

Specification

Module No. : GEA-101E01-DC9509-G010
Client Name : _____
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Version No. : A1

Client Confirmation	Approved by	Prepared by
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Issue History

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1. Purpose

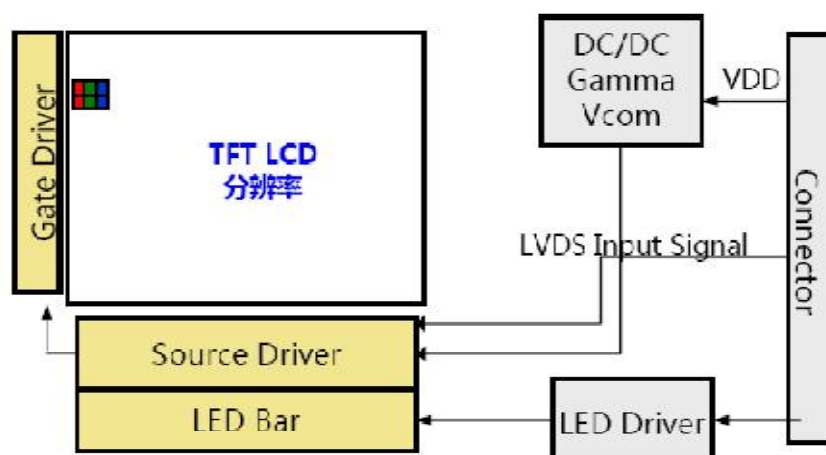
This specification document is issued for the 10.1" TFT Liquid Crystal Display bonded with Capacitive-Type Touch Panel delivered by General Electrical Touch Co., Limited. This document defined the general provisions (including structure, performance, characteristics and quality guarantee) for the specific module listed at the front page of this document. In the event of conflict between this document and other documents, this document including the attachments and drawing, is highest-level specification for this products.

2. Feature

2.1 Overview

The touch part is a 10.1 inch DITO glass Capacitive-Type Touch Panel. It uses a SIS9509 touch controller with USB communication.

The display part BOE GT101WSM-N10 which is a color active matrix TFT LCD module using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This module has a 10.1 inch diagonally measured active area with XGA resolutions (1024 horizontal by 768 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this module can display 16.7M colors.



2.2 Absolute Maximum Ratings

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit.

<Environment Absolute Maximum Ratings>

[Ta=25±2℃]

Parameter	Symbol	Min.	Max.	Unit	Remarks
Back-light Power Supply Voltage	HV _{DDOUT}	4.2	24	V	Ta = 25 °C Note 1&2
Back-light LED Current	I _{HVDD}	-	-	mA	
Back-light LED Reverse Voltage	V _R	-	43	V	
Operating Temperature	T _{OP}	-20	70	℃	
Storage Temperature	T _{ST}	-30	80	℃	
Operating Ambient Humidity	Hop			%RH	
Storage Humidity	Hst			%RH	

Notes:

1. These range above is maximum value not the actual operating temperature . Actual operating temperature is no more than 40℃ and temperature refers to the LCM surface temperature ;
2. BOE is not responsible for product problems beyond the use conditions.

2.3 Module Structure

Main Component	Materials	Remarks
Cover Glass	2mm chemical strengthened glass	black printed board
Adhesive	OCA	Thickness: 0.175 mm
Touch Sensor	DITO glass	0.55mm, 60~90Ω/□
Air Bonding Tape	3M 4905	Thickness: 0.5 mm
Display	TFT LCD	BOE GT101WSM-N10

2.4 Physical Specifications

Item	Specifications	Remark
TFT Active Area	222.72(H) x 125.28(V) mm	
Touch Visible Area	224.30(H)*126.90(V) mm	
Number Of Pixels	1024(H)×600(V)	
Pixel Pitch	0.0725(H)X0.2088(V) mm	
Pixel Arrangement	1P1D	
Display Colors	16.7M(8bits)	6bit / 8bit
Display Mode	Normally White	
Surface Treatment		
Back-light	Edge side, 1-LED Lighting Bar Type	28*LED
Touch Activation	Multi-finger touch	
Touch Resolution	20X, 32Y	
Touch Controller	SIS9509	
Bonding Method	CG to touch sensor: optical bonding TP module to display: tape bonding	
Outline Dimension	247.00(H)*166.00(V)*8.20(Typ) mm	
Weight	0.45 KG	

3. Electrical Specifications

3.1 Display Electrical Specifications

3.1.1 TFT LCD Module

<LCD Module Electrical Specifications> [Ta=25±2℃]

Parameter	Symbol	Values			Unit	Notes
		Min	Typ	Max		
Power Supply Input Voltage	V _{DD}	3.0	3.3	3.6	V	Note 1
Power Supply Current	I _{DD}	-	140	160	mA	
LED Driver Power Supply Voltage	H _{VDD}	4.2	5	24	V	Note 2
LED Driver Power Supply Current	I _{HVDD}	-	390	500	mA	
LED Power Consumption	P _{LED}	-	1.95	2.5	W	
Positive-going Input Threshold Voltage	V _{IT+}	-		+100	mV	V _{com} = 1.2V typ.
Negative-going Input Threshold Voltage	V _{IT-}	-100		-	mV	
Differential input common mode voltage	V _{com}	1.125	-	1.375	V	V _{IH} =100mV, V _{IL} =-100mV

Notes:

1. The supply voltage is measured and specified at the interface connector of LCM.
The current draw and power consumption specified is for 3.3V at 25 °C.
Max value at Black Pattern.
2. Calculated value for reference $I_{LED} \times V_{LED} \div 0.85 = P_{LED}$

3.1.2 Back-Light Unit

<LED Driving guideline specifications>

[Ta=25±2℃]

Parameter		Min.	Typ.	Max.	Unit	Remarks
Power supply voltage for Back light		V_{LED}	19.6	21	23.1	V
Power supply Current for Back light		I_{LED}	-	88	-	mA
Power supply for Back light		P_{LED}	1.73	1.85	2.04	W
EN Control Level	Backlight on	V_{ENH}	1.9	-	-	V
	Backlight off	V_{ENL}	-	-	0.8	V
PWM Control Level	PWM High Level	V_{PMH}	1.9	-	-	V
	PWM Low Level	V_{PML}	-	-	0.8	V
PWM Control Frequency		F_{PWM}	100	-	30	KHz
Duty Ratio		-	1	-	100	%

Notes:

1. Calculator Value for reference $I_{LED} \times V_{LED} = P_{LED}$
2. The LED Life-time define as the estimated time to 50% degradation of initial luminous under the condition of the ambient temperature of 25℃.

3.1.3 Electrical Interface Connection

The electronics interface connector is 20455_040E. The LED connector is MSAK24037P9.

The connector interface pin assignments are listed in below table.

<Pin Assignments for the Interface Connector>

Terminal	Symbol	Functions	Terminal	Symbol	Functions
Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	VCCS	Power supply	21	RX3P	LVDS Pair 3
2	VCCS	Power supply	22	VSS	Ground
3	VCCS	Power supply	23	NC	Reverse for BOE test
4	VEDID	DDC 3.3V Power	24	NC	
5	NC	Reverse for Bist test	25	Oder SEL	H→JEDA / L→Ns like
6	CLKEDID	DDC CLK	26	SEL68	H→8bit / L→6bit
7	DATAEDID	DDC DATA	27	VSS	Ground
8	RX0N	LVDS Pair 0	28	LED_GND	LED Ground
9	RX0P		29	LED_GND	
10	VSS	Ground	30	LED_GND	
11	RX1N	LVDS Pair 1	31	LED_GND	
12	RX1P		32	LED_GND	
13	VSS	Ground	33	LED_GND	
14	RX2N	LVDS Pair 2	34	NC	NC
15	RX2P		35	LED_PWM	PWM signal for LED Driver
16	VSS	Ground	36	LED_EN	Enable signal for LED Driver
17	RXCLKN	LVDS CLK	37	LED_VCC	LED Power supply
18	RXCLKP		38	LED_VCC	LED Power supply
19	GND	Ground	39	LED_VCC	LED Power supply
20	RX3N	LVDS Pair 3	40	LED-VCC	LED Power supply

<Pin Assignments for the LED Connector>

Terminal	Symbol	Functions
Pin No.	Symbol	Description
1	VLEDOUT	12V
2	VLEDOUT	12V
3	NC	No Connection
4	NC	No Connection
5	LED1	CH1
6	LED2	CH2
7	LED3	CH3
8	LED4	CH4
9	NC	No Connection

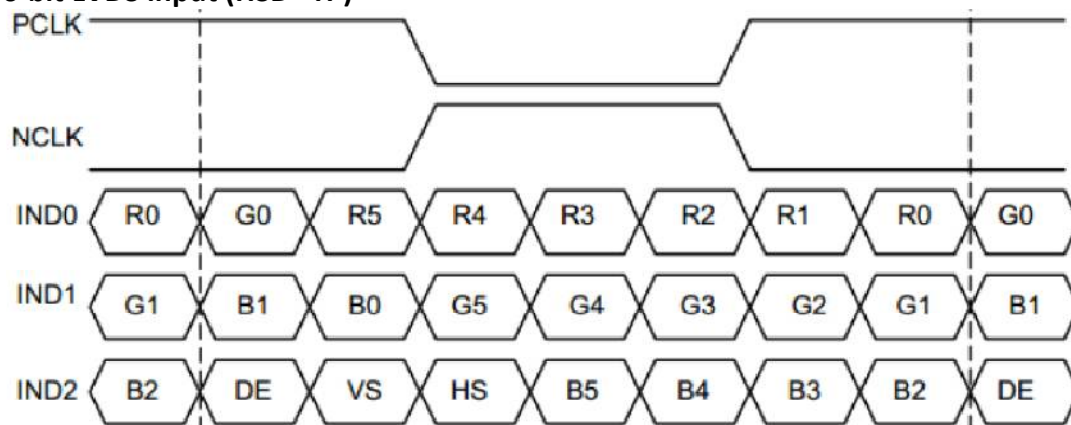
3.1.4 Signal Timing Specification

The GT101WSM-N10 is operated by the DE only.

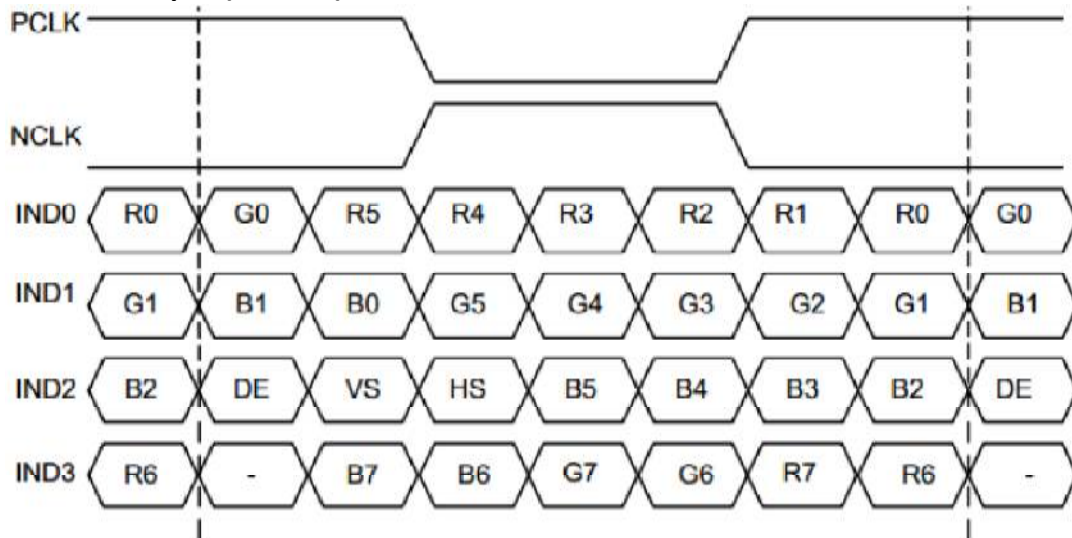
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK Frequency	fclk	40.8	51.2	67.2	MHz
Horizontal display area	thd	1024			pixel
HSYNC period time	th	1114	1344	1400	pixel
HSYNC blanking	thb+ thfp	90	320	376	pixel
Vertical display area	Tvd	600			H
VSYNC period time	Tv	610	635	800	H
VSYNC blanking	Tvb+ Tvfp	10	35	200	H

3.1.5 Data Input Format

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

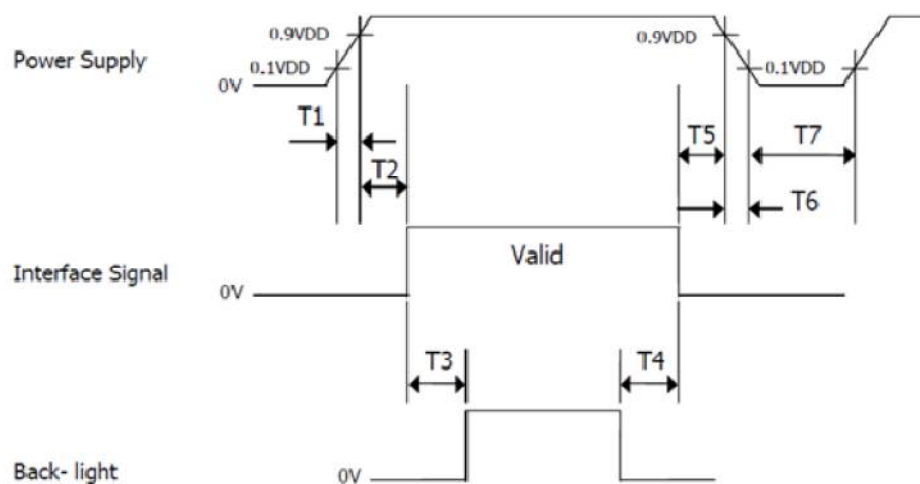


8-bit LVDS input (HSD='L')



3.1.6 Power Sequence

To prevent a latch-up or DC operation of the LCD module, the power on/off sequence shall be as shown in below



	Min.	Typical	Max.	unit
T1			1	ms
T2	80			ms
T3	112			ms
T4	32			ms
T5	80			ms
T6			5	ms
T7	500			ms

3.2 Touch Panel Electrical Specifications

3.2.1 Interface Connection

Item	Specification	Remarks
FPC type	COF	
Connector	USB-MINI-B	
	Molex 53261-1071	or compatible
Communication	USB and I ² C	

3.2.2 Connector Pins Definition

<Molex 53261-1071 Pins Definition>

Pin	Definition	Description
1	Vcc	5V
2	USB Data+	
3	USB Data-	
4	SDA	I ² C serial data
5	SCL	I ² C serial clock
6	INT	Interrupt pin sending request to HOST
7	Reset	Low active power on reset signal
8	GPIO0	General purpose input/output port
9	GND	
10	GND-Shielding	

3.2.3 I²C Interface

Slaver address	0x5c(7-bits addressing, programmable)
Clock rate	@400 kHz(fast mode)
Interrupt mode	Default active low, level trigger
_CID	PNP0C50
_DSM	3CDF6F7-4267-4555-AD05-B30A3D8938DE
HID Descriptor address	0x0000

4. Optical Specifications

4.1 Display Optical Specifications

4.1.1 Overview

The test of view angle range shall be measured in a dark room (ambient luminance ≤ 1 lux and temperature $=25\pm 2^{\circ}\text{C}$) with the equipment of Luminance meter system (Goniometer system and TOPCON CS2000/CA310) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of θ and Φ equal to 0. We refer to $\theta = 0$ ($=\theta_3$) as the 3 o'clock direction (the "right"), $\theta = 90$ ($=\theta_{12}$) as the 12 o'clock direction ("upward"), $\theta = 180$ ($=\theta_9$) as the 9 o'clock direction ("left") and $\theta = 270$ ($=\theta_6$) as the 6 o'clock direction ("bottom"). While scanning θ and/or Φ , the center of the measuring spot on the Display surface shall stay fixed. The luminance, color and uniformity (etc) should be tested by CS2000/CA310. The backlight should be operating for 10 minutes prior to measurement. VDD shall be $3.3 \pm 0.3\text{V}$ at 25°C . Optimum viewing angle direction is 6 'clock.

4.1.2 Optical Specifications

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle range	Horizontal	Θ_3	CR > 10	-	70	-	Deg.	Note 1
		Θ_9		-	70	-	Deg.	
	Vertical	Θ_{12}		-	60	-	Deg.	
		Θ_6		-	60	-	Deg.	
Luminance Contrast ratio		CR	$\Theta = 0^\circ$	400	500	-		Note 2
Luminance of White	Center	Y_w	$\Theta = 0^\circ$	300	350	-	cd/m ²	Note 3
White Luminance uniformity	9 Points	ΔY_9		75	80	-	%	Note 4
Color Gamut	NTSC	CIE1931	$\Theta = 0^\circ$	45	50	-	%	Note 5
Reproduction of color	White	W_x	$\Theta = 0^\circ$	Typ. -0.05	0.313	Typ. +0.05		
		W_y			0.329			
Response Time		Tr+Td	Ta= 25° C $\Theta = 0^\circ$	-	20	25	ms	Note 6

Note:

1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface (see FIGURE 1).

2. Contrast measurements shall be made at viewing angle of $\theta = 0^\circ$ and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state. (See FIGURE 1) Luminance Contrast Ratio (CR) is defined mathematically.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

3. Luminance of white is defined as luminance values of center of the LCD surface.

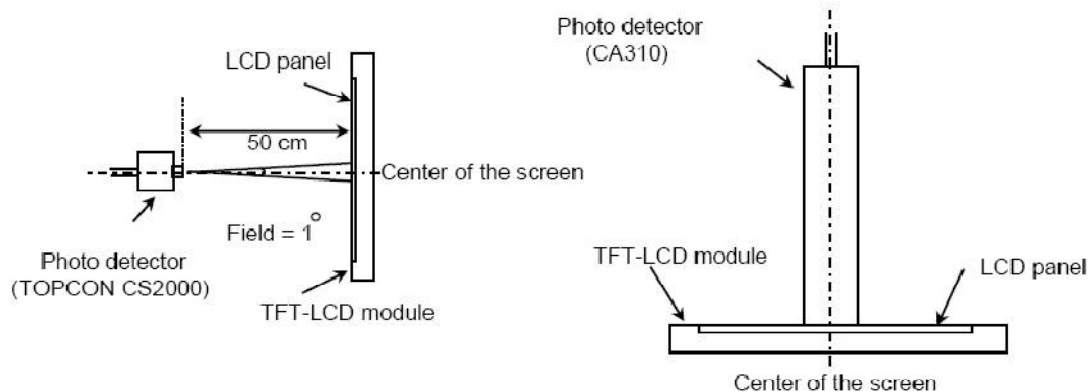
Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display. The luminance is measured by CS2000/CA310 when the LED current is set at 88mA.

4. The White luminance uniformity on LCD surface is then expressed as : $\Delta Y = \text{Minimum Luminance of 9 points} / \text{Maximum Luminance of 9 points}$ (See FIGURE 2).

5. The color chromaticity coordinates specified in the table above shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.

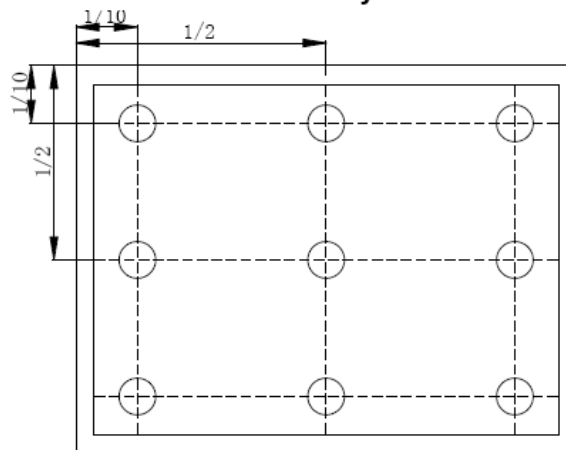
6. The electro-optical response time measurements shall be made as FIGURE 3 by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is T_r , and 90% to 10% is T_d .

Figure 1. Measurement Set Up



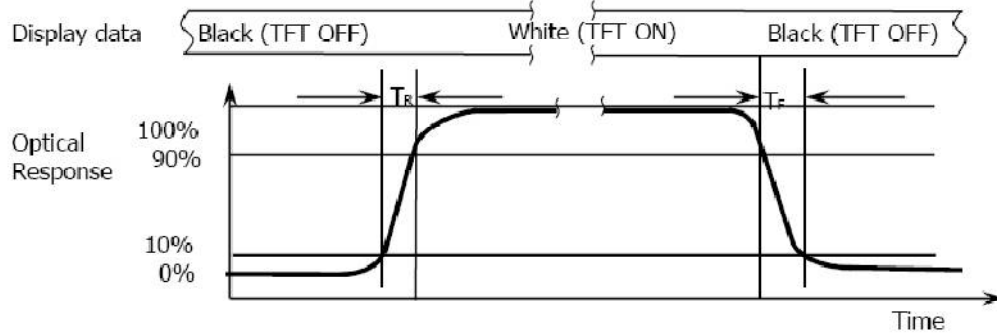
View angel range, uniformity, etc. measurement setup Flicker, measurement setup

Figure 2. White Luminance and Uniformity Measurement Locations (9 points)



Luminance of white is defined as luminance values of center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display. The White luminance uniformity on LCD surface is then expressed as : $\Delta Y9 = \text{Minimum Luminance of 9 points} / \text{Maximum Luminance of 9 points}$ (see FIGURE 2).

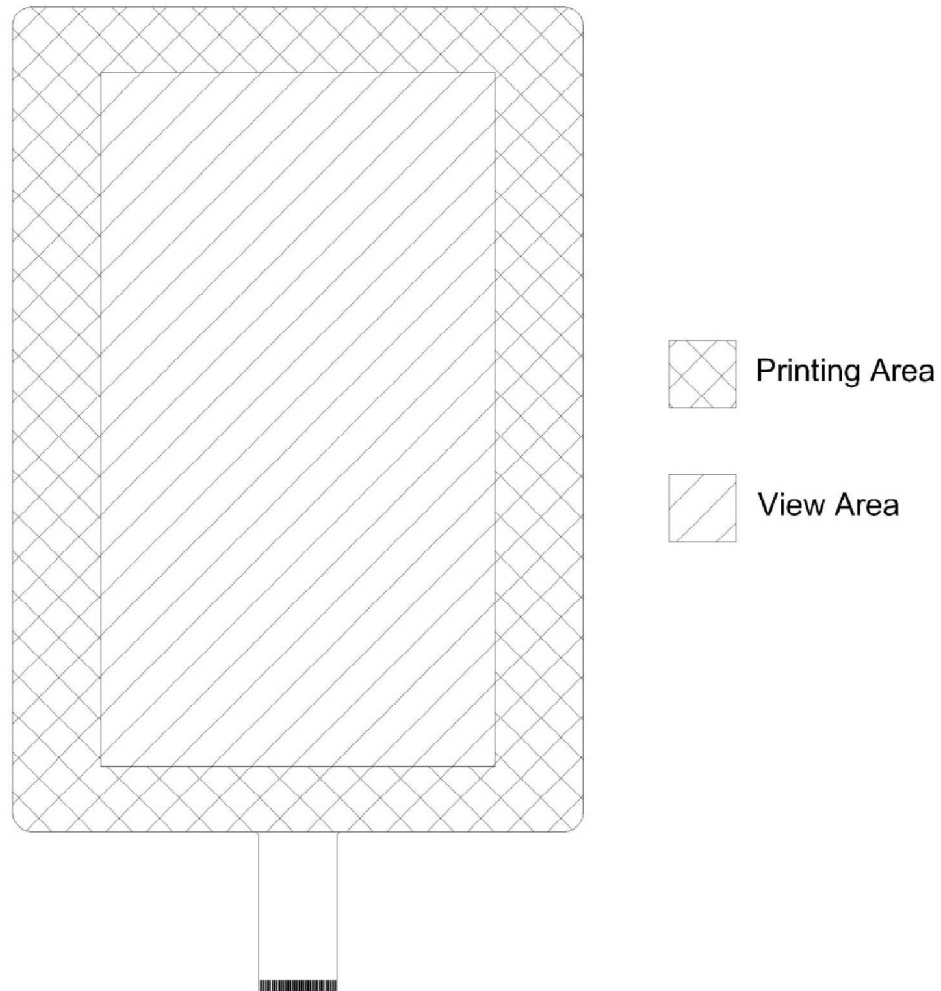
Figure 3. Response Time Testing



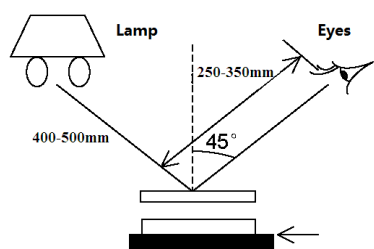
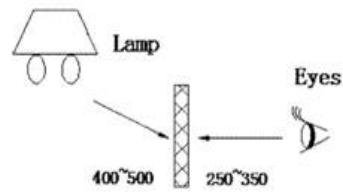
The electro-optical response time measurements shall be made as shown in FIGURE 3 by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is T_r and 90% to 10% is T_d .

4.2 Appearance Specifications

4.2.1 Terms Definition



4.2.2 Inspection Conditions

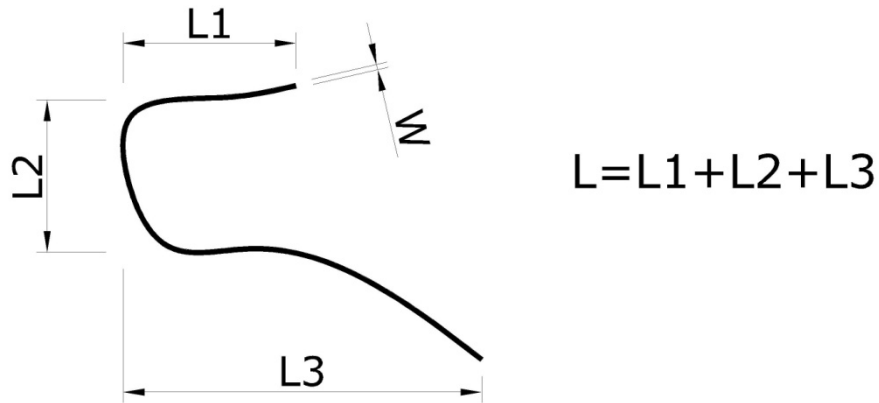
Items	Conditions	Remarks
Inspection Lamp	Florescent Cool White Lamp, 1000~1200Lux	
Inspection with Reflect Light (RL)	<ul style="list-style-type: none"> *Normal eyes level 1.0 (with Glasses accepted); *Distance between Lamp and product:40-50cm; *Distance between Eyes and Product:25-35cm; *Angle of view: 45°; *Black background; *Inspection time no more than 10s. 	
Inspection with Through Light (TL)	<ul style="list-style-type: none"> *Normal eyes level 1.0 (with Glasses accepted); *Distance between Lamp and Product: 40-50cm; *Distance between Eyes and Product: 25-35cm; *Angle of view: 45°; *Black background; *Inspection time no more than 10s. 	

4.2.3 Printing Area Appearance Inspection Criteria

Items	Conditions	Inspection Criteria	Method
Light Transparent Hole/Light Leakage	TL	Not Allowed (Repaired with black marker pen at the back side can be accepted.)	Eye view
Ink Off	TL	Not Allowed	Eye view
Stain and Dirty Mark	RL	*Stain and dirty mark refer to visible sheet contamination; the non-cleanable stain should be inspected as "Dot-like Defects". *Contamination cannot be cleaned by soft cloth and alcohol, Not Allowed; *Contamination can be cleaned by soft cloth and alcohol, Accept; but if the ratio of such contamination defected products is more than 10% of all the inspected products, Not Allowed;	Eye view
Liner-like Defects	RL	Refer to 4.2.4 Liner-like Defects.	Eye view, dot/wire gauge
Dot-like Defects	RL	Refer to 4.2.4 Dot-like Defects.	Eye view, dot/wire gauge
Logo/ Letter	RL	*Logo Break; Not Allowed *within a shaping printing < 120 mm: ± 0.10 ≥ 120 mm < 400 mm: ± 0.15 ≥ 400 mm: ± 0.25 *between shaping printing(offset to 2nd, 3rd, etc. color) < 400 mm: ± 0.30 ≥ 400 mm: ± 0.50	Eye view, dot/wire gauge

4.2.4 View Area Appearance Inspection Criteria

(W=Width, L=Length)



<Liner-like Defects>

Condition	Width(mm)	Length(mm)	Criteria
RL	$W \leq 0.03$	Not limited	*Accept QTY: not limited.
	$0.03 < W \leq 0.06$	$L \leq 10$	*Accept QTY: not more than 6; *Not allowed if the distance between 2 objects is less than 20 mm.
	$0.06 < W \leq 0.10$	$L \leq 10$	*Accept QTY: not more than 4; *Not allowed if the distance between 2 objects is less than 20 mm.
	$W > 0.10$	$L > 10$	*Not allowed.
	Liner-like Defects including: Liner Foreign Object/Scratch.		

< Dot-like Defects>

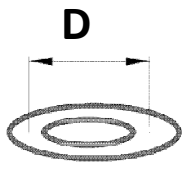
(D=Diameter)

Condition	Average Diameter(mm)	Criteria
RL	$D \leq 0.20$	*Not limited.
	$0.20 < D \leq 0.30$	*Accept Qty: not more than 10; *Not allowed if the distance between 2 defects is less than 20mm.
	$0.30 < D \leq 0.40$	*Accept Qty: not more than 5; *Not allowed if the distance between 2 defects is less than 20mm.
	$D > 0.40$	*Not allowed.
	Dot-like Defects including: Foreign Objects/Stab.	

< Stain and Dirty Mark>

Condition	Criteria
RL	<p>* Stain and Dirty Mark refer to the visible contamination in mass, Dot-like contamination should be inspect as "Dot-like Defects";</p> <p>*Contamination cannot be clean by soft cloth and alcohol, Not Allowed;</p> <p>*Contamination can be clean by soft cloth and alcohol, Accept; but if the ratio of such defected products are more than 10% of all the inspected products, Not Allowed.</p>

< Surface Fisheye>

Condition	Average Diameter(mm)	Criteria	Remarks
RL	$D \leq 0.15$	<p>*Accept QTY: not more than 3;</p> <p>* Not allowed if the distance between 2 objects is less than 50 mm.</p>	
	$0.15 < D \leq 0.30$	<p>*Accept Qty: not more than 2;</p> <p>* Not allowed if the distance between 2 objects is less than 50 mm.</p>	
	$0.30 < D \leq 0.50$	*Accept Qty: not more than 1.	
	$D > 0.50$	*Not allowed.	

Defects of back side, locates outside the View Area

The Appearance defects, such as Scratch, Foreign Object, Stain and Dirty-mark, on the backside of Module not lead to the performance failure, Accept;

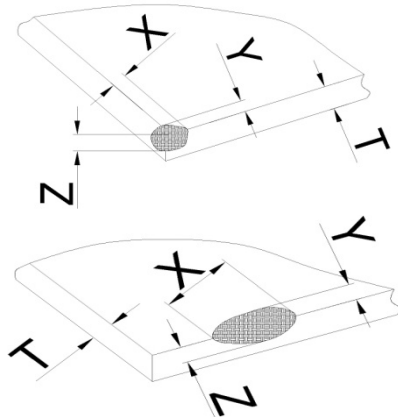
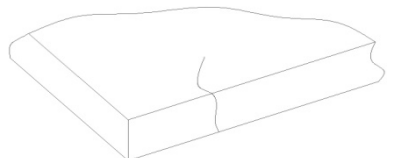
FPC and sensor pin bonding migration not more than pin width 1/2, Accept;

Scratches on bonding area on PS, Not Allowed;

Mechanical damages on FPC(dent/kink), Not Allowed;

Glue residue, broken and oxidation on gold finger, Not Allowed.

4.2.5 Glass Breakage

Items	Criteria	Remarks
Corner/ Edge Breakage	$*(X+Y)/2 < 0.3 \text{ mm}$, $Z < 1/3T \text{ mm}$; distance between 2 defects more than 5 mm; *Accept QTY: not more than 3.	
Crack	Not Allowed.	

5. Reliability Test

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

No	Test Items	Conditions
1	High temperature storage test	Ta =80℃, 240 hrs
2	Low temperature storage test	Ta =-30℃, 240 hrs
3	High temperature & high humidity operation test	Ta =60℃, 90%RH, 240hrs
4	High temperature operation test	Ta =70℃, 240hrs
5	Low temperature operation test	Ta =-20℃, 240hrs
6	Thermal shock	Ta = -30℃↔80℃(0.5hr), 100 cycle
7	Vibration test	Random: 0.015G ² /Hz, 5~200Hz -6dB/Octave, 200~400Hz XYZ 8H
8	Image Sticking	5*5 Pattern, 2hrs 25℃±2℃ check pattern Gray 127, after 5 min, the Mura must be disappeared completely
9	ESD test	Air Voltage: ±8KV & ±15KV Contact Voltage: ±8KV R: 330Ω; C: 150pF; 5 times
10	Impact Resistance	Steel ball: 64 g Height: 30 cm

6. General Precaution

6.1 Handing

- (1) Use fingerstalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.
- (2) You must mount a module using specified mounting holes (Details refer to the drawings).
- (3) Please make sure to avoid external forces applied to the Source PCB or FPC and D-IC during the process of handling or assembling. If not, It causes panel damage or malfunction.
- (4) Note that polarizer is very fragile and could be easily damaged. Do not touch, push or rub the exposed polarizer with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment.
- (5) Do not pull or fold the source D-IC which connect the source PCB or FPC and the panel. Do not pull or fold the LED wire.
- (6) After removing the protective film, when the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with alcohol or purified water. Do not strong polar solvent because they cause chemical damage to the polarizer.
- (7) Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading.
- (8) Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.
- (9) Since the LCD is made of glass, do not apply strong mechanical impact or static load onto it. Handling with care since shock, vibration, and careless handling may seriously affect the pro duct. If it falls from a high place or receives a strong shock, the glass may be broken.
- (10) Do not disassemble the module.
- (11) To determine the optimum mounting angle, refer to the viewing angle range in the specification for each model.
- (12) If the customer's set presses the main parts of the LCD, the LCD may show the abnormal display. But this phenomenon does not mean the malfunction of the LCD and should be pressed by the way of mutual agreement.
- (13) Do not drop water or any chemicals onto the LCD's surface.

6.2 Operating Precautions

- (1) Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.
- (2) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimized the interference.
- (3) The electrochemical reaction caused by DC voltage will lead to LCD degradation, so DC drive should be avoided.
- (4) The LCD modules use C-MOS LSI drivers, so customers are recommended that any unused input terminal would be connected to Vdd or Vss, do not input any signals before power is turn on, and ground you body, work/assembly area, assembly equipments to protect against static electricity.
- (5) Do not exceed the absolute maximum rating value. (supply voltage variation, input voltage variation, variation in part contents and environmental temperature, and so on) Otherwise the Module may be damaged.
- (6) Design the length of cable to connect between the connector for back-light and the converter as short as possible and the shorter cable shall be connected directly. The longer cable between that of back-light and that of converter may cause the luminance of LED to lower and need a higher startup voltage(Vs).
- (7) Connectors are precise devices for connecting PCB and transmitting electrical signals. Operators should insert and unplug MDL in parallel when assembling MDL.
- (8) Do not connect or disconnect the cable to/ from the module at the "Power On" condition.
- (9) When the module is operating, do not lose CLK, ENAB signals. If any one of these signals is lost, the LCD panel would be damaged.
- (10) Obey the supply voltage sequence. If wrong sequence is applied, the module would be damaged.
- (11) Do not re-adjust variable resistor or switch etc.

6.3 Electrostatic Discharge Control

- (1) Since a module is composed of electronic circuits, it is not strong to electrostatic discharge. Make certain that treatment persons are connected to ground through wrist band etc. And don't touch interface pin directly. Keep products as far away from static electricity as possible.
- (2) Avoid the use work clothing made of synthetic fibers. We recommend cotton clothing or other conductivity-treated fibers.

6.4 Precautions for Strong Light Exposure

Strong light exposure causes degradation of polarizer and color filter. It is not allowed to store or run directly in strong light or in high temperature and humidity for a long time.

6.5 Storage Precautions

When storing modules as spares for a long time, the following precautions are necessary.

(1) The polarizer surface should not come in contact with any other object. It is recommended that they be stored in the container in which they were shipped.

Temperature: 5 ~ 40°C

(2) Humidity: 35 ~ 75%RH

(3) Period: 6 months

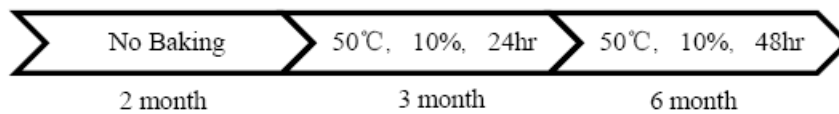
(4) Control of ventilation and temperature is necessary.

(5) Please make sure to protect the product from strong light exposure, water or moisture. Be careful for condensation.

(6) Store in a polyethylene bag with sealed so as not to enter fresh air outside in it.

(7) Do not store the LCD near organic solvents or corrosive gasses.

(8) Please keep the Modules at a circumstance shown below Fig.



6.6 Handling Precautions for Protection Film

(1) Remove the protective film slowly, keeping the removing direction approximate 30-degree not vertical from panel surface, If possible, under ESD control device like ion blower, and the humidity of working room should be kept over 50%RH to reduce the risk of static charge.

(2) In handling the LCD, wear non-charged material gloves. And the conducting wrist to the earth and the conducting shoes to the earth are necessary.

6.7 Operation Condition Guide

(1) Normal operating condition

- Temperature: 0 ~ 40°C

- Operating Ambient Humidity : 10 ~ 90%

- Display pattern: dynamic pattern (Real display)

- Suitable operating time: under 8 hours a day.

(2) If the product will be used in extreme conditions such as high temperature, humidity, display patterns or operation time etc., It is strongly recommended to contact BOE for Application engineering advice. Otherwise, its reliability and function may not be guaranteed.

(3) Black image or moving image is strongly recommended as a screen save.

(4) Lifetime in this spec. is guaranteed only when Commercial Display is used according to operating usages.

(5) Please contact BOE in advance when you want to switch between portrait and landscape screen.

(6) Please contact BOE in advance for outdoor operation.

(7) Please contact BOE in advance when you display the same pattern for a long time.

(8) If the Module keeps displaying the same pattern for a long period of time, the image may be "sticked" to the screen. To avoid image sticking, it is recommended to use a screen saver.

(9) Do not exceed the absolute maximum rating value. (supply voltage variation, input voltage variation, variation in part contents and environmental temperature, and so on) Otherwise the Module may be damaged.

(10) Dew drop atmosphere should be avoided.

(11) The storage room should be equipped with a good ventilation facility, which has a temperature controlling system.

(12) When expose to drastic fluctuation of temperature (hot to cold or cold to hot), the LCD may be affected; Specifically, drastic temperature fluctuation from cold to hot, produces dew on the LCD's surface which may affect the operation of the polarizer and the LCD.

(13) Response time will be extremely delayed at lower temperature than the operating temperature range and on the other hand at higher temperature LCD may turn black at temperature above its operational range. However those phenomena do not mean malfunction or out of order with the LCD. The LCD will revert to normal operation once the temperature returns to the recommended temperature range for normal operation.

6.8 Others

(1) When returning the module for repair or etc., Please pack the module not to be broken. We recommend to use the original shipping packages.

(2) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs or clothes, it must be washed away thoroughly with soap.

(3) For the crash damaged or unnecessary LCD, it is recommended to wash off liquid crystal by either of solvents such as acetone and ethanol and should be burned up later.

(4) If you should swallow the liquid crystal, first, wash your mouth thoroughly with water, then drink a lot of water and induce vomiting, and then, consult a physician.

(5) If the liquid crystal should get in your eyes, flush your eyes with running water for at least fifteen minutes.

7. Packing

TBD

