



晶采光電科技股份有限公司
AMPIRE CO., LTD.

SPECIFICATIONS FOR LCD MODULE

CUSTOMER	
CUSTOMER PART NO.	
AMPIRE PART NO.	AM-1024600WTMQW-00H
APPROVED BY	
DATE	

- Approved For Specifications
- Approved For Specifications & Sample

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RECORD OF REVISION

Revision Date	Page	Contents	Editor
2015/11/24 2016/03/21	-- 12	New Release Add Power Supply Voltage Table	Mark Mark

1.0 General Descriptions

1.1 Introduction

AM-1024600WTMQW-00H is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT LCD panel, a driver circuit and a backlight system. This TFT LCD has a 8.0 inch diagonally measured active display area with WSVGA resolution (1,024 horizontal by 600 vertical pixels array)

1.2 Features

- Supported WAVGA Resolution
- LVDS Interface
- Compatible with RoHS Standard

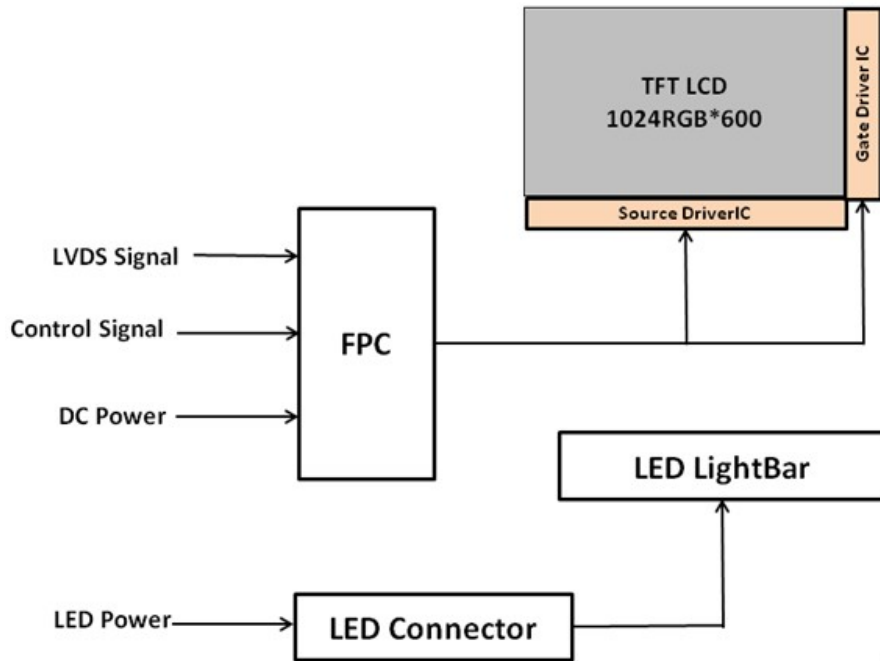
1.3 Product Summary

Items	Specifications	Unit
Screen Diagonal	8.0	inch
Active Area (H x V)	176.64 x 99.36	mm
Number of Pixels (H x V)	1,024 x 600	-
Pixel Pitch (H x V)	0.1725 x 0.1656	mm
Pixel Arrangement	R.G.B. Vertical Stripe	-
Display Mode	Normally White	-
White Luminance	(670) (Typ.)	cd /m ²
Contrast Ratio	(800) (Typ.)	-
Response Time	(16) (Typ.)	ms
Input Voltage	(3.3) (Typ.)	V
Weight	(240) (Max.)	g
Outline Dimension (H x V x D)	(192.8)(Typ.) x (116.9)(Typ.) x(6.4) (Typ.)	mm
Electrical Interface (Logic)	LVDS	-
Support Color	16.7M	-
Viewing Direction	6 O'clock	-
Surface Treatment	Anti-glare	-

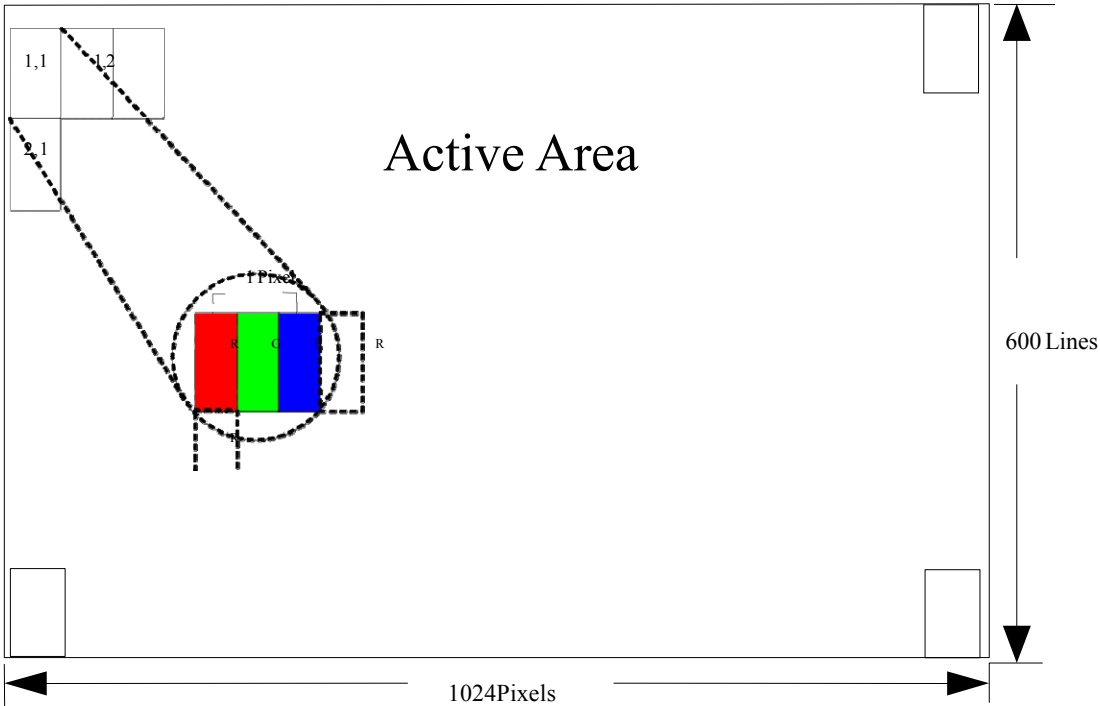
1.4 Functional Block Diagram

Shows the functional block diagram of the LCD module.

Figure 1 Block Diagram



1.5 Pixel Mapping



2.0 Absolute Maximum Ratings

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Logic Signal Input Level	V_{in}	2.3	--	3.6	V	1,2
Operating Temperature	Tops	-30	--	85	°C	3,4,5,6
Storage Temperature	Tstg	-40	--	90	°C	

Note :

Note (1) Permanent damage may occur to the LCD module if beyond this specification. Functional operation should be restricted to the conditions described under normal operating conditions.

Note (2) Operating temperature 25°C , humidity 55%RH.

Note (3) ($T \leq 40^\circ\text{C}$) Note static electricity. Maximum wet bulb temperature at 39°C or less. ($T > 40^\circ\text{C}$) No condensation.

Note (4) There is a possibility of causing deterioration in the irregularity and others of the screen

and the display fineness though the liquid crystal module doesn't arrive at destruction when using it at 85~90°C or -40~-30°C

.Note (5) There is a possibility of causing the fineness deterioration by the prolonged use in the (high temperature) humidity environment (60%RH or more).

Note (6) In the operating temperature item, the low temperature side is the ambient temperature regulations. The high temperature side is the panel surface temperature regulations.

Note (7) half-sine; Frequency: 8Hz ~ 33Hz; Stroke: 1.3mm; Sweep: 2.9G 33.3Hz ~ 400Hz X,Z

Cycle : 15 minutes; 2 hrs for each direction of X,Z ; 4 hours for Y direction

Note (8) 6ms, half sine wave, three times for X, Y, Z axis.

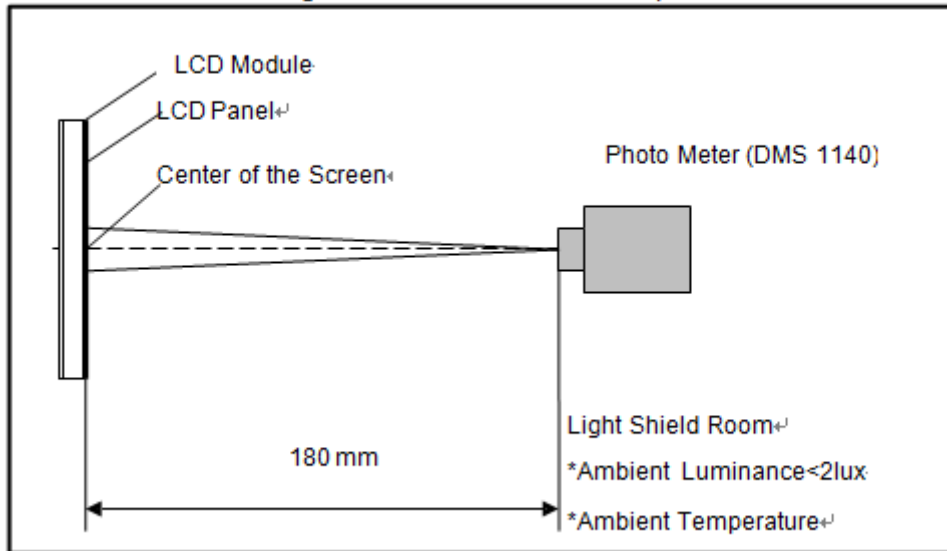
3.0 Optical Specifications

Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR>10)	Horizontal	θ_{x+}	(65)	(75)	-	degree	(1),(2),(3)
		θ_{x-}	(65)	(75)	-		
	Vertical	θ_{y+}	(60)	(70)	-		
		θ_{y-}	(65)	(75)	-		
Contrast Ratio	Center		(600)	(800)	-	-	(1),(2),(4) $\theta_x=\theta_y=0^\circ$
Response Time	Rising + Falling		-	(16)	(25)	ms	(1),(2),(5) $\theta_x=\theta_y=0^\circ$
Color Chromaticity (CIE1931)	Red	x	TBD	TBD	TBD	-	(1),(2),(3) $\theta_x=\theta_y=0^\circ$
	Red	y		TBD		-	
	Green	x		TBD		-	
	Green	y		TBD		-	
	Blue	x		TBD		-	
	Blue	y		TBD		-	
	White	x	Typ. (-0.05)	(0.315)	Typ. (+0.05)	-	
	White	y		(0.335)		-	
NTSC	-		(67)	(72)	-	%	(1),(2),(3) $\theta_x=\theta_y=0^\circ$
White Luminance	Center Point		(550)	(670)	-	cd/m ²	(1),(2),(6) $\theta_x=\theta_y=0^\circ$
Luminance Uniformity	9 Points		(75)	-	-	%	(1),(2),(6) $\theta_x=\theta_y=0^\circ$

Note (1) Measurement Setup:

The LCD module should be stabilized at given temperature(25°C) for 15 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 15 minutes in a windless room.

Figure 3 Measurement Setup

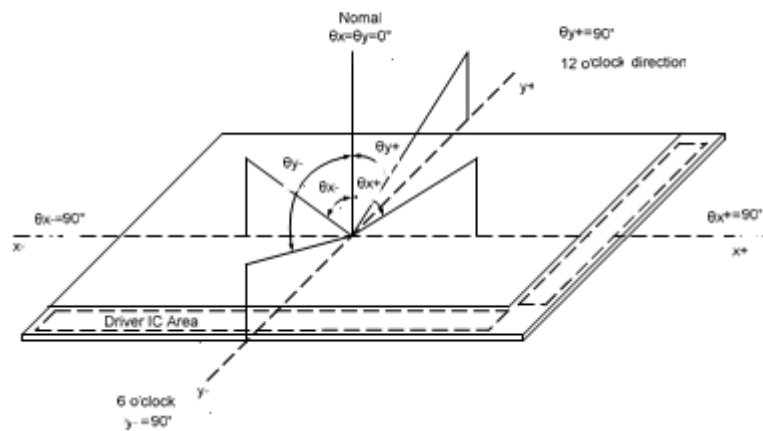


Note (2) The LED input parameter setting as:

I_{LED} : 420mA

Note (3) Definition of Viewing Angle

Figure 4 Definition of Viewing Angle



Note (4) Definition Of Contrast Ratio (CR)

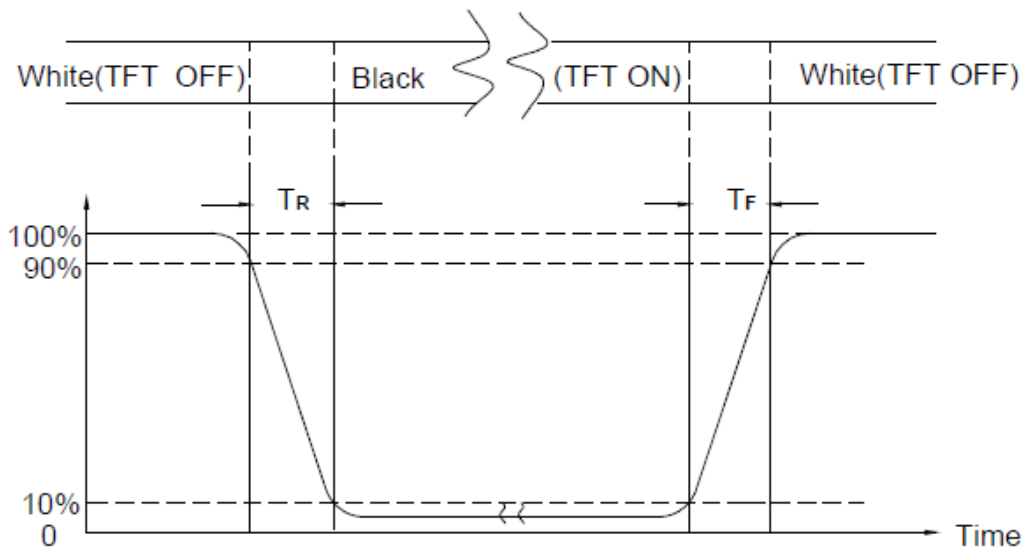
The contrast ratio can be calculated by the following

expression: Contrast Ratio (CR) = L_{255} / L_0

L_{255} : Luminance of gray level 255, L_0 : Luminance of gray level 0

Note (5) Definition Of Response Time (T_R , T_F)

Figure 5 Definition of Response Time



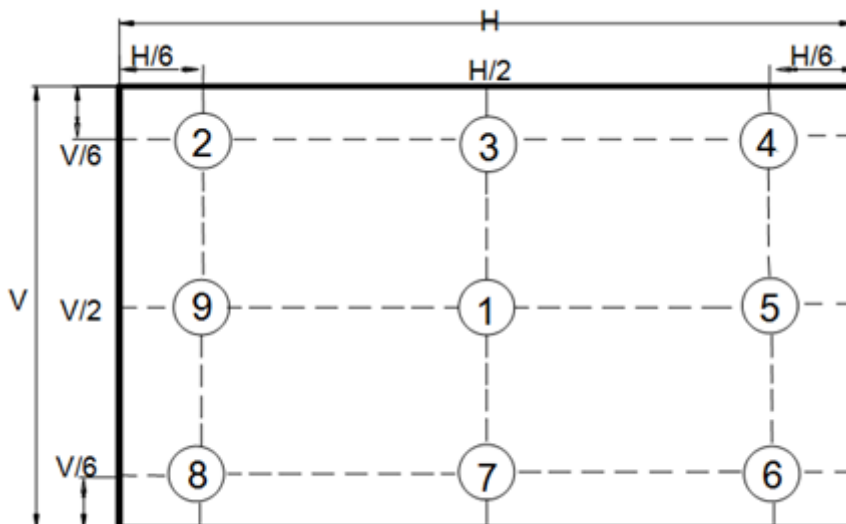
Note (6) Definition of Luminance Uniformity (Ref.: Active Area)

Measure the luminance of gray level 255 at 9 points.

Luminance Uniformity = $\text{Min.}(L_1, L_2, \dots, L_9) / \text{Max.}(L_1, L_2, \dots, L_9)$

H—Active Area Width, V—Active Area Height, L—Luminance

Figure 6 Measurement Locations of 9 Points



4.0 Interface Connections

4.1 Electrical Interface Connection

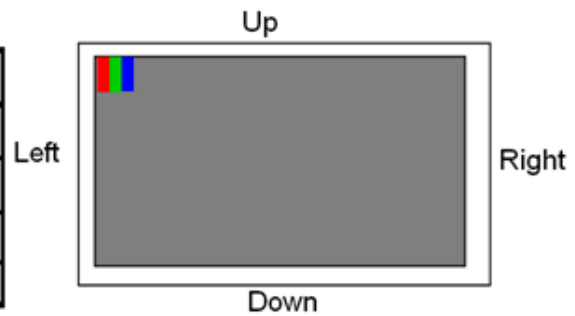
Item	Description
Manufacturer/Type	AORORA:F32D-1A7Y-21040

Pin No.	Symbol	Description	Remarks
1	VCOM	Common voltage	
2	DVDD	Digital power	
3	DVDD	Digital power	
4	NC	Not connect	
5	RESRT	Global reset pin. Active low to enter reset state.	
6	STBYB	Standby mode ,normally pull high	
7	GND	Ground	
8	NIND0	Negative LVDS differential data input	
9	PIND0	Positive LVDS differential data input	
10	GND	Ground	
11	NIND1	Negative LVDS differential data input	
12	PIND1	Positive LVDS differential data input	
13	GND	Ground	
14	NIND2	Negative LVDS differential data input	
15	PIND2	Positive LVDS differential data input	
16	GND	Ground	
17	NINC	Negative LVDS differential clock input	
18	PINC	Positive LVDS differential clock input	
19	GND	Ground	
20	NIND3	Negative LVDS differential data input	
21	PIND3	Positive LVDS differential data input	
22	GND	Ground	
23	NC	Not connect	
24	NC	Not connect	
25	GND	Ground	
26	NC	Not connect	

27	DITHER	Dithering function enable control. When DITHER=H,Enable internal dithering function.	SELB=H & DITHER=L
28	SELB	6bit/8bit mode select if LVDS input data is 6 bits ,SELB set to high if LVDS input data is 8 bits,SELB set to low	If Data is 8 Bits SELB=L & DITHER=H
29	AVDD	Power for Analog Circuit	
30	GND	Ground	
31	NC	Not connect	
32	NC	Not connect	
33	SHLR	Horizontal inversion	Note1
34	UPDN	Vertical inversion	Note1
35	VGL	Negative power for TFT	
36	NC	Not connect	
37	NC	Not connect	
38	VGH	Positive power for TFT	
39	NC	Not connect	
40	NC	Not connect	

Note1 : UPDN and SHLR control function.

SHLR	UPDN	Data shifting
DVDD	GND	Left→Right · Up→Down(default)
GND	GND	Right→Left · Up→Down
DVDD	DVDD	Left→Right · Down→Up
GND	DVDD	Right→Left · Down→Up



Power Supply Voltage

Item	Min.	Typ.	Max.	Unit
Avdd	(10.85)	(11)	(11.15)	V
Vcom	(3.15)	(3.35)	(3.55)	V
VGH	(19)	(20)	(21)	V
VGL	(-7.8)	(-6.8)	(-5.8)	V

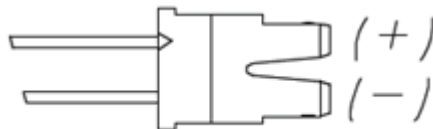
Table 5 LED Connector Name / Designation

Item	Description
Manufacturer / Type	JST/BHSR-02VS-1
Mating Receptacle / Type (Reference)	JST/SMO2B-BHSS-1 or Compatible

Table 6 LED Connector Pin Assignment

Pin No.	Symbol	Description	Remarks
1	A	Anode	-
2	K	Cathode	-

Figure 7 LED Connector



4.2 Signal Electrical Characteristics

4.2.1 Signal Electrical Characteristics For LVDS Receiver

The built-in LVDS receiver is compatible with (ANSI/TIA/TIA-644) standard.

Table 7 LVDS Receiver Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Differential Input High Threshold	V _{th}	-	-	(+100)	mV	V _{CM} =+1.2V
Differential Input Low Threshold	V _{tl}	(-100)	-	-	mV	V _{CM} =+1.2V
Magnitude Differential Input Voltage	V _{ID}	(200)	-	(600)	mV	-
Common Mode Voltage	V _{CM}	(1.0)	(1.2)	(1.4)	V	V _{th} - V _{tl} =200mA
Common Mode Voltage Offset	ΔV _{CM}	(-50)	-	(+50)	mV	V _{th} - V _{tl} =200mA

Note (1) Input signals shall be low or Hi- resistance state when VDD is off.

Note (2) All electrical characteristics for LVDS signal are defined and shall be measured at the interface connector of LCD.

Figure 8 Voltage Definitions

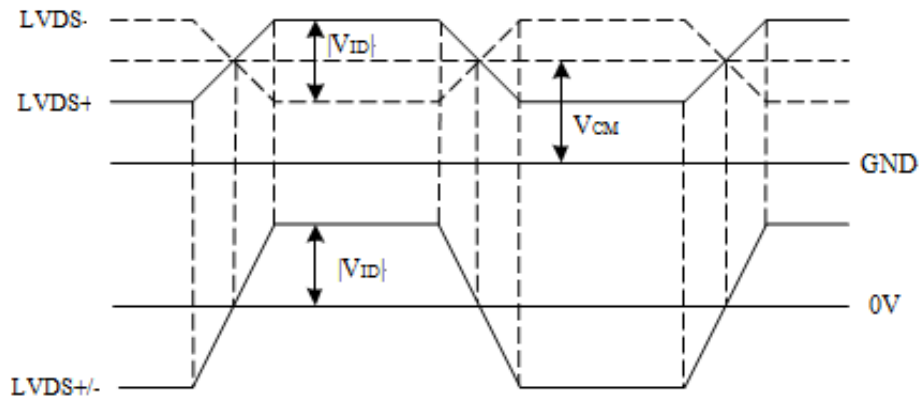


Figure 9 Measurement System

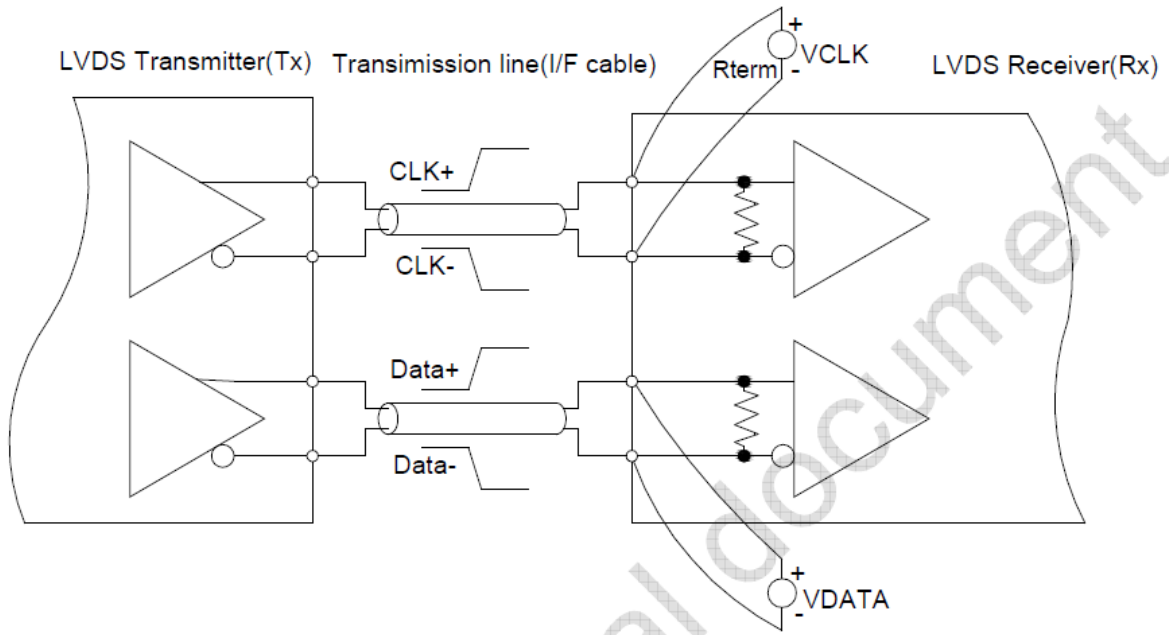
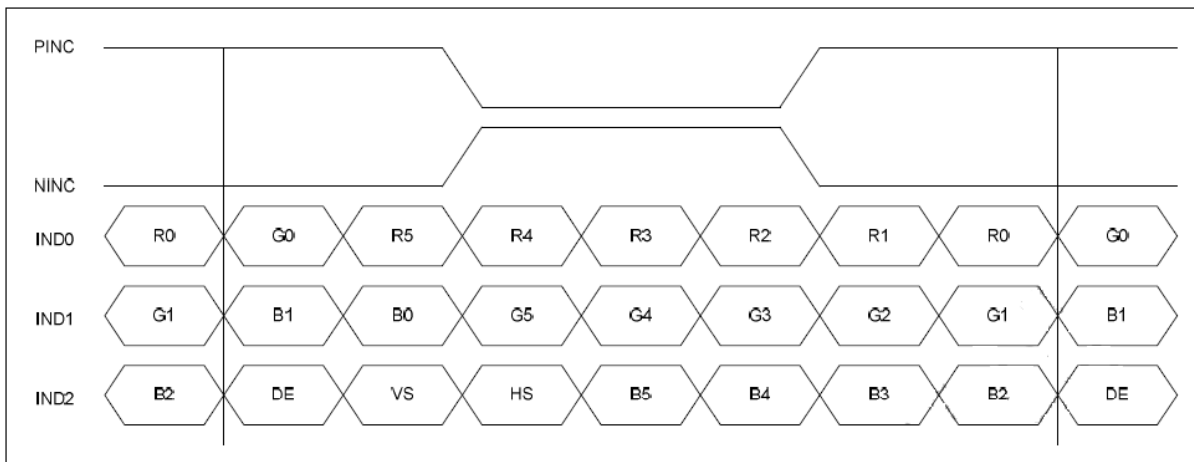
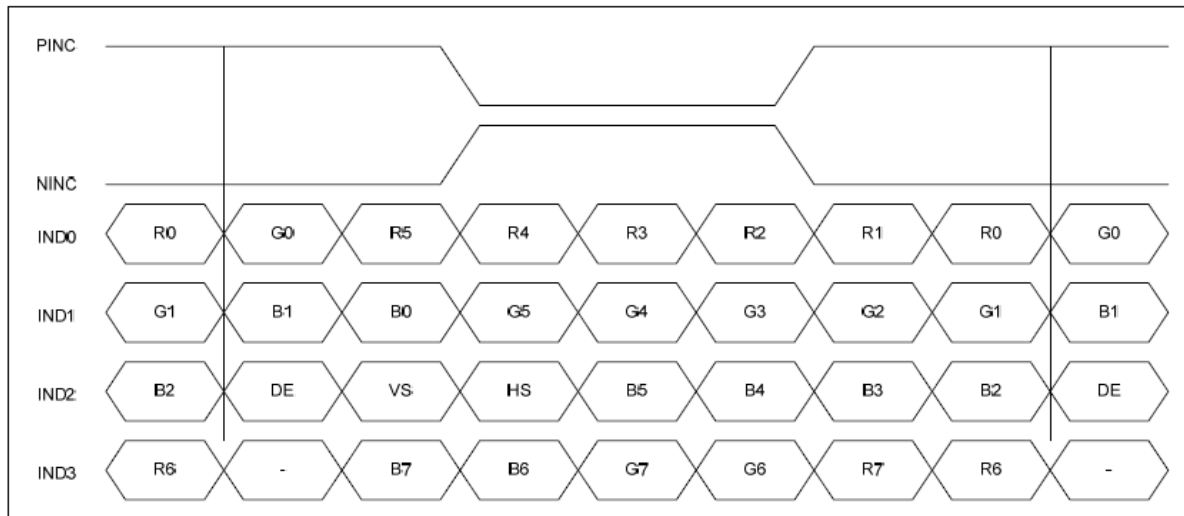


Figure 10 Data Mapping

Single 6 bit LVDS input



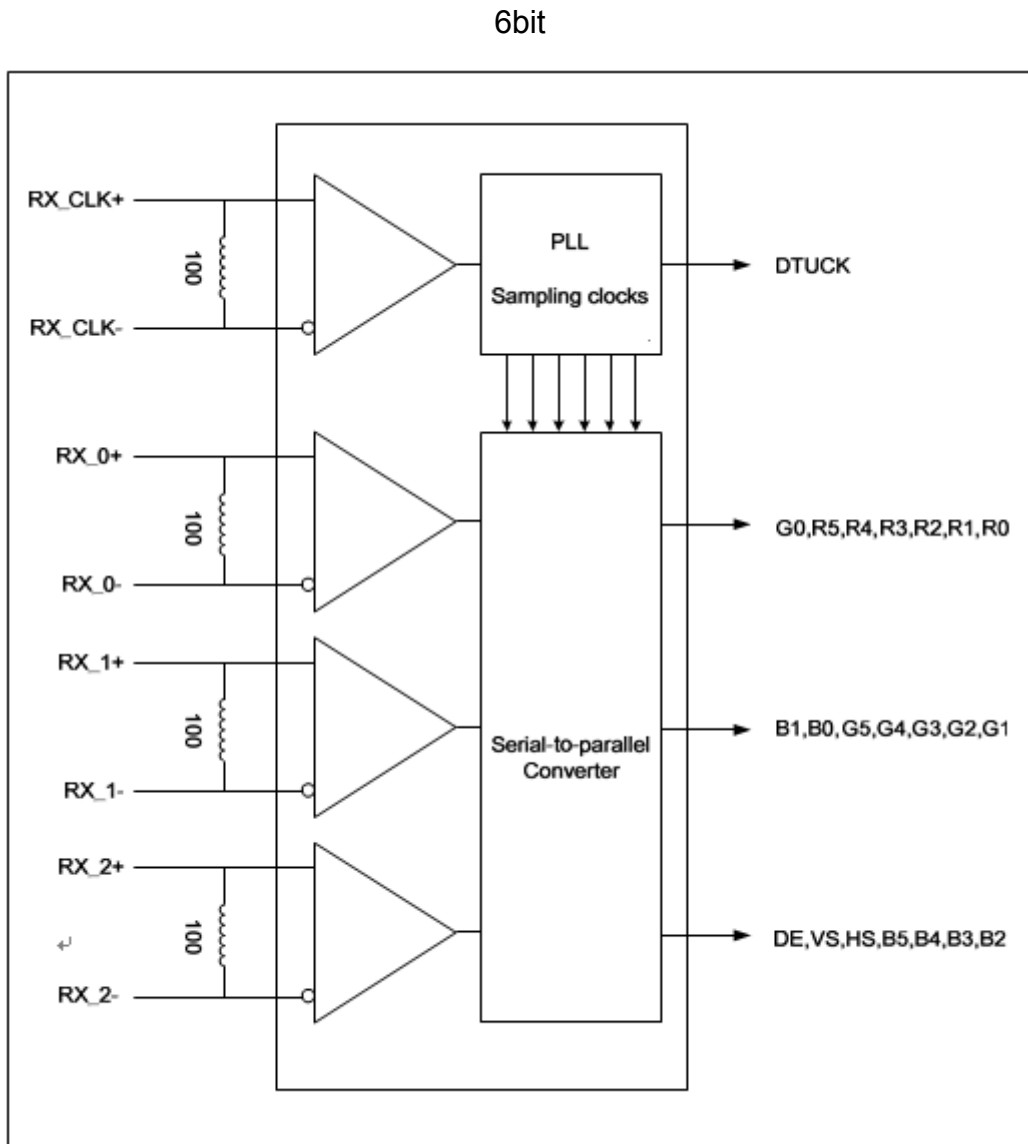
Single 8 bit LVDS input



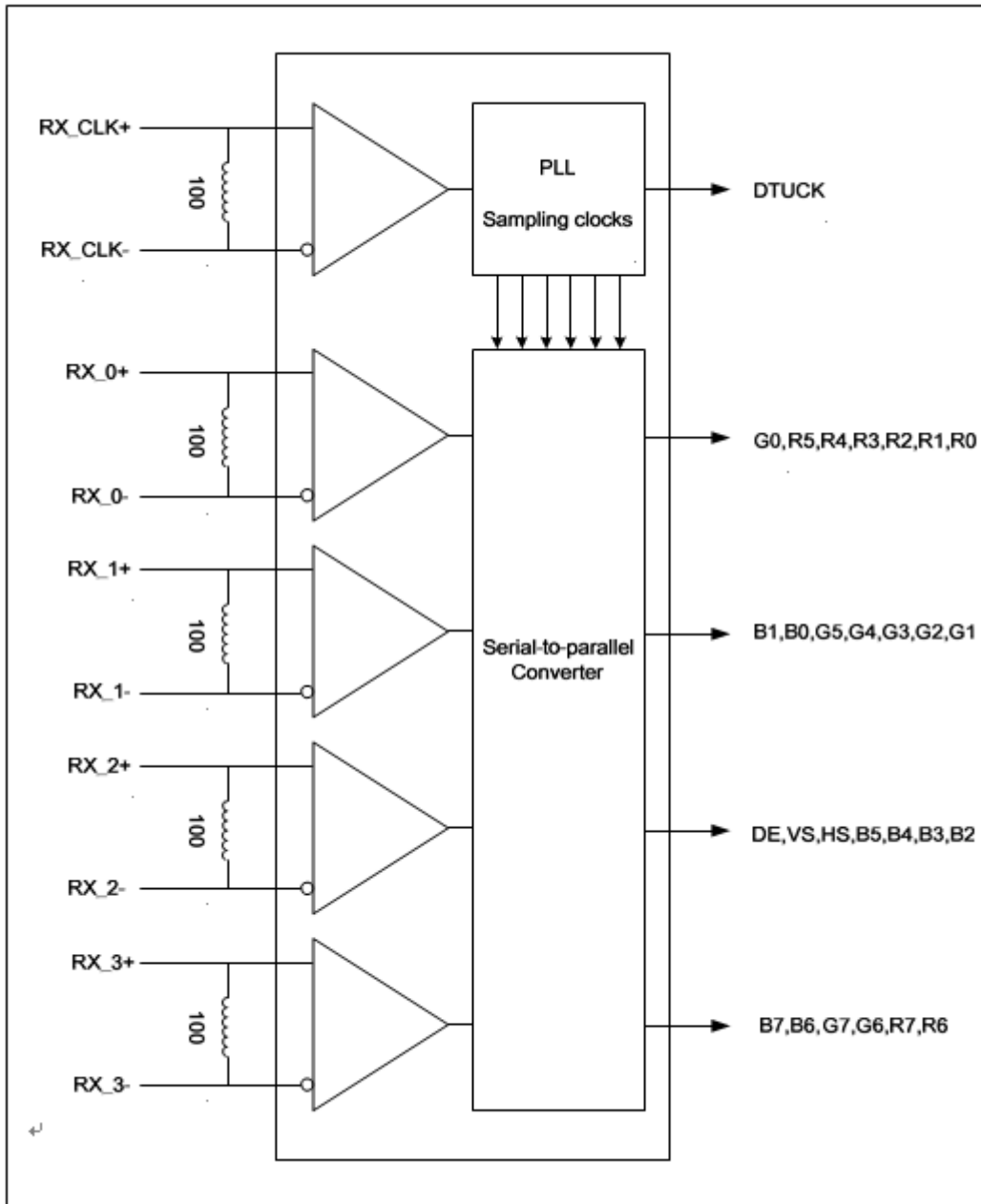
4.2.2 LVDS Receiver Internal Circuit

Figure 12 shows the internal block diagram of the LVDS receiver. This LCD module equips termination resistors for LVDS link.

Figure 11 LVDS Receiver Internal Circuit



8bit



4.3 Interface Timings

Table 8 Interface Timings

Parameter	Symbol	Min.	Typ.	Max.	Unit
LVDS Clock Frequency	f_{dck}	(45)	(51.2)	(57)	MHz
H Total Time	T_{hp}	(1,324)	(1,344)	(1,364)	Clocks
H Active Time	HA	(1,024)	(1,024)	(1,024)	Clocks
H Blanking Time	$T_{H_{Blank}}$	(300)	(320)	(340)	Clocks
V Total Time	T_{vp}	(625)	(635)	(645)	Lines
V Active Time	VA	(600)	(600)	(600)	Lines
V Blanking Time	$T_{V_{Blank}}$	(25)	(35)	(45)	Clocks
Frame Rate	F_v	(55)	(60)	(65)	Hz

4.4 Input Power Specifications

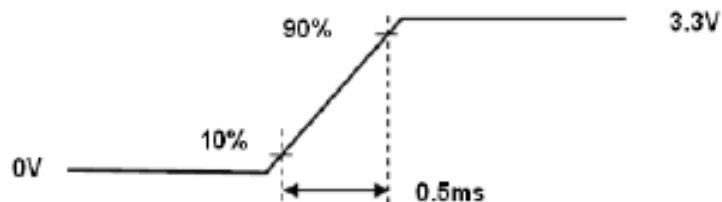
Input power specifications are as follows.

Table 9 Input Power Specifications

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note	
System Power Supply							
LCD Drive Voltage (Logic)	V_{DD}	(3.0)	(3.3)	(3.6)	V	(2), (4)	
VDD Current	Black Pattern	I_{DD}	-	-	(0.0625)	A	(3),(4)
VDD Power Consumption	Black Pattern	P_{DD}	-	-	(0.225)	W	
Rush Current	I_{Rush}	-	-	(1.5)	A	(1),(4),(5)	
Allowable Logic/LCD Drive Ripple Voltage	V_{VDD-RP}	-	-	(200)	mV	(4)	
LED Power Supply							
LED Input Voltage	V_{LED}	(8.4)	(9.6)	(10.2)	V	(4),(6)	
LED Power Consumption	P_{LED}	-	-	(4.3)	W	(4),(6)	
LED Forward Voltage	V_F	(2.8)	(3.2)	(3.4)	V	(4)	
LED Forward Current	I_F	-	(60)	-	mA		
LED Life Time	LT	30,000	-	-	Hours	(4)(7)	

Note (1) Measure Condition

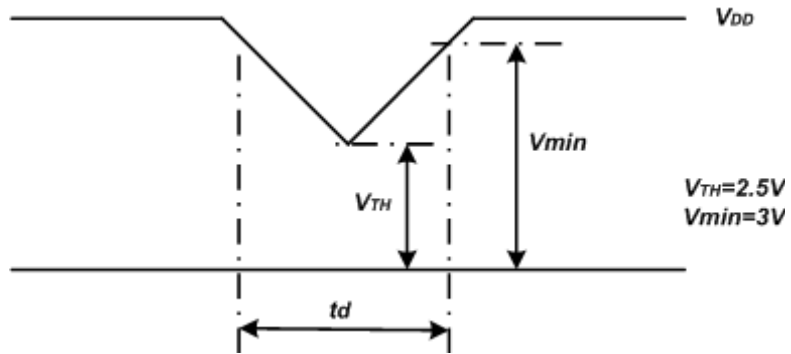
Figure 12 VDD Rising Time



Note (2) VDD Power Dip Condition

$V_{TH} < V_{DD} \leq V_{min}$, $t_d \leq 10ms$ (a time of the voltage return to normal), our panel can revive automatically.

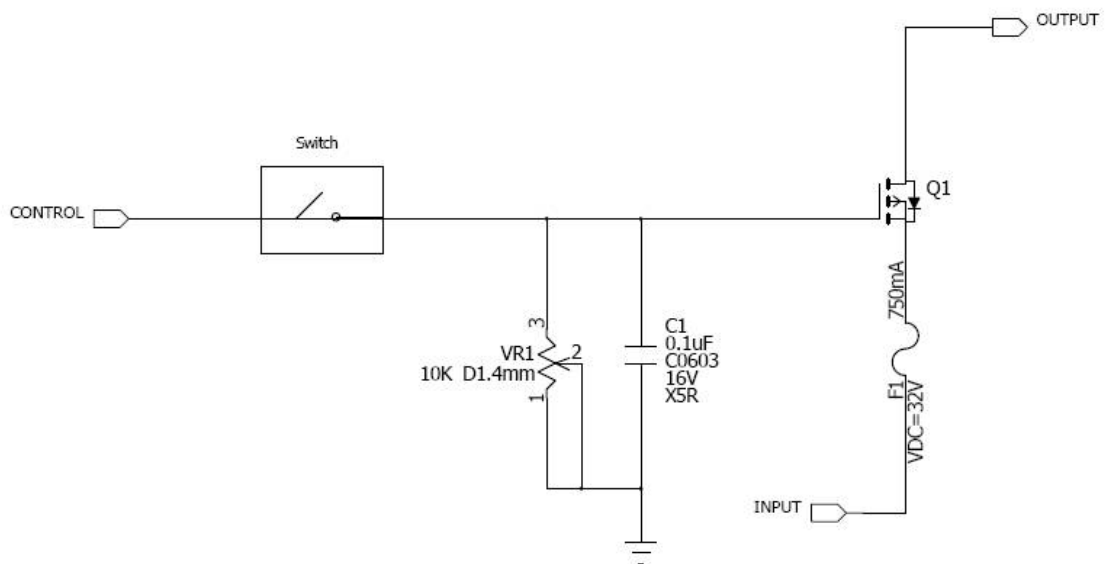
Figure 13 VDD Power Dip



Note (3) Frame Rate=60Hz, VDD=3.3V, DC Current.

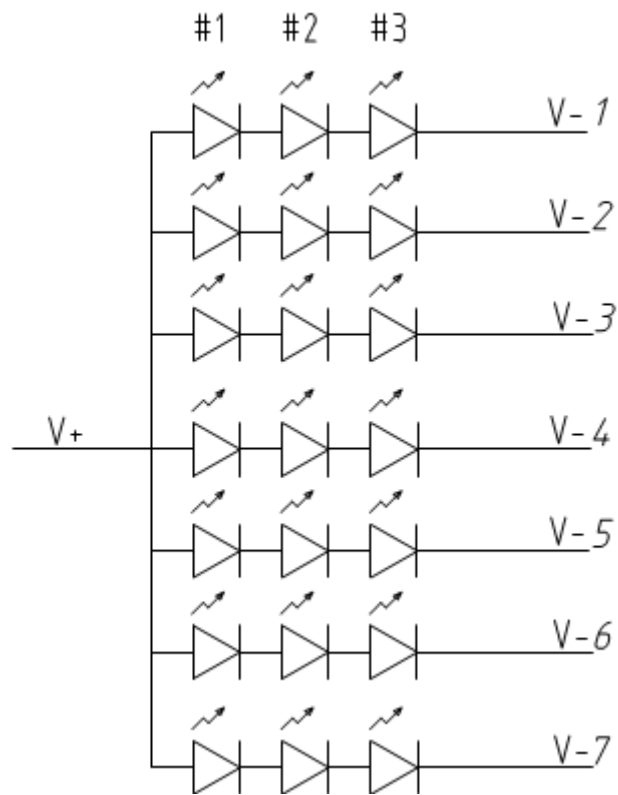
Note (4) Operating temperature 25°C, humidity 55%RH.

Note (5) The reference measurement circuit of rush current.



Note (6) Definition of V_{LED} and P_{LED}

$$V_{LED} = V_F \times 3, P_{LED} = V_{LED} \times I_F \times 7$$

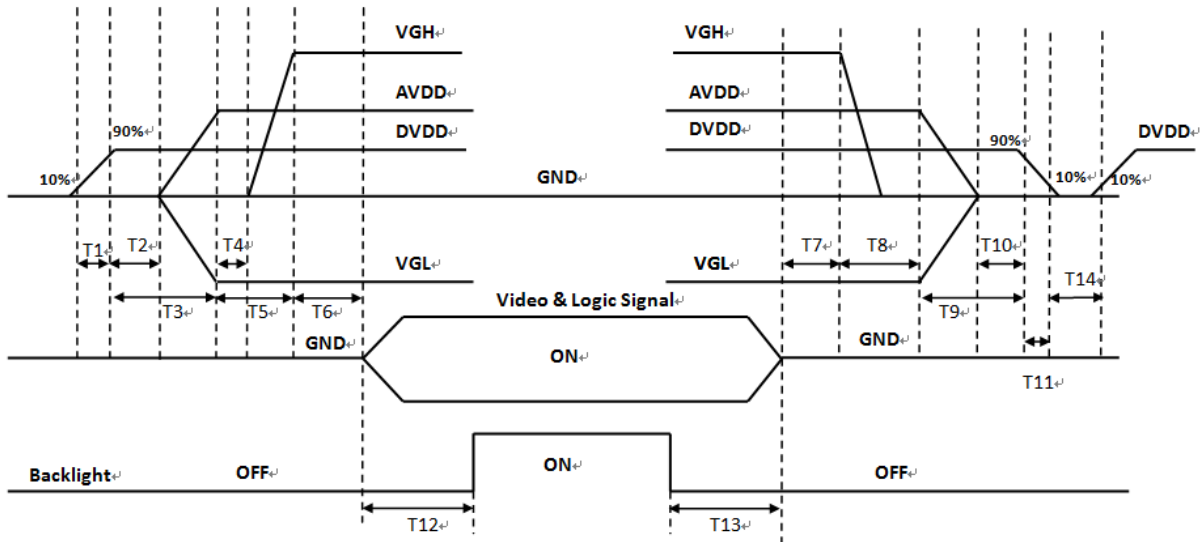


Note (7) The LED life time define as the estimated time to 50% degradation of initial luminous.

4.5 Power ON/OFF Sequence

Interface signals are also shown in the chart. Signals from any system shall be Hi- resistance state or low level when VDD voltage is off.

Figure 14 Power Sequence



Power On: DVDD_AVDD/VGL_VGH_Video & Logic Signal_Backlight

Power Off: Backlight→Video & Logic Signal→VGH→AVDD/VGL→ DVDD

Table 10 Power Sequencing Requirements

Parameter	Symbol	Min.	Typ.	Max.	Unit
DVDD Rising Time from 10% to 90%	T1	0.5	-	10	ms
DVDD Good to AVDD/VGL On	T2	0	-	-	ms
DVDD Good to AVDD/VGL Good	T3	20	-	-	ms
AVDD/VGL Good to VGH On	T4	0	-	-	ms
AVDD/VGL Good to VGH Good	T5	10	-	-	ms
VGH Good to Signal Valid	T6	0	-	10	ms
Signal Disable to VGH Down	T7	0	-	50	ms
VGH Down to AVDD/VGL Down	T8	0	-	50	ms
AVDD/VGL Down to DVDD Down	T9	0	-	-	ms
AVDD/VGL Off to DVDD Down	T10	0	-	-	ms
DVDD Falling Time	T11	0	-	10	ms
Signal Valid to Backlight Power On	T12	200	-	-	ms
Backlight Power Off to Signal disable	T13	200	-	-	ms
Power Off Time	T14	500	-	-	ms

5.0 Reliability Test and INCOMING INSPECTION STANDARD

The Reliability test items and its conditions are shown in below.

Test Item	Test Conditions	Note
High Temperature Operation	85±3°C , t=240 hrs	
Low Temperature Operation	-30±3°C , t=240 hrs	
High Temperature Storage	90±3°C , t=240 hrs	1,2
Low Temperature Storage	-40±3°C , t=240 hrs	1,2
Storage at High Temperature and Humidity	65°C, 90% RH , 240 hrs	1,2
Thermal Shock Test	-40°C (30min) ~ 85°C (30min) ,200 cycles	1,2
Vibration Test (Packing)	Sweep frequency : 10 ~ 55 ~ 10 Hz/1min Amplitude : 0.75mm Test direction : X.Y.Z/3 axis Duration : 30min/each axis	2

Note 1 : Condensation of water is not permitted on the module.

Note 2 : The module should be inspected after 1 hour storage in normal conditions
(15-35°C , 45-65%RH).

6.0 General Precaution

6.1 Use Restriction

This product is not authorized for use in life supporting systems, aircraft navigation control systems, military systems and any other application where performance failure could be life-threatening or otherwise catastrophic.

6.2 Handling Precaution

- (1) Please mount LCD module by using mounting holes arranged in four corners tightly.
- (2) Do not disassemble or modify the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display. IVO does not warrant the module, if customers disassemble or modify the module.
- (3) If LCD panel is broken and liquid crystal spills out, do not ingest or inhale liquid crystal, and do not contact liquid crystal with skin. If liquid crystal contacts mouth or eyes, rinse out with water immediately. If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.
- (4) Disconnect power supply before handling LCD module.
- (5) Refrain from strong mechanical shock and /or any force to the module.
- (6) Do not exceed the absolute maximum rating values, such as the supply voltage variation, input voltage variation, variation in parts parameters, environmental temperature; etc otherwise LCD module may be damaged. It's recommended employing protection circuit for power supply.
- (7) Do not touch, push or rub the polarizer with anything harder than HB pencil lead. Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD module for incoming inspection or assembly.
- (8) When the surface is dusty, please wipe gently with absorbent cotton or other soft material. When cleaning the adhesives, please use absorbent cotton wetted with a little petroleum benzene or other adequate solvent.
- (9) Wipe off saliva or water drops as soon as possible. If saliva or water drops contact with polarizer for a long time, they may causes deformation or color fading.
- (10) Protection film must remove very slowly from the surface of LCD module to prevent from electrostatic occurrence.
- (11) Because LCD module uses CMOS-IC on circuit board and TFT-LCD panel, it is very weak to electrostatic discharge, please be careful with electrostatic discharge. Persons who handle the module should be grounded through adequate methods.
- (12) Do not adjust the variable resistor located on the module.

6.3 Storage Precaution

- (1) Please do not leave LCD module in the environment of high humidity and high temperature for a long time.
- (2) The module shall not be exposed under strong light such as direct sunlight. Otherwise, display characteristics may be changed.
- (3) The module should be stored in a dark place. It is prohibited to apply sunlight or fluorescent light in storage.

6.4 Operation Precaution

- (1) Do not connect or disconnect the module in the "Power On" condition.
- (2) Power supply should always be turned on/off by "Power On/Off Sequence".
- (3) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference should be done by system manufacturers. Grounding and shielding methods may be important to minimize the interference.
- (4) 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.

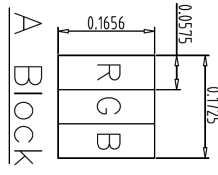
6.5 Others

- (1) Ultra-violet ray filter is necessary for outdoor operation.
- (2) Avoid condensation of water which may result in improper operation or disconnection of electrode.
- (3) If the module keeps displaying the same pattern for a long period of time, the image may be "sticked" to the screen.
- (4) This module has its circuitry PCB's on the rear side and should be handled carefully in order not to be stressed.

6.6 Disposal

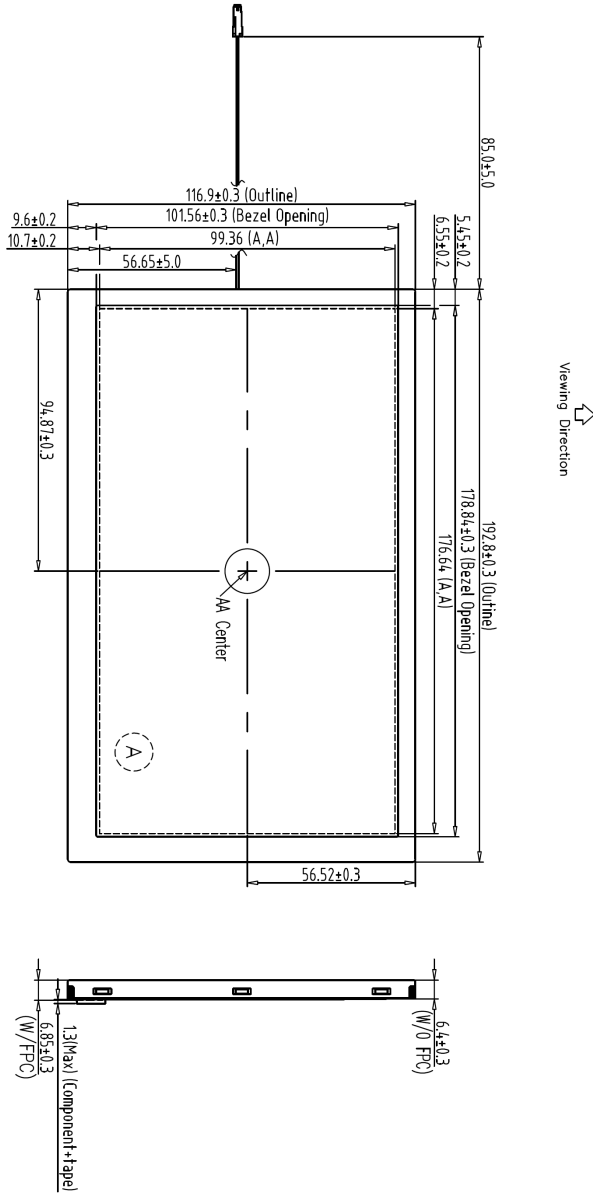
When disposing LCD module, obey the local environmental regulations.

11.0 Outline Dimension




1	VCOM	21	PIND3
2	DVDD	22	GND
3	DVDD	23	NC
4	NC	24	NC
5	RESRT	25	GND
6	STBYB	26	NC
7	GND	27	DITHER
8	NIND0	28	SELB
9	PIND0	29	AVDD
10	GND	30	GND
11	NIND1	31	NC
12	PIND1	32	NC
13	GND	33	SHLR
14	NIND2	34	UPDN
15	PIND2	35	VGL
16	GND	36	NC
17	NINC	37	NC
18	PINC	38	VGH
19	GND	39	NC
20	NIND3	40	NC

Note:
 1. Unless indicated, Tolerance "±0.3"
 2. UV Glue For OLB Protection.

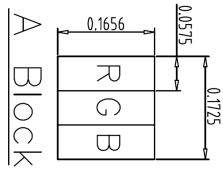


1	Supported WSVGA Resolution	7																	
2	VDS Interface	8																	
3	Compatible with RoHS Standard	9																	
4	Manufacturer/Type/ROHS/320-1AVY-2104	10																	
5	Manufacturer/Type/ST/BHSR-02VS-1	11																	
6	Mounting Receipt/Type (Reference)/S1/SM028-BHS-1 or Compatible	12																	

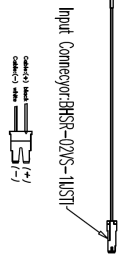
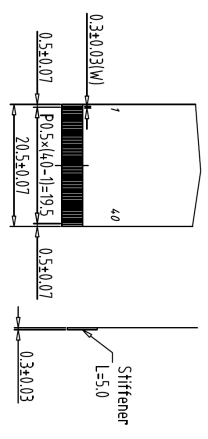
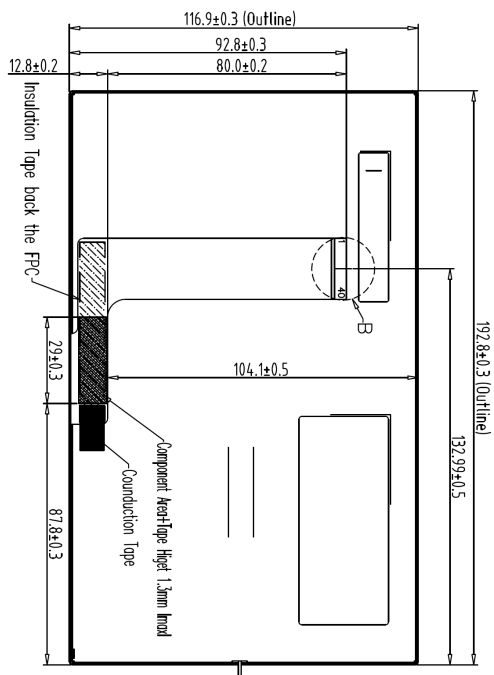
REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	08-10-15	D-Wen


晶承光電科技
 TITLE
 1024600W
 DWG. NO. *150868MA
 SHEET 1 OF 1

REV	REVISION RECORD	DATE NAME
0	NEW RELEASE	08-10-15 Di-Wen



1	VCOM	21	PNID3
2	DVDD	22	GND
3	DVDD	23	NC
4	NC	24	NC
5	RESRT	25	GND
6	STBYB	26	NC
7	GND	27	DITHER
8	NIND0	28	SELB
9	PNDD0	29	AVDD
10	GND	30	GND
11	NIND1	31	NC
12	PNDD1	32	NC
13	GND	33	SHLR
14	NIND2	34	UPDN
15	PNDD2	35	VGL
16	GND	36	NC
17	NINC	37	NC
18	PNIC	38	VGH
19	GND	39	NC
20	NIND3	40	NC



Back View

Note:
 1. Unless indicated, Tolerance "±0.3"
 2. UV Glue For OLB Protection.

1	Suppried WSVG Resolution	7		TOLERANCE GRADE(±)	A	B	DIM.	MM	DWN.	Di-Wen	DATE	08-10-15	TTTTT	AMPIRE 晶采光電科技
2	VDS Interface	8					IR NO.		CHEK.		DATE		1024600W	
3	Compatible with RoHS Standard	9					PARTS MOLCM-1		APPO.		DATE			
4	Manufacturer/Type:AO/RORA-F32D-1AY-2104	10					1024600W				DATE			
5	Manufacturer/Type:IST/BHSR-02VS-111	11									DATE			
6	Binding Resequency/Type (Reference:J57/SMD08-BHS-1 or Compatible)	12									DATE			