Product Specification

E104GTN-A01

☐ Preliminary Specifications

■ Final Specifications

Module	10.4” High Brightness TFT-LCD
Model Name	E104GTN-A01
Document Version	Rev.01

Customer

Approved by Date

Notice: This Specification is subject to change without notice.

Approved By	Prepared By
	

Revised Record				
Version	Date	Revised Content/Summary	Page	Remark
01	2018/01/05	First Edition	All	

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Contents

1.0 General Descriptions

1.1 Introduction

The E104GTN-A01 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 system. This TFT LCD has a 10.4 inch diagonally measured active display area with XGA resolution (1,024 horizontal by 768 vertical pixels array).

1.2 Features

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

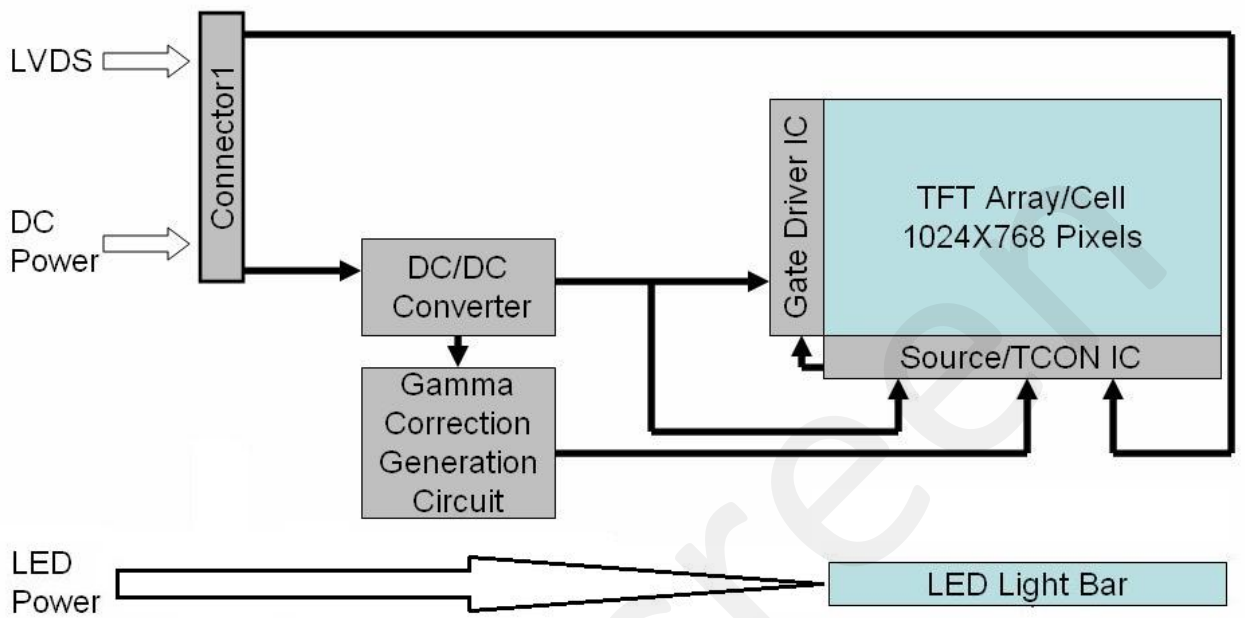
1.3 Product Summary

Items	Specifications	Unit
Screen Diagonal	10.4	inch
Active Area (H x V)	211.2 x 158.4	mm
Number of Pixels (H x V)	1,024 x 768	-
Pixel Pitch (H x V)	0.2063 x 0.2063	mm
Pixel Arrangement	R.G.B. Vertical Stripe	-
Display Mode	Normally White	-
White Luminance	1000 (Typ.)	cd /m^2
Contrast Ratio	900 (Typ.)	-
Response Time	16 (Typ.)	ms
Input Voltage	3.3 (Typ.)	V
Power Consumption	5.9 (Typ..)	W
Weight	300 (Max.)	g
Outline Dimension (H x V x D)	236.0 (Typ.) x 176.9(Typ.) x 5.70 (Typ)	mm
Electrical Interface (Logic)	LVDS	-
Support Color	262 K/16.7 M	-
NTSC	50 (Typ.)	%
Viewing Direction	6 O'clock	-
Surface Treatment	Anti-Glare	-

1.4 Functional Block Diagram

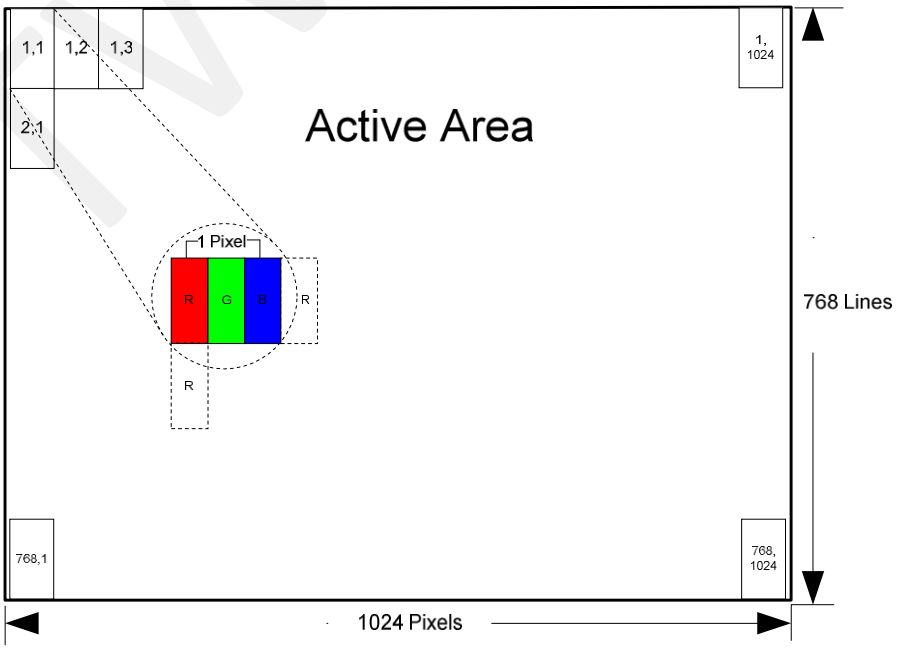
Figure 1 shows the functional block diagram of the LCD module.

Figure 1 Block Diagram



1.5 Pixel Mapping

Figure2 Pixel Mapping



2.0 Absolute Maximum Ratings

Table 1 Electrical & Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Logic Supply Voltage	V_{DD}	-0.3	3.96	V	(1),(2)
LED Driver Voltage	V_{LDE}	-0.3	28	V	
Operating Temperature	T_{OP}	-20	70	℃	(3),(4),(5),(6)
Storage Temperature	T_{ST}	-30	80	℃	
Vibration(Non-operating)	VB	-	1.5	G	(7)
Shock(Non-operating)	Shock	-	100G	G	(8)

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℃, humidity 55%RH.

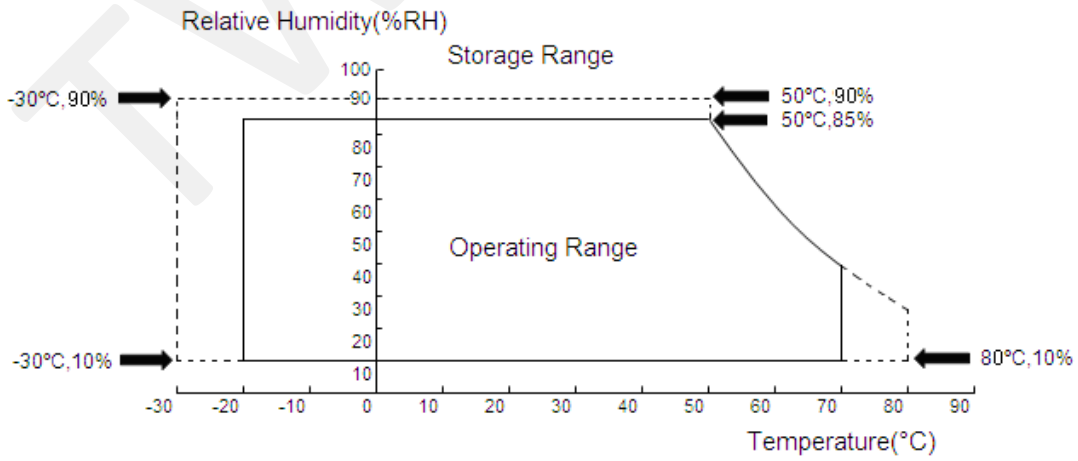
Note (3) (T<=40℃) Note static electricity. Maximum wet bulb temperature at 39℃ or less. (T>40℃) No condensation.

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 60~70℃ or -20~0℃.

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.

Figure 3 Absolute Ratings of Environment of the LCD Module



Note (7) 10-500Hz, random vibration, 30min for X, Y, Z axis.

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

3.0 Optical Characteristics

The optical characteristics are measured under stable conditions as following notes.

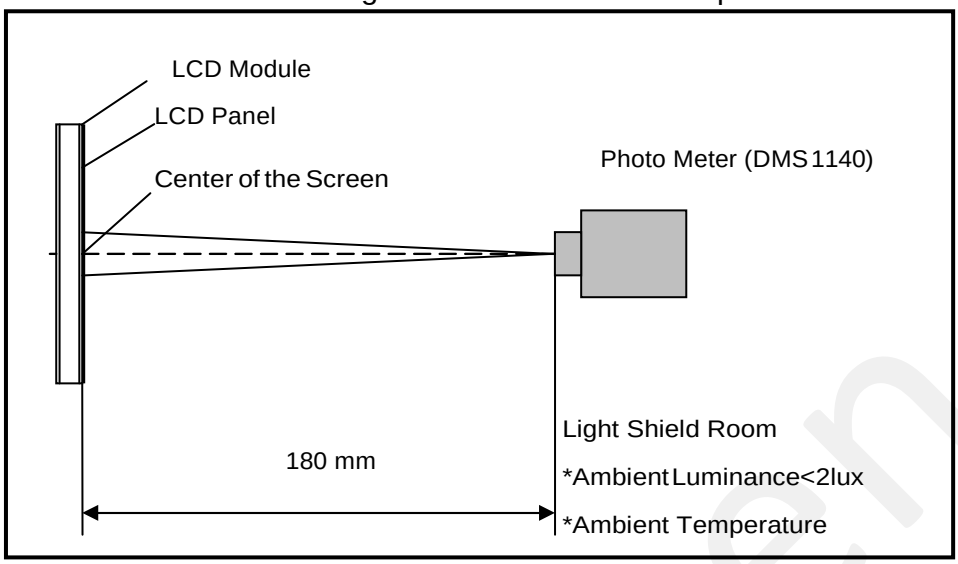
Table 2 Optical Characteristics

Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle （CR>10）	Horizontal	θ_{x+}	70	75	-	degree	(1),(2),(3)
		θ_{x-}	70	75	-		
	Vertical	θ_{y+}	70	75	-		
		θ_{y-}	70	75	-		
Contrast Ratio	Center		720	900	-	-	(1),(2),(4) θx=θy=0°
Response Time	Rising + Falling		-	16	25	ms	(1),(2),(5) θx=θy=0°
Color Chromaticity (CIE1931)	Red x		Typ. -0.03	0.602	Typ. +0.03	-	(1),(2),(3) θx=θy=0°
	Red y			0.352		-	
	Green x			0.320		-	
	Green y			0.570		-	
	Blue x			0.155		-	
	Blue y			0.132		-	
	White x		0.260	0.310	0.360	-	
	White y		0.280	0.330	0.380	-	
NTSC	-		48	50	-	%	(1),(2),(3) θx=θy=0°
White Luminance	Center		850	1000	-	cd/m^2	(1),(2),(6) θx=θy=0°
Luminance Uniformity	9 Points		75	80	-	%	(1),(2),(7) θx=θy=0°

Note (1) Measurement Setup:

The LCD module should be stabilized at given temperature (25℃) 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.

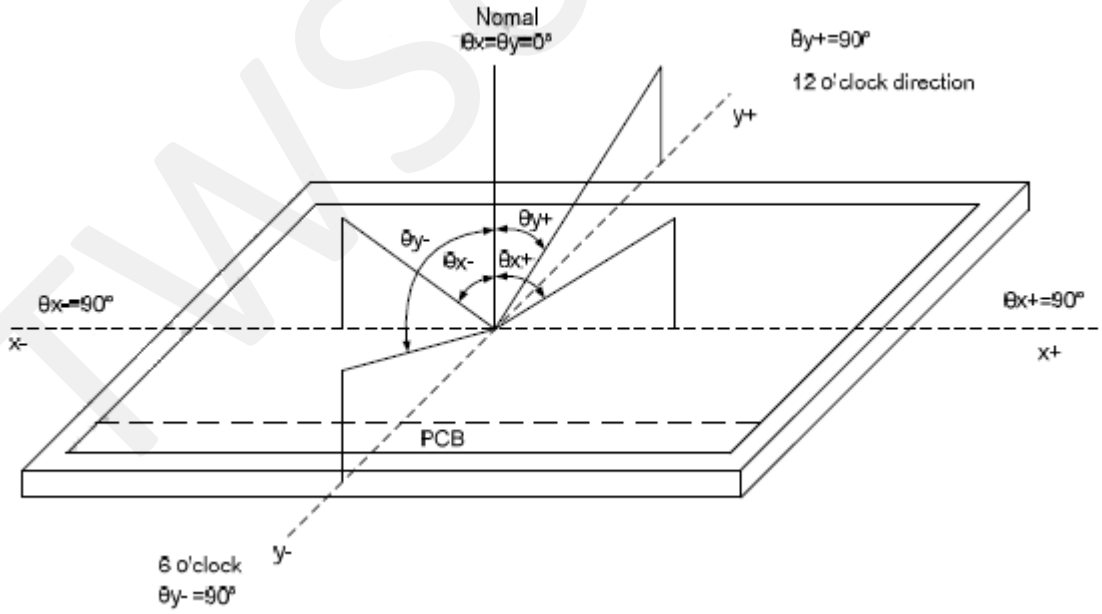
Figure 4 Measurement Setup



Note (2) The LED input parameter
setting as: I_LED: 178mA
PWM_LED: Duty 100 %

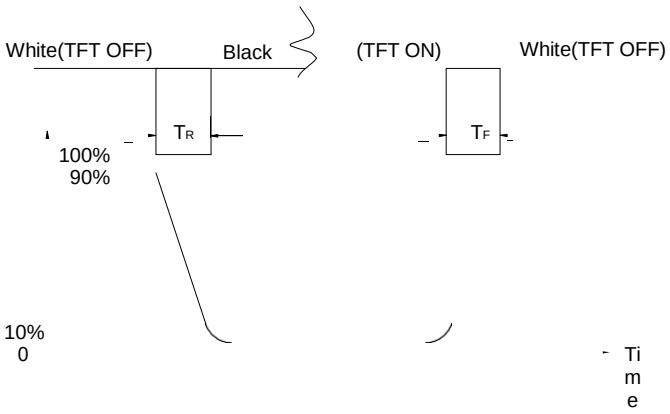
Note (3) Definition of Viewing Angle

Figure 5 Definition of Viewing Angle



Note (4) Definition Of Contrast Ratio (CR)
The contrast ratio can be calculated by the following expression:
Contrast Ratio (CR) = L255 / L0
L255: Luminance of gray level 255, L0: Luminance of gray level 0
Note (5) Definition Of Response Time (T_R, T_F)

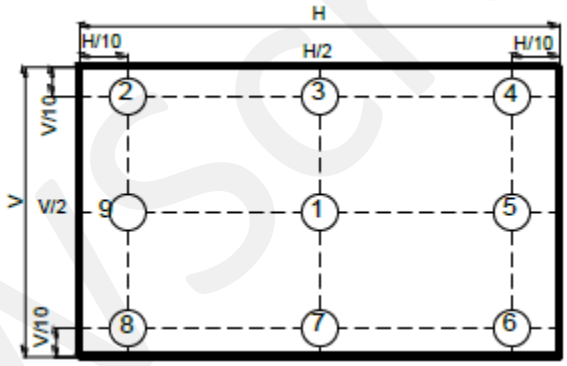
Figure 6 Definition of Response Time



Note (6) Definition Of Luminance White
Measure the luminance of gray level 255 at center point (Ref.: Active Area)

Note (7) Definition Of Luminance Uniformity (Ref.: Active Area)
Measure the luminance of gray level 255 at 9 points. Luminance Uniformity= Min.(L1, L2, ... L9) / Max.(L1, L2, ... L9) H—Active Area Width, V—Active Area Height, L—Luminance

Figure 7 Measurement Locations of 9 Points



4.0 Electrical Characteristics

4.1 Interface Connector

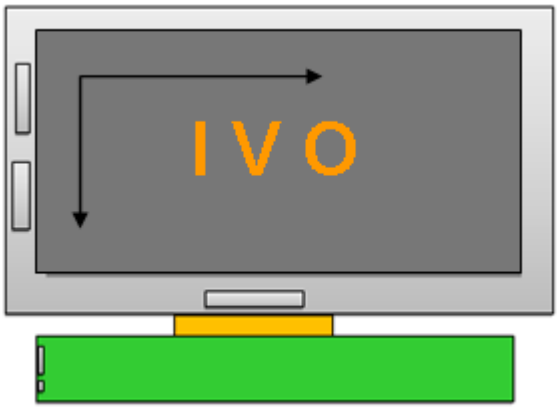
Table 3 Signal Connector Type

Item	Description
Manufacturer / Type	STM/MSB24013P20HA
Mating Receptacle / Type (Reference)	P24013P20 or compatible

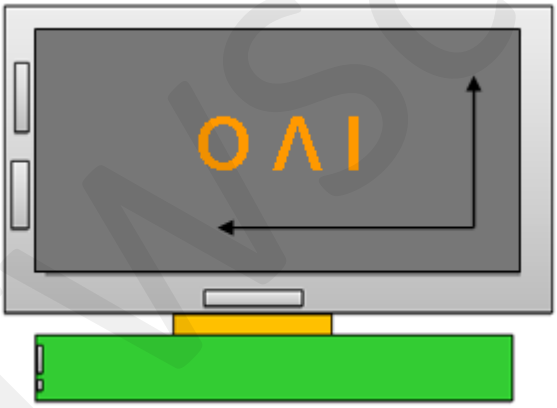
Table 4 Signal Connector Pin Assignment

Pin No.	Symbol	Description	Note
1	VDD	Power Supply, 3.3V (typical)	-
2	VDD	Power Supply, 3.3V (typical)	-
3	VSS	Ground	-
4	REV	Reverse Scan selection {High:2.5(min), 3.3(typ),3.6(max); Low: 0.5(max)}	(1)
5	Rin1-	-LVDS differential data input (R0-R5,G0)	-
6	Rin1+	+LVDS differential data input (R0-R5,G0)	-
7	VSS	Ground	-
8	Rin2-	-LVDS differential data input (G1-G5,B0-B1)	-
9	Rin2+	+LVDS differential data input (G1-G5,B0-B1)	-
10	VSS	Ground	-
11	Rin3-	-LVDS differential data input (B2-B5,HS,VS,DE)	-
12	Rin3+	+LVDS differential data input (B2-B5,HS,VS,DE)	-
13	VSS	Ground	-
14	ClkIN-	-LVDS differential clock input	-
15	ClkIN+	+LVDS differential clock input	-
16	GND	Ground	-
17	Rin4-	-LVDS differential data input (R6-R7,G6-G7,B6-B7)	-
18	Rin4+	+VDS differential data input (R6-R7,G6-G7,B6-B7)	-
19	SEL68	6/8 bits LVDS data input selection(H:8bits L/NC:6bits)	-
20	Bist	Internal use	-

Note(1) REV=LOW/NC



REV = High



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	Vth	-	-	+100	mV	V_{CM} =+1.2V
Differential Input Low Threshold	Vtl	-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	Vth – Vtl=200 mV
Common Mode Voltage Offset	ΔV_{CM}	-50	-	50	mV	Vth – Vtl=200 mV

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

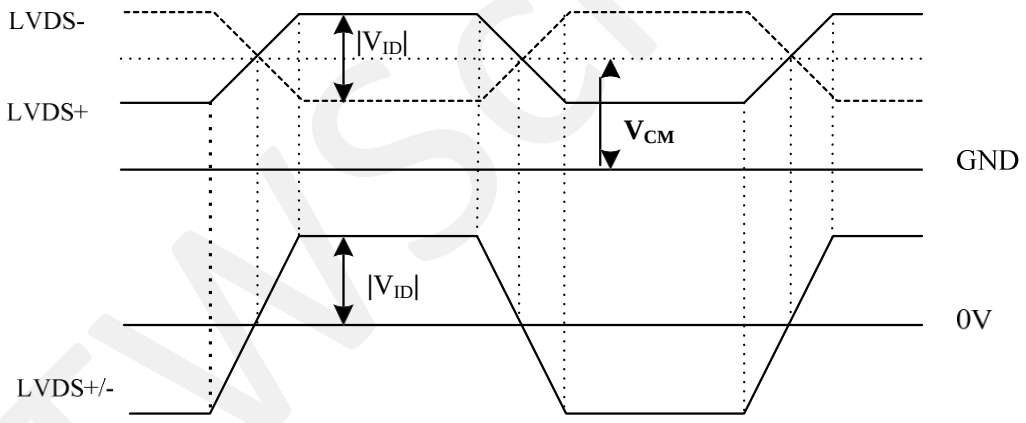


Figure 9 Measurement System

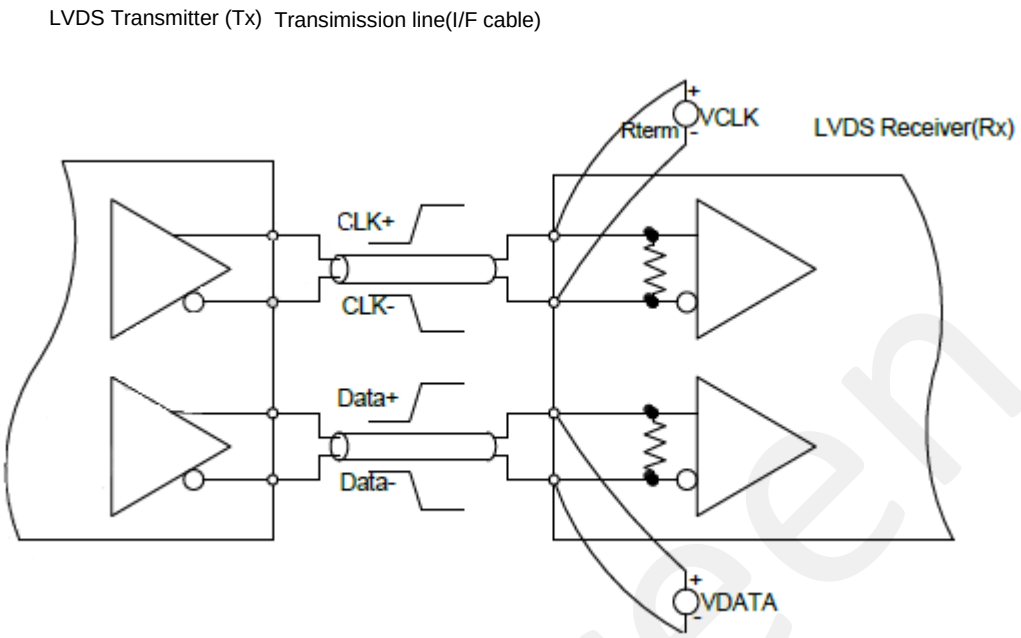


Figure 10 Data Mapping (6 Bit)

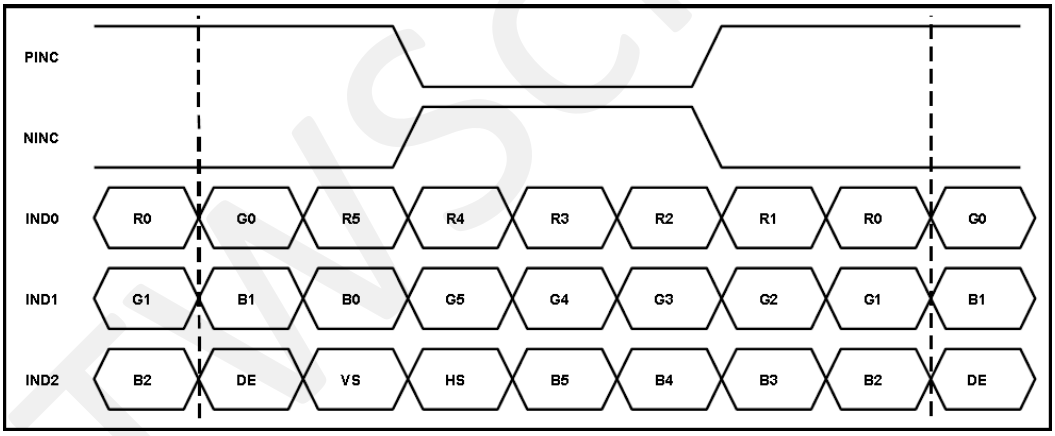
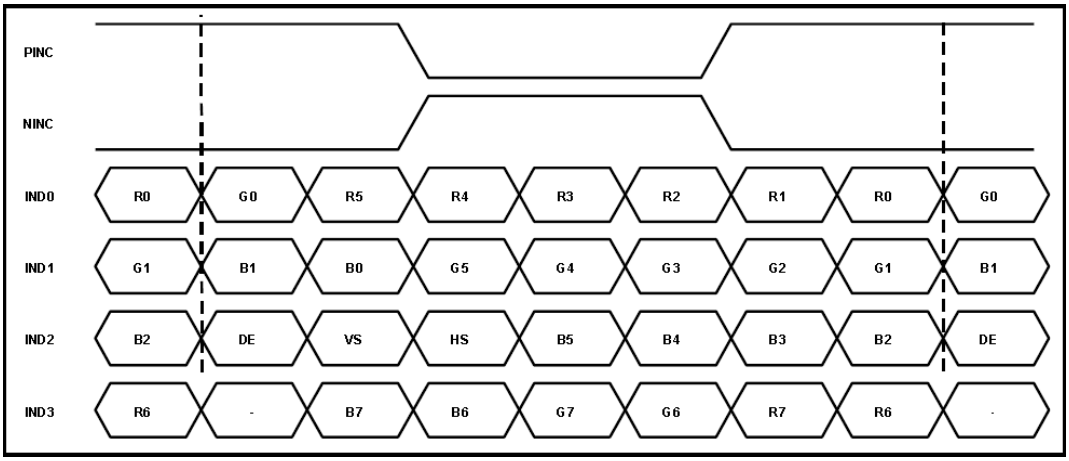


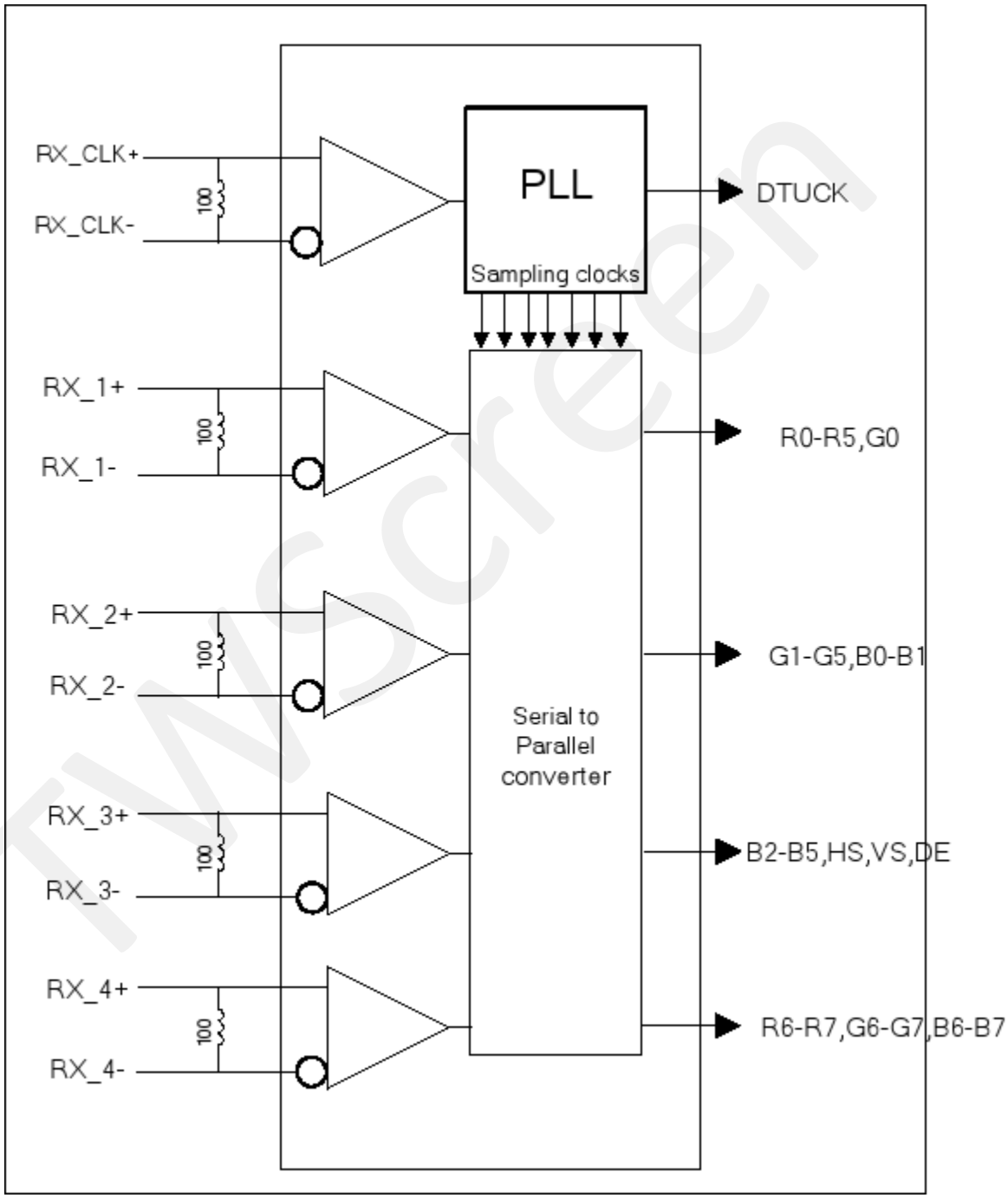
Figure 11 Data Mapping (8 Bit)



4.2.2 LVDS Receiver Internal Circuit

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

Figure 12 LVDS Receiver Internal Circuit



4.3 Interface Timings

Table 8 Interface Timings

Parameter	Symbol	Min.	Typ.	Max.	Unit
LVDS Clock Frequency	Fclk	52	65	71	MHz
H Total Time	HT	1,114	1,344	1,400	Clocks
H Active Time	HA	1,024	1,024	1,024	Clocks
V Total Time	VT	778	806	845	Lines
V Active Time	VA	768	768	768	Lines
Frame Rate	FV	55	60	65	Hz

4.4 Input Power Specifications

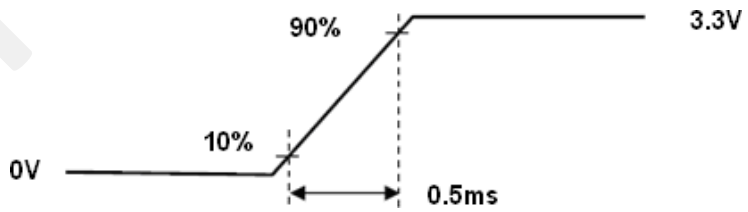
Input power specifications are as follows.

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}	-	-	0.25	A	(3),(4)
VDD Power Consumption	Black Pattern	P_{DD}	-	-	0.84	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							
Current of LED Backlight		I_{LED}	-	178	-	mA	(4)
Voltage of LED Backlight		V_{LED}		28		V	(4),
Backlight Power Consumption		P_{LED}	-	5	-	W	(4),
LED Life Time		LT	50,000			Hours	(4)(6)

Note (1) Measure Condition

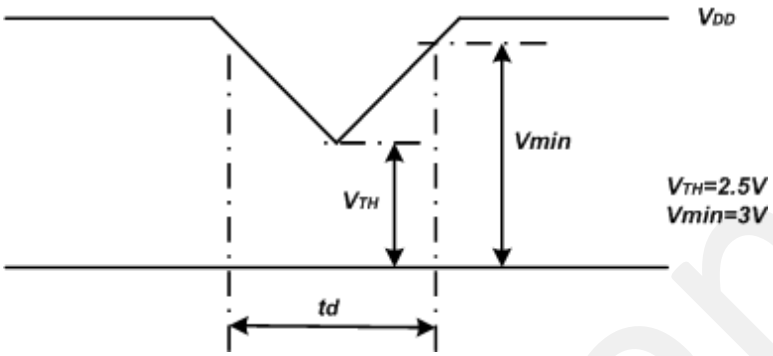
Figure 13 VDD Rising Time



Note (2) VDD Power Dip Condition

V_{TH}< V_{DD}≤ Vmin, td≤ 10ms (a time of the voltage return to normal), our panel can revive automatically.

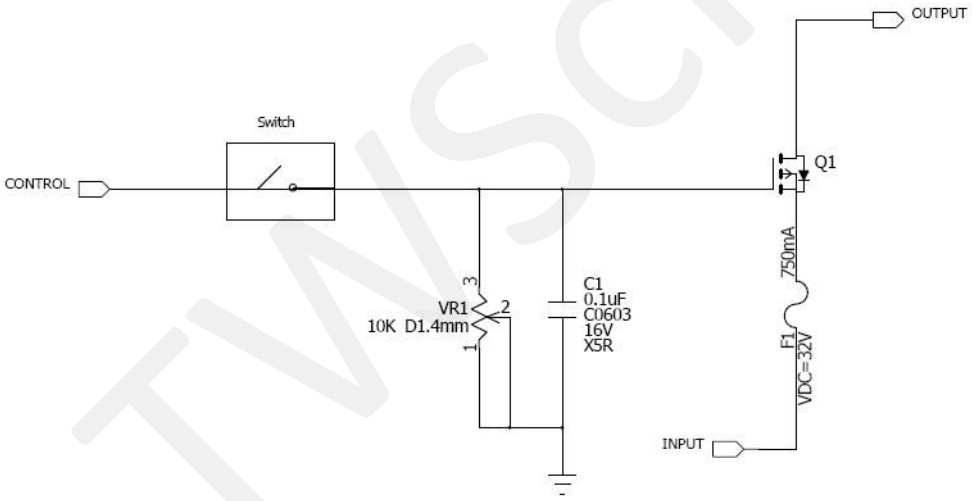
Figure 14 VDD Power Dip



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

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

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



Note (6) 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 15 Power Sequence

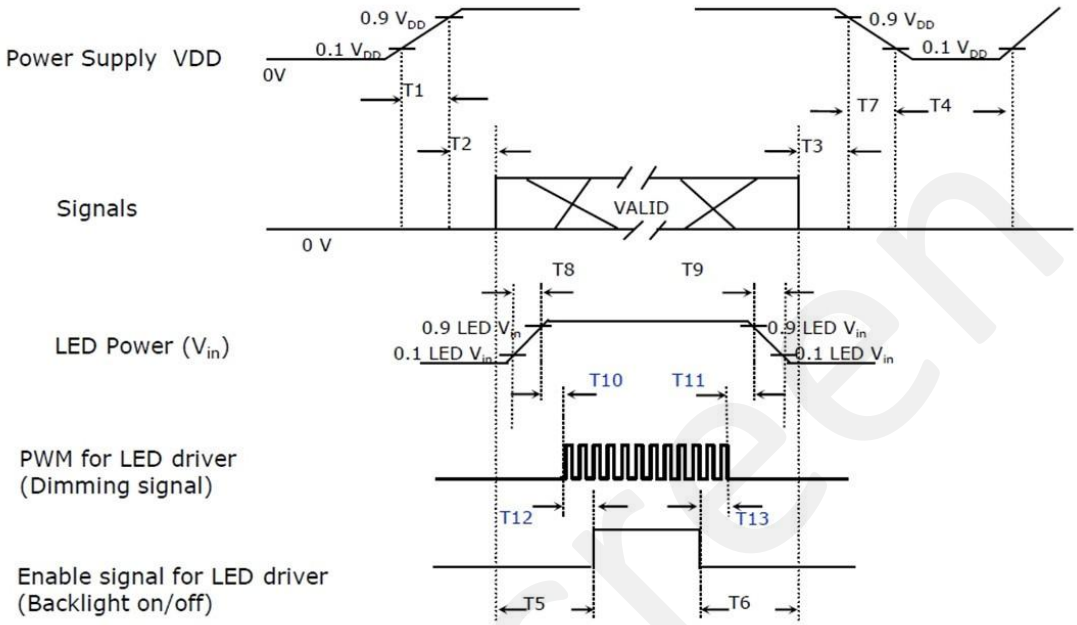


Table 10 Power Sequencing Requirements

Parameter	Symbol	Min.	Typ.	Max.	Unit
VDD rising time from 10% to 90%	T1	0.5	-	10	ms
Delay from VDD to valid data at power ON	T2	30	-	50	ms
Delay from valid data OFF to VDD OFF at power OFF	T3	0	-	50	ms
VDD OFF time for windows restart	T4	500	-	-	ms
Delay from valid data to B/L enable at power ON	T5	200	-	-	ms
Delay from valid data off to B/L disable at power Off	T6	200	-	-	ms
VDD falling time from 90% to 10%	T7	0.5	-	10	ms
LED Vin rising time from 10% to 90%	T8	0.5	-	10	ms
LED Vin falling time from 90% to 10%	T9	0.5	-	10	ms
Delay from LED driver Vin rising time 90% to PWM ON	T10	0	-	-	ms
Delay from PWM Off to LED driver Vin falling time 10%,Must keep rule	T11	0	-	-	ms
Delay from PWM ON to B/L Enable ON, Must keep rule	T12	0	-	-	ms
Delay from B/L Enable Off to PWM Off	T13	0	-	-	ms

5.0 Mechanical Characteristics

5.1 Outline Drawing

Figure 16 Reference Outline Drawing (Front Side)

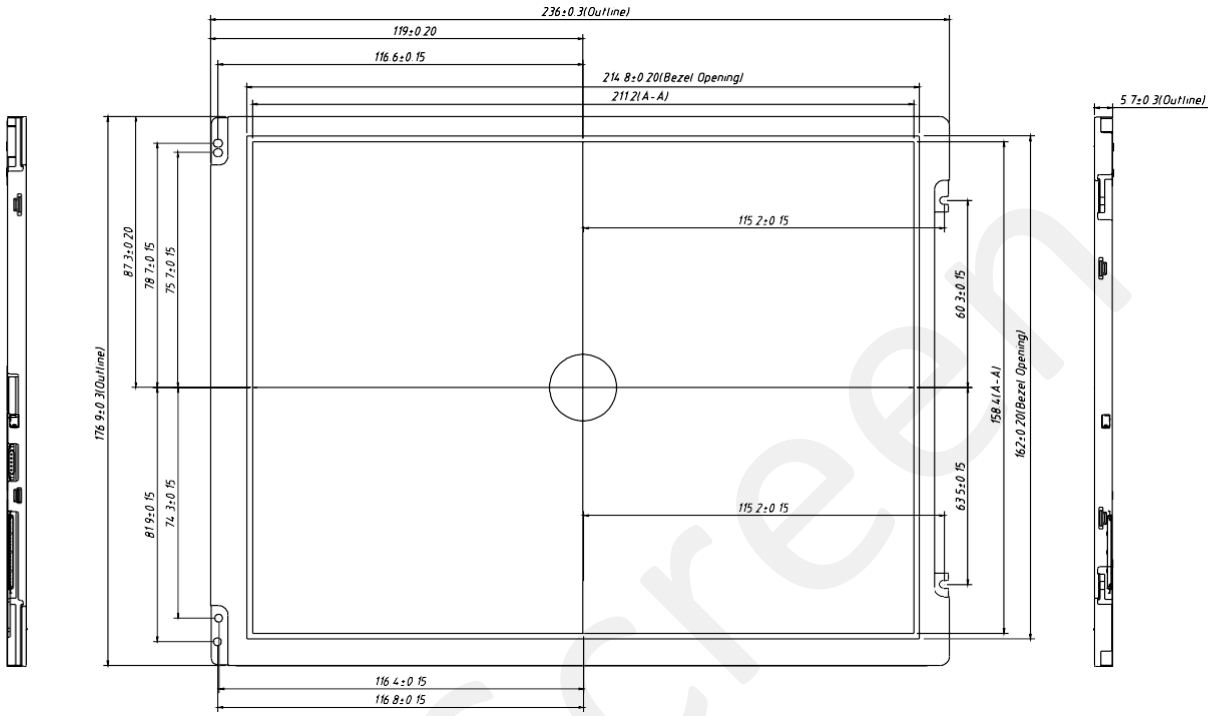
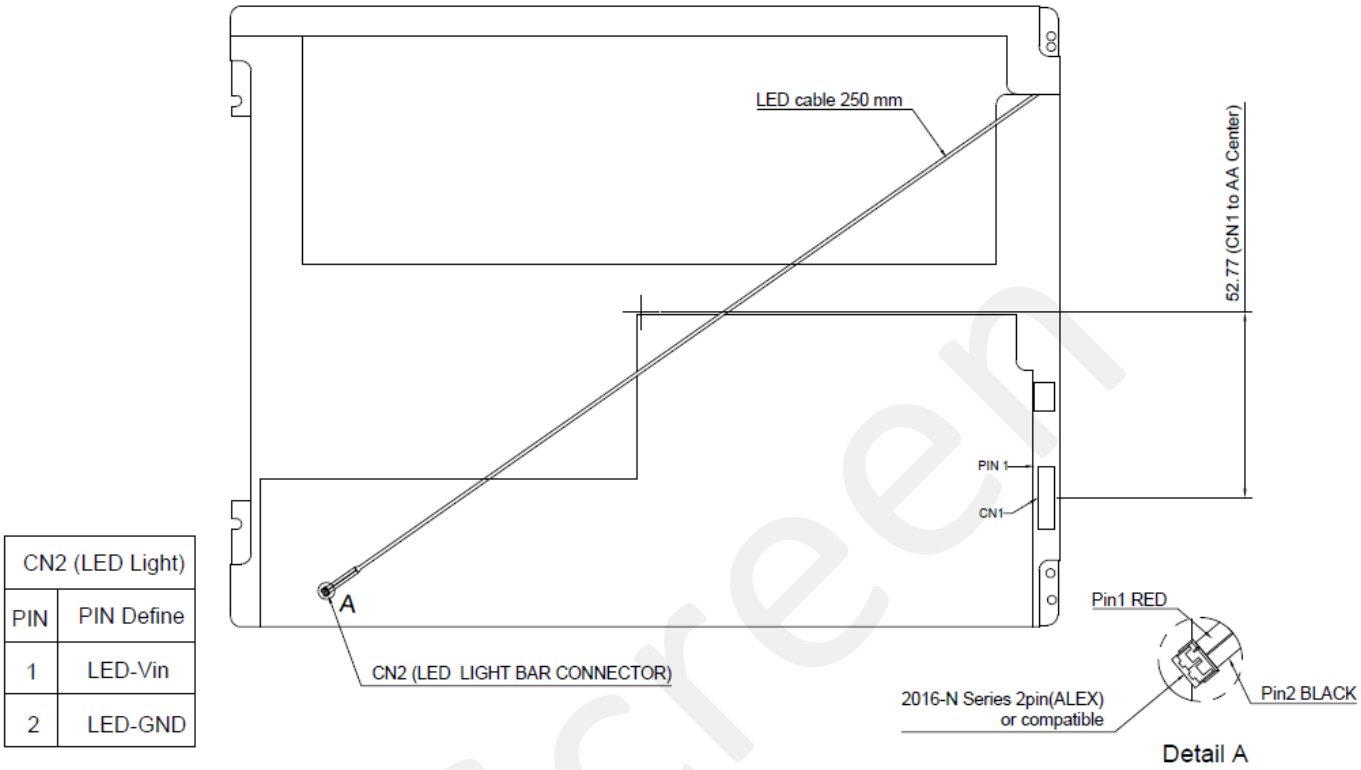


Figure 17 Reference Outline Drawing (Back Side)



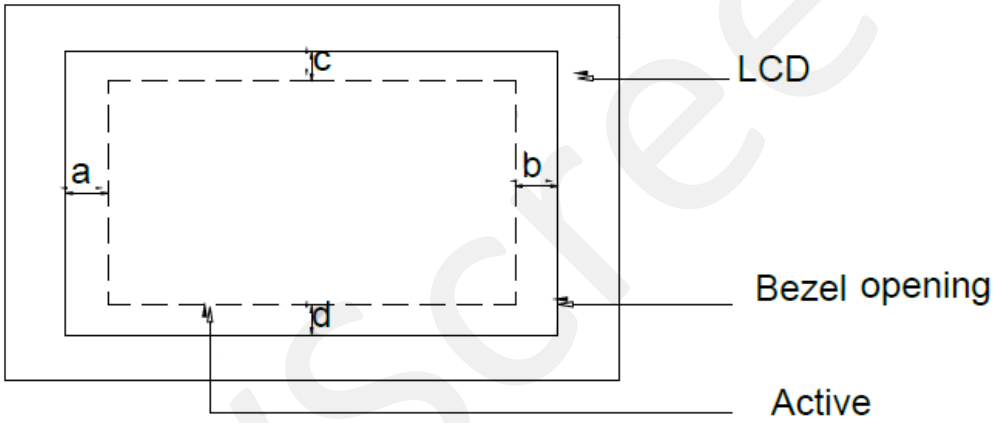
CN2 (LED Light)	
PIN	PIN Define
1	LED-Vin
2	LED-GND

5.2 Dimension Specifications

Table 11 Module Dimension Specifications

Item	Min.	Typ.	Max.	Unit
Width	235.7	236.0	236.3	mm
Height	176.6	176.9	177.2	mm
Thickness	5.4	5.7	6.0	mm
Weight	-	-	300	g
BM：| a-b | & | c-d |	≤1.0			mm

Figure 18 BM Area



Product Specification

DB-LD0C-02

☐ Preliminary Specifications
■ Final Specifications

Product	Backlight Driver Board
Model Name	DB-LD0C-02
Document Version	Rev.01

Customer

Approved by Date

Notice: This Specification is subject to change without notice.

Approved By	Prepared By
	

Product Specification

DB-LD0C-02

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Revised Record				
Version	Date	Revised Content/Summary	Page	Remark
01	2017/12/22	First Edition	All	

1. General Description

This Product Specification is made to be the standard of Elite manufactured LED Driving Board such a standard will be followed in Taiwan Screen production, shipment, and quality inspection.

2. Feature

- 30W LED Driver
- Constant-Current Control
- Support PWM Dimming

3. Protection

Item	Max.	Remark
Over current protection (OCP)	Depending on LED B/L	
Over voltage protection (OVP)	56V(Note1)	

Note : When the LED string is opened, over voltage protection will limit the output to approximately 56V

4. Optional Backlight Driving Condition

Item	Symbol	Min.	TYP.	Max.	Unit	Remark
LED Voltage	V_{LED}		28		V	
LED Current	I_{LED}	-	178	-	mA	

5. Absolute maximum ratings

Parameter	Symbol	Min.	TYP.	Max.	Unit	Remark
Input Voltage	Vin	10.8	12	15	V	
Output Voltage	Vout			50	V	
Output Current	Iout			1000	mA	

6. Interface Characteristics

Parameter	Symbol	Min.	TYP.	Max.	Unit	Remark
Backlight ON Voltage	INVON	1.25	5	Vin	V	
Backlight OFF Voltage	INVON			0.4	V	
PWM Control	PWM	3.3	5		V	
PWM Control Frequency	PWM	85	100		Hz	
PWM Control Duty	PWM	0		100	%	

7. Environmental

Item	Symbol	Conditions	MIN	MAX	Unit	Remark
Operating Temperature	Top	Ha=90%RH	0	60	℃	
Storage Temperature	Tstg	Ha=95%RH	-20	85	℃	

8. Connector Socket

8.1 Connector Type

Connector (J1)

Connector Name / Designation	For Signal Connector
Manufacturer	JST or compatible
Type / Part Number	S7B-PH-SM4-TB or compatible
Mating Housing / Part Number	PHR-7 or compatible

Connector (J2 & J3)

Connector Name / Designation	For Signal Connector
Manufacturer	JST or compatible
Type / Part Number	S2B-PH-SM4-TB or compatible
Mating Housing / Part Number	PHR-2 or compatible

J1 S7B-PH-SM4-TB

(Pin 1)

J2 & J3 S2B-PH-SM4-TB

(Pin 1)

8.2 Pin Definition

Connector (J1)

PIN No.	Symbol	Description
1	Vin	Power Input (+12V)
2	Vin	Power Input (+12V)
3	Vin	Power Input (+12V)
4	GND	Ground
5	PWM	PWM Brightness Control
6	GND	Ground
7	EN	Backlight on/off Control (5V / 0V)

Connector (J2 & J3)

PIN No.	Symbol	Description
1	V_LED+	LED Power +
2	V_LED-	LED Power -

9. Mechanical Characteristics

Dimension: 75(L) *30(W) *8.5(H) mm
Weight: MAX. 20g