

Engineering Approval Sheet

CUSTOMER.	
MODEL.	AG084TH-LED1000 (based on AUO G084SN05 V7)
ITEM	LED Type High Brightness TFT-LCD
DATE. 2008	-07-15

CUSTOMER'S APPROVAL

APPROVED BY	SIGNATURE DATE
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PRESENTED

BY _____

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Record of Revision

Version and Date	Page	Old description	New Description
0.0 2008/07/15	All	First Edition	

1. Operating Precautions

- 1) Since front polarizer is easily damaged, pay attention not to scratch it.
- 2) Be sure to turn off power supply when inserting or disconnection from input connector.
- 3) Wipe off water drop immediately. Long contact with water may cause discoloration or spots.
- 4) When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.
- 5) Since the panel is made of glass, it may break or crack if dropped or bumped on hard surface.
- 6) Since CMOS LSI is used in this module, take care of static electricity and insure human earth when handling.
- 7) Do not open nor modify the module Assembly.
- 8) Do not press the reflector sheet at the back of the module to any directions.
- 9) At the insertion or removal of the Signal Interface Connector, be sure not to rotate nor tilt the interface Connector of the TFT module.
- 10) After installation of the TFT module into an enclosure, do not twist nor bend the TFT module even momentary. At designing the enclosure, it should be taken into consideration that no bending/twisting forces are applied to the TFT module from outside. Otherwise the TFT module may be damaged.
- 11) Cold cathode fluorescent lamp in LCD contains a small amount of mercury. Please follow local ordinances or regulations for disposal.

2.0 General Description

This specification applies to the 8.4 inch color TFT LCD module AG084TH-LED1200

This module is designed for display units for Industrial Applications.

The screen format is intended to support the SVGA (800(H) x 600(V)) screen and 16.2M (RGB 8-bits) or 262k colors (RGB 6-bits).

All input signals are LVDS interface compatible.

This is an RoHS product.

Back Light with White LEDs (Light Emitting Diode)

2.1 Display Characteristics

The following items are characteristics summary on the table under 25°C condition :

Items Unit		Specifications
Screen Diagonal	[mm]	213.4 (8.4")
Active Area	[mm]	170.4(H) x 127.8(V)
Pixel H x V		800(x3) x 600
Pixel Pitch	[mm]	0.213(H) x 0.213(V)
Pixel Arrangement		R.G.B. Vertical Stripe
Display Mode		Normally White
Typical White Luminance	[cd/m2]	1,000 Typ.
Nominal Input Voltage VDD	[Volt]	+3.3 Typ.
Weight	[Grams]	320 ±10
Physical Size	[mm]	203.0(W) x 142.5(H) x 8.0(D)
Electrical Interface		1 channel LVDS
Support Color		262K(6-bit) / 16.2M(8-bit)
Temperature Range		
Operating	[°C]	-30 to +85 (+85°C as panel surface temp.)
Storage(Shipping)	[°C]	-30 to +85

2.2 Optical Characteristics

The optical characteristics are measured under stable conditions at 25°C (Room Temperature):

Item Unit		Conditions	Min.	Typ.	Max.
Viewing Angle	[degree] 75	Horizontal (Right)	-		-
	[degree]	K = 10 (Left)		75 -	
	[degree] 75	Vertical (Upper)	-		-
	[degree]	K = 10 (Lower)		75 -	
White Uniformity		9 Points	-	-	1.6
Contrast ratio		$\theta = 0$	400 500		-
Response Time (Room Temp)	[msec]	Rising -		10	-
	[msec]	Falling -		25	-
Color Chromaticity Coordinates(CIE)		Red x		0.628	
		Red y		0.347	
		Green x		0.300	
		Green y		0.578	
		Blue x		0.148	
		Blue y		0.126	
		White x		0.305	
		White y		0.350	
White Luminance (Back Light with 64 LEDs)	[cd/m ²]	$\theta = 0^\circ$	- 1,	000	-

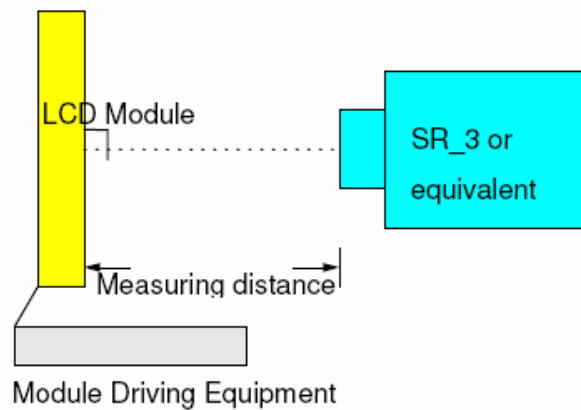
Note 1: Measurement method

Equipment Pattern Generator, Power Supply, Digital Voltmeter, Luminance meter (SR_3 or equivalent)

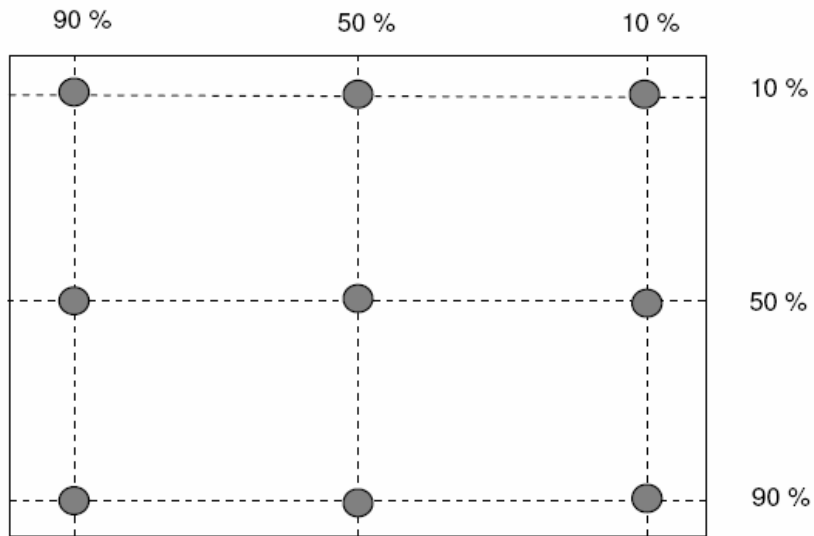
Aperture 1° with 50cm viewing distance

Test Point Center

Environment < 1 lux



Note 2: Definition of 9 points position (Display active area : 170.4(H) x 127.8(V))



Note 3: The luminance uniformity of 9 points is defined by dividing the minimum luminance values by the maximum test point luminance

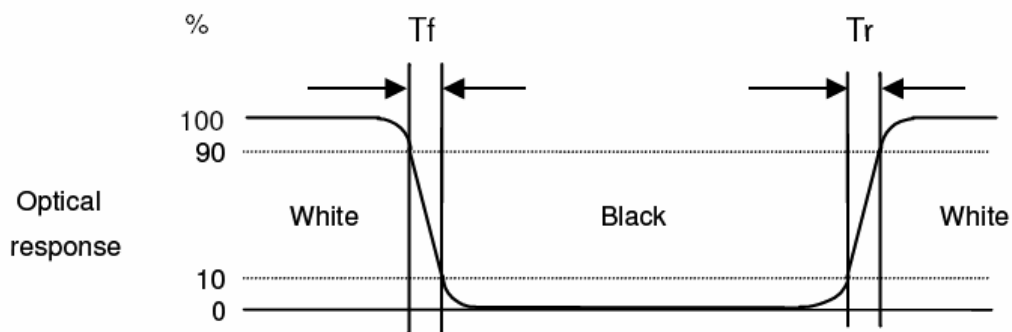
$$\delta_{w9} = \frac{\text{Minimum Brightness of nine points}}{\text{Maximum Brightness of nine points}}$$

Note 4: Definition of contrast ratio (CR):

$$\text{Contrast ratio (CR)} = \frac{\text{Brightness on the "White" state}}{\text{Brightness on the "Black" state}}$$

Note 5: Definition of response time:

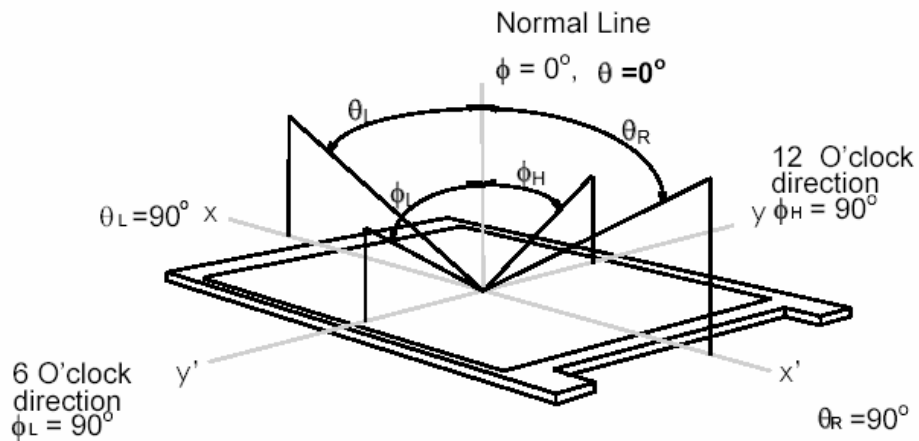
The output signals of photo detector are measured when the input signals are changed from "White" to "Black" (falling time) and from "Black" to "White" (rising time), respectively. The response time interval is between 10% and 90% of amplitudes. Please refer to the figure as below.



Note 6: Definition of viewing angle

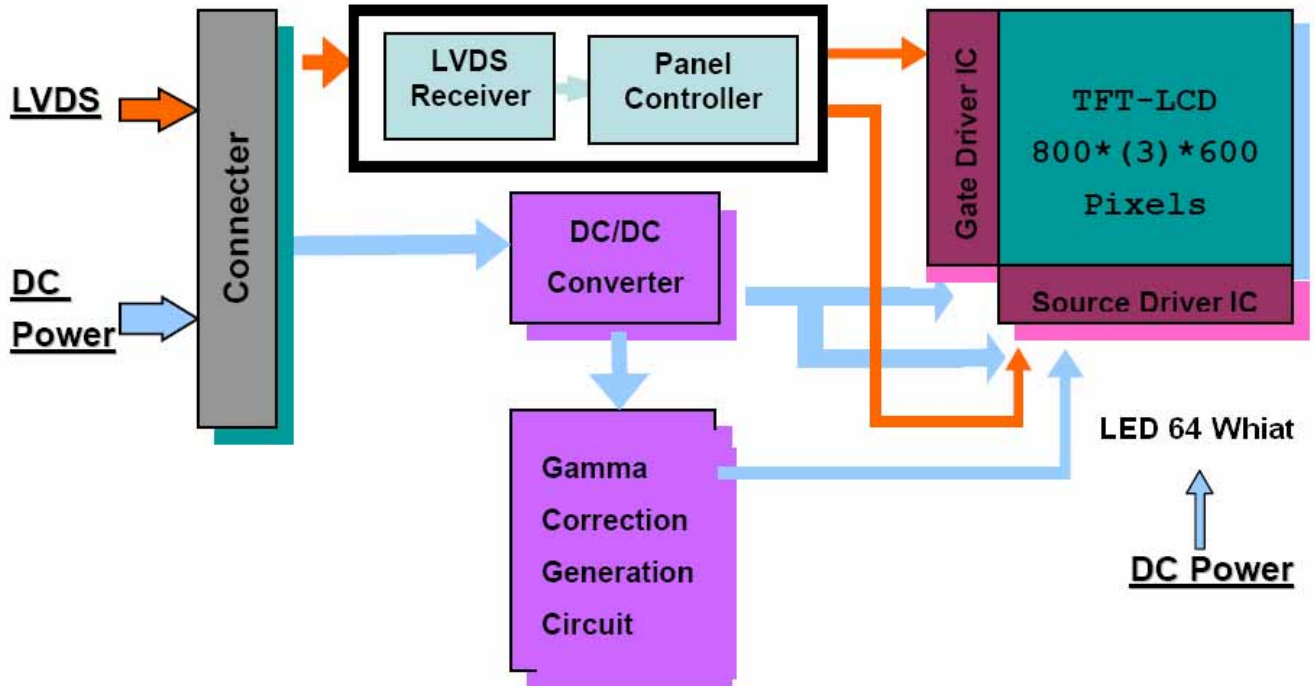
Viewing angle is the measurement of contrast ratio ≥ 10 , at the screen center, over a 180° horizontal and 180° vertical range (off-normal viewing angles). The 180° viewing angle range is broken down as below: 90° (θ)

horizontal left and right, and 90° (φ) vertical high (up) and low (down). The measurement direction is typically perpendicular to the display surface with the screen rotated to its center to develop the desired measurement viewing angle.



3. Functional Block Diagram

The following diagram shows the functional block of the 8.4 inch color TFT/LCD module:



4. Absolute Maximum Ratings

4.1 Absolute Ratings of TFT LCD Module

Item Symb	ol	Min	Max	Unit
Logic/LCD Drive Voltage	VDD	-0.3	+3.6	[Volt]
Input Voltage of Signal	Vin	-0.3	VDD+0.3	[Volt]

4.2 Absolute Ratings of Environment

Item Symb	ol	Min	Max	Unit
Operating Temperature	TOP	-30 +85		[°C]
Operating Humidity	HOP 8		95	[%RH]
Storage Temperature	TST -30		+85	[°C]
Storage Humidity	HST 5		95	[%RH]

Note: Maximum Wet-Bulb should be 39°C and no condensation.

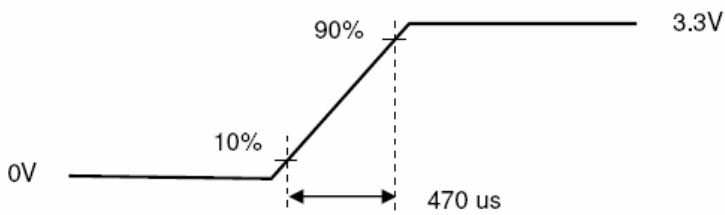
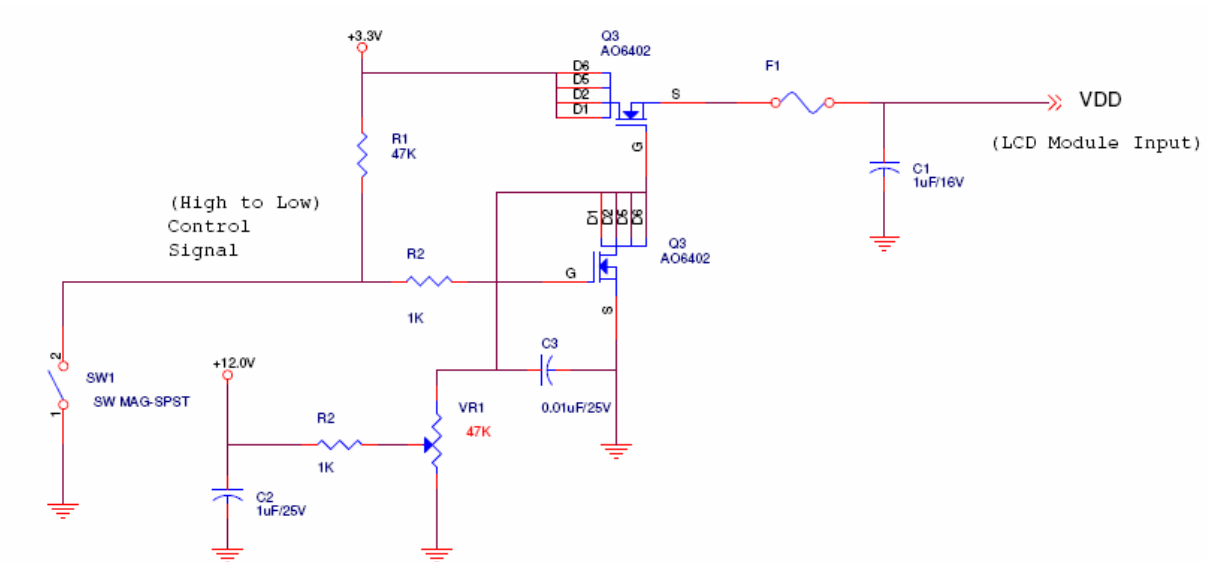
5. Electrical Characteristics

5.1 TFT LCD Module

5.1.1 Power Specification

Symbol	Parameter	Min	Typ	Max	Units	Remark
VDD	Logic/LCD Drive Voltage	3.0	3.3	3.6	[Volt]	±10%
IDD	VDD Current	- 300		330	[mA]	64 Gray Bar Pattern (VDD=3.3V, at 60Hz)
Irush	LCD Inrush Current	- -		3	[A]	Note 1
PDD	VDD Power	1		1.2	[Watt]	64 Gray Bar Pattern (VDD=3.3V, at 60Hz)

Note 1: Measurement condition:



VDD rising time



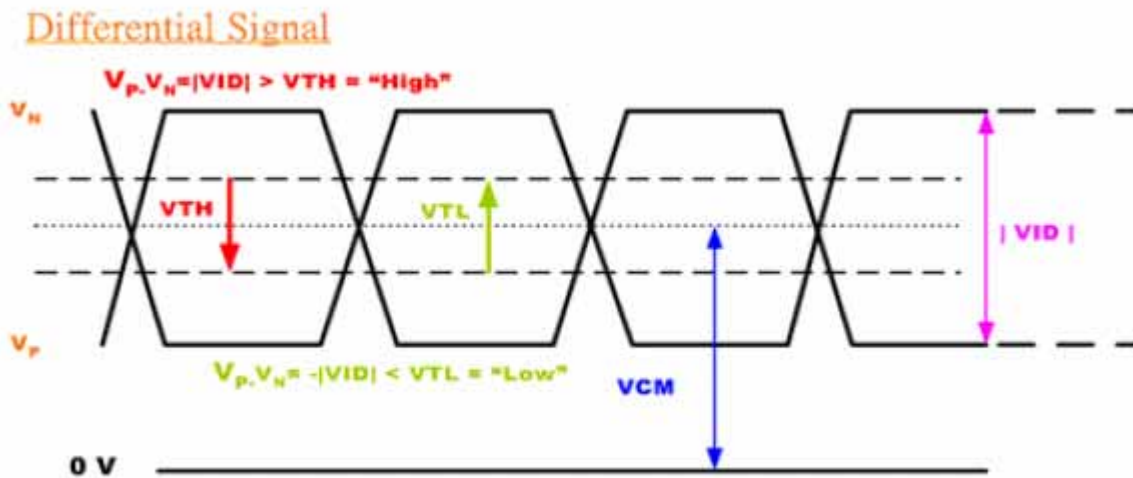
64 Gray pattern

5.1.2 Signal Electrical Characteristics

Input signals shall be low or Hi-Z state when VDD is off.

Symbol	Item	Min.	Typ.	Max.	Unit	Remark
VTH	Differential Input High Threshold	-	-	100	[mV]	VCM=1.2V
VTL	Differential Input Low Threshold	-100	-	-	[mV]	VCM=1.2V
VID	Input Differential Voltage	100	400	600	[mV]	
VICM	Differential Input Common Mode Voltage	1.1		1.6	[V]	VTH/VTL= ±100mV

Note: LVDS Signal Waveform.



5.2 LED Backlight Unit

The Back Light system is an edge-lighting type with white LED (Light Emitting Diode)s.

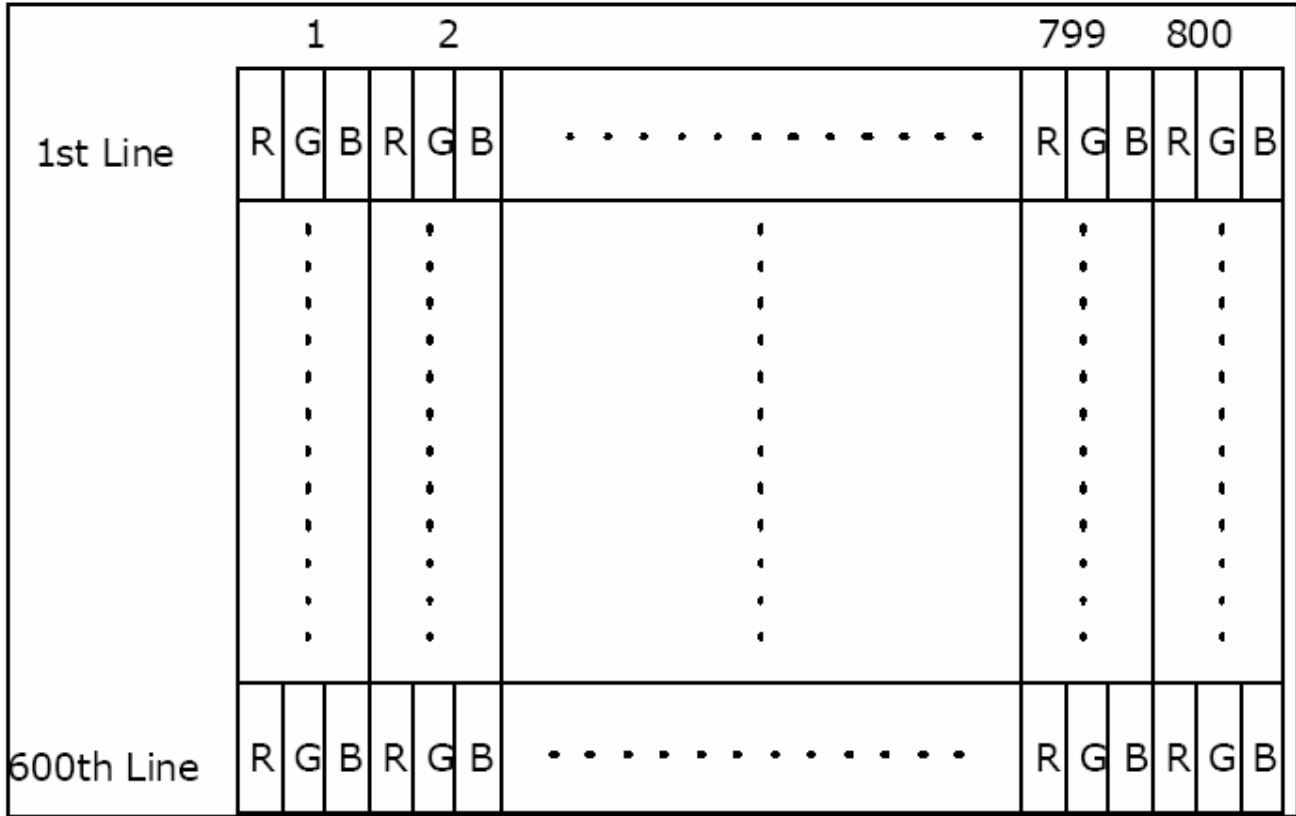
(Ta=25 ± 2°C)

Item Symbol		Min.	Typ.	Max.	Unit	Note
LEDs Current	I_B	- 50		60	mA	-
Power Consumption	P_{BL}	- 1.6(TBD)		2.1	W	-

6. Signal Characteristic

6.1 Pixel Format Image

Following figure shows the relationship between input signal and LCD pixel format.



6.2 Scanning Direction

The following figures show the image seen from the front view. The arrow indicates the direction of scan.

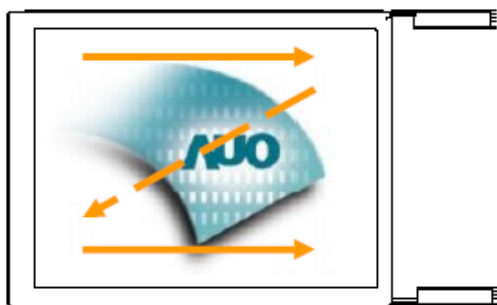


Fig. 1

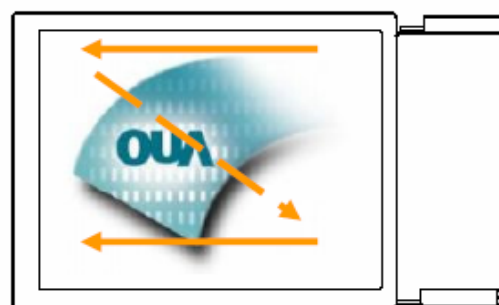


Fig. 2

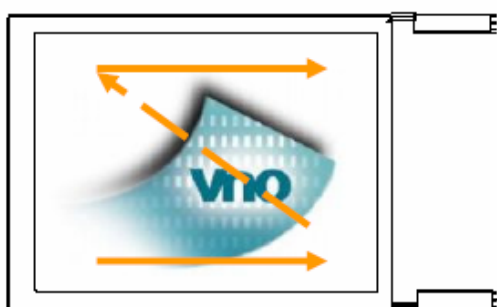


Fig. 3

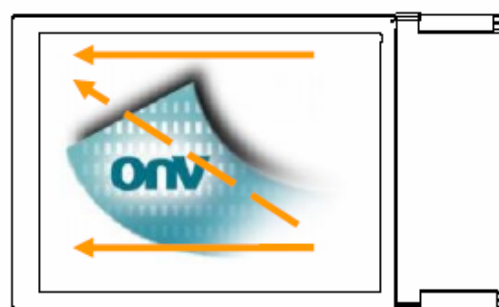


Fig. 4

Fig. 1 Normal scan (Pin3, UD = Low or NC ; Pin4, RL = Low or NC)

Fig. 2 Reverse scan (Pin3, UD = Low or NC ; Pin4, RL = High)

Fig. 3 Reverse scan (Pin3, UD = High ; Pin4, RL = Low or NC)

Fig. 4 Reverse scan (Pin3, UD = High ; Pin4, RL = High)

6.3 Signal Description

LVDS is a differential signal technology for LCD interface and high speed data transfer device. The connector pin definition is as below.

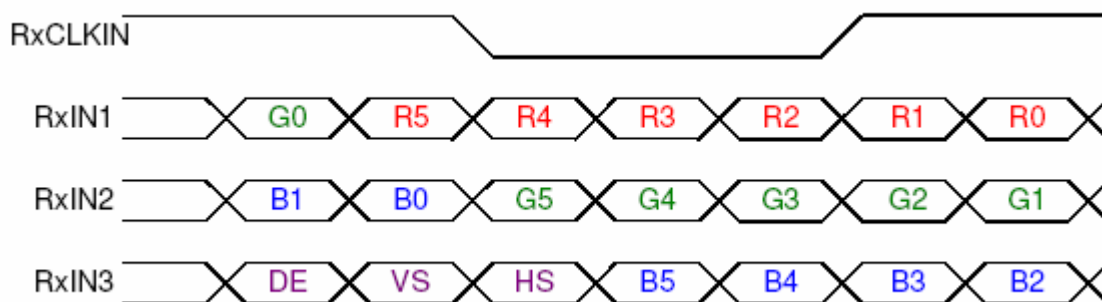
Pin No.	Symbol	Description
1	VDD	Power Supply, 3.3V (typical)
2	VDD	Power Supply, 3.3V (typical)
3	UD	Vertical Reverse Scan Control, Low or NC → Normal Mode. High → Vertical Reverse Scan. ^{Note}
4	LR	Vertical Reverse Scan Control, Low or NC → Normal Mode. High → Vertical Reverse Scan. ^{Note}
5	RxIN 0-	LVDS differential data input Pair 0
6	RxIN 0+	
7	GND	Ground
8	RxIN 1-	LVDS differential data input Pair 1
9	RxIN 1+	
10	GND	Ground
11	RxIN 2-	LVDS differential data input Pair 2
12	RxIN 2+	
13	GND	Ground
14	RXCLKIN -	LVDS differential Clock input Pair
15	RXCLKIN+	
16	GND	Ground
17	SEL 68	LVDS 6/8 bit select function control, Low or NC _ 6 Bit Input Mode. High _ 8 Bit Input Mode. ^{Note}
18	NC	NC
19	RxIN 3-	LVDS differential data input Pair 3. Must be tied to Ground in 6 bit input mode.
20	RxIN 3+	

Note : “Low” stands for 0V. “High” stands for 3.3V. “NC” stands for “No Connected.”

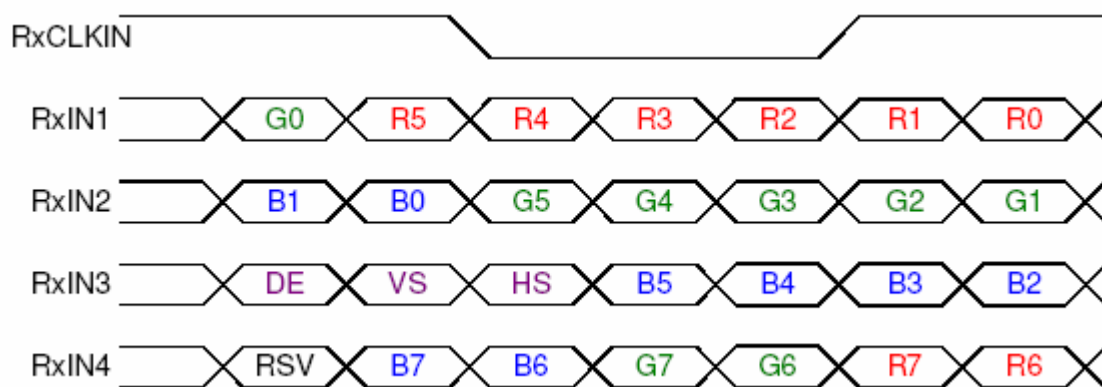
6.4 The Input Data Format

6.4.1 SEL68

SEL68 = "Low" or "NC" for 6 bits LVDS Input



SEL68 = "High" for 8 bits LVDS Input



Note1: Please follow PSWG.

Note2: R/G/B data 7:MSB, R/G/B data 0:LSB

Signal Name	Description	Remark
R7	Red Data 7 (MSB)	Red-pixel Data Each red pixel's brightness data consists of these 8 bits pixel data.
R6	Red Data 6	
R5	Red Data 5	
R4	Red Data 4	
R3	Red Data 3	
R2	Red Data 2	
R1	Red Data 1	
R0	Red Data 0 (LSB)	
G7	Green Data 7 (MSB)	Green-pixel Data Each green pixel's brightness data consists of these 8 bits pixel data.
G6	Green Data 6	
G5	Green Data 5	
G4	Green Data 4	
G3	Green Data 3	
G2	Green Data 2	
G1	Green Data 1	
G0	Green Data 0 (LSB)	
B7	Blue Data 7 (MSB)	Blue-pixel Data Each blue pixel's brightness data consists of these 8 bits pixel data.
B6	Blue Data 6	
B5	Blue Data 5	
B4	Blue Data 4	
B3	Blue Data 3	
B2	Blue Data 2	
B1	Blue Data 1	
B0	Blue Data 0 (LSB)	
RXCLKIN+	LVDS Clock Input	
RXCLKIN		
DE	Display Enable	
VS	Vertical Sync	
HS	Horizontal Sync	

Note: Output signals from any system shall be low or Hi-Z state when VDD is off.

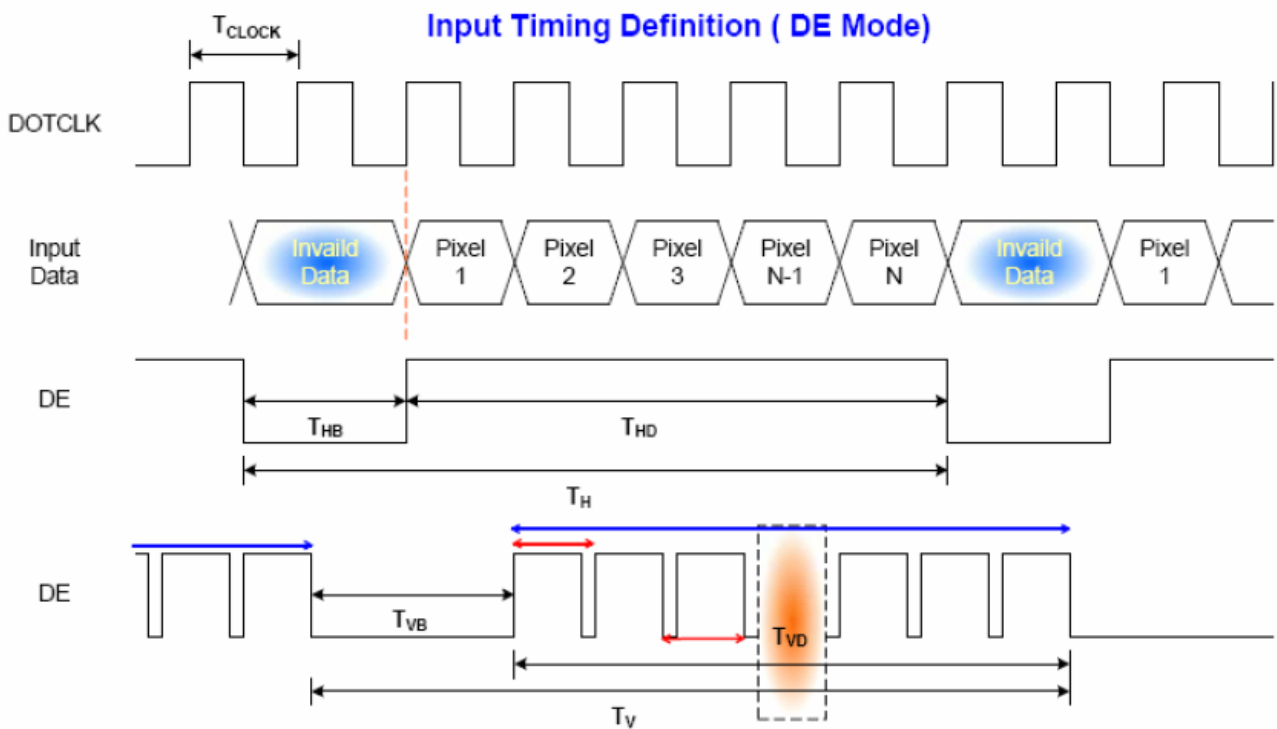
6.5 Interface Timing

6.5.1 Timing Characteristics

DE mode only

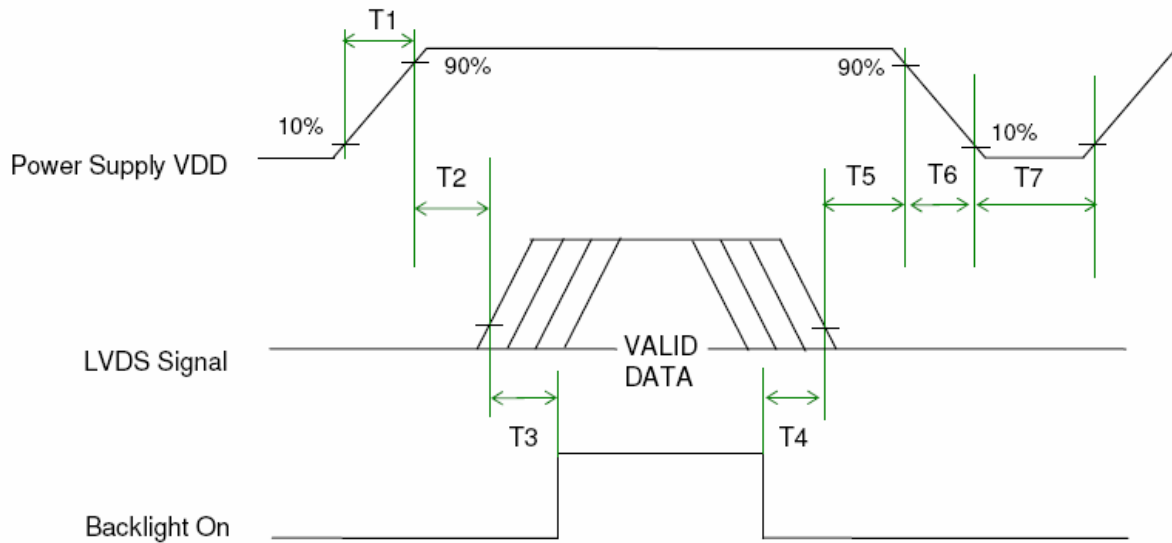
Parameter		Symbol	Min.	Typ.	Max.	Unit	Condition
Clock frequency		$1/T_{Clock}$	33.6 39.8		48.3	MHz	
Vertical Section	Period	T_V	608 628		650	T_H	
	Active	T_{VD}	600 600		600		
	Blanking	T_{VB}	8 28		50		
Horizontal Section	Period	T_H	920 1056		1240	T_{Clock}	
	Active	T_{HD}	800 800		800		
	Blanking	T_{HB}	120 256		440		

6.5.2 Input Timing Diagram



6.6 Power ON/OFF Sequence

VDD power and LED on/off sequence is as below. Interface signals are also shown in the chart. Signals from any system shall be Hi-Z state or low level when VDD is off.



Power ON/OFF sequence timing

Parameter	Value			Units
	Min.	Typ.	Max.	
T1	0.5	-	10	ms
T2	0	40	50	ms
T3	200	-	-	ms
T4	200	-	-	ms
T5	0	16	50	ms
T6	0	-	10	ms
T7	1000	-	-	ms

The above on/off sequence should be applied to avoid abnormal function in the display. Please make sure to turn off the power when you plug the cable into the input connector or pull the cable out of the connector.

7. Connector & Pin Assignment

Physical interface is described as for the connector on module. These connectors are capable of accommodating the following signals and will be following components.

7.1 TFT LCD Module: LVDS Connector

Connector Name / Designation	Signal Connector
Manufacturer	STM
Connector Model Number	MSB24013P20 or compatible.
Adaptable Plug	P24013P20

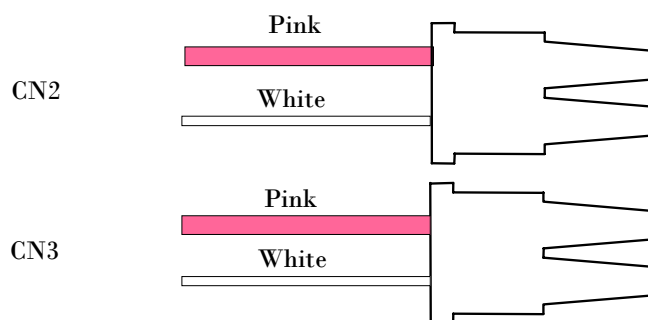
Pin No.	Signal Name	Pin No.	Signal Name
1	VDD 2 VDD		
3 UD 4			LR
5 RxIN0	-	6	RxIN0+
7 GND		8	RxIN1-
9 RxIN1+		10	GND
11 RxIN2	-	12	RxIN2+
13 GND		14	CKIN-
15 CKIN+ 16			GND
17 SEL	68 18		NC
19 RxIN3+ 20			RxIN3-

7.2 Backlight Unit: LED Connector

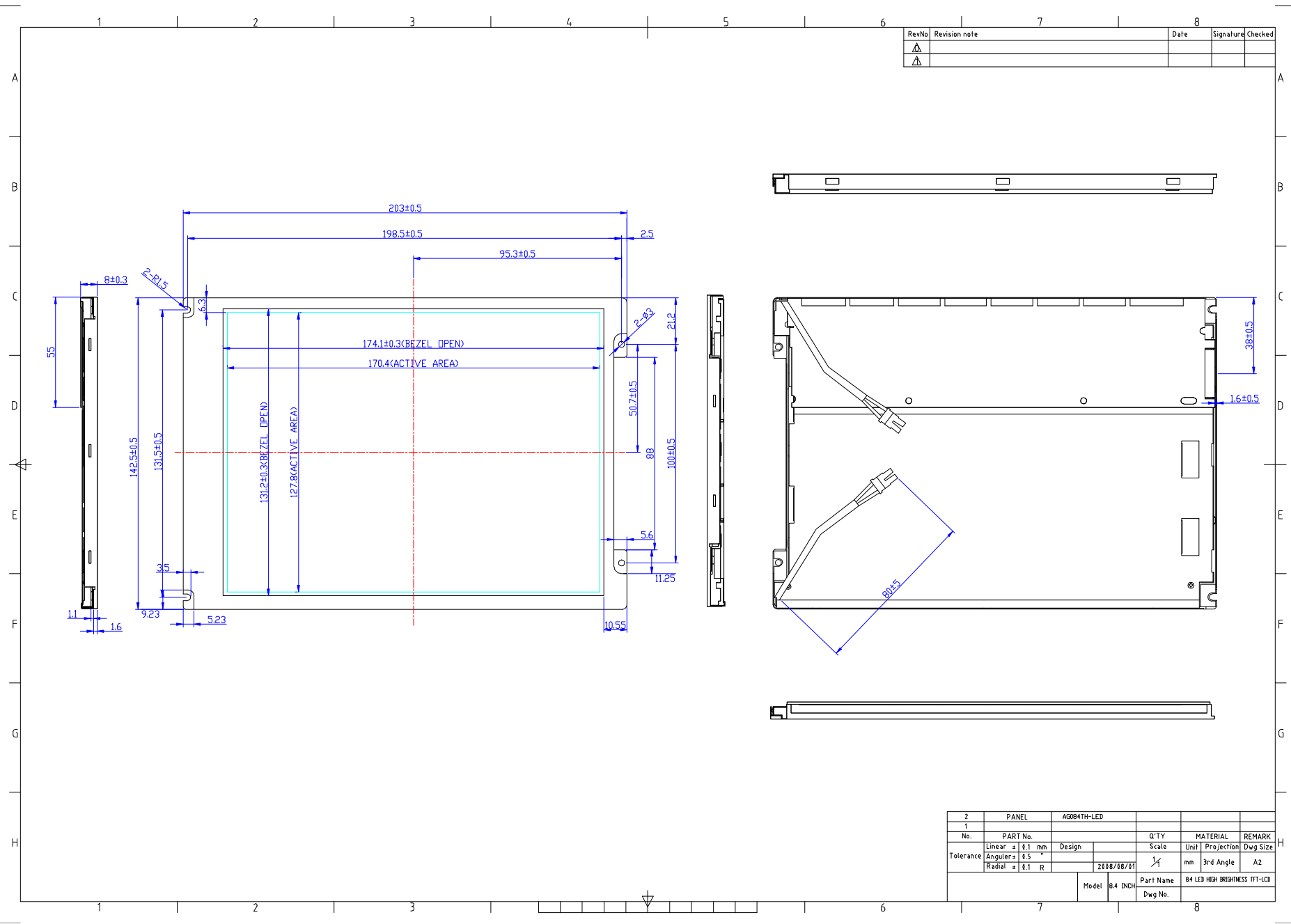
Connector Name / Designation	For LED Connector
Manufacturer	JST
Type / Part Number	JST BHSR - 02VS -1
Mating Connector / Part Number	SM02B-BHSS-1(JST)

7.3 LED Connector Pin Assignment

Pin no.	Symbol	Function	Remark
1	Vcc LED	POWER	-
2	FB	LED current ADJ FB -	-



RevNo	Revision note	Date	Signature	Checked
△				
△				



No.	PART No.	Design	Q'TY	MATERIAL	REMARK
2	PANEL	AG084TH-LED			
1					
Tolerance	Linear = ± 0.1 mm	Design	Scale	Unit	Projection
	Angular = ± 0.5 °				
	Radial = ± 0.1 R				
		2428/68/81	1	mm	3rd Angle
					A2
		Model	8.4 INCH	Part Name	8.4 LED HIGH BRIGHTNESS TFT-LCD
				Dwg No.	