0.82	1.06	[A]	VDD= 5.0V, All Black Pattern At 75Hz, +30%
PDD	VDD Power	-	4.1	5.3	[Watt]	VDD= 5.0V, All Black Pattern At 75Hz, Note 1
IRush	Inrush Current	-	-	2.5	[A]	Note 2
VDDrp	Allowable Logic/LCD Drive Ripple Voltage	-	-	100	[mV] p-p	VDD= 5.0V, All Black Pattern At 75Hz

Note 1: The variance of VDD power consumption is ±30%.

Note 2: Measurement conditions:



2.2 LCD PANEL SIGNAL PROCESSING BOARD

The module using a pair of LVDS receiver SN75LVDS82(Texas Instruments) or compatible. LVDS is a differential signal technology for LCD interface and high speed data transfer device. Transmitter shall be SN75LVDS83(negative edge sampling) or compatible. The first LVDS port(RxOxxx) transmits odd pixels while the second LVDS port(RxExxx) transmits even pixels.

PIN #	SIGNAL NAME	DESCRIPTION
1	RxOIN0-	Negative LVDS differential data input (Odd data)
2	RxOIN0+	Positive LVDS differential data input (Odd data)
3	RxOIN1-	Negative LVDS differential data input (Odd data)
4	RxOIN1+	Positive LVDS differential data input (Odd data)
5	RxOIN2-	Negative LVDS differential data input (Odd data, H-Sync,V-Sync,DSPTMG)
6	RxOIN2+	Positive LVDS differential data input (Odd data, H-Sync,V-Sync,DSPTMG)
7	VSS	Power Ground
8	RxOCLKIN-	Negative LVDS differential clock input (Odd clock)
9	RxOCLKIN+	Positive LVDS differential clock input (Odd clock)
10	RxOIN3-	Negative LVDS differential data input (Odd data)
11	RxOIN3+	Positive LVDS differential data input (Odd data)
12	RxEIN0-	Negative LVDS differential data input (Even data)
13	RxEIN0+	Positive LVDS differential data input (Even data)
14	VSS	Power Ground
15	RxEIN1-	Negative LVDS differential data input (Even data)
16	RxEIN1+	Positive LVDS differential data input (Even data)
17	VSS	Power Ground
18	RxEIN2-	Negative LVDS differential data input (Even data)
19	RxEIN2+	Positive LVDS differential data input (Even data)
20	RxECLKIN-	Negative LVDS differential clock input (Even clock)
21	RxECLKIN+	Positive LVDS differential clock input (Even clock)
22	RxEIN3-	Negative LVDS differential data input (Even data)
23	RxEIN3+	Positive LVDS differential data input (Even data)
24	VSS	Power Ground
25	VSS	Power Ground
26	NC	No Connection (for AUO test)
27	VSS	Power Ground
28	VCC	+5.0V Power Supply
29	VCC	+5.0V Power Supply
30	VCC	+5.0V Power Supply

2.3 BACKLIGHT CONNECTOR PIN CONFIGURATION

LED Driving Electrical specification

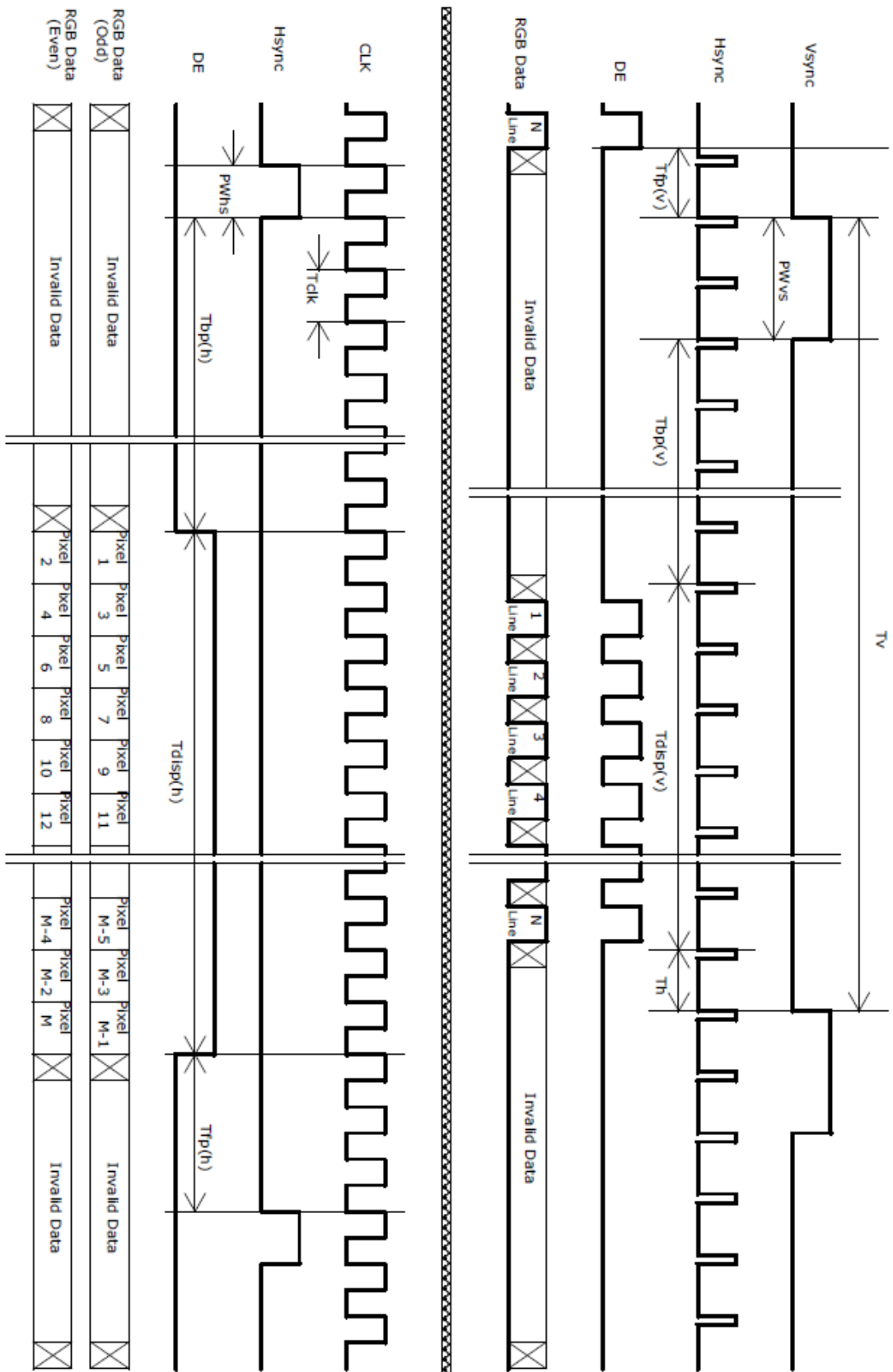
Item	Symbol	Conditions	MIN.	TYP.	MAX.	Unit	Remark
Input Voltage	Vin		10.0	12.0	15.0	V	
Input Current (Low Brightness)	linL	VIN=12V,Vadj=5V	0.0	-----	-----	mA	
Input Current (High Brightness)	linH	VIN=12V,Vadj=0V	1.66	1.36	1.08	A	
LED Current (Low Brightness)	loutL	VIN=12V,Vadj=5V	0.0	-----	-----	Arms	
LED Current (High Brightness)	loutH	VIN=12V,Vadj=0V	0.667	0.667	0.667	A	
Working Frequency	Freq	VIN=12V,Vadj=0V	120	125	130	KHZ	
PWM Frequency	Freq	VIN=12V	180	200	220	HZ	
Brightness Control	Vadj	Connection of Voltage	0.5	-----	4.8	V	
ON/OFF Control	Von/off	Normal Operation	2	-----	5	V	
Output Voltage	Vout	VIN=12V,Vadj=0V	23.2	23.14	23.08	V	
Efficiency	η	VIN=12V,Vadj=0V	93.22	94.57	94.88	%	

2.4 SIGNAL TIMING SPECIFICATIONS

Signal	Item	Symbol	Min	Typ	Max	Unit
Vertical Section	Period	Tv	1032	1066	1150	Th
	Active	Tdisp(v)	1024	1024	1024	Th
	Blanking	Tbp(v)+Tfp(v)+PWvs	8	42	126	Th
Horizontal Section	Period	Th	780	844	2047	Tclk
	Active	Tdisp(h)	640	640	640	Tclk
	Blanking	Tbp(h)+Tfp(h)+PWhs	140	204	-	Tclk
Clock	Period	Tclk	22.2	18.52	14.81	ns
	Frequency	Freq.	45	54	67.5	MHz
Frame Rate	Frequency	1/Tv	50	60	75	Hz

DE only Mode

2.5 SIGNAL TIMING WAVEFORMS

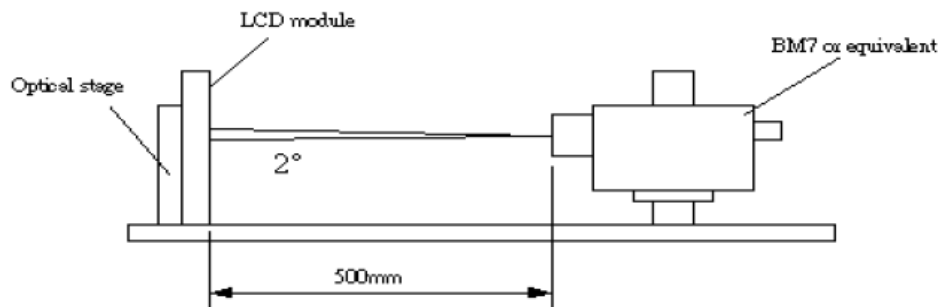


3.0 OPTICAL CHARACTERISTICS

3.1 TEST CONDITIONS

Optical characteristics are determined after the unit has been 'ON' and stable for approximately 45 minutes in a dark environment at 25 °C. The values specified are at an approximate distance 500mm from the LCD surface at a viewing angle of Φ and θ equal to 0°.

Fig.1 1 presents additional information concerning the measurement equipment and method.



3.2 OPTICAL SPECIFICATIONS

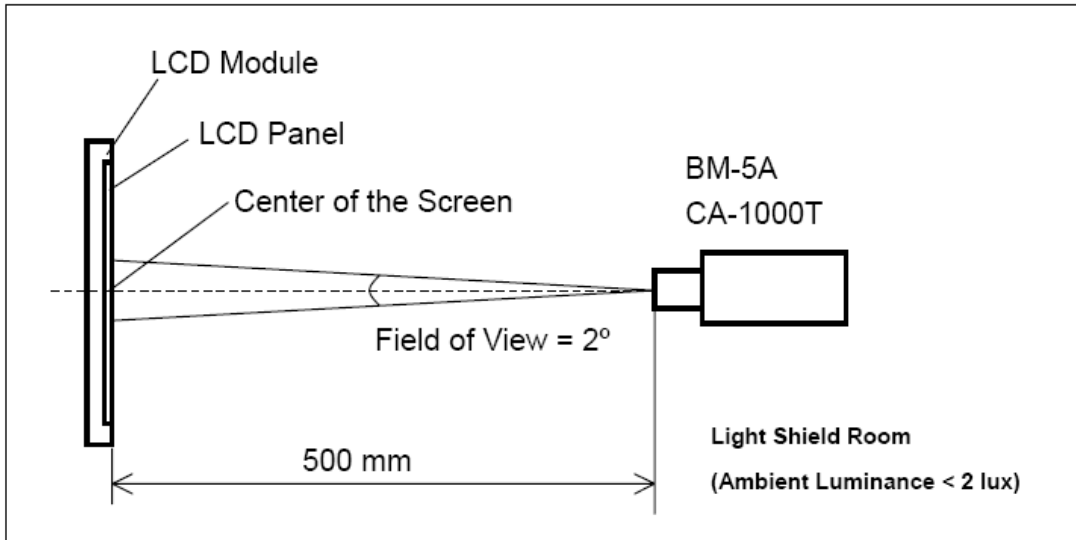
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Contrast Ratio	CR	-	1000	-	-	(1)
Luminance of White	L _{Ave}	-	1000	-	cd/m ²	(2)
Response Time	T _γ	-	5	-	ms	(3)
Chromaticity	Red	R _x	Typ.-0.03	0.64	Typ.+0.03	-
		R _y		0.34		-
	Green	G _x		0.28		-
		G _y		0.60		-
	Blue	B _x		0.14		-
		B _y		0.07		-
	White	W _x		0.31		-
		W _y		0.32		-
Viewing Angle	x axis, right($\varphi=0^\circ$)	θ_r	-	80	-	Degree
	x axis, left($\varphi=180^\circ$)	θ_l	-	80	-	
	y axis, up($\varphi=90^\circ$)	θ_u	-	85	-	
	y axis, down ($\varphi=0^\circ$)	θ_d	-	85	-	

Note:

1. Contrast Ratio (CR) is defined mathematically as:

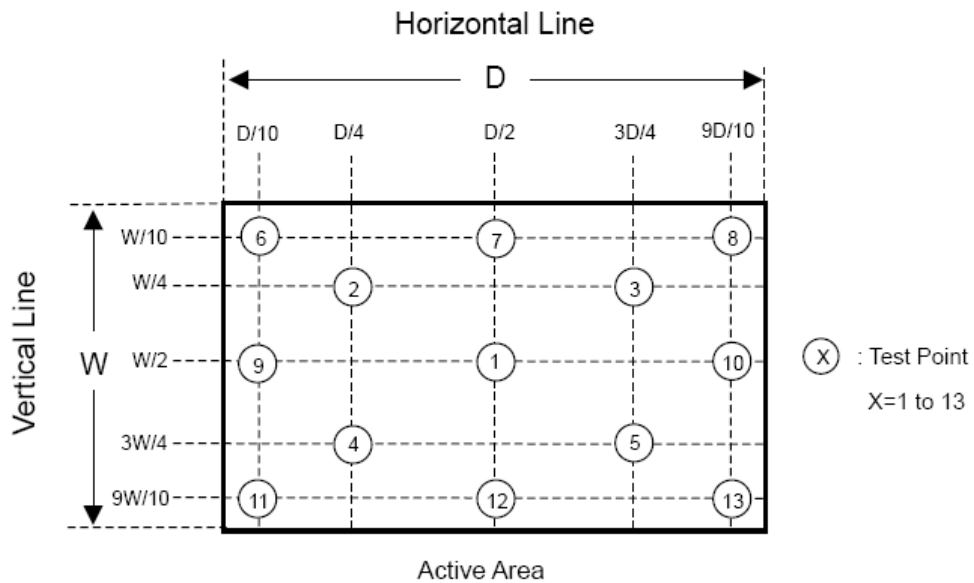
$$\text{Contrast Ratio} = \frac{\text{Surface Luminance of } L_{\text{on1}}}{\text{Surface Luminance of } L_{\text{off1}}}$$

2. Measurement Setup: The LCD module should be stabilized at given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.



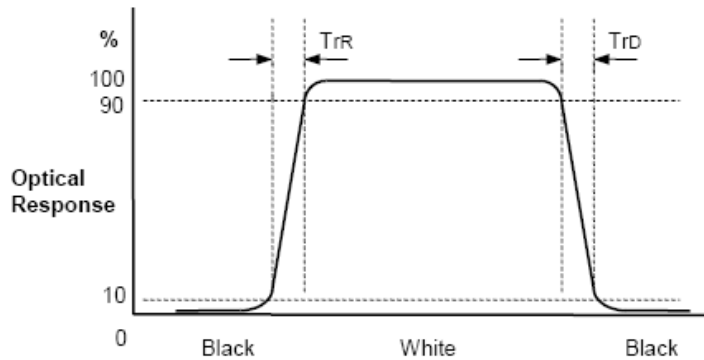
Definition of luminance measured points: Measure the luminance of gray level 255 at point L(1)
 Definition of White Variation (δW): Measure the luminance of gray level 255 at 9 points

$$\delta W = \frac{\text{Maximum [L (1), L (6), L (7), L (8), L (9), L (10), L (11), L (12), L (13)]}}{\text{Minimum [L (1), L (6), L (7), L (8), L (9), L (10), L (11), L (12), L (13)]}}$$



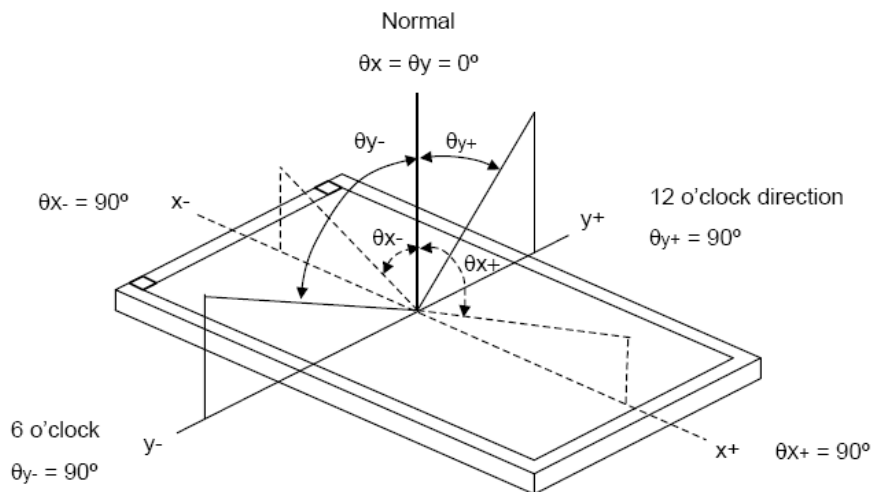
3. Response time T_r is the average time required for display transition by switching the input signal for five luminance ratio (0%,25%,50%,75%,100% brightness matrix) and is based on $f_v=60\text{Hz}$ to optimize.

	0%	25%	50%	75%	100%
0%		t0%-25%	t0%-50%	t0%-75%	t0%-100%
25%	t25%-0%		t25%-50%	t25%-75%	t25%-100%
50%	t50%-0%	t50%-25%		t50%-75%	t50%-100%
75%	t75%-0%	t75%-25%	t75%-50%		t75%-100%
100%	t100%-0%	t100%-25%	t100%-50%	t100%-75%	



4. Viewing angle is the angle at which the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface.

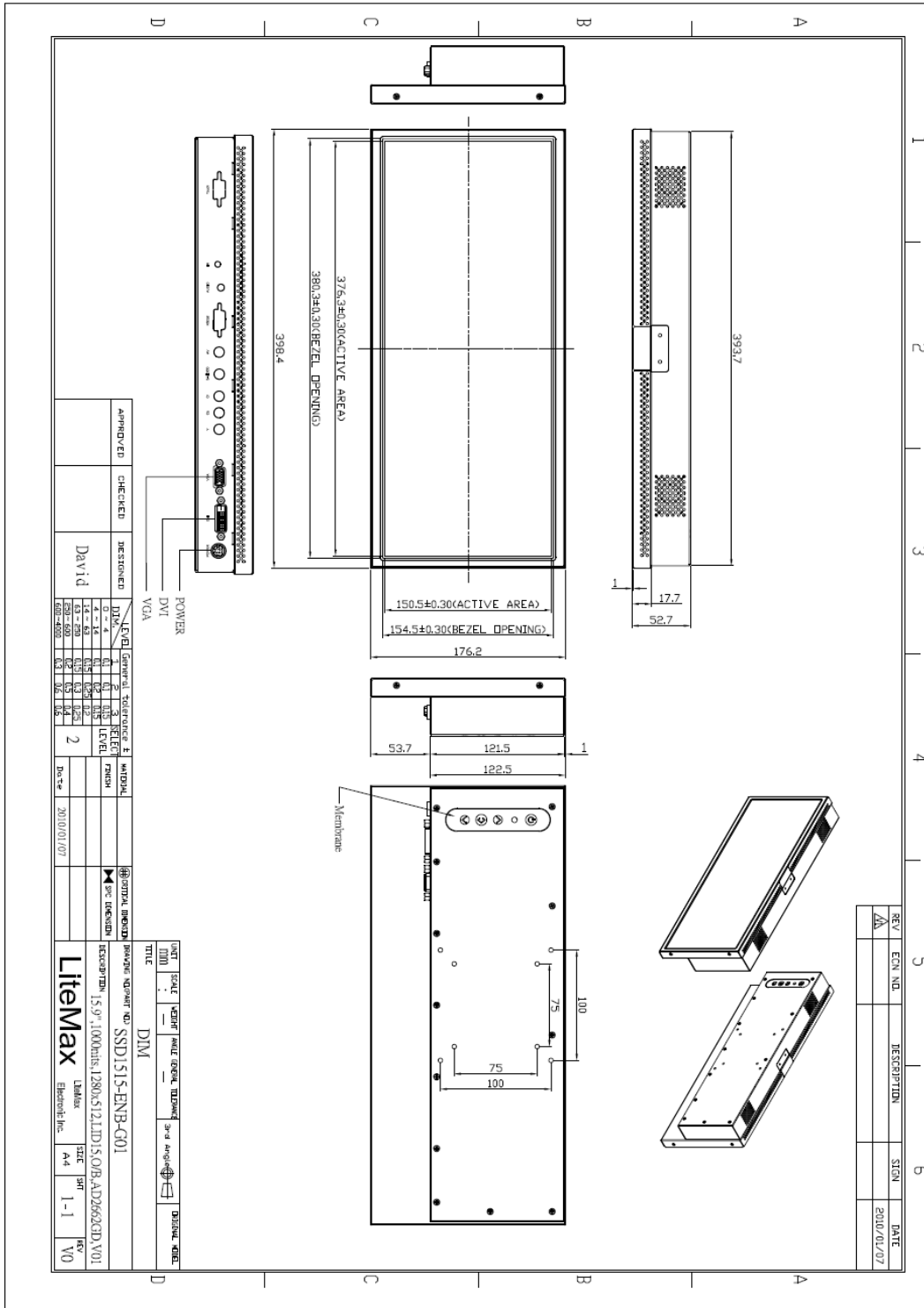
Definition of Viewing Angle (θ_x, θ_y):



4.0 MECHANICAL CHARACTERISTICS

SSD1515 MECHANICAL SPECIFICATION

Item		Min.	Typ.	Max.	Unit
Module Size	Horizontal(H)	-	398.4	-	mm
	Vertical(V)	-	176.2	-	mm
	Depth(D)	-	52.7	-	mm
Weight (Module only)		-	TBA	-	kg
Weight (1 module per box)		-	TBA	-	kg



5.0 PRECAUTIONS

5.1 HANDLING PRECAUTIONS

- (1) The module should be assembled into the system firmly by using every mounting hole. Be careful not to twist or bend the module.
- (2) While assembling or installing modules, it can only be in the clean area. The dust and oil may cause electrical short or damage the polarizer.
- (3) Use fingerstalls or soft gloves in order to keep display clean during the incoming inspection and assembly process.
- (4) Do not press or scratch the surface harder than a HB pencil lead on the panel because the polarizer is very soft and easily scratched.
- (5) If the surface of the polarizer is dirty, please clean it by some absorbent cotton or soft cloth. Do not use Ketone type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanently damage the polarizer due to chemical reaction.
- (6) Wipe off water droplets or oil immediately. Staining and discoloration may occur if they left on panel for a long time.
- (7) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contacting with hands, legs or clothes, it must be washed away thoroughly with soap.
- (8) Protect the module from static electricity, it may cause damage to the C-MOS Gate Array IC.
- (9) Do not disassemble the module.
- (10) Do not pull or fold the lamp wire.
- (11) Pins of I/F connector should not be touched directly with bare hands.

5.2 STORAGE PRECAUTIONS

- (1) High temperature or humidity may reduce the performance of module. Please store LCD module within the specified storage conditions.
- (2) It is dangerous that moisture come into or contacted the LCD module, because the moisture may damage LCD module when it is operating.
- (3) It may reduce the display quality if the ambient temperature is lower than 10 °C. For example, the response time will become slowly, and the starting voltage of lamp will be higher than the room temperature.

5.3 OPERATION PRECAUTIONS

- (1) Do not pull the I/F connector in or out while the module is operating.
- (2) Always follow the correct power on/off sequence when LCD module is connecting and operating. This can prevent the CMOS LSI chips from damage during latch-up.

6.0 AD Board & OSD Functions

6.1 AD BOARD GENERAL SPECIFICATIONS

- Max Resolution Up To Full HD 1920x1080
- Analog RGB Input
- ULTRA-RELIABLE DVI INPUT
- CBVS, S-VIDEO, Ycbcr INPUT
- 1.5Wx2 Audio Out
- Dual/single LVDS interface
- Support Panel DC5V or 3.3V, 12V Output
- Automatic External Fan Control
- OSD Control
- Inverter 0~5V Dimming Control
- *External V.R. brightness control (optional)
- *External light sensor brightness control (optional)
- *External RS232 control (optional)
- Input Power 12Vdc

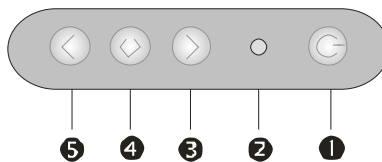
6.2 SUPPORTED TIMING (*by your panel resolution)

The following table displays optimum quality modes that the LCD monitor provides. If the other video modes are used, the monitor will stop working or display a poor quality picture.

TIMMING	
MODE	RESOLUTION
VGA	640x480@60Hz
	640x480@72Hz
	640x480@75Hz
SVGA	800x600@56Hz
	800x600@60Hz
	800x600@72Hz
	800x600@75Hz
XGA	1024x768@60Hz
	1024x768@70Hz
	1024x768@75Hz
SXGA	1280x1024@60Hz
	1280x1024@70Hz
	1280x1024@75Hz
WXGA	1366x768@60Hz

WSXGA+	1680x1050@60Hz
SXGA+	1400x1050@60Hz(Pixel f 101.000MHz)
	1400x1050@60Hz(Pixel f 121.750MHz)
	1400x1050@75Hz
UXGA	1600X1200@60Hz
	1600x1200@65Hz
	1600x1200@75Hz
FHD	1920X1080@60Hz
	1920X1080@65Hz
	1920X1080@75Hz

6.3 MEMBRANE CONTROL BUTTOM



- ① **POWER SWITCH:** Pushing the power switch will turn the monitor on. Pushing it again to turn the monitor off.
- ② **Power LED:** Power ON-Green / Power off-No.
- ③ **Up Key >:** Increase item number or value of the selected item.
- ④ **Menu Key:** Enter to the OSD adjustment menu. It also used for go back to previous menu for sub-menu, and the change data don't save to memory.
- ⑤ **Down Key <:** Decrease item number or item value when OSD is on. When OSD is off, it is hot key for input switch between VGA, AV, and S-video.

Screen Adjustment Operation Procedure

1. **Entering the screen adjustment**
The setting switches are normally at stand-by. Push the **Menu Key** once to display the main menu of the screen adjustment. The adjustable items will be displayed in the main menu.
2. **Entering the settings**
Use the **Down Key <** and **Up Key >** buttons to select the desired setting icon and push the SELECT button to enter sub-menu.
3. **Change the settings**
After the sub-menu appears, use the **Down Key <** and **Up Key >** buttons to change the setting values.
4. **Save**

After finishing the adjustment, push the SELECT button to memorize the setting.

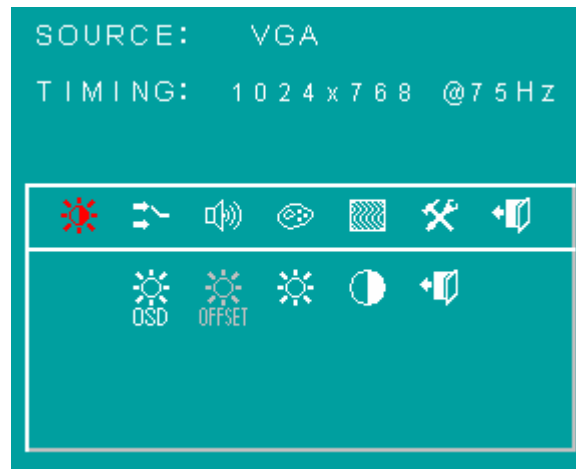
5. Return & Exit the main menu

Exit the screen adjustment; push the "MENU" button. When no operation is done around 30 sec (default OSD timeout), it goes back to the stand-by mode and no more switching is accepted except MENU to restart the setting.

6.4 OSD FUNCTIONS

Here are some instructions for you to use the OSD (On Screen Display). By pressing the "menu", you will see the below picture.

Timing shows resolution, H-frequency, and V-frequency of the panel. Version shows the firmware control version. This 2 information is not changeable by user.



There are 7 sub pages inside the OSD manual, Brightness, Signal select, Sound, Color, Image, Tools, and Exit.

When you press "menu" button, you enter the "Brightness" sub page. You will see 5 selections:



press "menu"



press "menu"



press "menu"



OSD Brightness:



press "right" key



press "menu" once, you can go into adjust the brightness. Press "left" you can dim down the brightness to "0", while press "right" you can increase the brightness to "100".



Ambient light sensor: press this icon, must to accompany with Litemax ambient light sensor to auto dimming.(OPTION)



Potentiometer: press this icon, adjust VR function.(OPTION)



Ambient light sensor with OSD offset: press this icon



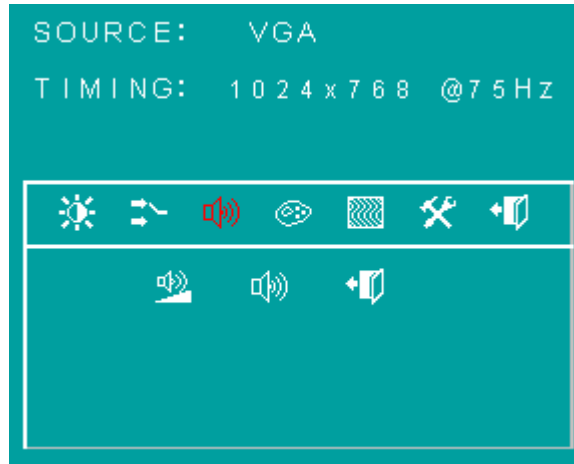
Press 'menu' once, you can adjust min. luminance to fit your application (OPTION)



Contrast: Press "menu" and "right" you can adjust the contrast from "0" to "100" by pressing the "left" and "right".

Exit: You can exit this sub menu back to normal screen.

Sound :



There are 3 options for "Sound" sub page.



Audio Volume: Audio volume adjustment.



Mute: You can mute the speaker by pressing this option.



Exit: back to the normal screen.



Auto Color: by press this "Auto Color" option, you can get the optimal color performance.



sRGB: Windows standard color setting.



Color Tempure: You can have 3 options in this selection.



Color Tempure User



Color Tempure_6500K



Color Tempure_9300K

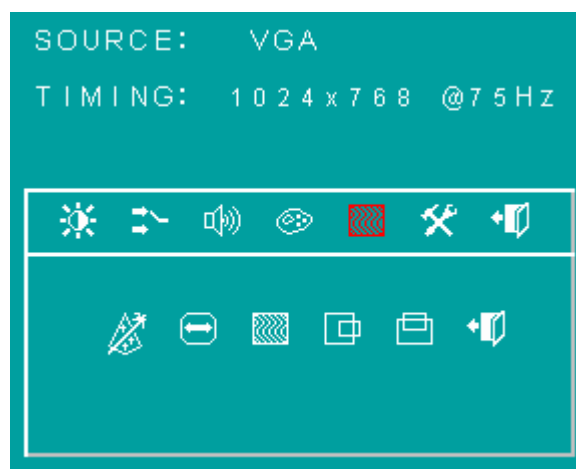
“user mode”, “6500K” (Warm color scheme), “9300K (Cold color scheme).
Default is “user”, and inside all “R”, “G”, and “B” are set “100”



Exit: back to the normal screen.

Image :

Go into the “Image” page, you can see below picture.



Auto just: Pressing this option, the AD5621 will adjust the optimal frequency of horizontal and vertical. You will see “Auto tune....” On the screen for around 3

seconds.



Clock: If you are not satisfied about the Autotune result, you can adjust manually by “Clock”.

The screen will be “wider” if you adjust this function.



Phase: If you see “double image” on characters, you can adjust “Phase” to make it perfect image.



HPos: You can shift the screen horizontally by this function.



Vpos: You can shift the screen vertically by this function.



Exit: Back to normal screen.

TOOLS :

On the “Tools” sub menu, you will see 5 icons.



Osd Control: Select this option, you will see 4 more options:



Osd_time: You can selection the time of OSD from 2 sec. to 16 sec.

D



Osd_HPos: You can move the OSD horizontally over the screen.



Osd_VPos: You can move the OSD Vertically over the screen.



Exit: back to main menu.



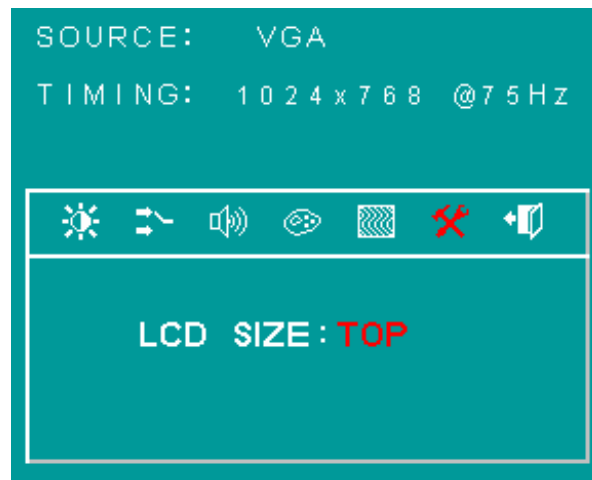
Factory_Reset: By pressing this, the screen will be back to the factory setting on very beginning and lost all the personal settings.



Sharpness: You can make the characters looks sharper.



LCD SIZE: Select this option, you can control LCD size 3 type, 1. Bottom mode, 2. Top mode, 3. Compress mode.



Exit

BURNIN MODE :

Factory Burn-in mode: While your VGA cable is connected on the monitor, press “Menu” and Left and Right <” simultaneously, you will see “BURN IN MODE” on the center of the screen for 3 sec. Then unplug the VGA cable, the screen will show Red, Green, Blue, White, and Black in sequence automatically.

You can plug in the VGA signal cable, and re-plug the power connector to exit the burn-in mode.

KEY LOCK MODE :

OSD Lock Function: It is possible to lock all the OSD buttons to prevent unauthorized changes to occur by pressing “Menu” and “right >” buttons simultaneously. You will see the “lock” icon below on the center of the screen for 3 seconds. If any button is pushed after the lock function is initiated, the below icon will appear on the screen.'



KEY LOCK

To release the OSD lock, press “Menu” and “Right >”. The below icon will appear on the center of the screen for 3 seconds. Now all OSD keys are active again.



KEY UNLOCK

7.0 LED Driving Board Specification

General: This specification is applied to LED converter unit for LED backlight

Operating Characteristics:

Item	Symbol	Conditions	MIN.	TYP.	MAX.	Unit	Remark
Input Voltage	Vin		10.0	12.0	15.0	V	
Input Current (Low Brightness)	IinL	VIN=12V,Vadj=5V	0.0	-----	-----	mA	
Input Current (High Brightness)	IinH	VIN=12V,Vadj=0V	1.66	1.36	1.08	A	
LED Current (Low Brightness)	IoutL	VIN=12V,Vadj=5V	0.0	-----	-----	Arms	
LED Current (High Brightness)	IoutH	VIN=12V,Vadj=0V	0.667	0.667	0.667	A	
Working Frequency	Freq	VIN=12V,Vadj=0V	999	1000	1001	KHz	
PWM Frequency	Freq	VIN=12V	180	200	220	HZ	
Brightness Control	Vadj	Connection of Voltage	0.5	-----	4.8	V	
ON/OFF Control	Von/off	Normal Operation	2	-----	5	V	
Output Voltage	Vout	VIN=12V,Vadj=0V	23.2	23.14	23.08	V	
Efficiency	η	VIN=12V,Vadj=0V	93.22	94.57	94.88	%	

Environment:

Operation Temperature	-20 ~ 70°C
Operation Humidity	% Max.RH
Storage Temperature	-40 ~ 85°C
Storage Humidity	% Max.RH

Connector Socket:

Input Connector: J3(JST BH 8B-PH or Compatible)

PIN No	Symbol	Description
1	Vin	DC+12V
2	Vin	DC+12V
3	Vin	DC+12V
4	GND	Ground
5	GND	Ground
6	GND	Ground
7	Brightness	Brightness Control 5V~0V
8	Control	ON/OFF Control 0.8V(OFF) 2~5V(ON)

Output Connector: J1,J2(JST S 2B-ZR-SM3A-TF or Compatible)

PIN NO	Symbol	Description
1	Output	LED High Voltage(+)
2	Output	LED Low Voltage (-)

DIMENSION:

