

# 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. : VGG322425-6UFLWI(RoHS)**

**REVISION : 2**

APPROVAL FOR SPECIFICATIONS ONLY

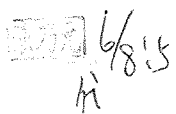

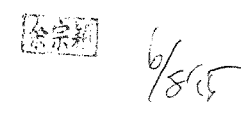
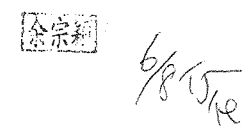
APPROVAL FOR SPECIFICATIONS AND SAMPLE

**CUSTOMER :**

**STD.**

**APPROVED BY :**

### EVERVISION LCM R&D CENTER

APPROVED BY	CHECKED BY	PREPARED BY	
 6/8/15 H	 6/8/15	 6/8/15	 6/8/15 H
<b>DIRECTOR</b>	<b>MANAGER</b>	<b>Mechanism Engineer</b>	<b>Electronic Engineer</b>

億力光電股份有限公司總公司  
**EVERVISION ELECTRONICS LTD.**  
 台北市中和區建一路 186 號 12 樓  
 12F., No.186, Jian 1st Rd., Zhonghe Dist., New  
 Taipei City 235, Taiwan (R.O.C.)  
 TEL : +886 2 8227-2788  
 FAX : +886 2 8227-2799

億力光電股份有限公司台中分公司  
**EVERVISION ELECTRONICS(T.C) LTD.**  
 台中市潭子區建國路 19 號  
**No.19, Jianguo Rd., Tanzi Dist., Taichung City**  
**427, Taiwan (R.O.C.)**  
 TEL : +886 4 2532-8889  
 FAX : +886 4 2532-6689

東莞莞城德寶電子廠  
**EVERVISION ELECTRONICS(B.V.I) LTD.**  
 廣東省東莞市城區東縱大道天寶路 9 號  
 NO.9,Tian Bao Rd.,Dong Zong St.,Dong Guan City  
 Guang Dong. China.  
 TEL : +86 769 2220 5258  
 FAX : +86 769 2220 7258

勁佳光電(昆山)有限公司  
**EVERVISION ELECTRONICS(KUNSHAN) LTD.**  
 江蘇省昆山市玉山鎮高科技工業園城北路 8 號  
 NO.8,Chengbei Rd., Hi-Tech Industry Park ,  
 Yushan Town , Kunshan City , Jiangsu,China.  
 TEL : +86 512 5778 7288  
 FAX : +86 512 5777 0688

<http://www.evervisionlcd.com>

<b>EVERVISION</b>	<b>MODEL NO.</b>		<b>PAGE</b>
	VGG322425-6UFLWI	SPEC SAMPLE	2

## 1. Table of Contents

<b>No.</b>	<b>Contents</b>	<b>Page</b>
1	Table of Contents	2
2	Record of Revisions	3
3	Module Numbering System	4
4	Application	5
5	Features	5
6	General Specifications	5
7	Absolute Maximum Ratings	6
8	Electrical Characteristics	7
9	Block Diagram	9
10	Input / Output Terminals Pin Assignment	10
11	Interface Timing	13
12	Optical Characteristics	16
13	Reliability Test	19
14	Packaging	20
15	Precautions	21
16	Outline Drawing	23
17	Definition of Labels	24
18	Incoming Inspection Standards	26



<b>EVERVISION</b>	<b>MODEL NO.</b>		<b>PAGE</b>
	VGG322425-6UFLWI	SPEC SAMPLE	4

### 3. Module Numbering System

**V G G 3224 25 – 6 U F L W I**

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:  
**A:** ASTN; **B:** STN Blue; **C:** CSTN; **D:** DSTN;  
**F:** TFT; **G:** STN Gray; **H:** HTN; **I:** IBN;  
**K:** Black Mask TN **L:** LTPS; **M:** MVA;  
**N:** others; **O:** OLED; **P:** PLED; **S:** IPS;  
**T:** TN; **U:** FSC TN; **W:** FSTN Black/white;  
**X:** FFSTN; **Y:** STN Yellow;

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

<b>EVERVISION</b>	<b>MODEL NO.</b>		<b>PAGE</b>
	VGG322425-6UFLWI	SPEC SAMPLE	5

#### 4. Application

This specification is applied to the 3.5 inch QVGA supported TFT-LCD module, and can display 16M colors. The module is designed for PMP, GPS application and other electronic products which require flat panel display of digital signal interface.

#### 5. Features

- QVGA (320×240 pixels) resolution.
- Display in 16M colors
- Line inversion mode with stripe type.
- On-chip voltage generator
- SYNC mode is supported for digital RGB input data format.

#### 6. General Specifications

Item	Specifications	Unit
Screen Size	3.5 (Diagonal)	inch
Display Format	320RGB(H)×240(V)	dot
Active Area	70.08(H)×52.56(V)	mm
Dot Pitch	0.073(H)×0.219(V)	mm
Pixel Configuration	RGB Vertical Stripe	-
Display Mode	TN Type Transmissive Mode(Micro Reflective) Normally White	-
Surface Treatment	Anti-Reflection	-
Viewing Direction	6 O'clock (The Gray Inversion will appear at this direction)	-
Outline Dimension	76.9(W)×63.9(H)×3.3(D)	mm
DC to DC circuit	Build-in	-
Weight	( 32.5 )	g
RoHS Compliance	Evervision certifies this product to be in compliance with European Union Directive 2011/65/EU on the restriction of certain hazardous substances in electrical and electronic equipment.	-

<b>EVERVISION</b>	<b>MODEL NO.</b>		<b>PAGE</b>
	VGG322425-6UFLWI	SPEC SAMPLE	6

## 7. Absolute Maximum Ratings

### 7.1 Absolute Ratings of Environment

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T <sub>ST</sub>	-40	+80	°C	(1)(2)
Operating Temperature	T <sub>OP</sub>	-30	+80	°C	(1)(2)

Note1: Background color changes slightly depending on ambient temperature.

This phenomenon is reversible.

Note2: Please refer to item of RELIABILITY.

### 7.2 Electrical Absolute Ratings

#### 7.2.1 TFT-LCD Module

(Ta=25±2°C, GND=V<sub>SS</sub>=0V)

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Digital Power Supply Voltage	V <sub>CC</sub>	V <sub>SS</sub> -0.3	5.0	V	-

#### 7.2.2 Backlight Unit

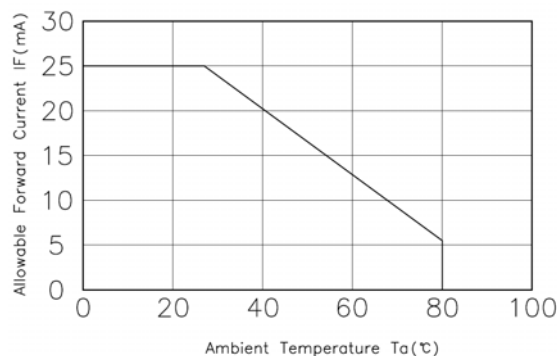
(Ta=25±2°C)

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Forward current	I <sub>f</sub>	-	(50)	mA	(1)(2)
Reverse voltage	V <sub>R</sub>	-	(25)	V	(1)

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

Note (2) Relation between maximum LED forward current and ambient temperature is showed as bellow.(a string of LEDs)

#### Ambient Temperature vs. Allowable Forward Current



## 8. Electrical Characteristics

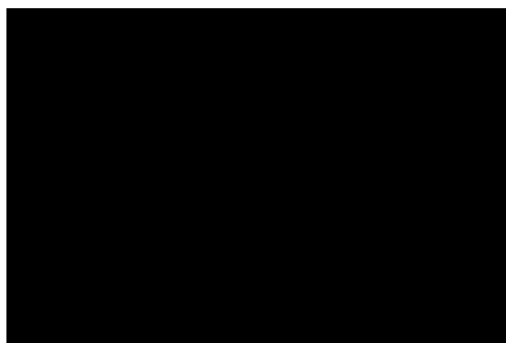
### 8.1 TFT-LCD Module

(Ta=25±2°C)

Item	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Power Supply Voltage	V <sub>CC</sub>	2.5	3.3	3.6	V	-
Power Supply Current	I <sub>CC</sub>	-	15.6	22.0	mA	(1)
Input High Threshold Voltage	V <sub>IH</sub>	0.8V <sub>CC</sub>	-	V <sub>CC</sub>	V	-
Input Low Threshold Voltage	V <sub>IL</sub>	0	-	0.2V <sub>CC</sub>	V	-
Power Consumption	P <sub>L</sub>	-	51.48	72.6	mW	(1)
VSYNC Frequency	F <sub>V</sub>	-	60	90	Hz	-
HSYNC Frequency	F <sub>H</sub>	-	15.72	22.35	KHz	-
DCLK Frequency	DCLK	-	6.5	10	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

<b>EVERVISION</b>	<b>MODEL NO.</b>		<b>PAGE</b>
	VGG322425-6UFLWI	SPEC SAMPLE	8

## 8.2 Backlight Unit

(Ta=25±2°C)

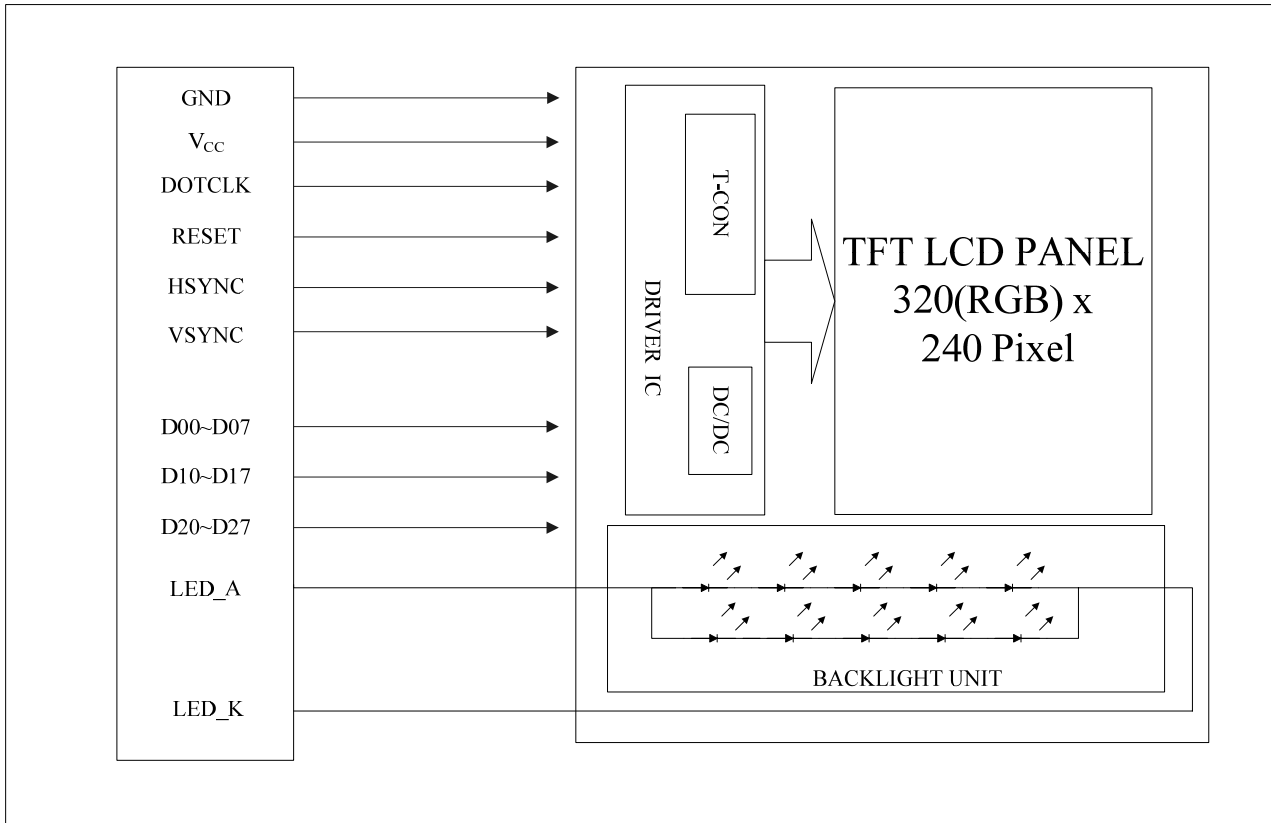
Item	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
LED Voltage	VL	-	( 16.5 )	-	V	( 1 )
LED Current	IL	-	( 40 )	-	mA	( 1 )
Power Consumption	P <sub>BL</sub>	-	( 660 )	-	mW	( 1 )
LED Life Time ( 25°C )	-	50000	60000	-	hr	( 2 )

Note ( 1 ) The driving design of backlight unit is dependent on serial consideration of 5S2P LEDs.

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



**9. Block Diagram  
TFT-LCD Module with Backlight Unit**



**10. Input / Output Terminals Pin Assignment****10.1 TFT-LCD Module (CVILUX CF25541D0R0-05)**

Pin No.	Symbol	I/O	Description
1	LED_K	I	LED_cathode
2	LED_K	I	LED_cathode
3	LED_A	I	LED_anode
4	LED_A	I	LED_anode
5	NC	I	No connection
6	NC	I	No connection
7	NC	I	No connection
8	RESET	I	Reset
9	NC	I	No connection
10	NC	I	No connection
11	NC	I	No connection
12	D20	I	Blue data(LSB)
13	D21	I	Blue data
14	D22	I	Blue data
15	D23	I	Blue data
16	D24	I	Blue data
17	D25	I	Blue data
18	D26	I	Blue data
19	D27	I	Blue data(MSB)
20	D10	I	Green data(LSB)
21	D11	I	Green data
22	D12	I	Green data
23	D13	I	Green data
24	D14	I	Green data
25	D15	I	Green data
26	D16	I	Green data
27	D17	I	Green data(MSB)
28	D00	I	Red data(LSB)
29	D01	I	Red data
30	D02	I	Red data

Pin No.	Symbol	I/O	Description
31	D03	I	Red data
32	D04	I	Red data
33	D05	I	Red data
34	D06	I	Red data
35	D07	I	Red data(MSB)
36	HSYNC	I	Line synchronization signal.
37	VSYNC	I	Frame synchronization signal.
38	DOTCLK	I	Dot Colck signal
39	NC	I	No connection
40	NC	I	No connection
41	V <sub>CC</sub>	I	For system power supply.
42	V <sub>CC</sub>	I	For system power supply.
43	NC	I	No connection
44	NC	I	No connection
45	NC	I	No connection
46	NC	I	No connection
47	NC	I	No connection
48	NC	I	No connection
49	NC	I	No connection
50	NC	I	No connection
51	NC	I	No connection
52	NC	I	No connection
53	GND	I	Ground
54	GND	I	Ground



<b>EVERVISION</b>	<b>MODEL NO.</b>		<b>PAGE</b>
	VGG322425-6UFLWI	SPEC SAMPLE	13

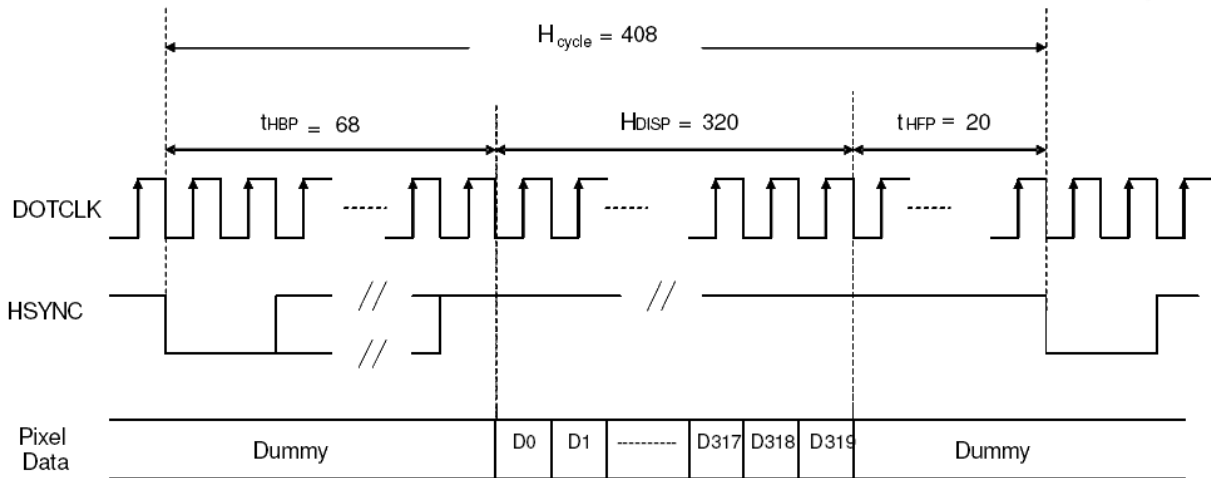
## 11. Interface Timing

### 11.1 Input Signal Characteristics

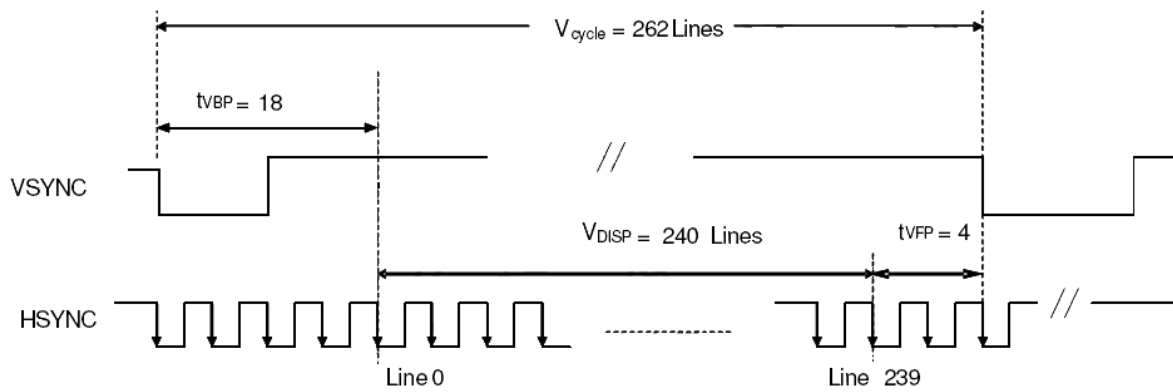
#### 11.1.1 Digital Parallel RGB Interface (960x240 resolution)

Characteristics	Symbol	Min.	Typ.	Max.	Unit
		24 bit	24 bit	24 bit	
DOTCLK Frequency	fDOTCLK	-	6.5	10	MHz
DOTCLK Period	tDOTCLK	100	154	-	ns
Horizontal Frequency (Line)	fH	-	14.9	22.35	KHz
Vertical Frequency (Refresh)	fV	-	60	90	Hz
Horizontal Back Porch	tHBP	-	68	-	tDOTCLK
Horizontal Front Porch	tHFP	-	20	-	tDOTCLK
Horizontal Data Start Point	tHBP	-	68	-	tDOTCLK
Horizontal Blanking Period	tHBP + tHFP	-	88	-	tDOTCLK
Horizontal Display Area	HDISP	-	320	-	tDOTCLK
Horizontal Cycle	Hcycle	-	408	450	tDOTCLK
Vertical Back Porch	tVBP	-	18	-	Lines
Vertical Front Porch	tVFP	-	4	-	Lines
Vertical Data Start Point	tVBP	-	18	-	Lines
Vertical Blanking Period	tVBP + tVFP	-	22	-	Lines
Vertical Display Area	NTSC	VDISP	240	-	Lines
	PAL		280(PALM=0)		
			288(PALM=1)		
Vertical Cycle	NTSC	Vcycle	262	350	Lines
	PAL		313		

**11.2 Waveform**



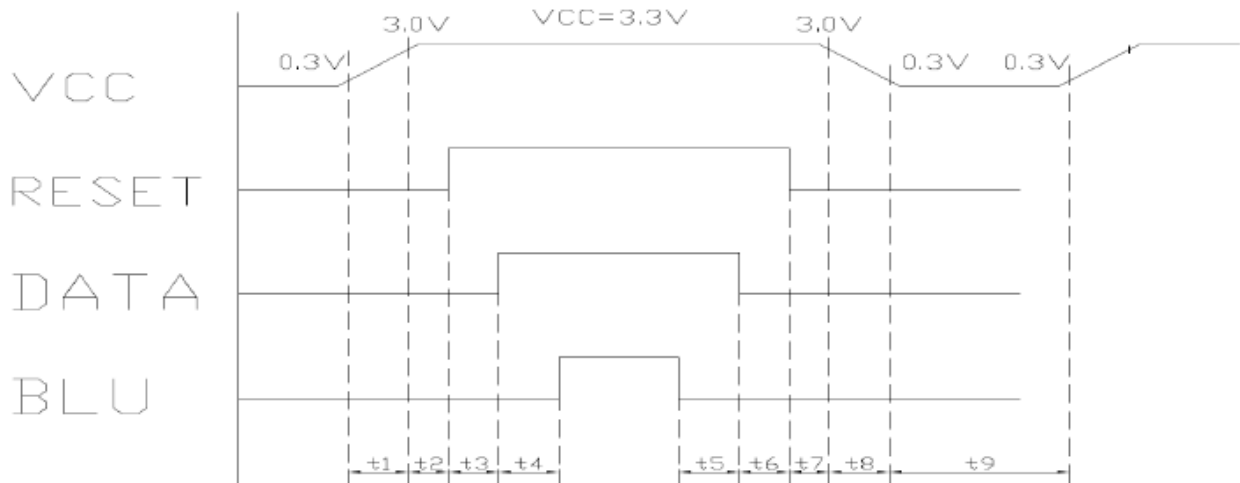
Horizontal Data Transaction Timing



Vertical Data Transaction Timing

**Figure 3. Data Transaction Timing in Parallel RGB (24 bit) Interface (SYNC Mode)**

**11.3 Power On / Off Sequence**



- |                   |                   |                         |
|-------------------|-------------------|-------------------------|
| $T1 \leq 10ms$    | $200ms \leq T5$   | $1 \text{ sec} \leq T9$ |
| $10\mu s \leq T2$ | $50ms \leq T6$    |                         |
| $50ms \leq T3$    | $10\mu s \leq T7$ |                         |
| $200ms \leq T4$   | $T8 \leq 10ms$    |                         |

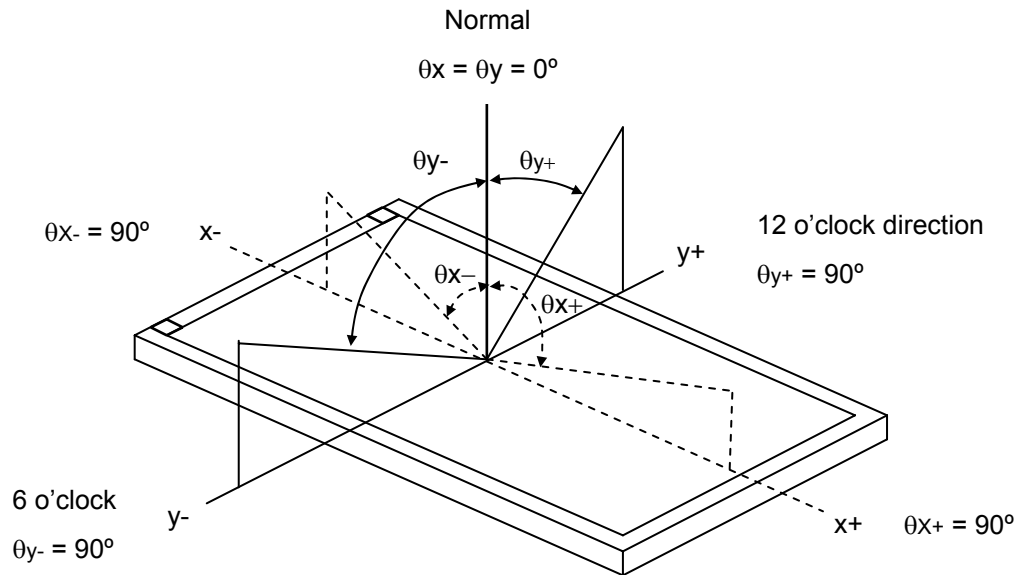
**12. Optical Characteristics**

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		400	( 500 )	-	-	(2)
Response Time		T <sub>R</sub> +T <sub>F</sub>		-	50	-	ms	(3)
Luminance(Center)		Y		1000	( 1200 )	-	cd/m <sup>2</sup>	(4)
Brightness uniformity		BUNI		75	( 80 )	-	%	(5)
Color Chromaticity	Red	Rx		Viewing Normal Angle $\theta_x=0^\circ, \theta_y=0^\circ$	0.595	0.645	0.695	-
		Ry	0.295		0.345	0.395	-	
	Green	Gx	0.315		0.365	0.415	-	
		Gy	0.520		0.570	0.620	-	
	Blue	Bx	0.095		0.145	0.195	-	
		By	0.045		0.095	0.145	-	
	White	Wx	0.250		0.300	0.350	-	
		Wy	0.260		0.310	0.360	-	
Viewing Angle	Horizontal	$\theta_{x+}$	CR $\geq$ 10	55	( 70 )	-	deg.	
		$\theta_{x-}$		55	( 70 )	-		
	Vertical	$\theta_{y+}$		40	( 55 )	-		
		$\theta_{y-}$		50	( 70 )	-		



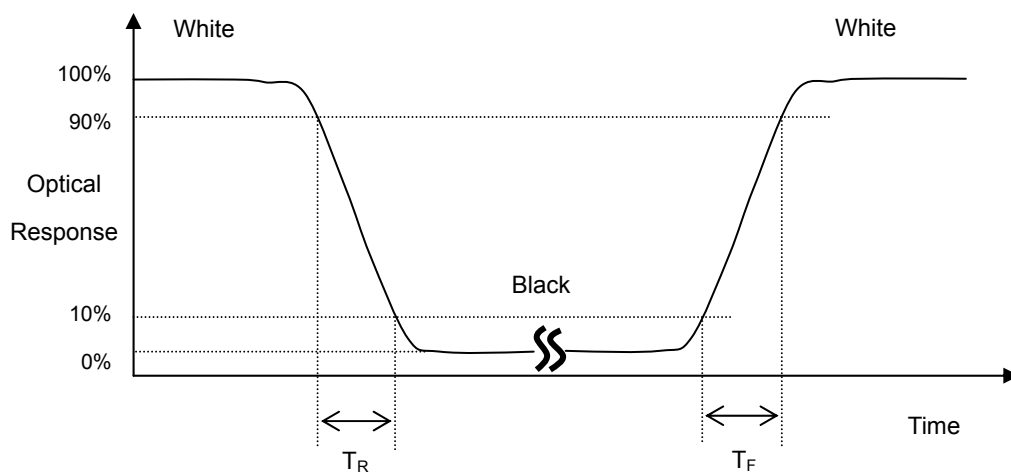
Note (1) Definition of Viewing Angle ( $\theta_x, \theta_y$ ):



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

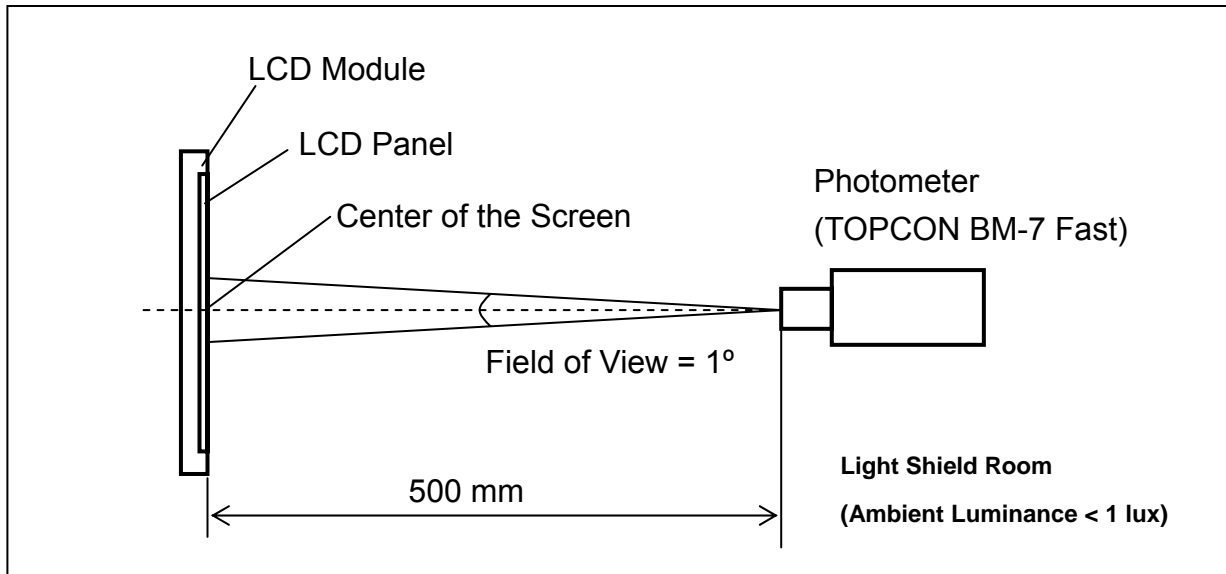
$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

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



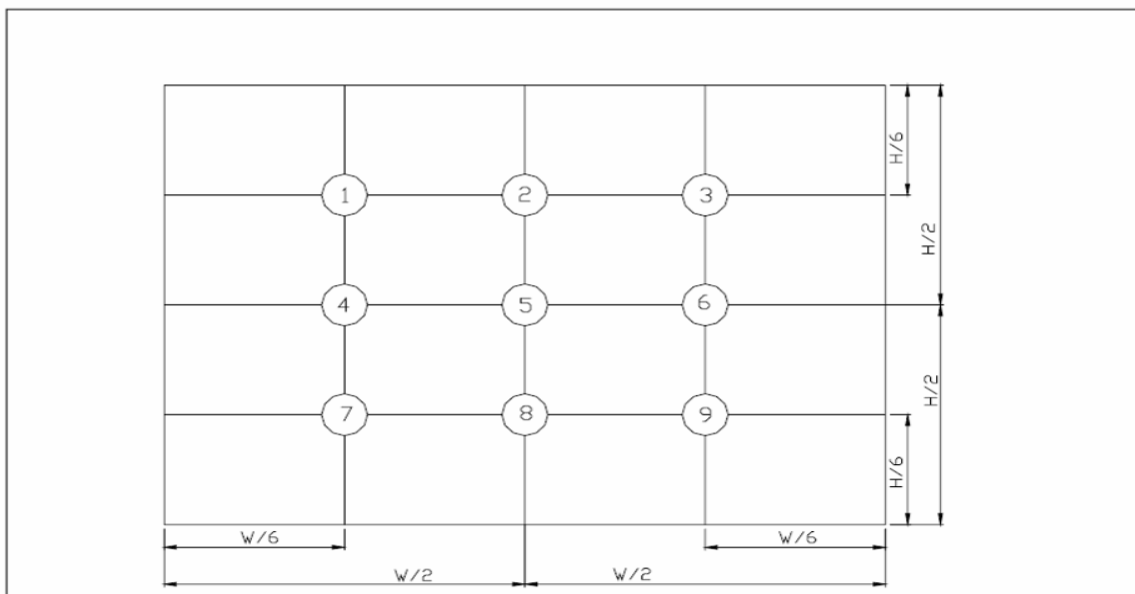
**Note (4) Measurement Set-Up:**

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 dark room or equivalent condition.



**Note (5) Definition of brightness uniformity**

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



( 單位 : mm )

<b>EVERVISION</b>	<b>MODEL NO.</b>		<b>PAGE</b>
	VGG322425-6UFLWI	SPEC SAMPLE	19

### 13. Reliability Test

No.	Test Items	Test Condition	Remark
1	High Temperature Storage Test	$T_a = 80^{\circ}\text{C}$ 240 hours	(1),(3),(4)
2	Low Temperature Storage Test	$T_a = -40^{\circ}\text{C}$ 240 hours	(1),(3),(4)
3	High Temperature Operation Test	$T_s = 80^{\circ}\text{C}$ 240 hours	(2),(3),(4)
4	Low Temperature Operation Test	$T_a = -30^{\circ}\text{C}$ 240 hours	(1),(3),(4)
5	High Temperature and High Humidity Operation Test	$T_a = 60^{\circ}\text{C}$ 90%RH 240 hours	(3),(4)
6	Electro Static Discharge Test (non-operating)	-Panel Surface/Top Case : 150pF, 330Ω Air: ±15kV, Contact: ±8kV	(3)
7	Mechanical Shock Test (non-operating)	Half sine wave, 100G, 6ms 3 times shock of each six surfaces	(3)
8	Vibration Test (non-operating)	Sine wave: 10 ~ 55 ~ 10Hz amplitude: 1.5mm 3 axis, 2 hours/axis	(3)
9	Thermal Shock Test (non-operating)	$-20^{\circ}\text{C}$ (30min) ~ $70^{\circ}\text{C}$ (30min), 10cycles	(3),(4)
10	Drop Test(with Carton)	Height: 80cm 1 corner, 3 edges, 6 surfaces	(3)

Note 1:  $T_a$  is the ambient temperature of samples.

Note 2:  $T_s$  is the temperature of panel' s surface.

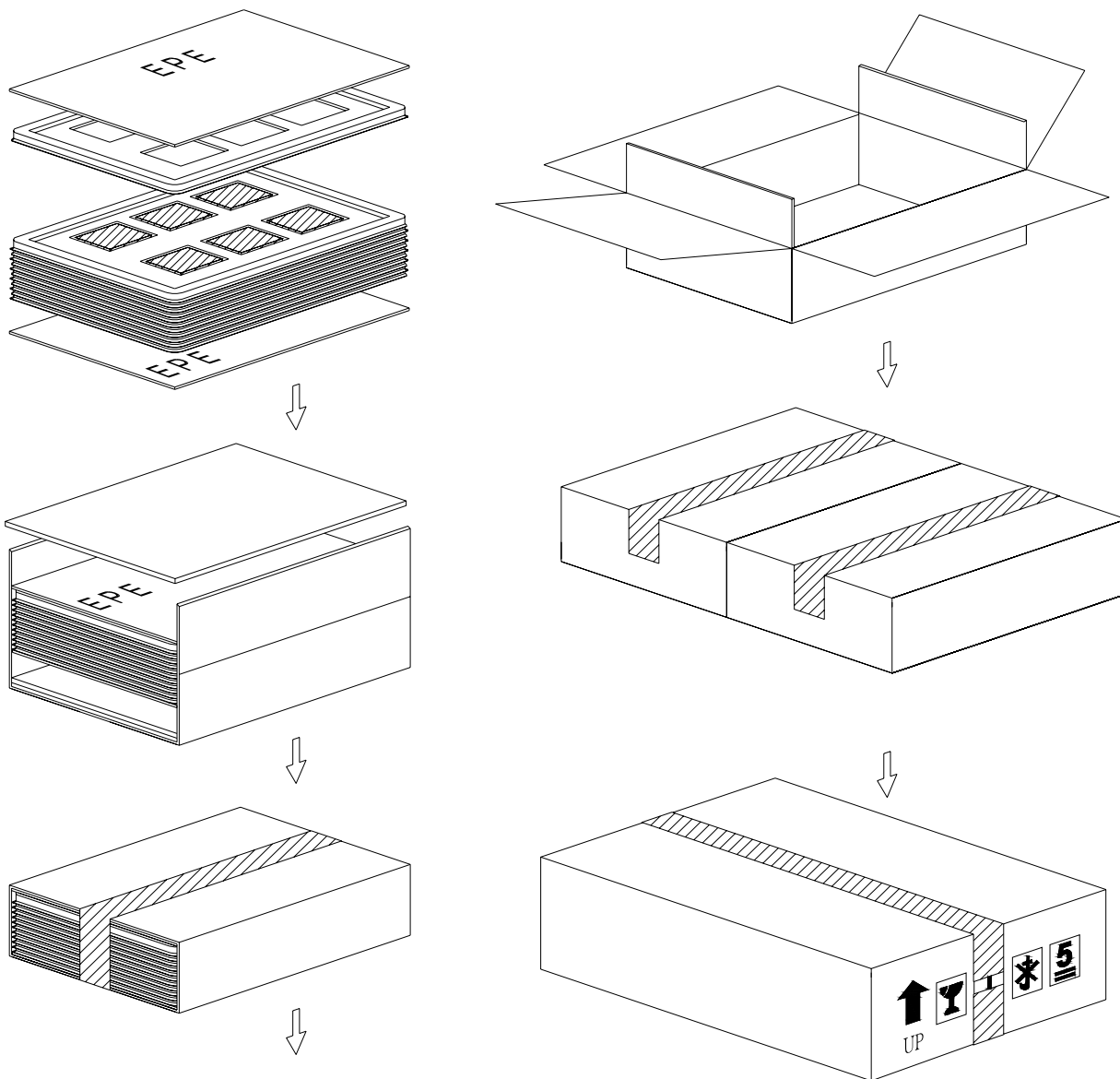
Note 3: In the standard condition, there shall be no practical problem that may affect the display function.

After the reliability test, the product only guarantees operation, but don' t guarantee all of the cosmetic specification.

Note 4: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

Note 5 : When OP reaches -30 degree, the reaction of the display will be slower. However, this phenomenon is reversible after the ambient temperature returns to higher values.

**14. Packaging**



PARTS LIST					
	ITEM	SIZE(LxWxH) unit:mm	MATERIAL	Q.T.Y	NOTE
1	TRAY	372.0x262.0x16.6	PET	28	
2	EPE(J46)	372.0x262.0x5.0	EPE	4	
3	CARD BOARD(P01)	816.0x375.0x3.5	CARTON	2	
4	CARD BOARD(P02)	945.0x275.0x3.5	CARTON	2	
5	CARD BOARD(P03)	375.0x265.0x3.5	CARTON	4	
6	INTERNAL BOX(S01)	400.0x290.0x150.0	CARTON	2	
7	EXTERNAL BOX(L28)	600.0x420.0x180.0	CARTON	1	
8	PRODUCT	76.9x63.9x3.3		156	

<b>EVERVISION</b>	<b>MODEL NO.</b>		<b>PAGE</b>
	VGG322425-6UFLWI	SPEC SAMPLE	21

## **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**

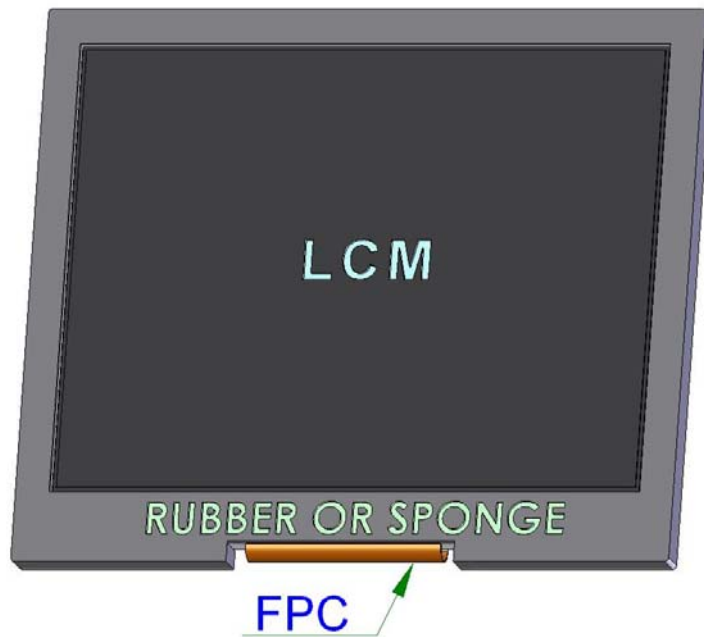
- (1) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.
- (2) After the module's end of life, it is not harmful in case of normal operation and storage.

### **15.3 Terms of Warrant**

- (1) Acceptance inspection period  
The period is within one month after the arrival of contracted commodity at the buyer's factory site.
- (2) Applicable warrant period  
The period is within twelve months since the date of shipping out under normal using and storage conditions.

#### 15.4 Cautions for LCM's installing and assembling

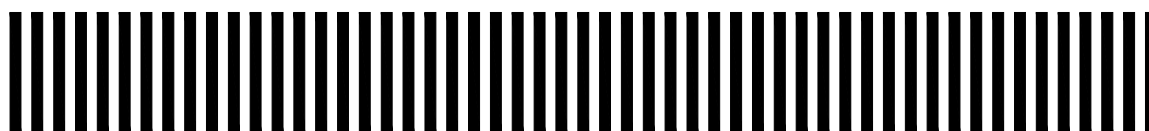
Please keep away the FPC while assembling or fixing the LCM to avoid FPC being damaged or extruded or other related problems. Please see below picture.



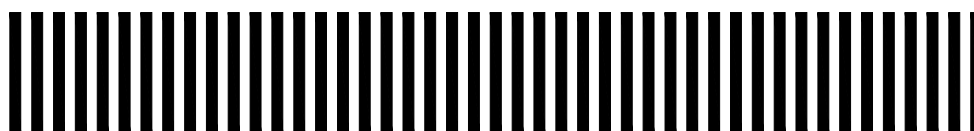


**17. Definition of Labels**

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



VGG322425-6UFLWI

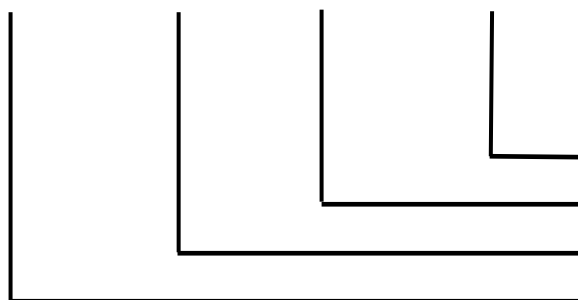


ABCDEFGHIJKL

(a) Module Name : VGG322425-6UFLWI

(b) Serial ID :

A B C D   E F G   H   I J K L



Serial No.  
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
Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Mark	A	B	C	D	E	F	G	H	I	J



<b>EVERVISION</b>	<b>MODEL NO.</b>		<b>PAGE</b>
	VGG322425-6UFLWI	SPEC SAMPLE	25

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) Serial No. (IJKL):

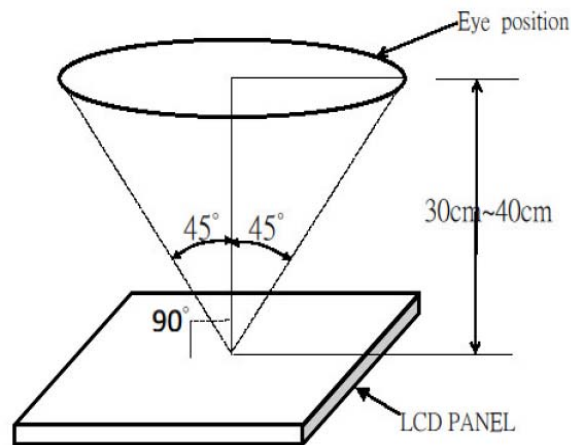
Manufacturing sequence of product, for example : 0001~9999.

## 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: 45 ~ 65 % RH
- (3) Viewing distance is approximately 30 ~ 40 cm
- (4) Viewing angle is normal to the LCD panel as Fig\_1 (  $\pm 45^{\circ}$  )
- (5) Ambient Illumination: 300 ~ 500 Lux for external appearance inspection



Fig\_1

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

- (1) Test method :According to ANSI/ASQC Z 1.4 .General Inspection Level II take a single time
- (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.

<b>EVERVISION</b>	<b>MODEL NO.</b>		<b>PAGE</b>
	VGG322425-6UFLWI	SPEC SAMPLE	27

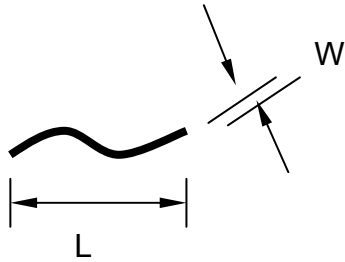
### 18.3 Inspection Parameters

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	$N \leq 0$	$N \leq 2$	$N \leq 6$	
		DARK DOT	$N \leq 2$	$N \leq 4$		
		TOTAL DOT	$N \leq 2$	$N \leq 4$		
TWO ADJACENT DOT	NOT ALLOWED					
THREE OR MORE ADJACENT DOT	NOT ALLOWED					
External Inspection (non-operating or operating)	Scratch ( in display area)	L(mm)	W(mm)	Acceptable number	Note:2	
		$L \leq 2.5$	$W \leq 0.1$	3		
		$L > 2.5$	$W > 0.1$	0		
	Polarizer dent or bubble ( in display area)	Dimension(mm)		Acceptable number		Note:3
		$D \leq 0.25$		Disregard		
		$D \leq 0.5$		4		
	Line Shape (Particles and Lint in display area)	L(mm)	W(mm)	Acceptable number		Note:2
		-	$W \leq 0.07$	Disregard		
		$L \leq 5$	$W \leq 0.1$	4		
		$L \geq 5$	$W \geq 0.1$	0		
	Dot Shape (Particle in Display area)	Dimension(mm)		Acceptable number		Note:3
		$D \leq 0.25$		Disregard		
$D \leq 0.5$		4				

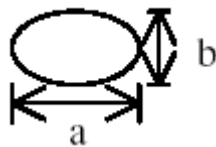
Item		Specification/Description			Note
Touch Panel	Scratch	L(mm)	W(mm)	Acceptable number	Note:2
		L ≤ 10	W < 0.05	Disregard	
			0.05 ≤ W < 0.1	N ≤ 4	
			W ≥ 0.1	0	
	Foreign Materials (Linear shape)	L ≤ 10	W < 0.05	Disregard	Note:2
			0.05 ≤ W < 0.1	N ≤ 3	
			W ≥ 0.1	0	
	Foreign Materials (Circular shape)	Dimension(mm)		Acceptable number	Note:3
		D ≤ 0.25		Disregard	
		0.25 < D ≤ 0.5		N ≤ 6	
Glass chipping		a ≤ 5.0mm b ≤ 3.0mm c ≤ t (t : Glass think)		Note:7	
		a ≤ 3.0mm b ≤ 3.0mm c ≤ t (t : Glass think)		Note:7	
Newton-ring	(In case of doubtful situations) Observe on 60° from the product surface under a white Fluorescent lamp (3-wavelength lamp).	Average diameter ≤ 1/3 Touch Panel area Disregard.		Note:7	
Membrane Drum		H ≤ 0.3mm		-	

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.

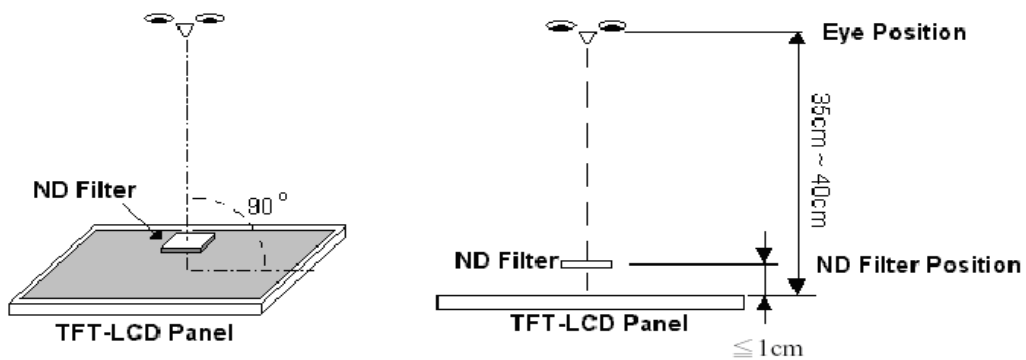
Note2.



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



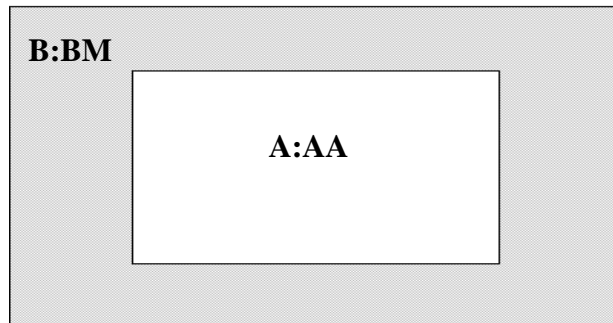
Note4. Bright dot is defined through 2% transmission ND Filter as following.



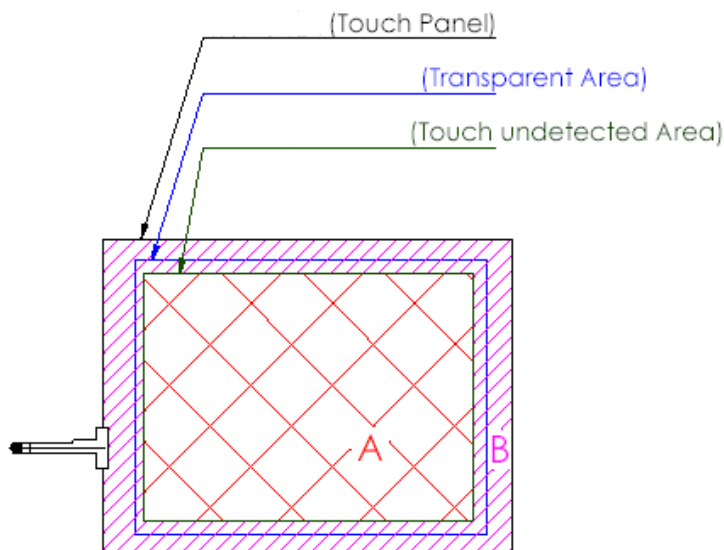
Note5. ADJACENT DOT



Note6.



Note7.



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

B area : None-specify

#### 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.