



# SmarterGlass

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**DLC Display Co., Limited**

德爾西顯示器有限公司



MODEL No: DLC0350YZQ

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### Record of Revision

Date	Revision No.	Summary
2016-03-03	1.0	Rev 1.0 was issued

### 1. Scope

This data sheet is to introduce the specification of DLC0350YZQ active matrix TFT module. It is composed of a color TFT-LCD panel, driver ICs, FPC and a backlight unit. The 3.50'' display area contains 240(RGB) x 320 pixels.

### 2. Application

Digital equipments which need color display, mobile phone, mobile navigator/video systems.

### 3. General Information

Item	Contents	Unit
Size	3.5	inch
Resolution	240(RGB) x 320	/
Interface	RGB/MCU	/
Technology type	a-Si TFT	/
Pixel Configuration	R.G.B. Vertical Stripe	
Outline Dimension (W x H x D)	84.8461.55x8.60	mm
Active Area	71.04x53.28	mm
Display Mode	Transmissive	/
Backlight Type	LED	/
Driver IC	ILI9325C	/
Weight	TBD	g

### 4. Outline Drawing

PIN	NAME
1	LEBK
2	LEBK
3	LEBK
4	LEDA
5	C22+
6	C22+
7	C21+
8	C21+
9	C13+
10	C13+
11	VGH
12	VGL
13	C11+
14	C11+
15	C12+
16	C12+
17	VCI
18	VCI
19	DVIDH
20	VCL
21	VEGOUT
22	YCOML
23	YCOMH
24	VCOM
25	VDD
26	I/OVCC
27	TE (FANARO)
28	CS
29	RS
30	W/SCL
31	RD
32	SDI
33	D80
34	D81
35	D82
36	D83
37	D84
38	D85
39	D86
40	D87
41	D88
42	D89
43	D90
44	D91
45	D92
46	D93
47	D94
48	D95
49	D96
50	D97
51	DE
52	DCLK
53	HSYNC
54	VSYNC
55	RESET
56	IM3
57	IM2
58	IM1
59	IM0
60	GND

**DETAIL A (2:1)**

**LED CIRCUIT DIAGRAM:**

2\*5=10EA If=100mA

**DETAIL B (4:1)**

**DETAIL A (4:1)**

**DETAIL A (2:1)**

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**LED CIRCUIT DIAGRAM:**

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**DETAIL B (4:1)**

**DETAIL A (4:1)**

**DETAIL A (2:1)**

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DRAWN BY:	TITLE: DLC0350YZQ		SCALE:
CHECKED BY:	DWG NO:	UNIT: mm	
APPROVED BY:	DWG NAME:	SHEET NO:	OF
CONFIRMED BY:			

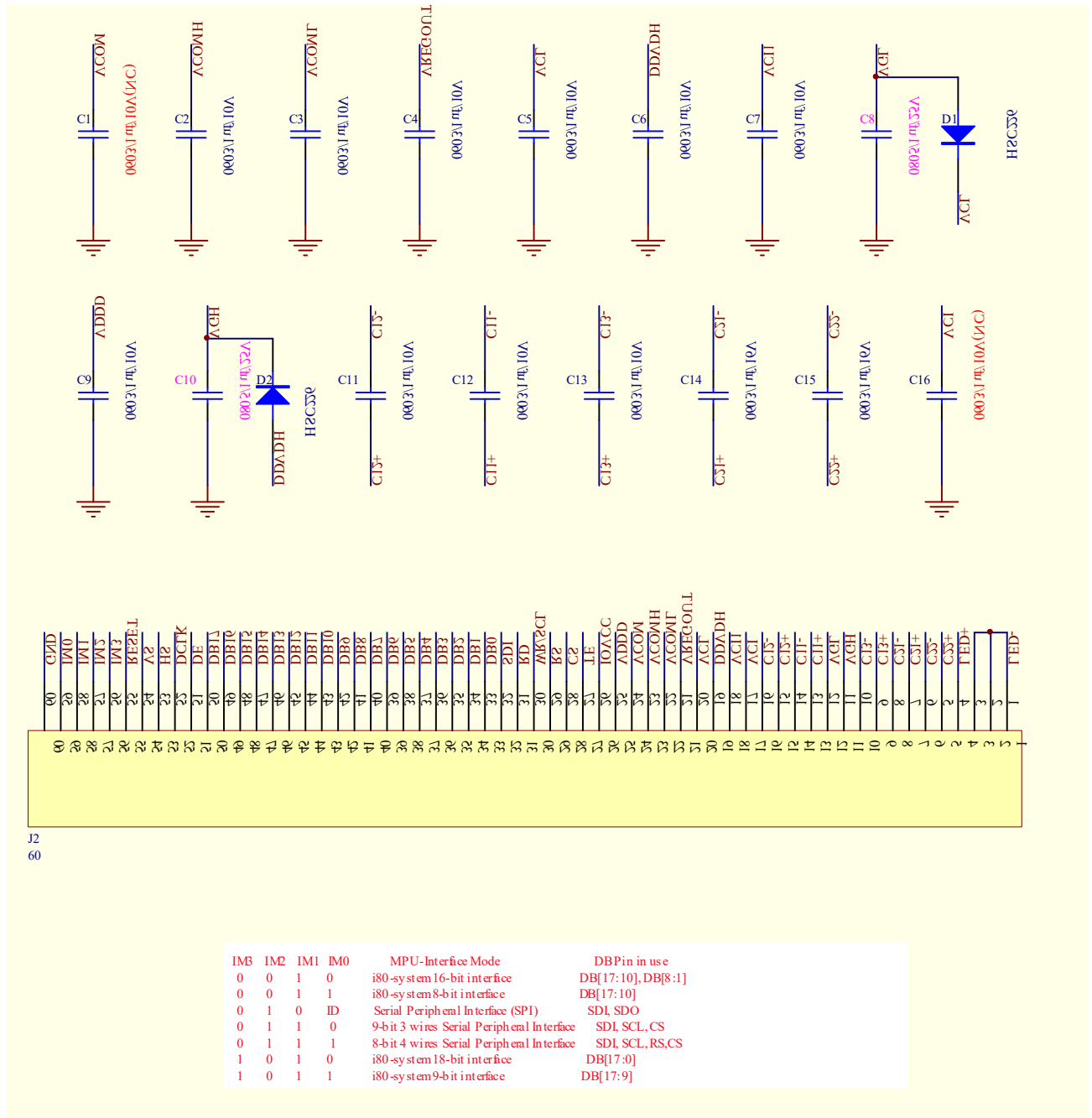
- NOTES:**
1. DISPLAY TYPE: 3.5" TFT, TRANSMISSIVE
  2. VIEWING DIRECTION : U/L/D/R 55/65/65/65
  3. Driver IC : ILI9325C
  4. Top : -30° C ~ 85° C, Tst : -40° C ~ 90° C
  5. GENERAL TOLERANCE: ±0.2
  6. LCM Luminance: LED/650cd/m<sup>2</sup> (Typical)
  7. RoHS compliant

## 5. Interface signals

Pin No.	Symbol	I/O	Function
1-3	LEDK	P	LED back light(Cathode)
4	LEDA	P	LED back light(Anode)
5	C22+	I	Connect these pins to the capacitors for the step-up circuit 2.According to the step-up rate. When not using the step-up circuit2,disconnect them.
6	C22-	I	
7	C21+	I	
8	C21-	I	
9	C13+	I	Connect to the step-up capacitors for step up circuit 3 operation.Leave thispin open if the internal step-up circuit is not used.
10	C13-	I	
11	VGH	P	Power supply for the gate driver.
12	VGL	P	Power supply for the gate driver.
13	C11+	I	Connect to the step-up capacitors according to the step-up 1 factor. Leave this pin open if the internal step-up circuit is not used.
14	C11-	I	
15	C12+	I	
16	C12-	I	
17	VCI	P	A supply voltage to the analog circuit. Connect to an external power
18	VCI1	P	An internal reference voltage for the step-up circuit1.
19	DDVDH	P	Power supply for the source driver and VCOM drive.
20	VCL	P	VCOML driver power supply.
21	VREGOUT	P	Output voltage generated from the reference voltage.
22	VCOML	P	The low level of VCOM AC voltage.
23	VCOMH	P	The high level of VCOM AC voltage.
24	VCOM	P	A supply voltage to the common electrode of TFT panel.
25	VDDD	P	Digital circuit power pad.
26	IOVCC	P	A supply voltage to the interface pins:
27	TE(FMARK)	I	Output a frame head pulse signal.
28	CS	I	A chip select signal.
29	RS	I	A register select signal.
30	WR/SCL	I	Write enable pin I80 parallel bus system interface 4-line system (D/CX): Serves as command or parameter select.
31	RD	I	A read strobe signal and enables an operation to read out data when the signal is low.
32	SDI	I/O	Serial in/out signal.
33-50	DB0-DB17	I	Data BUS
51	DE	I	Data enable signal for RGB interface operation

52	DCLK	I	Dot clock signal for RGB interface operation.
53	HSYNC	I	Line synchronizing signal for RGB interface operation.
54	VSYNC	I	Frame synchronizing signal for RGB interface operation.
55	RESET	I	Reset the display
56-59	IM3-IM0	I	Select the interface
60	GND	P	Ground.

Note:



## 6. Absolute maximum Ratings

### 6.1. Electrical Absolute max. ratings

Parameter	Symbol	MIN	MAX	Unit	Remark
Power Supply Voltage	VCI	-0.3	3.6	V	

Notes:

1. If the module is above these absolute maximum ratings. It may become permanently damaged. Using the module within the following electrical characteristic conditions are also exceeded, the module will malfunction and cause poor reliability.
2.  $V_{CI} > V_{SS}$  must be maintained.

### 6.2. Environment Conditions

Item	Symbol	MIN	MAX	Unit	Remark
Operating Temperature	TOPR	-30	85	°C	
Storage Temperature	TSTG	-40	90	°C	

Note:

1. The response time will become lower when operated at low temperature.
2. Background color changes slightly depending on ambient temperature.  
The phenomenon is reversible.
3.  $T_a \leq 40^\circ\text{C}$ : 85%RH MAX.  
 $T_a > 40^\circ\text{C}$ : Absolute humidity must be lower than the humidity of 85%RH at  $40^\circ\text{C}$ .



## 7. Electrical Specifications

### 7.1 Electrical characteristics

GND=0V, Ta=25°C

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note	
Power supply	VCI	Ta=25°C	2.8	3.0	3.3	V		
Input voltage	'H'	V <sub>IH</sub>	VCI=3.0V	0.8VCI	-	VCI	V	
	'L'	V <sub>IL</sub>	VCI=3.0V	0	-	0.2VCI	V	
Current Consumption	I <sub>CC1</sub>	Normal mode	-	7	12	mA	1	
	I <sub>CC2</sub>	Sleep mode	-	0.05	0.1	mA	1	

Note: Tested in 1×1 chessboard pattern.

### 7.2 LED Backlight

Ta=25°C

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	IF	-	100	-	mA	
Forward Voltage	VF	-	6.0	-	V	
LED life time	--	-	20,000	--	Hr	Note

Note 2: The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25°C and IL =100mA. The LED lifetime could be decreased if operating IL is larger than 100mA.

### 8. Optical Specification

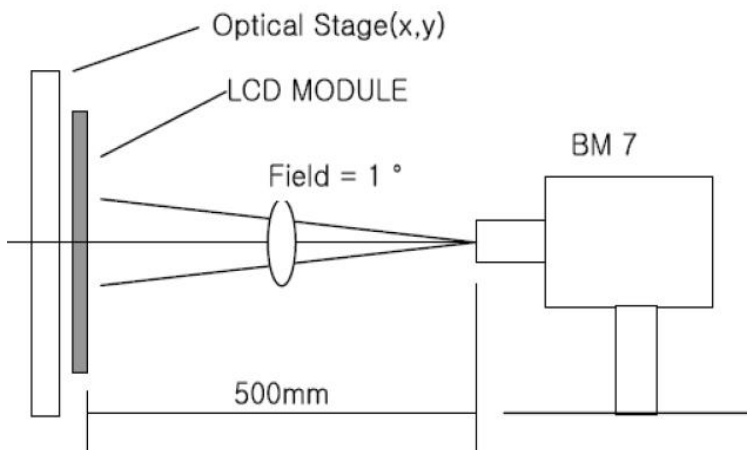
Ta=25°C

Item	Symbol	Condition	Min	Typ.	Max.	Unit	Remark
Contrast Ratio	CR	$\theta=0^\circ$	300	500	-		Note1 Note2
Response Time	Tr	25°C	-	10	-	ms	Note1
	Tf		-	10	-	ms	Note3
View Angles	$\theta T$	$CR \geq 10$	-	55	-	Degree	Note 4
	$\theta B$		-	65	-		
	$\theta L$		-	65	-		
	$\theta R$		-	65	-		
Chromaticity	White	x	Brightness is on	-	0.34	-	Note5, Note1
		y		-	0.37	-	
	Red	x		-	0.59	-	
		y		-	0.35	-	
	Green	x		-	0.35	-	
		y		-	0.59	-	
	Blue	x		-	0.15	-	
		y		-	0.12	-	
NTSC	S		50	60	--	%	Note5
Luminance	L		550	650	--	cd/m <sup>2</sup>	Note1 Note6
Uniformity	U		--	80	--	%	Note1 Note7

Note 1: Definition of optical measurement system.

Temperature = 25°C(±3°C);

LED back-light: ON, Environment brightness < 150 lx

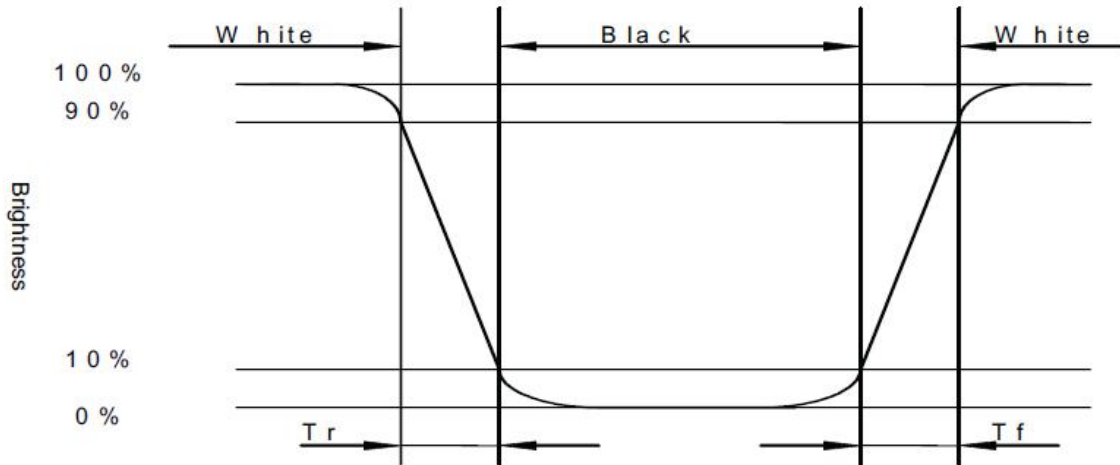


Note 2: Contrast ratio is defined as follow:

$$\text{Contrast Ratio} = \frac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all black pixels}}$$

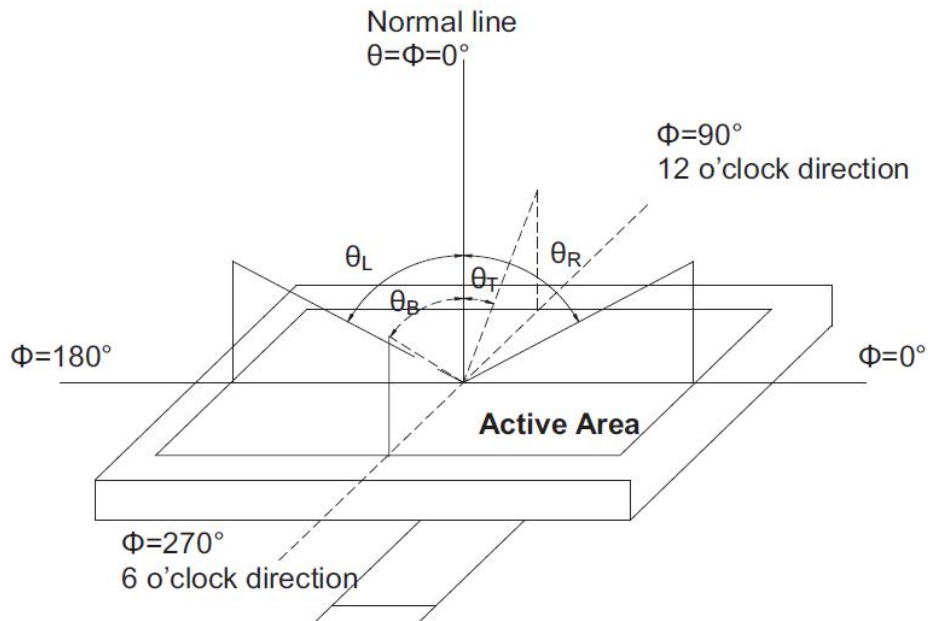
Note 3: Response time is defined as follow:

Response time is the time required for the display to transition from black to white (Rise Time,  $T_r$ ) and from white to black(Decay Time,  $T_f$ ).



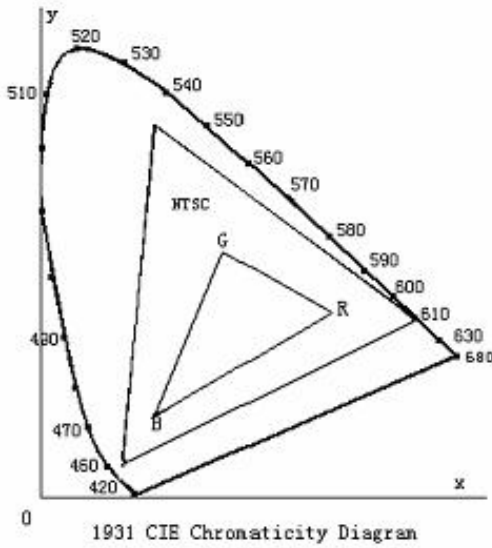
Note 4: Viewing angle range is defined as follow:

Viewing angle is measured at the center point of the LCD.



Note 5: Color chromaticity is defined as follow: (CIE1931)

Color coordinates measured at center point of LCD.



$$S = \frac{\text{area of RGB triangle}}{\text{area of NTSC triangle}} \times 100\%$$

Note 6: Luminance is defined as follow:

Luminance is defined as the brightness of all pixels “White” at the center of display area on optimum contrast.

Note 7: Luminance Uniformity is defined as follow:

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

$$\text{Uniformity (U)} = \frac{\text{Minimum Luminance( brightness ) in 9 points}}{\text{Maximum Luminance( brightness ) in 9 points}}$$

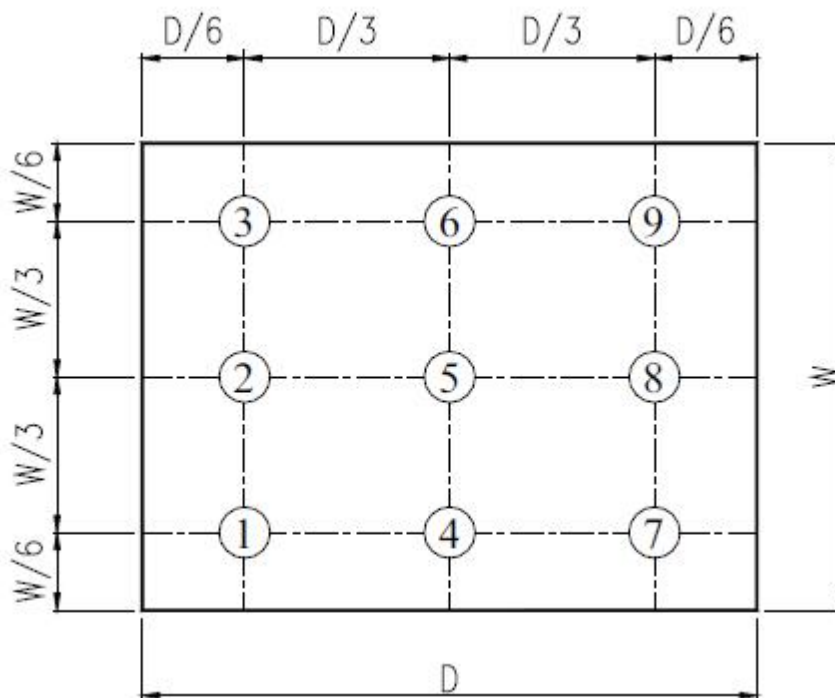


Fig. 2 Definition of uniformity

9. Environmental / Reliability Tests

No	Test Item	Condition	Judgment criteria
1	High Temp Operation	Ts=+85°C, 120hrs	Per table in below
2	Low Temp Operation	Ta=-30°C, 120hrs	Per table in below
3	High Temp Storage	Ta=+90°C, 240hrs	Per table in below
4	Low Temp Storage	Ta=-40°C, 240hrs	Per table in below
5	High Temp & High Humidity Storage	Ta=+50°C, 90% RH 120 hours	Per table in below (polarizer discoloration is excluded)
6	Thermal Shock (Non-operation)	-30°C 30 min~+85°C 30 min, Change time:5min, 5 Cycles	Per table in below
7	ESD (Operation)	C=150pF, R=330Ω, 5points/panel Air:±8KV, 5times; Contact:±4KV, 5 times;	Per table in below
8	Vibration (Non-operation)	10Hz~150Hz, 100m/s <sup>2</sup> , 120min	Per table in below
9	Shock (Non-operation)	Half- sine wave,300m/s <sup>2</sup> ,11ms	Per table in below
10	Package Drop Test	Height:80 cm, 1 corner, 3 edges, 6 surfaces	Per table in below

INSPECTION	CRITERION(after test)
Appearance	No Crack on the FPC, on the LCD Panel
Alignment of LCD Panel	No Bubbles in the LCD Panel No other Defects of Alignment in Active area
Electrical current	Within device specifications
Function / Display	No Broken Circuit, No Short Circuit or No Black line No Other Defects of Display

## 10. Precautions for Use of LCD Modules

### 10.1 Safety

The liquid crystal in the LCD is poisonous. Do not put it in your mouth. If the liquid crystal touches your skin or clothes, wash it off immediately using soap and water.

### 10.2 Handling

A. The LCD and touch panel is made of plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.

B. Do not handle the product by holding the flexible pattern portion in order to assure the reliability

C. Transparency is an important factor for the touch panel. Please wear clear finger sacks, gloves and mask to protect the touch panel from finger print or stain and also hold the portion outside the view area when handling the touch panel.

D. Provide a space so that the panel does not come into contact with other components.

E. To protect the product from external force, put a covering lens (acrylic board or similar board) and keep an appropriate gap between them.

F. Transparent electrodes may be disconnected if the panel is used under environmental conditions where dew condensation occurs.

G. Property of semiconductor devices may be affected when they are exposed to light, possibly resulting in IC malfunctions.

H. To prevent such IC malfunctions, your design and mounting layout shall be done in the way that the IC is not exposed to light in actual use.

### 10.3 Static Electricity

A. Ground soldering iron tips, tools and testers when they are in operation.

B. Ground your body when handling the products.

C. Power on the LCD module before applying the voltage to the input terminals.

D. Do not apply voltage which exceeds the absolute maximum rating.

E. Store the products in an anti-electrostatic bag or container.

### 10.4 Storage

A. Store the products in a dark place at  $+25^{\circ}\text{C} \pm 10^{\circ}\text{C}$  with low humidity (40% RH to 60% RH). Don't expose to sunlight or fluorescent light.

B. Storage in a clean environment, free from dust, active gas, and solvent.

### 10.5 Cleaning

A. Do not wipe the touch panel with dry cloth, as it may cause scratch.

B. Wipe off the stain on the product by using soft cloth moistened with ethanol. Do not allow ethanol to get in between the upper film and the bottom glass. It may cause peeling issue or defective operation. Do not use any organic solvent or detergent other than ethanol.

### 10.6 Cautions for installing and assembling

Bezel edge must be positioned in the area between the Active area and View area. The bezel may press the touch screen and cause activation if the edge touches the active area. A gap of approximately 0.5mm is needed between the bezel and the top electrode. It may cause unexpected activation if the gap is too narrow. There is a tolerance of 0.2 to 0.3mm for the outside dimensions of the touch panel and tail. A gap must be made to absorb the tolerance in the case and connector.

