

# 億力光電股份有限公司

## EVERVISION ELECTRONICS CO., LTD.

### Product Specification For LCD Module

(KVPF-7B-002-16)

**Model NO. : VGG804806-6UFLWB(RoHS)**

**REVISION : 2**

APPROVAL FOR SPECIFICATIONS ONLY







APPROVAL FOR SPECIFICATIONS AND SAMPLE

**CUSTOMER :**

STD.

**APPROVED BY :**

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### 3. Module Numbering System

**V G G 8048 06 – 6 U F L W B**

Serial No.: A~Z

Backlight Color:  
**N**: Without Backlight;  
**A**: Amber; **B**: Blue; **G**: Green;  
**L**: Yellow; **O**: Orange; **R**: Red;  
**W**: White; **Y**: YellowGreen;  
**X**: Others

Backlight Type:  
**N**: Without Backlight; **E**: EL; **F**: CCFL;  
**L**: General LED; **H**: High NTSC LED ;  
**R**: RGB LED; **X**: Others

LCD Model:  
**T**: TN; **H**: HTN; **G**: STN Gray; **Y**: STN Yellow;  
**B**: STN Blue; **W**: FSTN Black/White;  
**C**: CSTN; **F**: TFT; **O**: OLED; **P**: PLED;  
**L**: LTPS; **N**: Others

LCD Type:  
**R**: Reflective/Positive;  
**S**: Reflective/Negative ;  
**F**: Transflective/Positive ;  
**G**: Transflective/Negative ;  
**U**: Transmissive/Positive ;  
**T**: Transmissive/Negative ; **N**: Others

Temperature Range & View Direction:  
General Purpose : **1**:6H **2**:12H **3**:3H **4**:9H **5**:Others  
High Performance: **6**:6H **7**:12H **8**:3H **9**:9H **0**:Others

STD Product Serial No.: 01~99  
Customer Made Serial No.: A1,A2... A9,B1,B2... B9,C1..

Display Function:  
Segment Number / Characters Lines / Column and Row Dots  
/ Length \* Width of Other

Display Type:  
**C**: Character Type; **G**: Graphic Type; **S**: Segment Type; **O**: Other

Package Type:  
**B**: COB; **F**: COF; **G**: COG; **H**: Heat Seal; **S**: SMT; **T**: TAB; **O**: Others

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#### 4. Application

This specification is applied to the 7 inch WVGA supported TFT-LCD module, and can display true 262,144 colors(6 bit/ color). The module is designed for OA, Car TV application and other electronic products which require flat panel display of digital signal interface. This module is composed of a 7" TFT-LCD panel, a driver circuit and LED backlight unit and used as the input devices for general electric appliances via both finger and pen-entry.

#### 5. Features

- WVGA (800×480 pixels) resolution.
- Digital 18 bit parallel RGB.
- Dot inversion mode with stripe type.
- Transparent Touch panel
  - 4-Wire
  - Analog Resistive

#### 6. General Specifications

Item	Specifications	Unit
Screen Size	7 (Diagonal)	inch
Display Format	800RGB(H)×480(V)	dot
Active Area	152.4(H)×91.44(V)	mm
Dot Size	0.0635(H)×0.1905(V)	mm
Pixel Configuration	RGB Vertical Stripe	-
Display Mode	TN Type Transmissive Mode Normally White	-
Surface Treatment	Anti-Glare and Hard Coating(3H)	-
Viewing Direction	6 O'clock (The Gray Inversion will appear at this direction)	-
Outline Dimension	166.6(W)×109.4(H)×11.5(D)	mm
Weight	(220)	g

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## 7. Absolute Maximum Ratings

### 7.1 Absolute Ratings of Environment

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T <sub>ST</sub>	-30	+80	°C	(1)
Operating Ambient Temperature	T <sub>OP</sub>	-20	+70	°C	(1)

Note (1) Temperature and relative humidity range are shown in the figure below.

(a) 85%RH Max. ( $T_a \leq 40^\circ\text{C}$ ).

(b) Wet-bulb temperature should be 39°C Max. ( $T_a > 40^\circ\text{C}$ ).

(c) No condensation.

### 7.2 Electrical Absolute Ratings

#### 7.2.1 TFT-LCD Module

( $T_a = 25 \pm 2^\circ\text{C}$ , GND =  $V_{SS} = 0\text{V}$ )

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Digital Power Supply Voltage	V <sub>CC</sub>	-0.3	4.3	V	-

#### 7.2.2 Backlight Unit

( $T_a = 25 \pm 2^\circ\text{C}$ )

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Current of Backlight Unit	I <sub>B</sub>	-	250	mA	(1)
Voltage of Backlight Unit	V <sub>B</sub>	-	15	V	(1)

Note (1) Permanent damage to the device may occur if maximum values are exceeded or reverse voltage is loaded.

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## 8. Electrical Characteristics

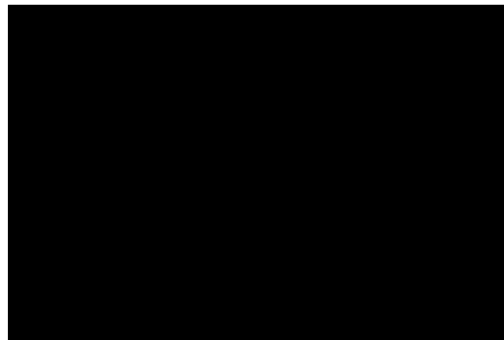
### 8.1 TFT-LCD Module

(Ta=25±2°C)

Item	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Power Supply Voltage	V <sub>CC</sub>	3.0	3.3	3.6	V	-
Power Supply Current	I <sub>CC</sub>	-	190	266	mA	(1)
Input High Threshold Voltage	V <sub>IH</sub>	0.7V <sub>CC</sub>	-	V <sub>CC</sub>	V	-
Input Low Threshold Voltage	V <sub>IL</sub>	0	-	0.3V <sub>CC</sub>	V	-
Power Consumption	P <sub>L</sub>	-	627	877.8	mW	(1)
VSYNC Frequency	F <sub>V</sub>	-	60	-	Hz	-
DCLK Frequency	DCLK	-	33.26	-	MHz	-

Note (1) The specified power consumption is under the conditions at V<sub>CC</sub>=3.3V, F<sub>V</sub>=60Hz, whereas a power dissipation check pattern below is displayed.

Black Pattern / 0 Gray



Active Area

### 8.2 Backlight Unit

(Ta=25±2°C)

Item	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Current of Backlight Unit	I <sub>B</sub>	-	200	-	mA	-
Voltage of Backlight Unit	V <sub>B</sub>	-	9.9	-	V	I <sub>B</sub> =200mA
Power Consumption	P <sub>BL</sub>	-	(1.98)	-	W	I <sub>B</sub> =200mA
LED Life Time(25°C)	-	40000	-	-	hr	(1)

Note (1) : LED life time is defined as under 25±2°C , when the average brightness decrease to 50% of original brightness

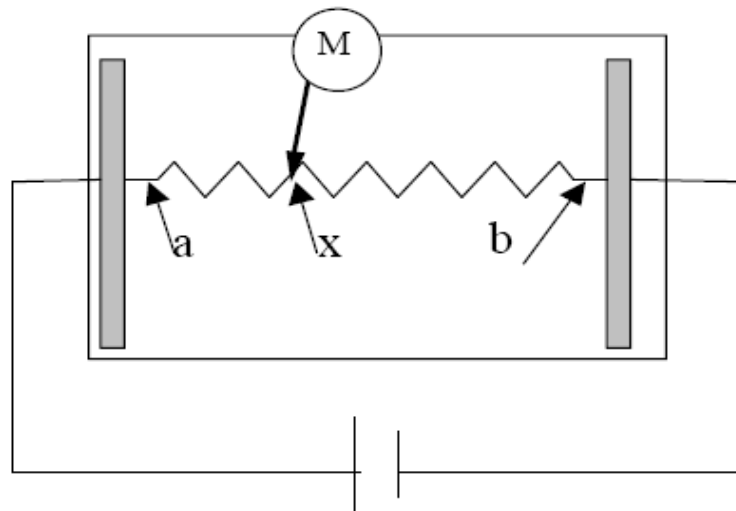
### 8.3 Transparent Touch panel

#### Electrical characteristics

Item		Value			Unit	Note
		Min.	Typ.	Max.		
Operating Voltage		-	5	7	V	-
Terminal Resistance	X-direction	120	-	390	$\Omega$	At connector
	Y-direction	620	-	1070	$\Omega$	At connector
Insulation Resistance		$\geq 20M\Omega$				At DC25V
Chatting		$\leq 10$ ms Max				At connector
Linearity		$\leq 1.5\%$				(1)

Note 1: Measurement condition of Linearity

#### Linearity Definition



$V_a$  : maximum voltage in the active area of touch panel

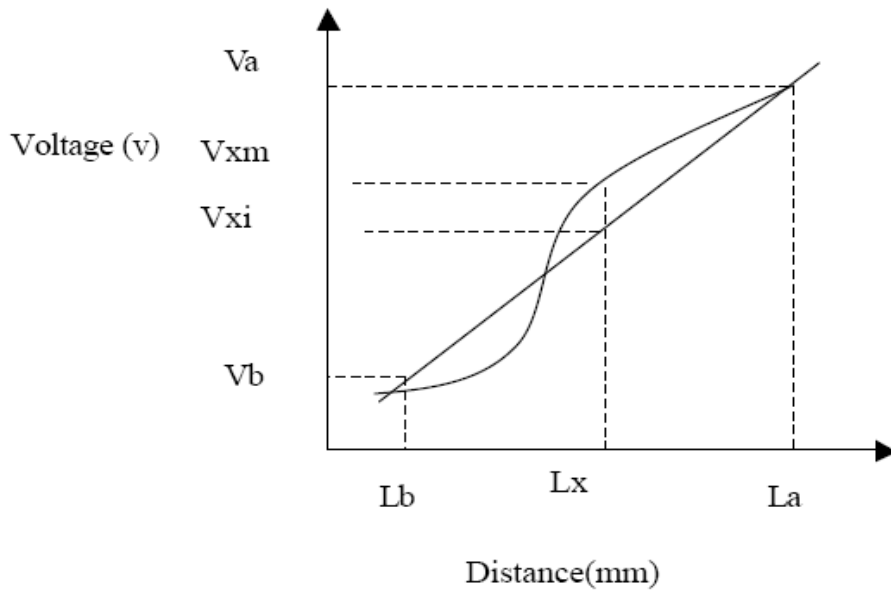
$V_b$ : minimum voltage in the active area of touch panel

$X$  : random measuring point

$V_{xm}$ : Actual voltage of  $L_x$  point

$V_{xi}$  : Theoretical voltage of  $L_x$  point

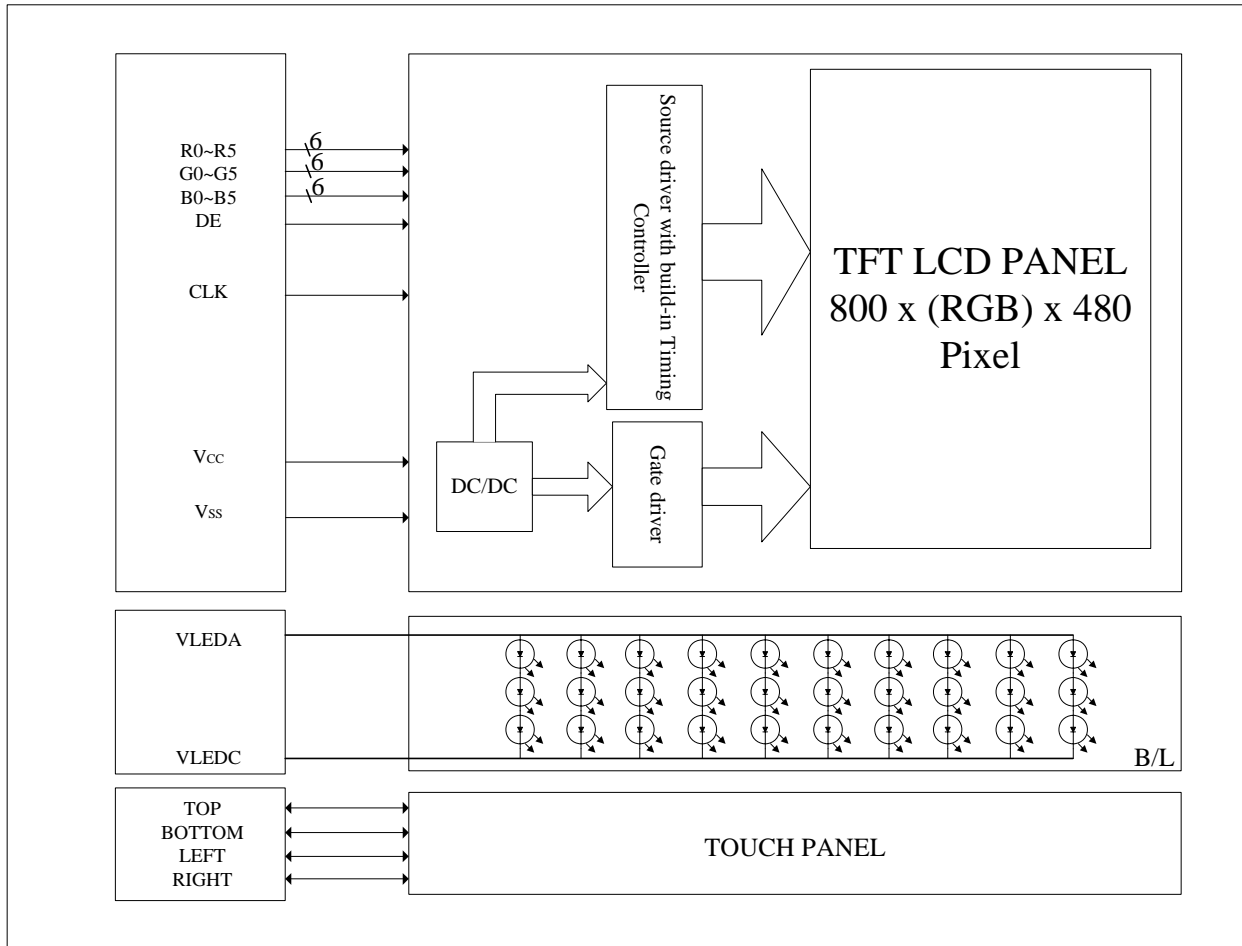




$$\text{Linearity} : [ | V_{xi} - V_{xm} | / (V_a - V_b) ] * 100\%$$

## 9. Block Diagram

### 9.1 TFT-LCD Module with Backlight Unit



## 10. Input / Output Terminals Pin Assignment

### 10.1 TFT-LCD Module

Connector: JAE FA5B040HP1

Pin No.	Symbol	I/O	Description
1	V <sub>CC</sub>	I	+3.3V power supply
2	V <sub>CC</sub>	I	+3.3V power supply
3	V <sub>CC</sub>	I	+3.3V power supply
4	V <sub>CC</sub>	I	+3.3V power supply
5	NC	I	No Connect
6	DE	I	Input data enable control
7	V <sub>SS</sub>	I	Ground
8	NC	I	No Connect
9	V <sub>SS</sub>	I	Ground
10	NC	I	No Connect
11	V <sub>SS</sub>	I	Ground
12	B5	I	Blue data(MSB)
13	B4	I	Blue data
14	B3	I	Blue data
15	V <sub>SS</sub>	I	Ground
16	B2	I	Blue data
17	B1	I	Blue data
18	B0	I	Blue data(LSB)
19	V <sub>SS</sub>	I	Ground
20	G5	I	GREEN data(MSB)
21	G4	I	GREEN data
22	G3	I	GREEN data
23	V <sub>SS</sub>	I	Ground
24	G2	I	GREEN data
25	G1	I	GREEN data
26	G0	I	GREEN data(LSB)
27	V <sub>SS</sub>	I	Ground
28	R5	I	RED data(MSB)
29	R4	I	RED data
30	R3	I	RED data

Pin No.	Symbol	I/O	Description
31	V <sub>SS</sub>	I	Ground
32	R2	I	RED data
33	R1	I	RED data
34	R0	I	RED data (LSB)
35	NC	I	No Connect
36	V <sub>SS</sub>	I	Ground
37	V <sub>SS</sub>	I	Ground
38	DCLK	I	Dot Clock
39	V <sub>SS</sub>	I	Ground
40	V <sub>SS</sub>	I	Ground

## 10.2 Backlight Unit

Connector: JST BHSR-02VS-1(N)

Pin No.	Symbol	I/O	Description	Wire Color
1	VLEDA	I	Backlight LED Anode.	Red
2	VLEDC	I	Backlight LED Cathode.	Black

## 10.3 Transparent Touch Panel

Connector: CVILUX CF25041D0R0-10

Pin No.	Symbol
1	RIGHT
2	TOP
3	LEFT
4	BOTTOM

### 10.4 Color Data Input Assignment

The brightness of each primary color(red, green and blue) is based on the 6 bit gray scale data input for the color. The higher the binary input, the brighter the color. The table provides the assignment of color versus data input.

Color		Data Signal																	
		Red						Green						Blue					
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale Of RED	Red(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
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	Red(61)	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Red(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	
Gray Scale Of Green	Green(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
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	Green(61)	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0
	Green(62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
Green(63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	
Gray Scale Of Blue	Blue(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
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	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(61)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1
	Blue(62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
Blue(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	

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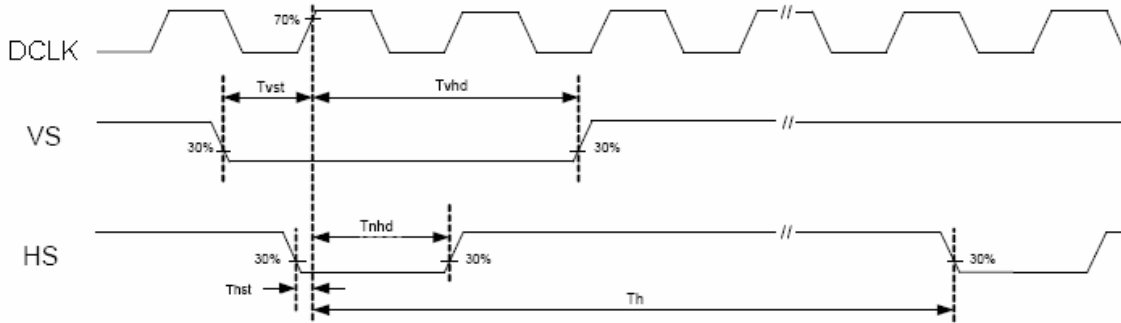
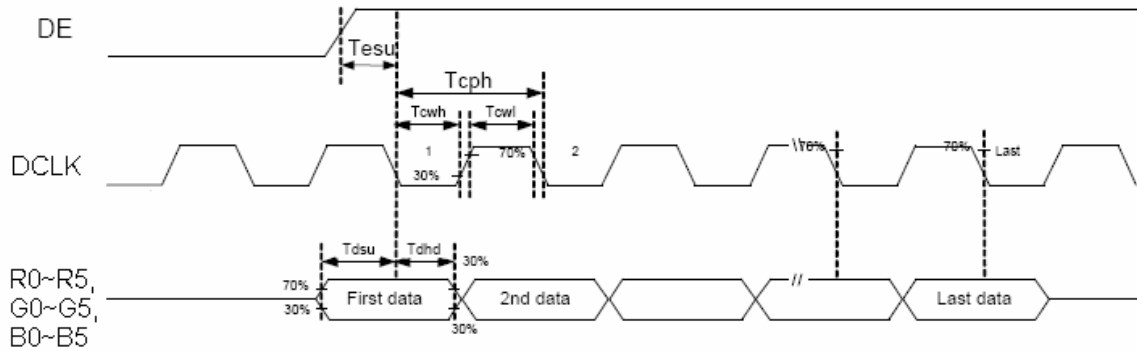
## 11. Interface Timing

### 11.1 Input Signal Characteristics

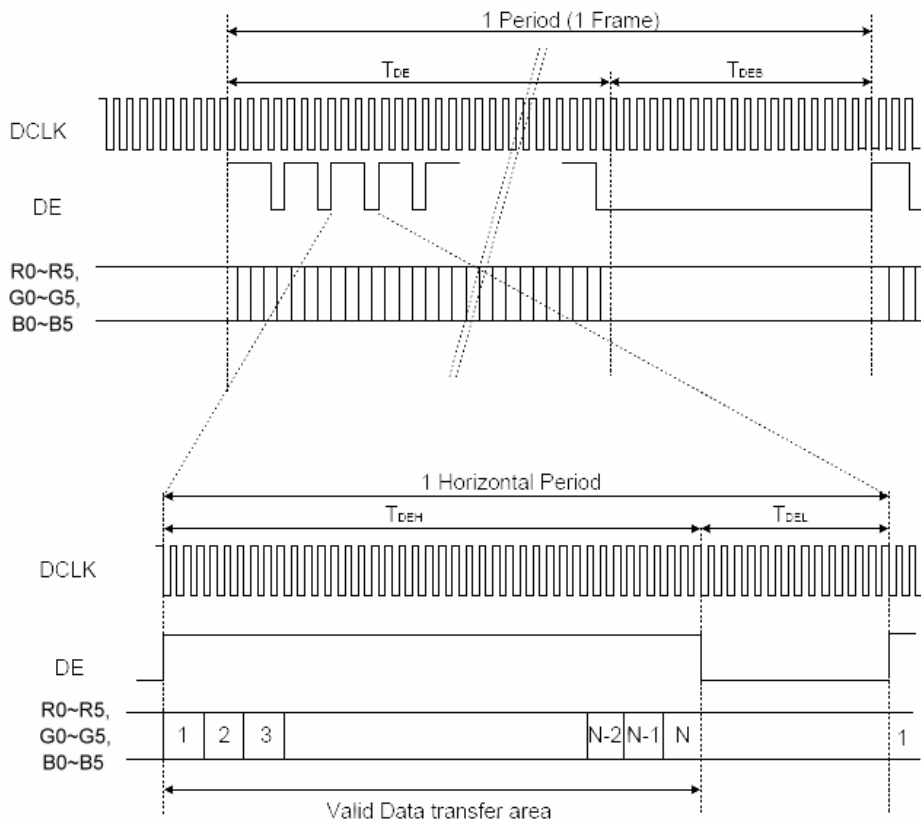
PARAMETER	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK frequency	$F_{CPH}$	-	33.26	-	MHz
DCLK period	$T_{CPH}$	-	30.06	-	ns
DCLK pulse duty	$T_{CWH}$	40	50	60	%
DE period	$T_{DEH}+T_{DEL}$	1000	1056	1200	$T_{CPH}$
DE pulse width	$T_{DEH}$	-	800	-	$T_{CPH}$
DE frame blanking	$T_{DEB}$	10	45	110	$T_{DEH}+T_{DEL}$
DE frame width	$T_{DE}$	-	480	-	$T_{DEH}+T_{DEL}$
Data setup time	$T_{dsu}$	6	-	-	ns
Data hold time	$T_{dhd}$	6	-	-	ns
DE setup time	$T_{esu}$	6	-	-	ns

## 11.2 Waveform

### 11.2.1 Clock and data input waveforms



### 11.2.2 Data input format



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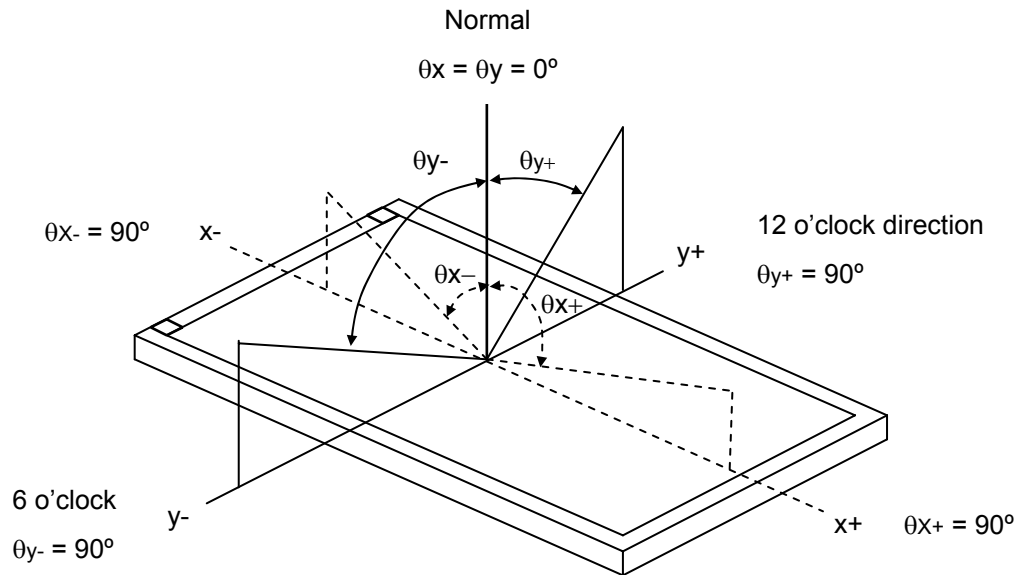
## 12. Optical Characteristics

The optical characteristics should be measured in a dark environment ( $\leq 1$  lux) or equivalent state with the methods shown in Note (4).

Item		Symbol	Conditions	Min.	Typ.	Max.	Unit	Note	
Contrast Ratio		CR	$\theta_x=0^\circ, \theta_y=0^\circ$ Viewing Normal Angle	150	(250)	-	-	(2)	
Response Time		$T_R$		-	5	10	ms	(3)	
		$T_F$		-	15	20	ms		
Luminance(Center)		Y		320	(400)	-	cd/m <sup>2</sup>	(4)	
Brightness uniformity		BUNI		70	(75)	-	%	(5)	
Color Chromaticity	Red	Rx		$\theta_x=0^\circ, \theta_y=0^\circ$ Viewing Normal Angle	0.530	0.580	0.630	-	(1),(4)
		Ry			0.310	0.360	0.410	-	
	Green	Gx			0.310	0.360	0.410	-	
		Gy	0.530		0.580	0.630	-		
	Blue	Bx	0.100		0.150	0.200	-		
		By	0.100		0.150	0.200	-		
	White	Wx	0.280		0.330	0.380	-		
		Wy	0.320		0.370	0.420	-		
Viewing Angle	Horizontal	$\theta_{x+}$	CR $\geq$ 10	55	(65)	-	deg.		
		$\theta_{x-}$		55	(65)	-			
	Vertical	$\theta_{y+}$		45	(55)	-			
		$\theta_{y-}$		55	(65)	-			



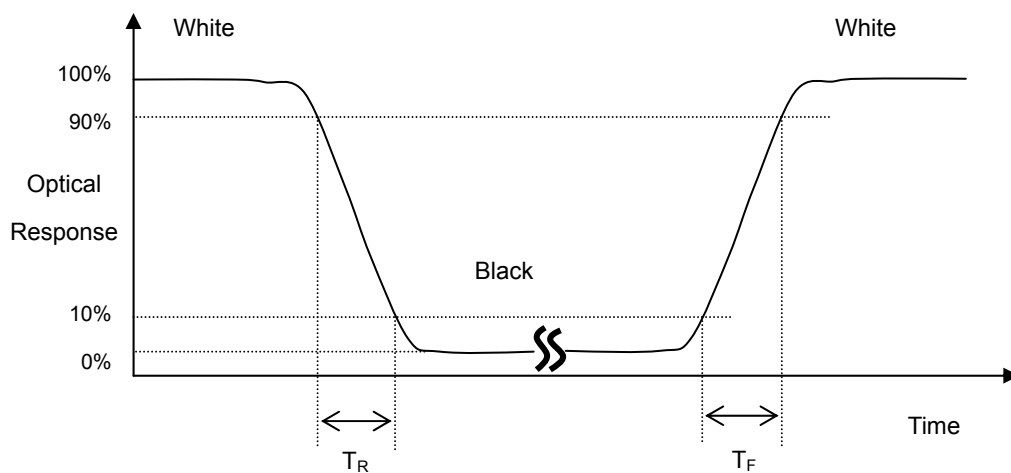
Note (1) Definition of Viewing Angle ( $\theta_x$ ,  $\theta_y$ ):



Note (2) Definition of Contrast Ratio (CR):

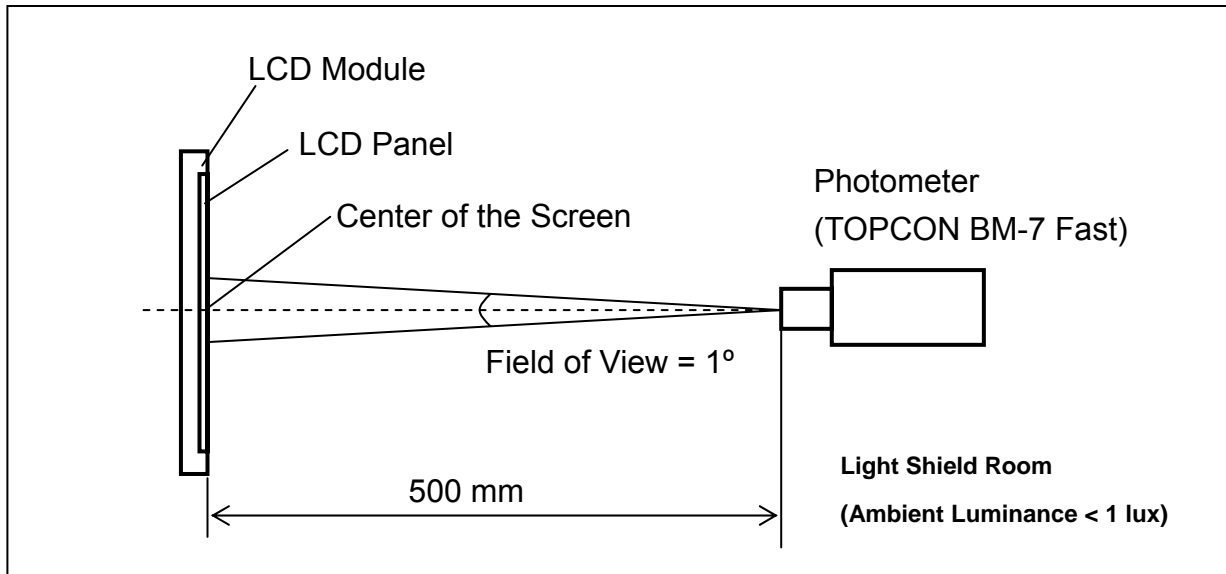
$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note (3) Definition of Response Time ( $T_R$ ,  $T_F$ ):



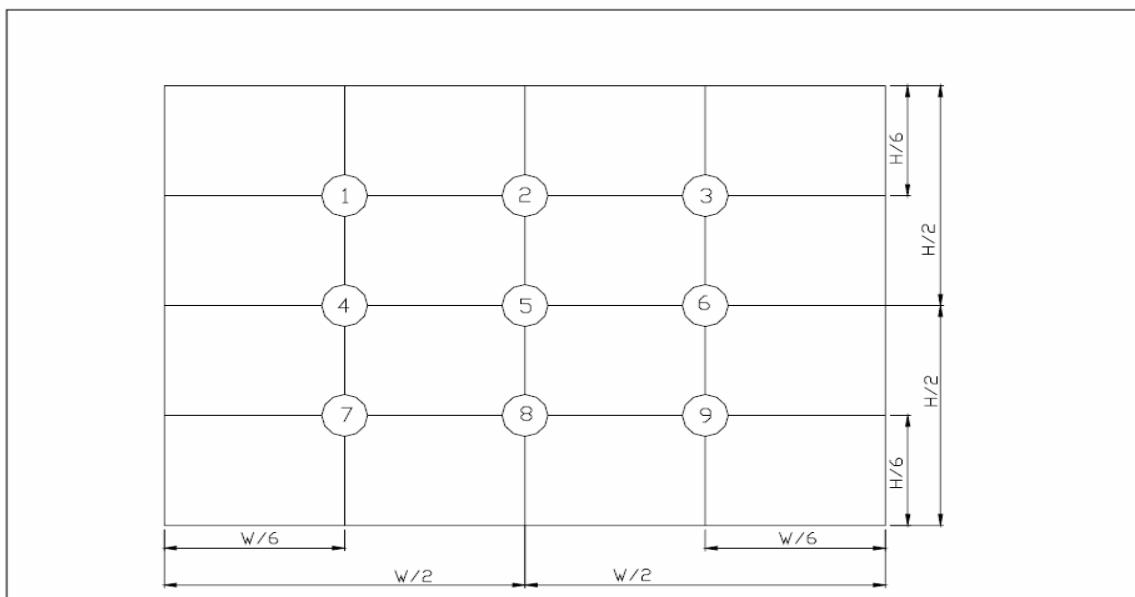
Note (4) Measurement Set-Up:

The LCD module should be stabilized at a given temperature for 30 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 30 minutes in a windless room.



Note (5) Definition of brightness uniformity

Brightness uniformity=(Min Luminance of 9 points)/(Max Luminance of 9 points)×100%



( 單位 : mm )

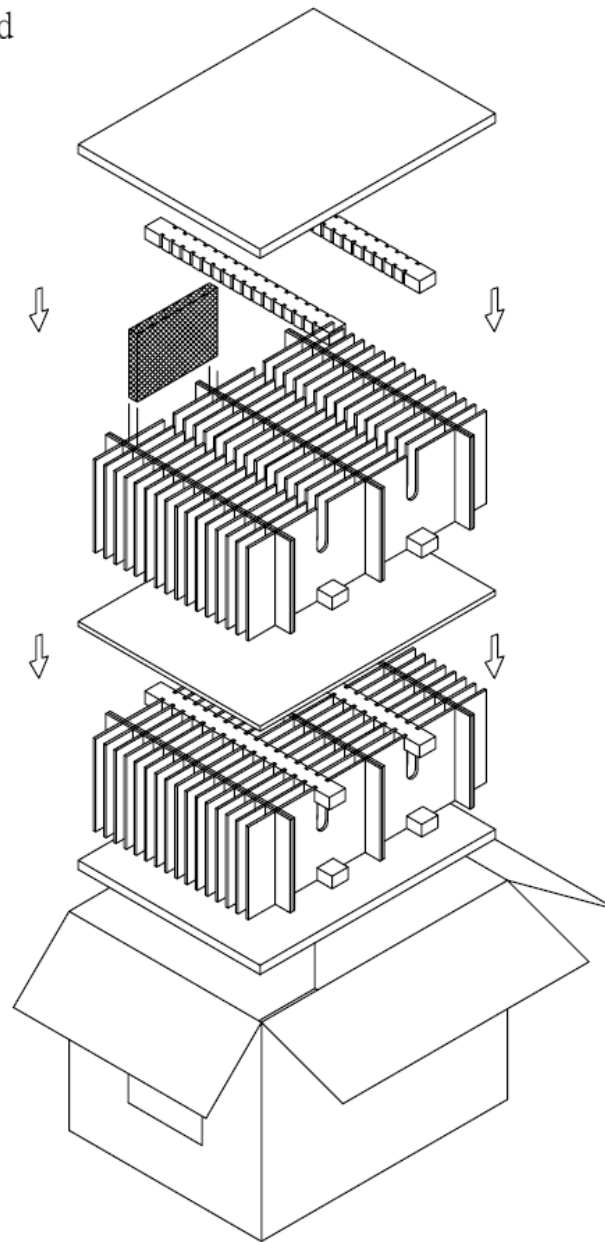
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### 13. Reliability Test

No.	Test Items	Test Condition	Remark
1	High Temperature Storage Test	T <sub>a</sub> = 80°C 240 hours	-
2	Low Temperature Storage Test	T <sub>a</sub> = -30°C 240 hours	-
3	High Temperature Operation Test	T <sub>a</sub> = 70°C 240 hours	-
4	Low Temperature Operation Test	T <sub>a</sub> = -20°C 240 hours	-
5	High Temperature and High Humidity Operation Test	T <sub>a</sub> =60°C 90%RH 240 hours	-
6	Electro Static Discharge Test (non-operating)	-Panel Surface/Top Case : 150pF, 330Ω Air: ±15kV, Contact: ±8kV	-
7	Mechanical Shock Test (non-operating)	Half sine wave, 80G, 11ms 3 times shock of each six surfaces	-
8	Vibration Test (non-operating)	Sine wave, 10 ~ 55 ~ 10Hz, 3 axis, 2 hours/axis	-
9	Thermal Shock Test (non-operating)	-20°C (30min) ~ 70°C (30min), 100 cycles	-
10	Drop Test(with Carton)	Height: 80cm 1 corner, 3 edges, 6 surfaces	-

## 14. Packaging

Packing Method



### PARTS LIST

	ITEM	SIZE(LxWxH) unit:mm	MATERIAL	Q.T.Y	NOTE
1	STATIC SHIEDING BAGS	200.0x145.0x0.09		60	
2	PU FOAM	440.0x340.0x15.0	SPONGE	2	
3	EPE PAD	345.0x30.0x20.0	EPE	8	
4	CARD BOARD	345.0x150.0x3.5	CARTON	12	
5	CARD BOARD	450.0x150.0x3.5	CARTON	32	
6	CARD BOARD	440.0x340.0x8.0	CARTON	1	
7	EXTERNAL BOX	460.0x360.0x355.0	CARTON	1	
8	PRODUCT	166.6x109.4x11.5		60	

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## 15. Precautions

### 15.1 Assembly and Handling Precautions

- (1) Do not apply rough force such as bending or twisting to the module during assembly.
- (2) It's recommended to assemble or to install a module into the user's system in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.
- (3) Don't apply pressure or impulse to the module to prevent the damage of LCD panel and Backlight.
- (4) Always follow the correct power-on sequence when the LCD module is turned on. This can prevent the damage and latch-up of the CMOS LSI chips.
- (5) Do not plug in or pull out the I/F connector while the module is in operation.
- (6) Do not disassemble the module.
- (7) Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.
- (8) Moisture can easily penetrate into LCD module and may cause the damage during operation.
- (9) High temperature or humidity may deteriorate the performance of LCD module. Please store LCD module in the specified storage conditions.
- (10) When ambient temperature is lower than 10°C, the display quality might be reduced. For example, the response time will become slow.

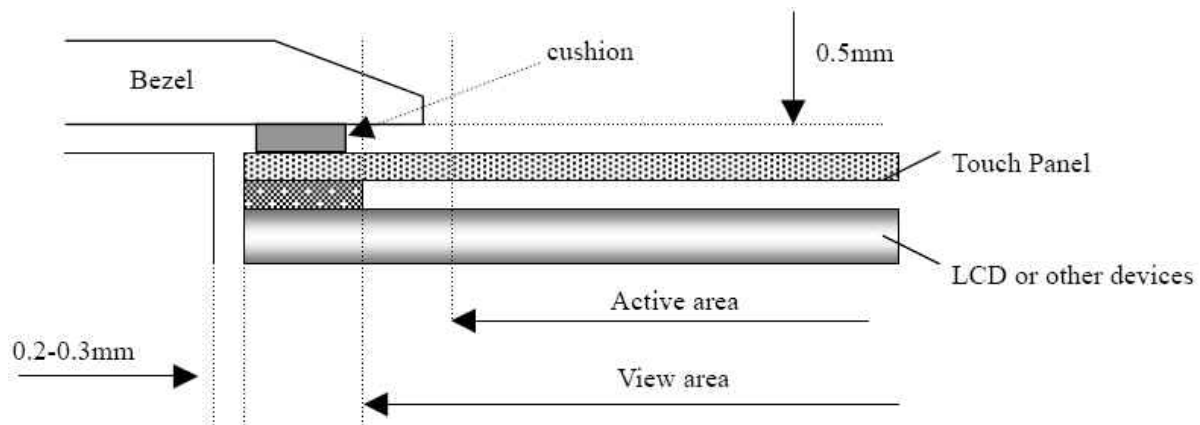
### 15.2 Safety Precautions

- (1) 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, skin or clothes, it has to be washed away thoroughly with soap.
- (2) After the module's end of life, it is not harmful in case of normal operation and storage.

### 15.3 Cautions for installing and assembling

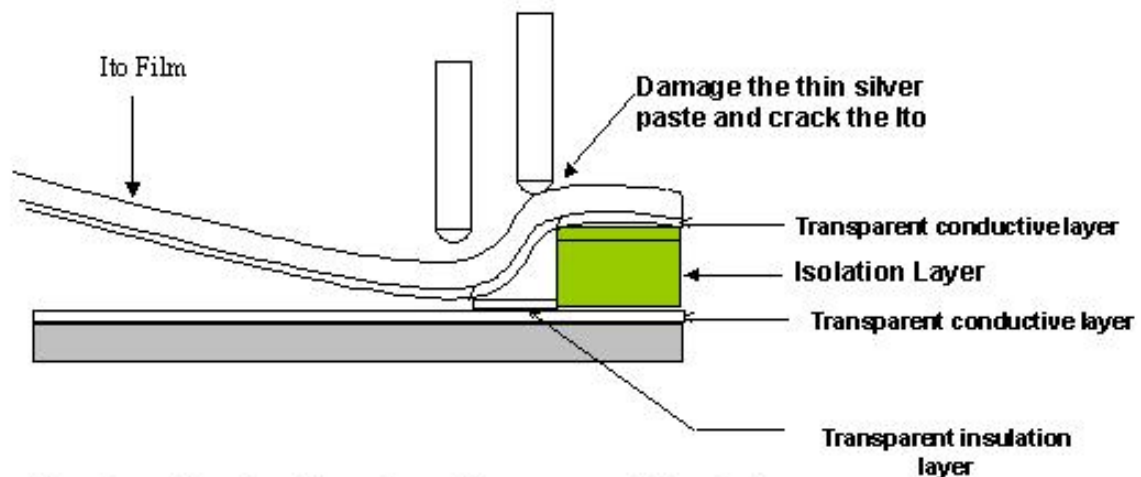
Bezel edge must be positioned in the area between the Active area and View area.

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.



### 15.4 Operation Prohibit

#### Not Suggested Pen Input Position On Touch Panel

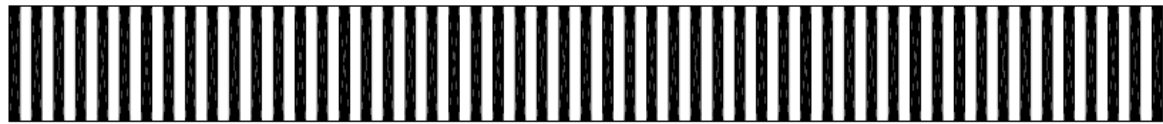


Pen input load on the edge of transparent insulation area might damage the ITO of ITO Pet-Film and reduce the durability of touch panel

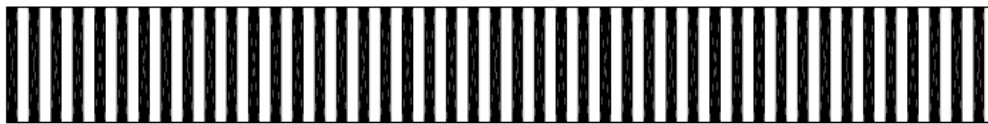


**17. Definition of Labels**

The bar code nameplate is pasted on each module as illustration, and its definitions are as following explanation.



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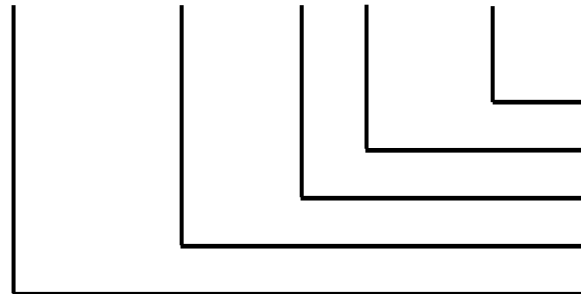


ABCDEFGHIJKLM

(a) Module Name: VGG804806-6UFLWB

(b) Serial ID:

A B C D E F G H I J K L M



Serial No.  
Revision Code  
Factory Code  
Manufactured Date  
Screen Size

Serial ID includes the information as below:

(a) Screen size (Diagonal): Inch Code (ABCD)

3.5" → 0350

10.4" → 1040

(b) Manufactured Date: Year, Month, Day (EFG)

Year (E)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Mark	0	1	2	3	4	5	6	7	8	9



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Month (F)

Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Mark	1	2	3	4	5	6	7	8	9	A	B	C

Day (G)

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Mark	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	G
Day	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Mark	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	

(c) Factory Code (H):

For EVERVISION internal use.

(d) Revision Code (I):

Cover all the change, for example: 1: Rev.1, 2: Rev.2, 3: Rev.3...etc.

(e) Serial No. (JKLM):

Manufacturing sequence of product, for example: 0001~9999.

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## 18. Incoming Inspection Standards

### 18.1 The environmental condition of inspection

The environmental condition and visual inspection shall be conducted as below.

- (1) Ambient temperature  $25 \pm 5^{\circ}\text{C}$
- (2) Humidity:  $60 \pm 5\%$  RH
- (3) Viewing distance is approximately 35 ~ 40 cm
- (4) Viewing angle is normal to the LCD panel as Fig \_1( $10^{\circ}$ )
- (5) Ambient Illumination: 300 ~ 500 Lux for external appearance inspection

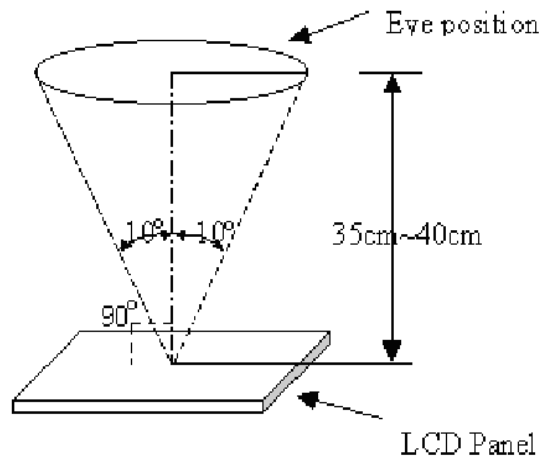


Fig \_ 1

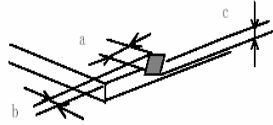
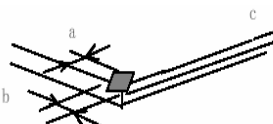
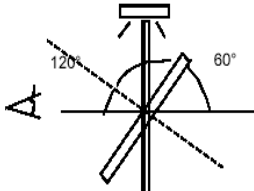
### 18.2 The defects classify of AQL as following:

Class of defects	AQL	Definition
Major	0.65%	It is defect that is likely to result in failure or to reduce materially the usability of the intended function.
Minor	1.5%	It is a defect that will not result in functioning problem with deviation classified.

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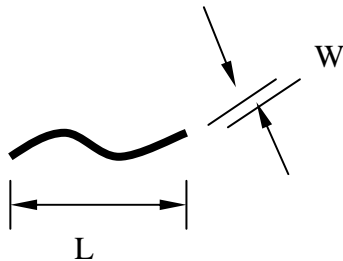
### 18.3 Inspection Parameters

Item		Specification/Description			Note	
Display	Function	No Display			-	
		Malfunction			-	
Operating	Contrast ratio	Out of Spec			-	
	Line defect	No obvious Vertical and Horizontal line defect in bright , dark and colored.			-	
	Point Defect (red,green,blue,dark , white)	Item	Acceptable number			Note: 1、 4、5、6
			A	B	Total	
		BRIGHT DOT	$N \leq 3$	$N \leq 3$	$N \leq 8$	
		DARK DOT	$N \leq 5$	$N \leq 6$		
		TOTAL DOT	$N \leq 5$	$N \leq 6$		
TWO ADJACENT DOT	NOT ALLOWED					
THREE OR MORE ADJACENT DOT	NOT ALLOWED					
External Inspection (non-operating)	Scratch on the polarizer	L(mm)	W(mm)	Acceptable number	Note:2	
		$L \leq 2.5$	$W \leq 0.1$	4		
		$L > 2.5$	$W > 0.1$	0		
	Dent or bubble on the polarizer	Dimension(mm)	Acceptable number		Note:3	
		$D \leq 0.5$	4			
		$D \leq 0.15$	Disregard			
Foreign material on the polarizer	Dimension(mm)	Acceptable number		Note:3		
	$D \leq 0.5$	4				
	$D \leq 0.15$	Disregard				

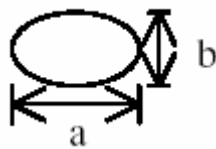
Item		Specification/Description			Note
Touch Panel	Scratch	L(mm)	W(mm)	Acceptable number	Note:2
		$L \leq 10$	$W < 0.05$	Disregard	
			$0.05 \leq W < 0.1$	$N \leq 4$	
			$W \geq 0.1$	0	
	Foreign Materials (Linear shape)	$L \leq 10$	$W < 0.05$	Disregard	Note:2
			$0.05 \leq W < 0.1$	$N \leq 3$	
			$W \geq 0.1$	0	
	Foreign Materials (Circular shape)	Dimension(mm)		Acceptable number	Note:3
		$D \leq 0.25$		Disregard	
		$0.25 < D \leq 0.5$		$N \leq 6$	
$D > 0.5$		0			
Glass chipping		$a \leq 5\text{mm}$ $b \leq 3\text{mm}$ $c \leq t$ (t : Glass think)		Note:7	
		$a \leq 3\text{mm}$ $b \leq 3\text{mm}$ $c \leq t$ (t : Glass think)		Note:7	
Newton-ring	(In case of doubtful situations) Observe on $60^\circ$ from the product surface under a white Fluorescent lamp(3-wavelength lamp).	Average diameter $\leq 1/3$ Touch Panel area Disregard.		Note:7	
					

Note1. The definition of dot defect : The dot defect was judged after repair and the size of a defective dot over 1/2 of whole dot is regarded as one defective dot.

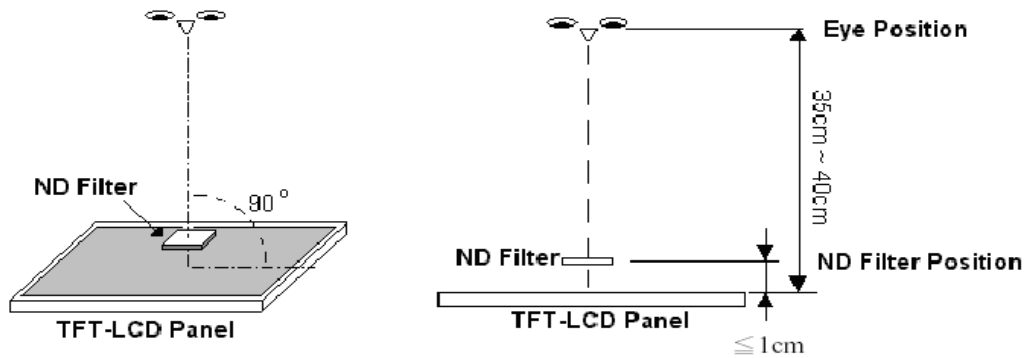
Note2.



Note3. D : Diameter  $D=(a+b)/2$



Note4. Bright dot is defined through 6% transmission ND Filter as following.

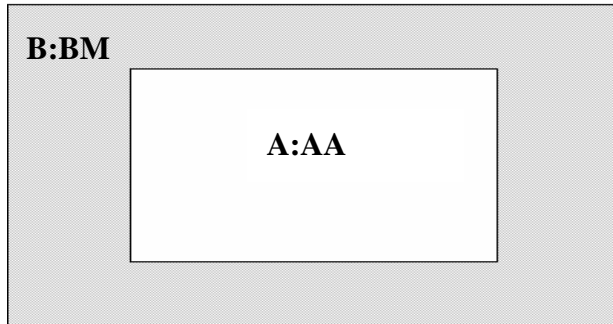


Note5. ADJACENT DOT

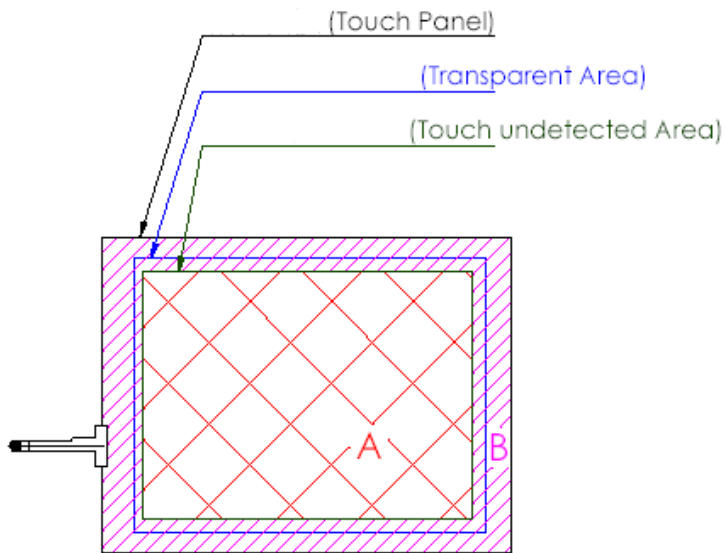


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Note6.



Note7.



A area : Without any defect point effect on normal operation.

B area : None-specify

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### 18.4 Handling of LCM

- (1) Don't give external shock.
- (2) Don't apply excessive force on the surface.
- (3) Liquid in LCD is hazardous substance. Must not lick and swallow. when the liquid is attach to your hand, skin, cloth etc. Wash it out thoroughly and immediately.
- (4) Don't operate it above the absolute maximum rating.
- (5) Don't disassemble the LCM.