

## Product Specification

**8.4" LCD with 800x600 SVGA resolution,1000nits(typ.)  
brightness, LVDS interface, LED driver board, 12VDC-in**

**Model: GSK0840**

**Model control code: GSK0840 V1**

**Date: Aug. 15<sup>th</sup>, 2012**

**Note: This specification is subject to change  
without notice**

**Customer :** \_\_\_\_\_

**Date :** \_\_\_\_\_

**Approved**

**Prepared**

**Date:**

**Date:**

# Product Specification

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## RECORD OF REVISION

Version and Date	Page	Old description	New description	Remark
0.1 2012/08/15	All	First Edition for customer		

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## 1. HANDLING 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 disconnecting 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 or modify the Module Assembly.
- 8) Do not press the reflector sheet at the back of the module to any directions.
- 9) In case if a Module has to be put back into the packing container slot after once it was taken out from the container, do not press the center of display.
- 10) At the insertion or removal of the Signal Interface Connector, be sure not to rotate nor tilt the Interface Connector of the TFT Module.
- 11) 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.

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## 2. General Description

### 2.1, Overview

GSK0840 is a Color Active Matrix Liquid Crystal Display composed of a TFT-LCD display, a driver circuit, and a backlight system. The screen format is intended to support 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.

### 2.2 Features

- Sunlight readable display, 1000nits.
- LED backlight
- RoHS Compliance

### 2.3 Application

Industrial Application.

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## 2.4 Display Specifications

Items	Unit	Specification
Screen Diagonal	inch	8.4 (213.4 mm)
Active Area	mm	170.4(H) x 127.8(V)
Pixels H x V	pixels	800x3(RGB) x 600
Pixels Pitch	um	213 (per one triad) x 213
Pixel Arrangement		RGB Vertical stripe
Display mode		TN mode, normally white
White luminance (center)	Cd/m <sup>2</sup>	1000 (Typ.)
Contrast ratio		600 (Typ.)
Optical Response Time	msec	35 ms (Typ. on/off)
Normal Input Voltage VDD	Volt	3.3
Power Consumption (VDD Line + LED Lines)	Watt	7.0 (TBD)
Weight	Grams	(TBD)
Physical size	mm	203.0(H)x 142.5(V) x 5.7(D) (typ.)
Electrical Interface		1 Chanel LVDS
Support Colors		262k(6-bits) / 16.2 M (8-bits)
Surface Treatment		Anti-Glare, 3H
Temperature range		
Operating	°C	-20 ~ 70(LCD surface temperature)
Storage (Shipping)	°C	-30 ~ 80
RoHS Compliance		RoHS Compliance

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## 2.5 Optical Characteristics

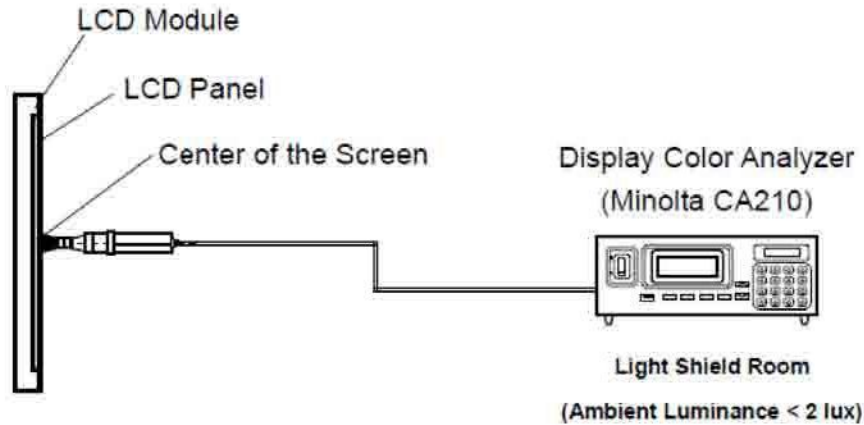
The following optical characteristics are measured under stable condition at 25 °C

Items	Unit	Conditions	Min.	Typ.	Max.	Note
Viewing angle	Deg.	Horizontal (Right)	60	70		2
		CR=10 (Left)	60	70		
		Vertical (Up)	50	60		
		CR=10 (Down)	60	70		
Contrast Ratio		Normal Direction	400	500		3
Response Time	msec	Raising time (T <sub>rR</sub> )				4
		Falling time (T <sub>rF</sub> )				
		Raising + Falling		25		
Color / Chromaticity Coordinates (CIE)		Red x	-0.03	TBD	+0.03	5
		Red y		TBD		
		Green x		TBD		
		Green y		TBD		
		Blue x		TBD		
		Blue y		TBD		
Color coordinates (CIE) White		White x		0.31		
		White y		0.33		
Center Luminance	Cd/m <sup>2</sup>		800	1000		6
Luminance Uniformity	%			70		7
Crosstalk (in 60 Hz)	%				1.2	
Flicker	dB				-20	

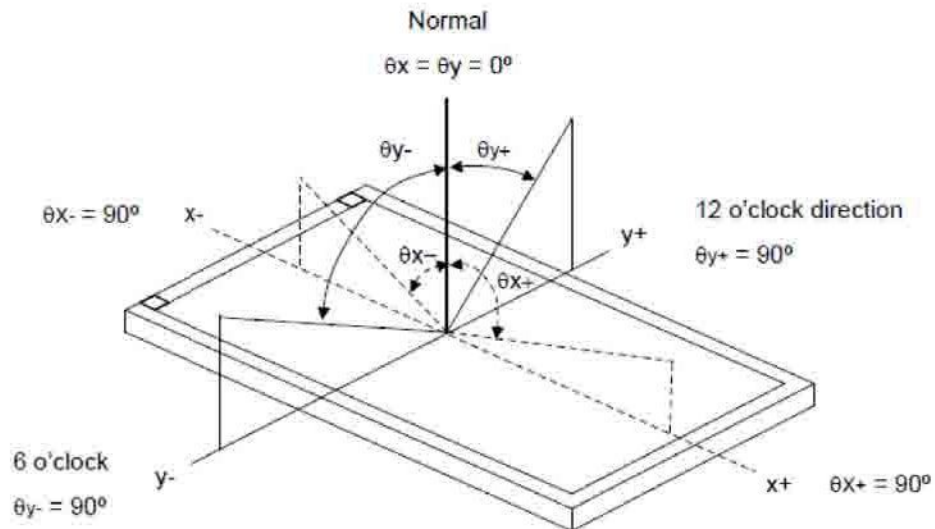
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## Note 1: Measurement method

The LCD module should be stabilized at given temperature for 0.5 hour to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 1 hour in a windless room.



## Note 2: Definition of viewing angle

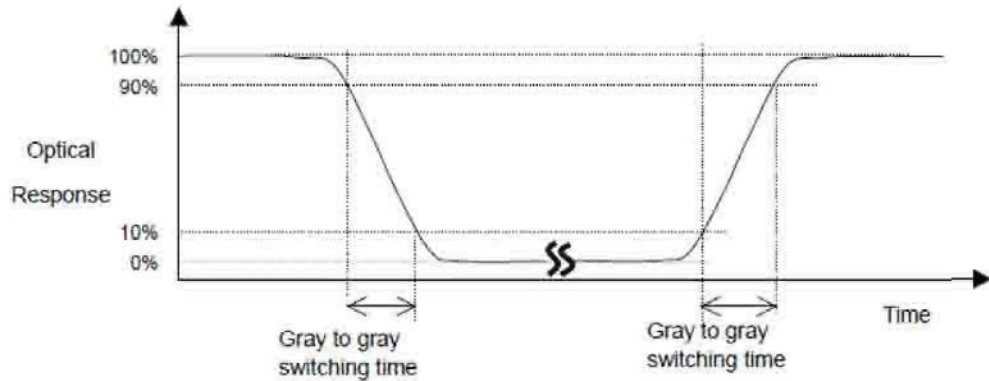


## Note 3: Contrast ratio is measured by Minolta CA210

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## Note 4: Definition of Response time

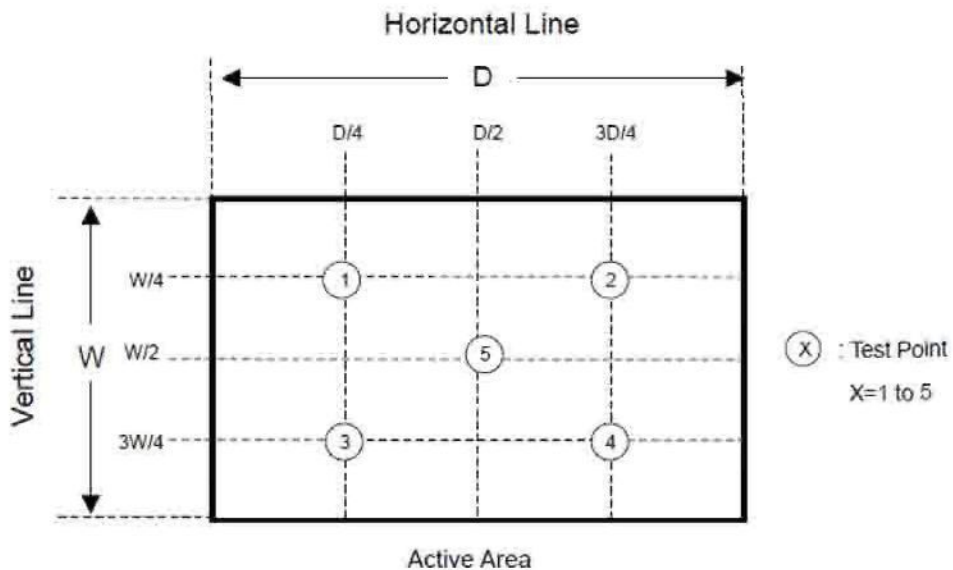
The output signals of photo detector are measured when the input signals are changed from "Full Black" to "Full White" (rising time), and from "Full White" to "Full Black" (falling time), respectively. The response time is interval between the 10% and 90% of amplitudes. Please refer to the figure as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



Note 5: Color chromaticity and coordinates (CIE) is measured by Minolta CA210

Note 6: Center luminance is measured by Minolta CA210

Note 7: Luminance uniformity of these 5 points is defined as below and measured by Minolta CA210

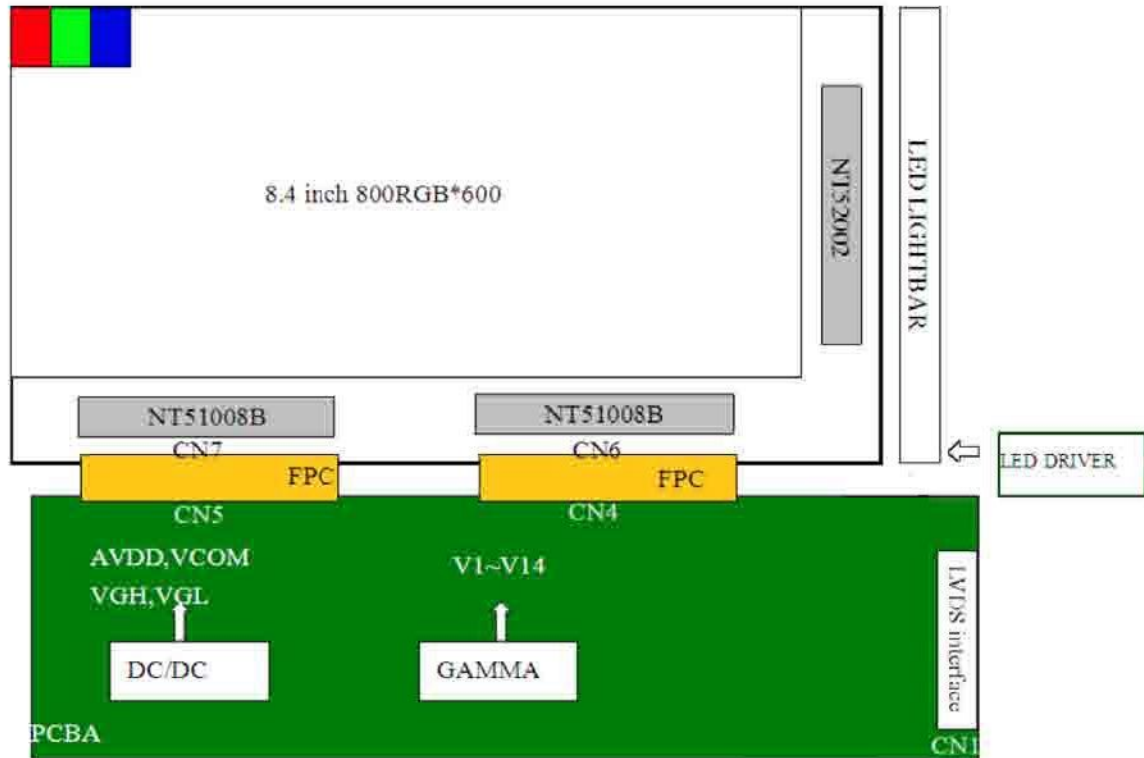


$$\text{Uniformity} = (\text{Min. Luminance of 5 points}) / (\text{Max. Luminance of 5 points})$$

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## 3. Functional Block Diagram

The following diagram shows the functional block of the 8.4 inches Color TFT-LCD Module:



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## 4. Absolute Maximum Ratings

Absolute maximum ratings of the module are as following:

### 4.1 TFT LCD Module

Items	Symbol	Min	Max	Unit	Conditions
Logic/ LCD drive voltage	VDD Vin	-0.5	5.0	Volt	Note 1, 2

### 4.2 Backlight unit

Items	Symbol	Min	Max	Unit	Conditions
LED Current	I LED		400	mA	Note 1, 2

### 4.3 Absolute Ratings of Environment

Items	Symbol	Values			Unit	Conditions
		Min.	Typ.	Max.		
Operation temperature	T <sub>OP</sub>	-20	-	70	°C	Note 3
Operation Humidity	H <sub>OP</sub>	8		90	%	
Storage temperature	T <sub>ST</sub>	-30		80	°C	
Storage Humidity	H <sub>ST</sub>	8		90	%	

Note 1: With in Ta= 25°C

Note 2: Permanent damage to the device may occur if exceed maximum values

Note 3: For quality performance, please refer to IIS (Incoming Inspection Standard).

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## 5. Electrical characteristics

### 5.1 TFT LCD Module

#### 5.1.1 Power Specification

Input power specifications are as follows

Symbol	Parameter	Min	Typ.	Max	Unit	Conditions
VDD	Logic/ LCD Drive Voltage	3	3.3	3.6	Volt	+/- 10%
IDD	Input current		TBD		mA	VDD=3.3V, All black pattern.
PDD	VDD power		TBD		W	VDD=3.3V, All black pattern.
IRush	Inrush current			3	A	

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## 5.1.2 Signal Electrical Characteristics

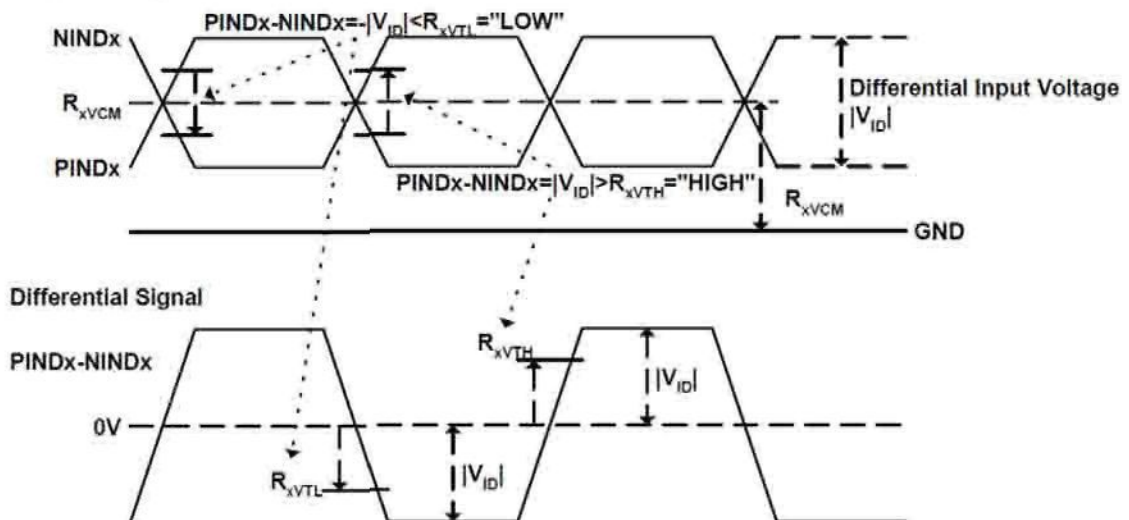
Input signal shall be low or Hi-Z state when VDD is off.

Characteristics of each signal are as following:

Symbol	Parameter	Min	Typ	Max	Unit	Condition
RxVTH	Differential Input High Threshold			+100	mV	VICM = 1.2V
RxVTL	Differential Input Low Threshold	-100			mV	VICM = 1.2V
RxVIN	Input voltage range (singled-end)	0		2.4	V	
VID	Input Differential Voltage	200	400	600	mV	
RxVCM	Differential Input Common Mode Voltage	VID /2		2.4- VID /2	V	VTH/VTL = 100mV

Note: LVDS Signal Waveform.

### Single-end Signals



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## 5.2 Backlight Unit

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

Parameter	Min	Typ	Max	Unit	Note
LED voltage (VL)		19.8	21.5	[V]	2
LED current (IL)		300	400	[mA]	2,
LED power (PL)		5.9		W	
LED Life Time(LTLED)		50,000		[Hour]	1

Note 1: The “LED lift time” is defined as the module brightness decrease to 50% original brightness that the ambient temperature is 25°C and typical LED Current at 300 mA.

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## 6. Timing Chart

### 6.1 TFT-LCD Input Timing

VCC=3.3V, GND=0V, Ta=25°C

Parameter	Symbol	Min	Typ	Max	Unit	Remark
DCLK	Fclk	34.5	39.6	50.4	MHz	Tclk=1/Fclk
	Tclk	16	25.3	30.7	ns	
HSYNC	TH	900	1000	1200	Tclk	
	THD	-	800	-	Tclk	
	Thwh	1	-	40	Tclk	
	Thbp	-	88	-	Tclk	
	Thfp	12	112	312	Tclk	
VSYNC	TV	640	660	700	TH	
	TVD	-	480	-	TH	
	Tvwh	1	-	20	TH	
	Tvbp	-	39	-	TH	
	Tvfp	1	21	61	TH	

Table 6.1 TCON input timing(HV mode)

### 6.2 Recommended Timing Setting Of TCON

#### TCON (Embedded In Source IC) Input timing at DE mode

VCC=3.3V, GND=0V, Ta=25°C

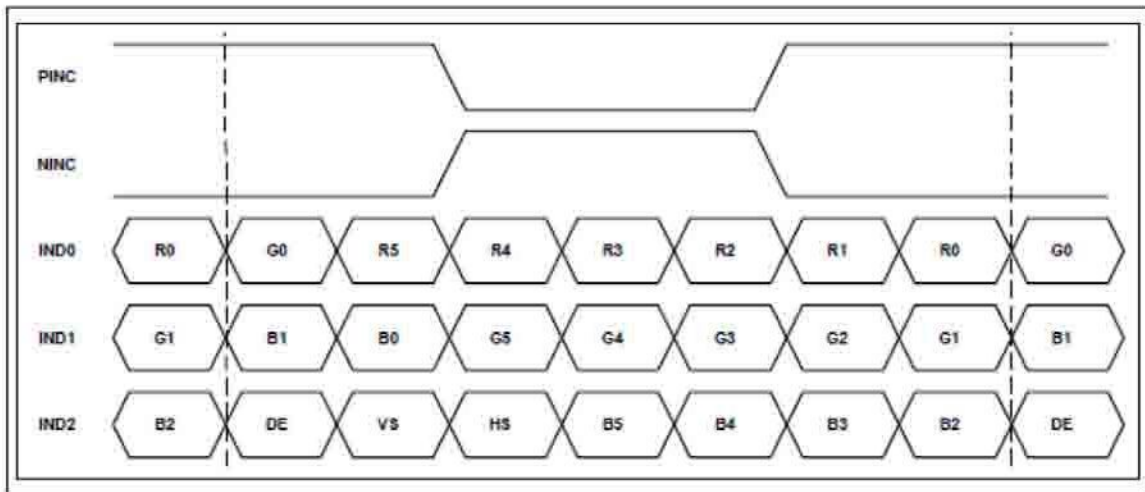
	Parameter	Symb ol	Min.	Typ.	Max.	Unit	Remark
Dclk frequency		Fclk	32.6	39.6	62.4	MHz	Tclk=1/Fclk
Horizontal section	Horizontal total	TH	890	1000	1300	Tclk	
	Horizontal blanking	THC	90	200	500	Tclk	
	Valid Data Width	THD	-	800	-	Tclk	
Vertical section	Frame rate	-	-	60	-	Hz	
	Vertical total	TV	610	660	800	TH	
	Vertical blanking	TVC	10	60	200	TH	
	Valid Data Width	TVD	-	600	-	TH	

Table 6.2 TCON input timing (DE mode)

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## 6.3 LVDS Input Data Format

### 6bit LVDS input (HSD='H')



### 8-bit LVDS input (HSD='L')

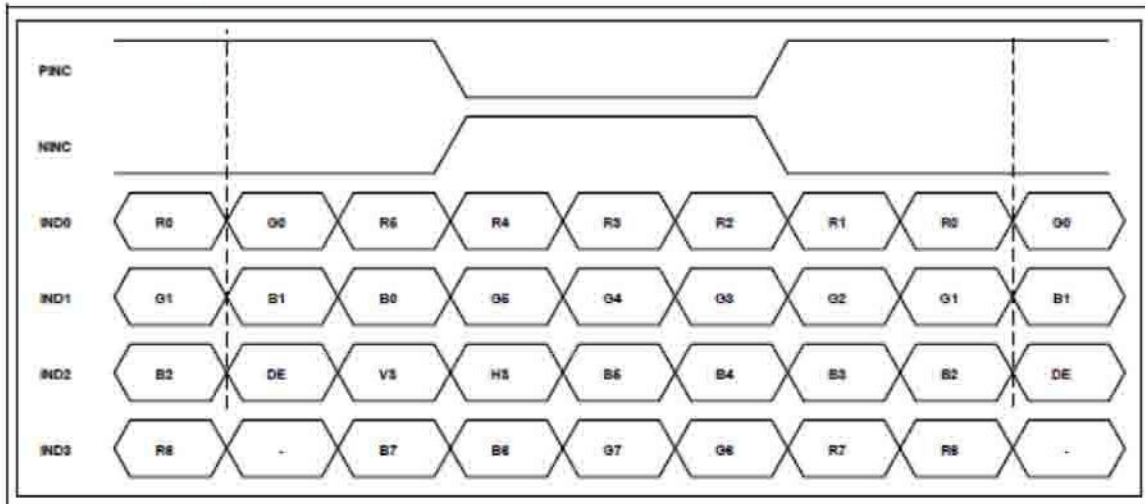


Figure 6.1 LVDS input data mapping

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## 6.4 Input signal AC timing

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Clock frequency	$R_{XFCLK}$	32.6	39.6	62.4	MHz	
Clock high time	$T_{LVCH}$		$4/(7 * R_{XFCLK})$		nS	
Clock low time	$T_{LVCL}$		$3/(7 * R_{XFCLK})$		nS	

Table 5.3 LVDS clock Input timing

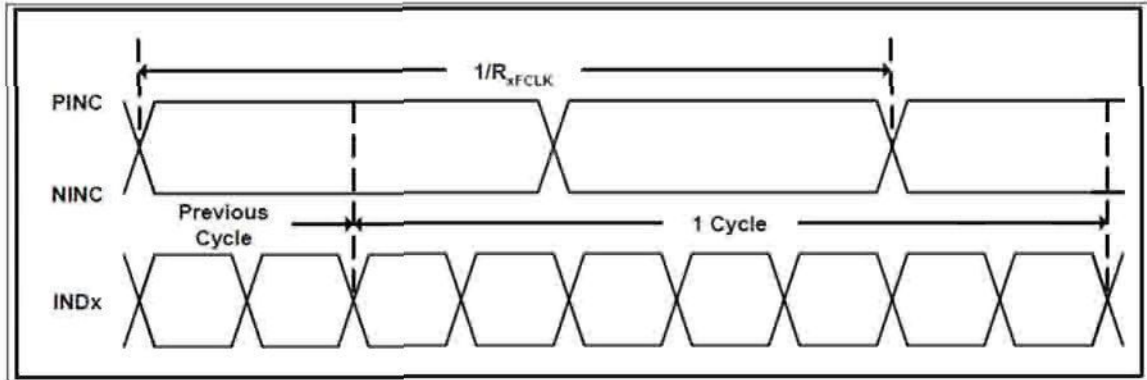


Figure 6.2 Input signal AC timing

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## 6.5 POWER ON/OFF SEQUENCE

Item	Symbol	Min	Typ	Max	Unit	Remark
VDD 3.3V to signal starting	Tp1	5	-	50	ms	
VDD rising time	Tr	0.1	-	5	ms	
Signal starting to backlight on	Tp2	150	-	-	ms	
Signal off to VDD 0V	Tp3	5	-	50	ms	
Backlight off to signal off	Tp4	150	-	-	ms	

Table 5.4 POWER ON/OFF SEQUENCE

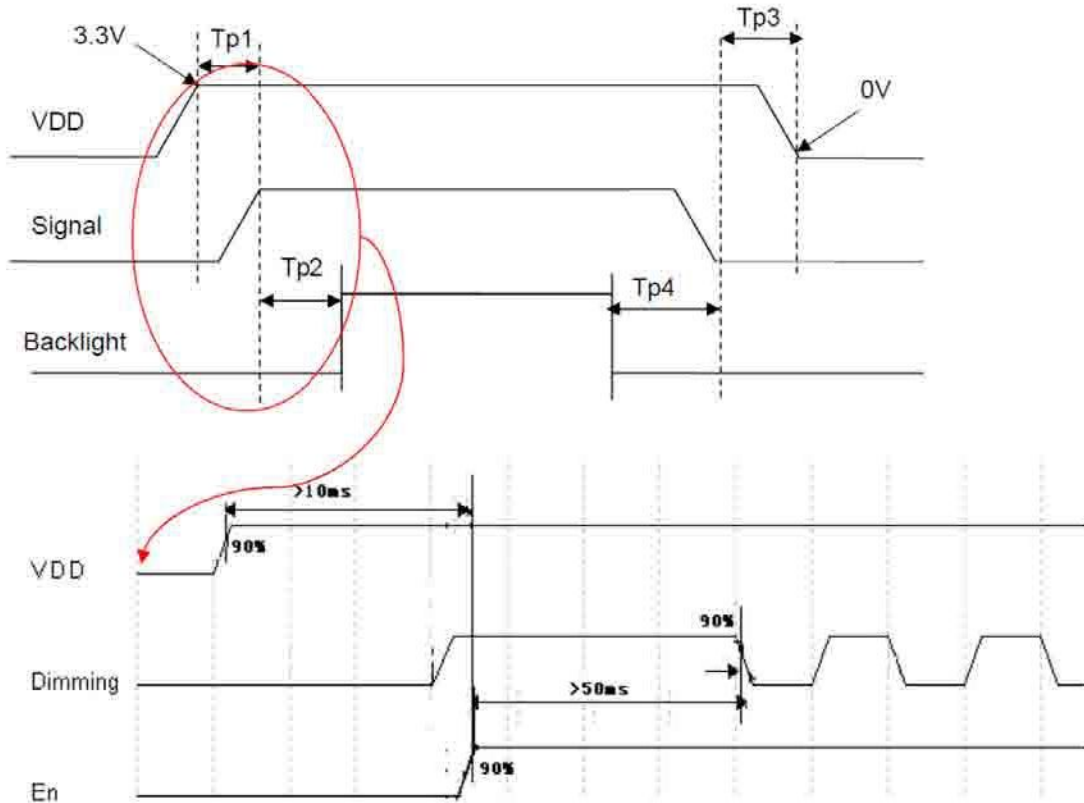


Figure 5.3 Interface power on/off sequence

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## 7.0 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 (CN1 of FPC)

Connector type: 107A20-0021RA-G3-R (Hirose)

Pin	Symbol	I/O	Description	Remark
1	VDD	P	Power supply	
2	VDD	P	Power supply	
3	UD	I	Vertical Reverse Scan Control	
4	LR	I	Horizontal Reverse Scan Control	
5	RxIN1-	I	Negative data 1 for LVDS signal input	
6	RxIN1+	I	Positive data 1 for LVDS signal input	
7	GND	P	Ground	
8	RxIN2-	I	Negative data 2 for LVDS signal input	
9	RxIN2+	I	Positive data 2 for LVDS signal input	
10	GND	P	Ground	
11	RxIN3-	I	Negative data 3 for LVDS signal input	
12	RxIN3+	I	Positive data 3 for LVDS signal input	
13	GND	P	Ground	
14	RxCLKIN-	I	negative clock for LVDS signal input	
15	RxCLKIN+	I	Positive clock for LVDS signal input	
16	GND	P	Ground	
17	SEL68	I	LVDS 6/8 bit selection control	
18	NC	I	No connection	
19	RxIN4-	I	Negative data 4 for LVDS signal input	
20	RxIN4+	I	Positive data 4 for LVDS signal input	

### 7.2 Backlight Unit: LED Connector (TBD)

Connector type: BHSR-02VS-1 manufactured by JST

Pin No.	Symbol	I/O	Function	Remark
1	VLED+	P	Power for LED backlight anode	Red
2	VLED-	P	Power for LED backlight cathode	Black

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## 8. Reliability Test

Environment test conditions are listed as following table.

Items	Required Condition	Note
Temperature Humidity Bias (THB)	Ta= 40°C , 90%RH, 300hours	
High Temperature Operation (HTO)	Ta= 70°C , 50%RH, 300hours	3
Low Temperature Operation (LTO)	Ta= -20°C , 300hours	
High Temperature Storage (HTS)	Ta= 80°C , 300hours	
Low Temperature Storage (LTS)	Ta= -30°C , 300hours	
Drop Test	Height: 60 cm, package test	
Thermal Shock Test (TST)	-20°C/30min, 60°C/30min, 100 cycles	1
On/Off Test	On/10sec, Off/10sec, 30,000 cycles	
ESD (ElectroStatic Discharge)	Contact Discharge: ± 8KV, 150pF(330Ω ) 1sec, 9 points, 25 times/ point.	2
	Air Discharge: ± 15KV, 150pF(330Ω ) 1sec 9 points, 25 times/ point.	2

Note 1: The TFT-LCD module will not sustain damage after being subjected to 100 cycles of rapid temperature change. A cycle of rapid temperature change consists of varying the temperature from -20°C to 60°C, and back again. Power is not applied during the test. After temperature cycling, the unit is placed in normal room ambient for at least 4 hours before power on.

Note 2: According to EN61000-4-2 , ESD class B: Some performance degradation allowed. No data lost. Self-recoverable. No hardware failures.

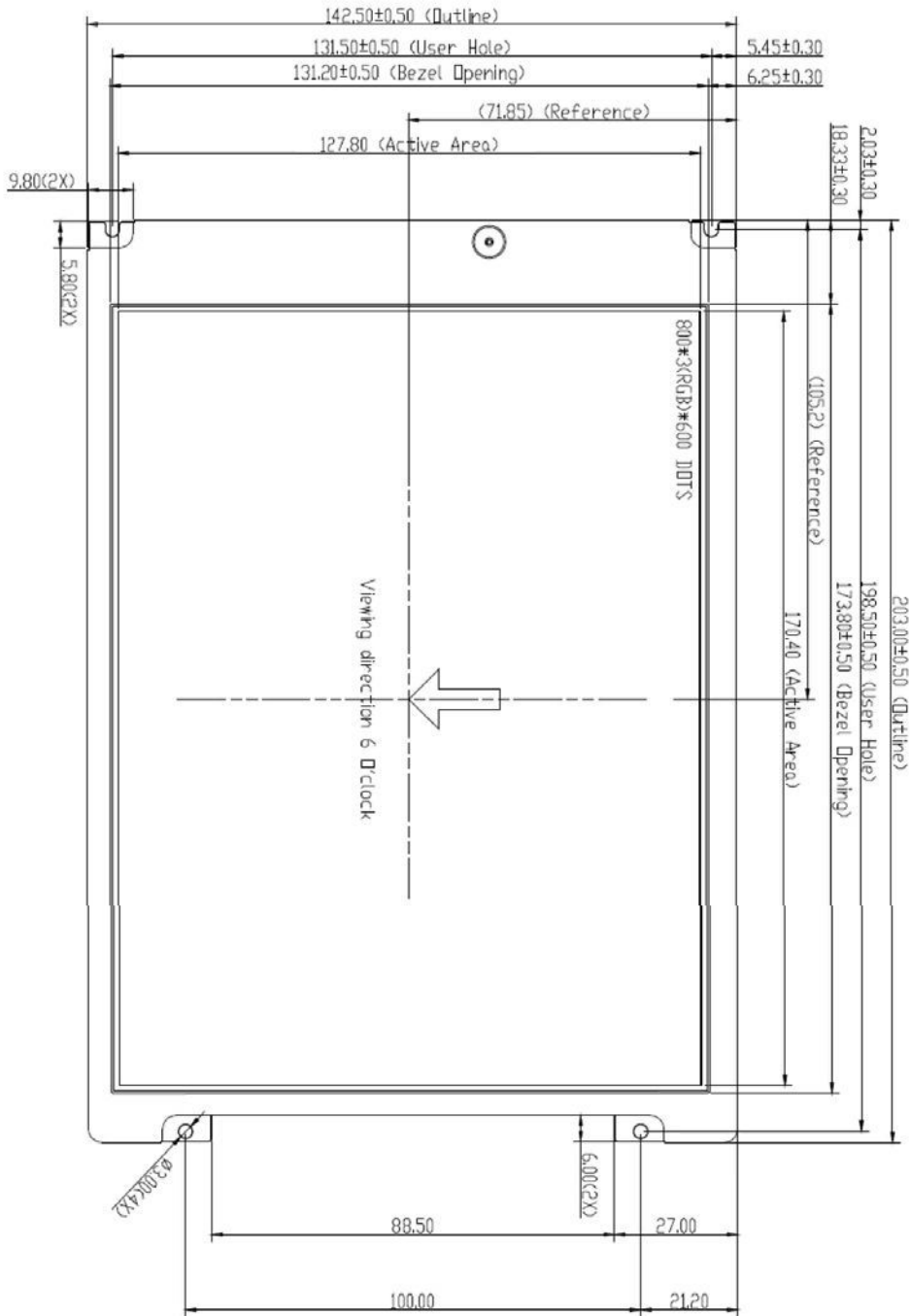
Note 3: The test items are tested by open frame type chassis.

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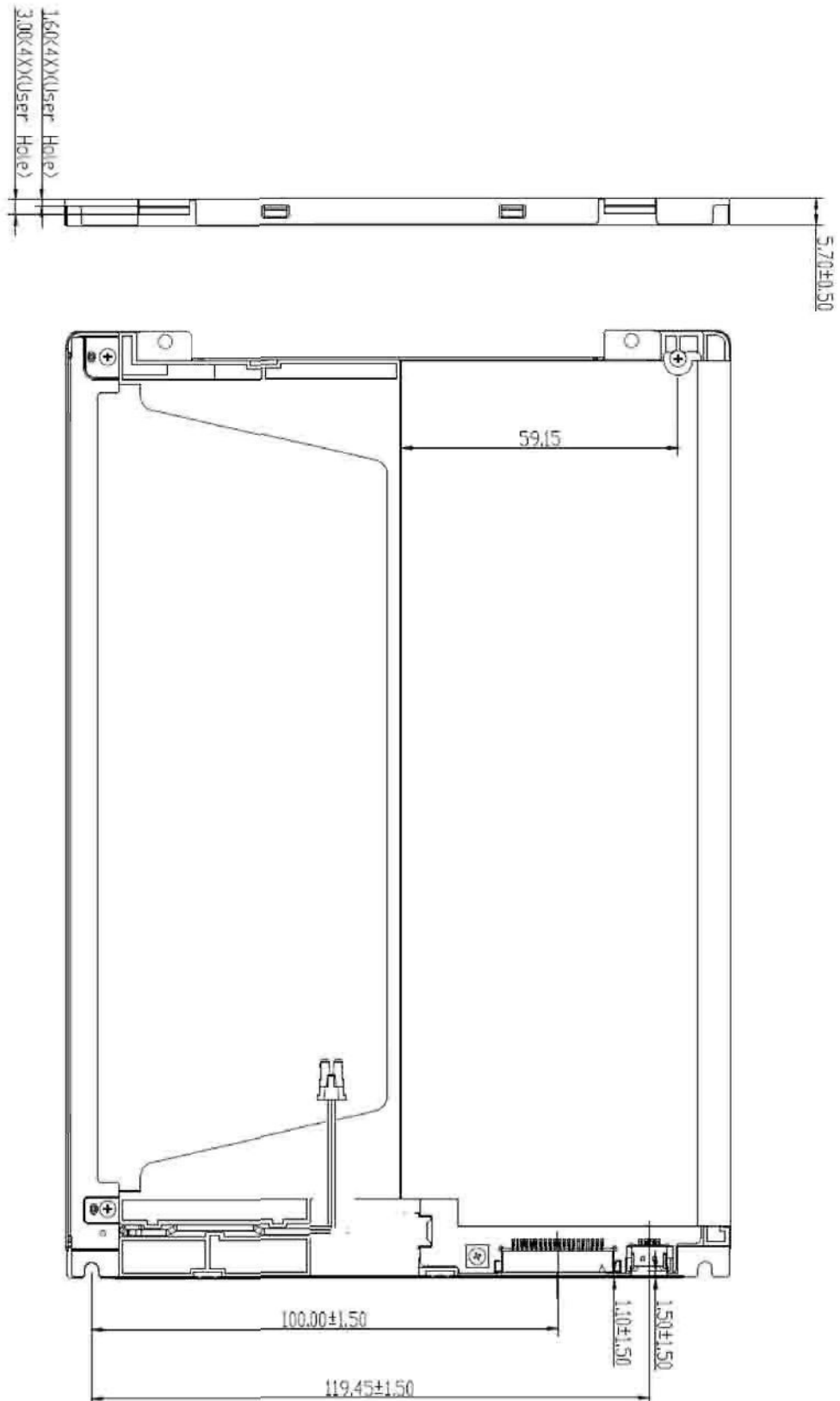
9. Shipping Label & Package  
(TBD)

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## 10. Mechanical Characteristic



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(Note: the LED cable length is 150 mm)