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. : VGG6448A4-6UFLWA(RoHS)

REVISION : 3

☐APPROVAL FOR SPECIFICATIONS ONLY

■APPROVAL FOR SPECIFICATIONS AND SAMPLE

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2. Record of Revisions

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3. Module Numbering System

V G G 6448 A4 – 6 U F L W A

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

4. Application

This specification is applied to the 5.7 inch VGA 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 5.7”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

- VGA (640×480 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	5.7 (Diagonal)	inch
Display Format	640RGB(H)×480(V)	dot
Active Area	115.2(H)×86.4(V)	mm
Dot Size	0.060(H)×0.180(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	144.0(W)×104.6(H)×14.5(D)	mm
Weight	229	g
RoHS Compliance	Eversion certifies this product to be in compliance with European Union Directive 2002/95/EC on the restriction of certain hazardous substances in electrical and electronic equipment.	-

7. Absolute Maximum Ratings

7.1 Absolute Ratings of Environment

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T_{ST}	-30	+80	°C	(1)(2)
Operating Ambient Temperature	T_{OP}	-20	+70	°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=VSS=0V)

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Digital Power Supply Voltage	VCC	-0.3	4.3	V	-

7.2.2 Backlight Unit

(Ta=25±2°C)

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Current of Backlight Unit	I_B	-	175	mA	(1)
Reverse voltage	V_R	-	15	V	(1)

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

8. Electrical Characteristics

8.1 TFT-LCD Module

(Ta=25±2°C)

Item	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Power Supply Voltage	VCC	3.0	3.3	3.6	V	-
Power Supply Current	ICC	-	261	365	mA	(1)
Input High Threshold Voltage	VIH	0.7VCC	-	VCC	V	-
Input Low Threshold Voltage	VIL	0	-	0.3VCC	V	-
Power Consumption	P_L	-	0.86	1.2	W	(1)
Frame Frequency	F_V	-	60	-	Hz	-
Dot Clock	DCLK	-	25.175	-	MHz	-

Note (1) The specified power consumption is under the conditions at VCC=3.3V, F_V=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_B	-	140	-	mA	-
Voltage of Backlight Unit	V_B	-	9.9	-	V	I_B =140mA
Power Consumption	P_{BL}	-	（1.39）	-	W	I_B =140mA
LED Life Time(25℃)	-	30000	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

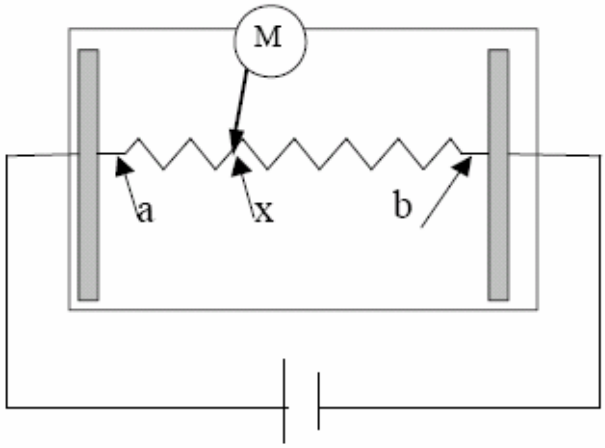
8.3 Transparent Touch panel

Electrical characteristics

Item		Value			Unit	Note
		Min.	Typ.	Max.		
Operating Voltage		-	5	7	V	-
Terminal Resistance	X-direction	100	-	1000	Ω	At connector
	Y-direction	100	-	1000	Ω	At connector
Insulation Resistance		≧ 20MΩ				At DC25V
Linearity		≦1.5%				（1）
Chatting		≦ 10 ms				At connector

Note(1): Measurement condition of Linearity

Linearity Definition



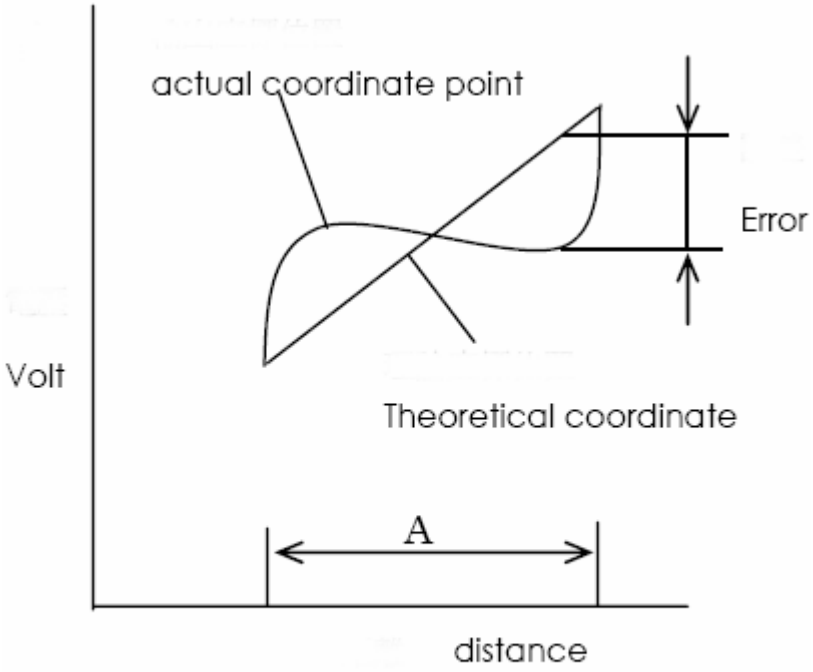
Va : maximum voltage in the active area of touch panel

Vb: minimum voltage in the active area of touch panel

X : random measuring point

Vxm: Actual voltage of Lx point

Vxi : Theoretical voltage of Lx point

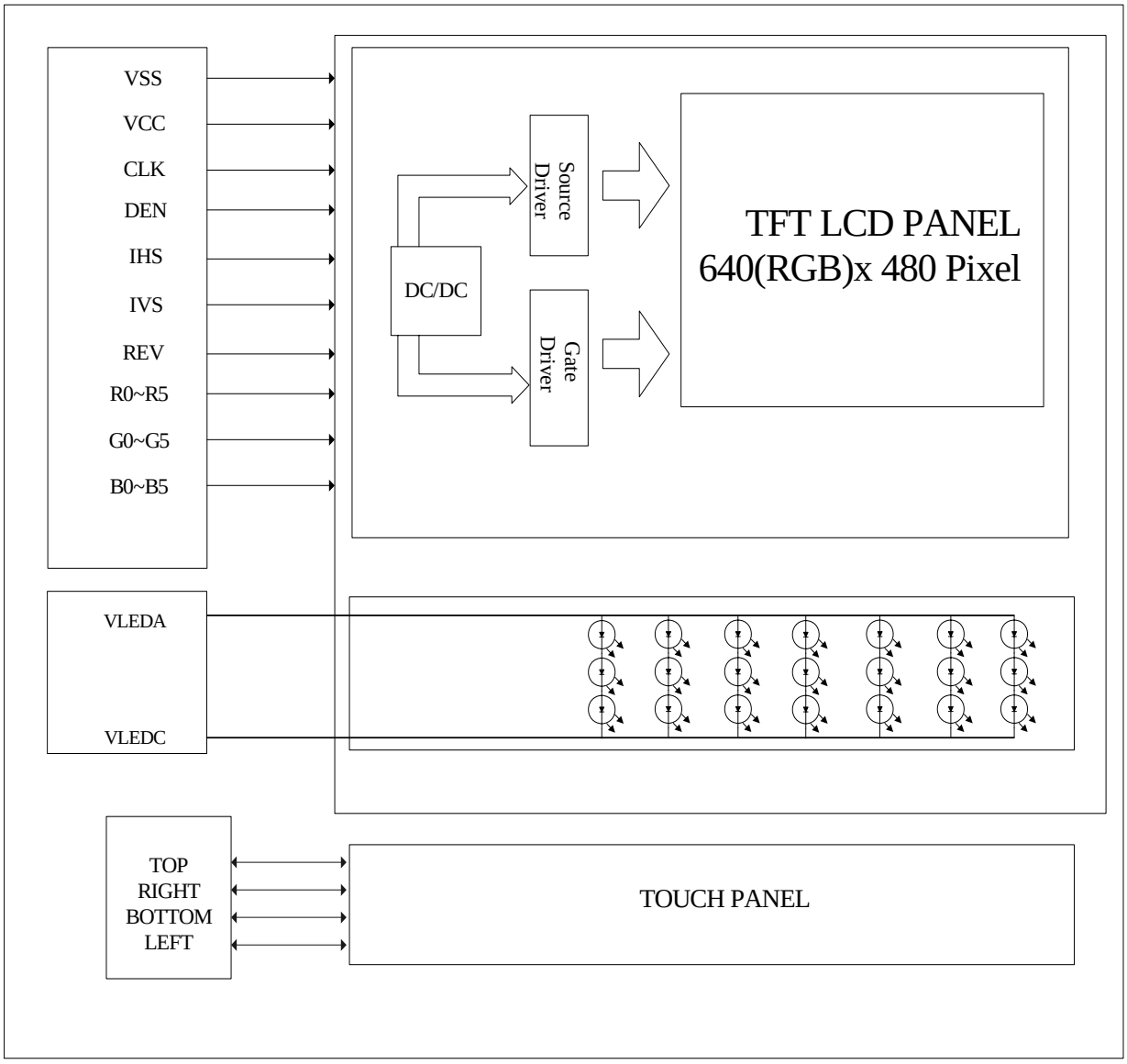


A:

Linearity : [½Vxi-Vxm½/ (Va-Vb)]*100%

9. Block Diagram

9.1 TFT-LCD Module with Backlight Unit



10. Input / Output Terminals Pin Assignment

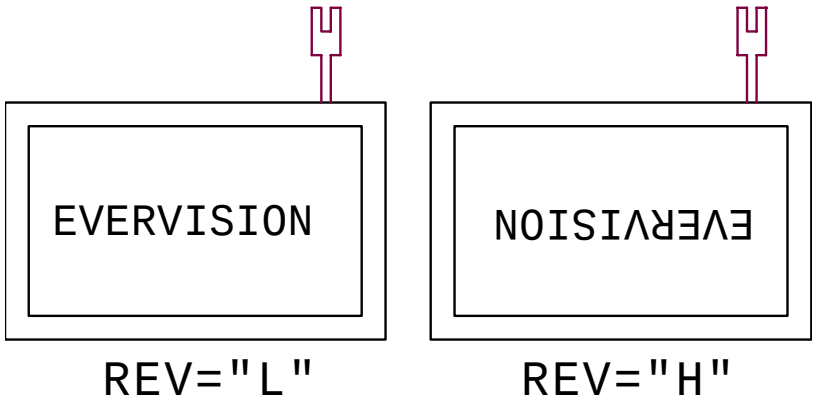
10.1 TFT-LCD Module

Connector: CVILUX CF25331D0R0-05

Pin No.	Symbol	I/O	Description
1	VSS	I	Ground
2	CLK	I	Clock signal
3	IHS	I	Horizontal synchronous signal
4	IVS	I	Vertical synchronous signal
5	VSS	I	Ground
6	R0	I	RED data (LSB)
7	R1	I	RED data
8	R2	I	RED data
9	R3	I	RED data
10	R4	I	RED data
11	R5	I	RED data(MSB)
12	VSS	I	Ground
13	G0	I	GREEN data(LSB)
14	G1	I	GREEN data
15	G2	I	GREEN data
16	G3	I	GREEN data
17	G4	I	GREEN data
18	G5	I	GREEN data(MSB)
19	VSS	I	Ground
20	B0	I	Blue data(LSB)
21	B1	I	Blue data
22	B2	I	Blue data
23	B3	I	Blue data
24	B4	I	Blue data
25	B5	I	Blue data(MSB)
26	VSS	I	Ground
27	DEN	I	Input data enable control
28	VCC	I	+3.3V power supply
29	VCC	I	+3.3V power supply

Pin No.	Symbol	I/O	Description
30	REV	I	Selection signal for horizontal/ vertical scanning direction. Note (1)
31	VSS	I	Ground
32	NC	I	No connection
33	VSS	I	Ground

Note (1)



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

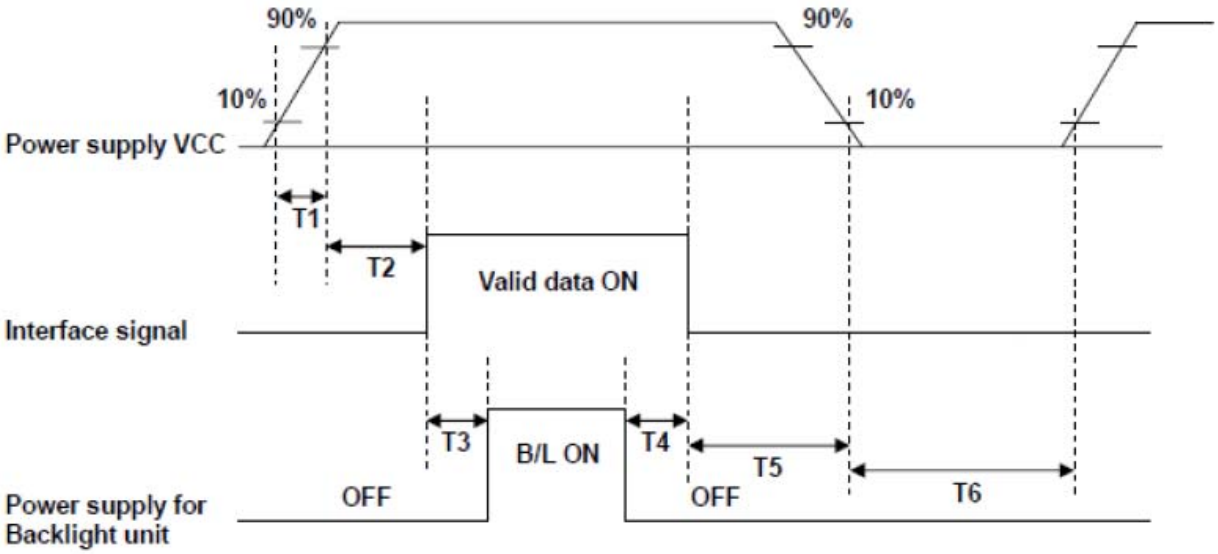
Pin No.	Symbol
1	TOP
2	RIGHT
3	BOTTOM
4	LEFT

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					
		D05	D04	D03	D02	D01	D00	D15	D14	D13	D12	D11	D10	D25	D24	D23	D22	D21	D20
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
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	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
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	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	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	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

10.5 Power ON/OFF Sequence



POWER SEQUENCE TABLE

Parameter	Value			Units
	Min.	Typ	Max.	
T1	1	-	2	ms
T2	101	-	-	ms
T3	34	-	-	ms
T4	34	-	-	ms
T5	34	-	-	ms
T6	1000	-	-	ms

11. Interface Timing

11.1 Input Signal Characteristics

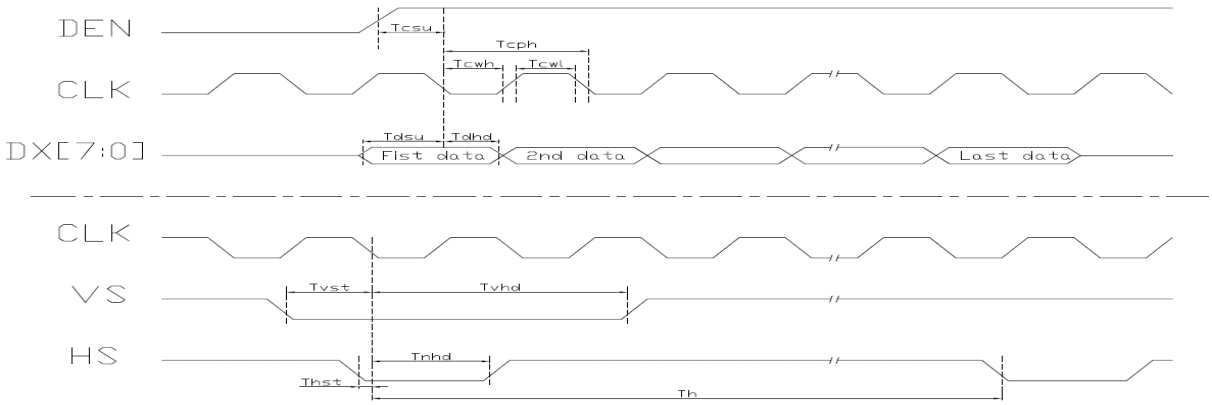
PARAMETER	Symbol	Min.	Typ.	Max.	Unit
HS setup time	T_{hst}	10	-	-	ns
HS hold time	T_{hhd}	10	-	-	ns
VS setup time	T_{vst}	10	-	-	ns
VS hold time	T_{vhd}	10	-	-	ns
Data setup time	T_{dsu}	10	-	-	ns
Data hold time	T_{dhd}	10	-	-	ns
DEN setup time	T_{esu}	10	-	-	ns
VS falling to HS falling time on odd field @ RGB mode	T_{HV_O}	-4	0	+4	T_{CPH}
VS falling to HS falling time on even field @ RGB mode	T_{HV_E}	0.4	0.5	0.6	T_H

PARAMETER	Symbol	Min.	Typ.	Max.	Unit
CLK frequency	F_{CPH}	-	25.175	-	MHz
CLK period	T_{CPH}	-	39.7	-	ns
CLK pulse duty	T_{CWH}	40	50	60	%
HS period	T_H	-	800	-	T_{CPH}
HS pulse width	T_{WH}	5	30	-	T_{CPH}
HS-DEN time	T_{HS}	112	144	175	T_{CPH}
DEN pulse width	T_{EP}	-	640	-	T_{CPH}
VS pulse width	T_{WV}	1	3	5	T_H
VS-DEN time	T_{STV}	-	35	-	T_H
VS period	T_V	-	525	-	T_H

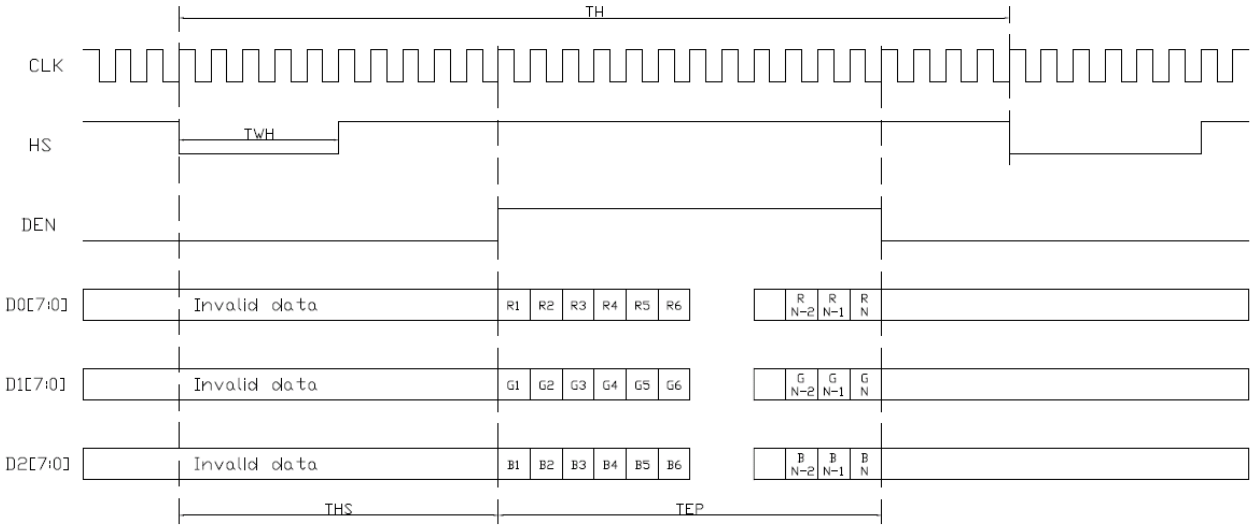
Note: When SYNC mode is used, 1st data start from 144th CLK after HS falling (when STHD[5:0]=00000)

11.2 Waveform

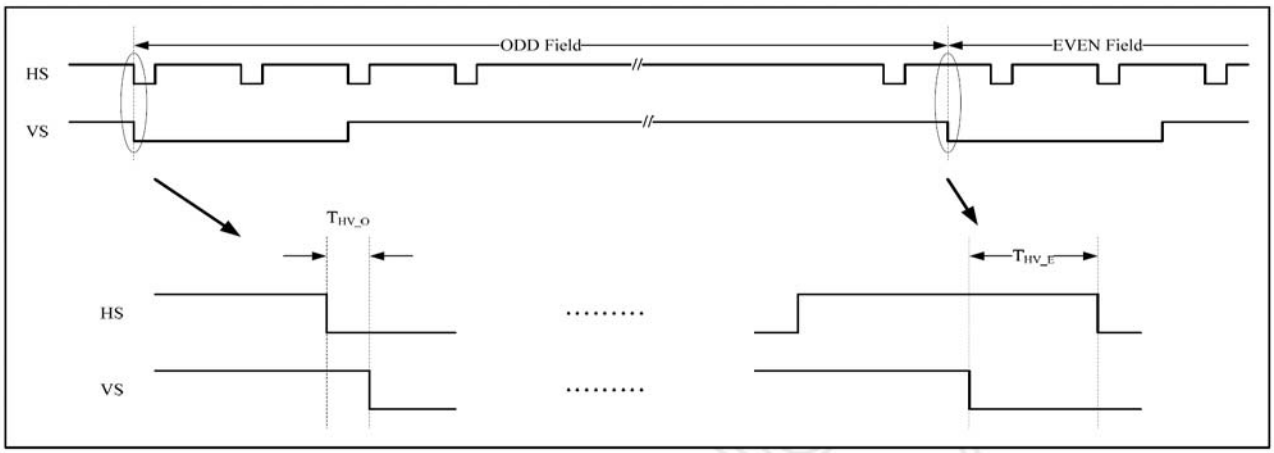
11.2.1 Clock and Data input waveforms



11.2.2 Data input format for RGB Mode



11.2.3 The HS & VS timing of the ODD/EVEN field

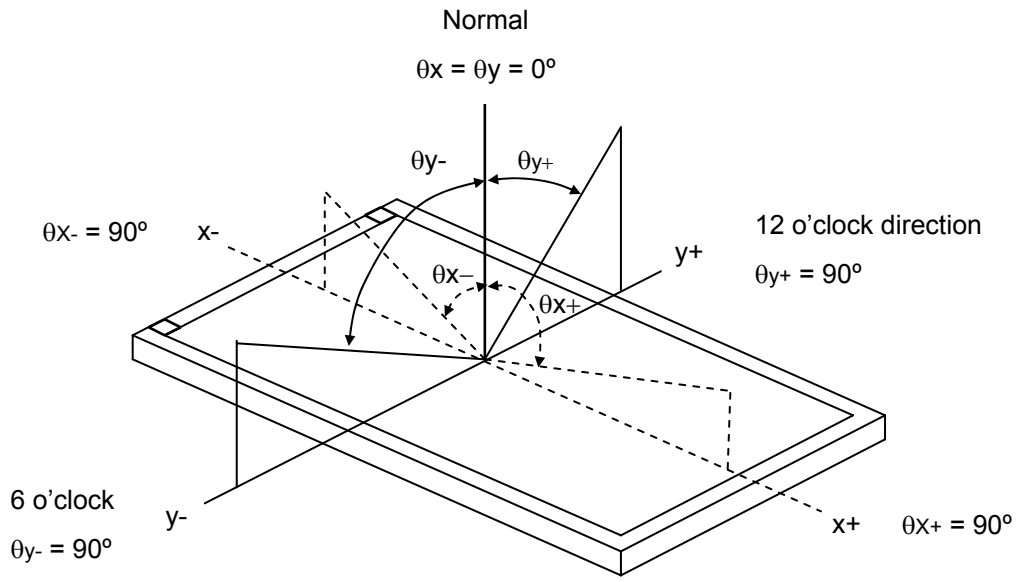


12. Optical Characteristics

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

Item		Symbol	Conditions	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	θ_x=0°, θ_Y =0° Viewing Normal Angle	200	（350）	-	-	(2)
Response Time		T_R		-	15	-	ms	(3)
		T_F		-	35	-	ms	
Luminance(Center)		Y		550	（630）	-	cd/m^2	(4)
Brightness uniformity		BUNI		80	（85）	-	%	(5)
Color Chromaticity	Red	Rx		0.580	（0.630）	0.680	-	(1),(4)
		Ry		0.300	（0.350）	0.400	-	
	Green	Gx		0.305	（0.355）	0.405	-	
		Gy		0.525	（0.575）	0.625	-	
	Blue	Bx		0.095	（0.145）	0.195	-	
		By		0.070	（0.120）	0.170	-	
	White	Wx		0.270	（0.320）	0.370	-	
		Wy		0.315	（0.365）	0.415	-	
Viewing Angle	Horizontal	θ_x+	CR≥10	55	（65）	-	deg.	
		θ_x-		55	（65）	-		
	Vertical	θ_Y+		55	（60）	-		
		θ_Y-		55	（70）	-		

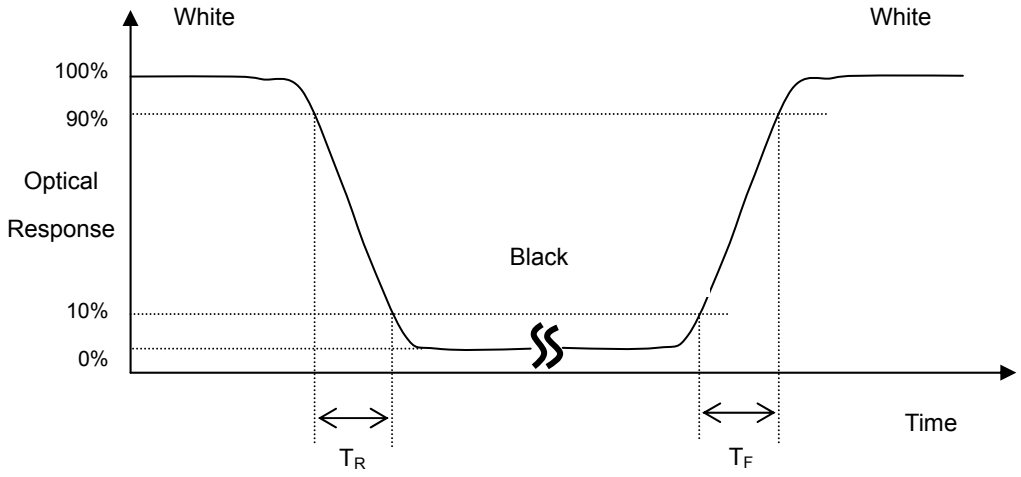
Note (1) Definition of Viewing Angle (θx, θy):



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

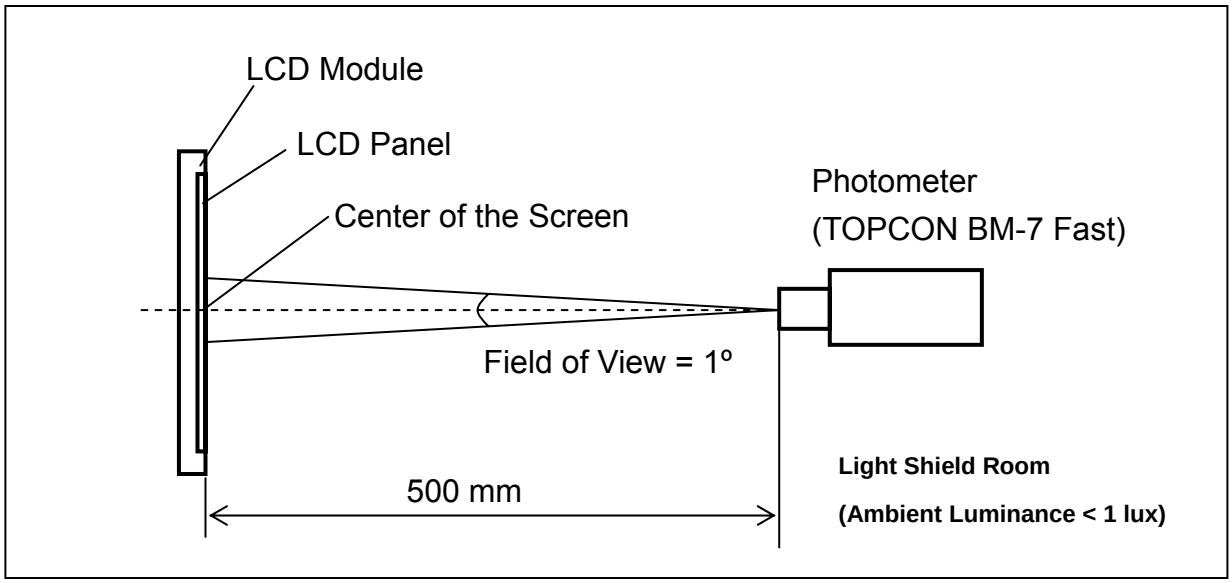
$$CR = \frac{\text{Luminance (brightness) all pixels "White"}}{\text{Luminance (brightness) all pixels "dark"}}$$

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



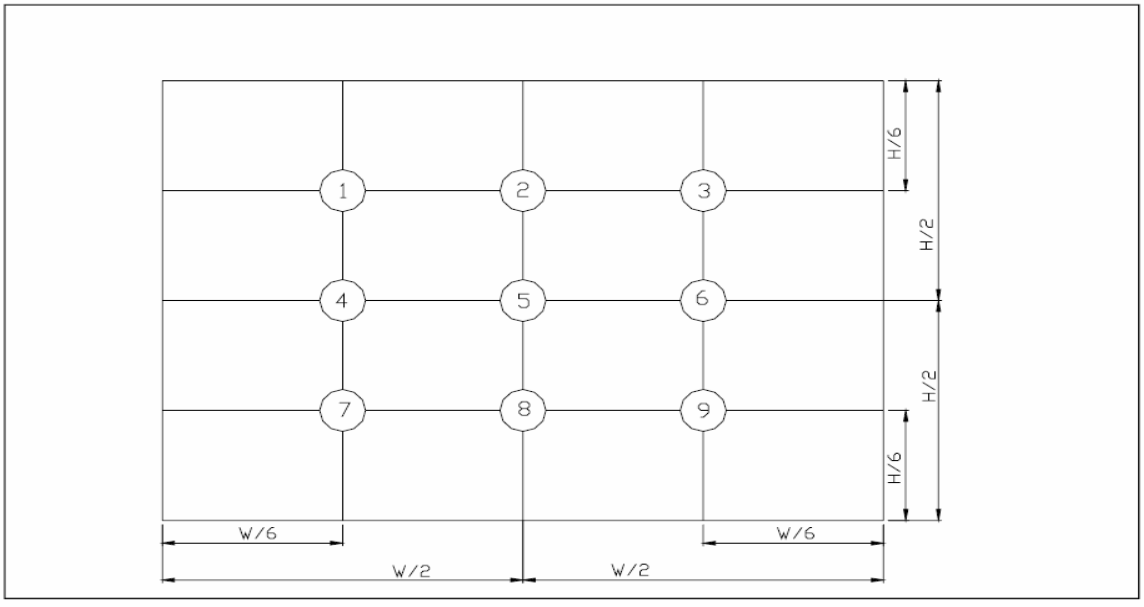
Note (4) Measurement Set-Up:

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)

13. Reliability Test

No.	Test Items	Test Condition	Remark
1	High Temperature Storage Test	T_a= 80℃ 240 hours	(1),(3),(4)
2	Low Temperature Storage Test	T_a= -30℃ 240 hours	(1),(3),(4)
3	High Temperature Operation Test	T_S= 70℃ 240 hours	(2),(3),(4)
4	Low Temperature Operation Test	T_a= -20℃ 240 hours	(1),(3),(4)
5	High Temperature and High Humidity Operation Test	T_a=60℃ 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℃(30min)~ 70℃(30min)，100 cycles	(3),(4)
10	Drop Test(with Carton)	Height：80cm 1 corner，3 edges，6 surfaces	(3)

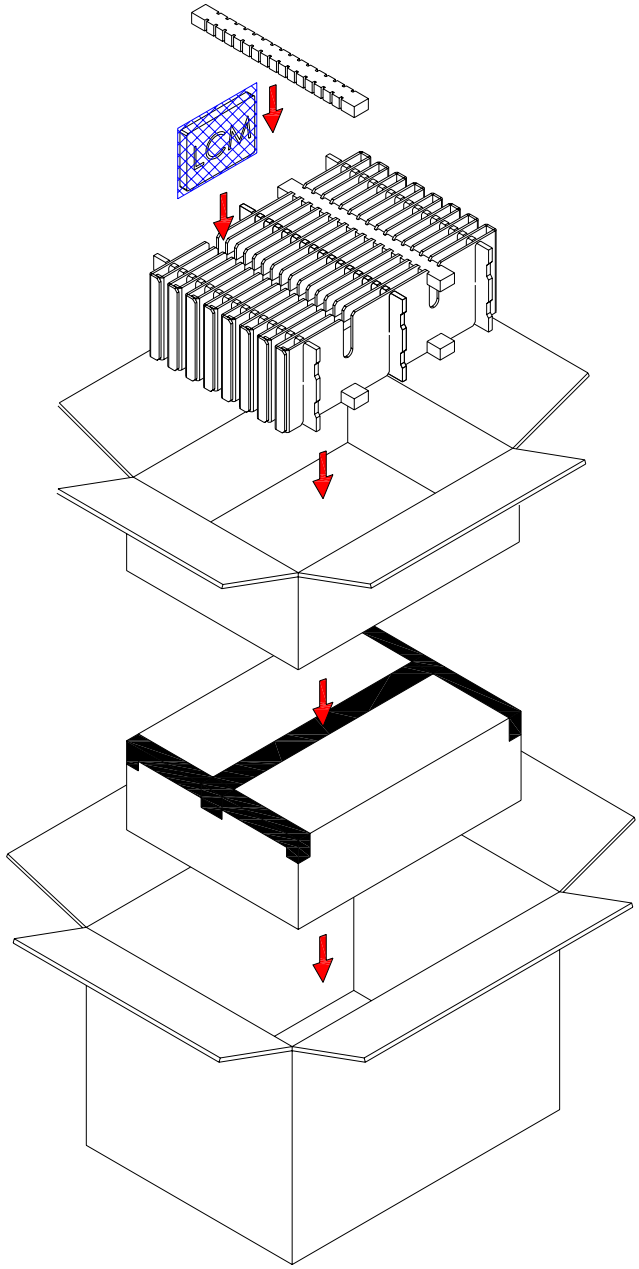
Note 1: Ta is the ambient temperature of samples.

Note 2: Ts 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.

14. Packaging



	PARTS LIST				
	ITEM	SIZE(LxWxH) unit:mm	MATERIAL	Q.T.Y	NOTE
1	STATIC SHIEDING BAGS	300.0x145.0x0.09		60	
2	EPE PAD	345.0x30.0x20.0	EPE	8	
3	CARD BOARD	345.0x150.0x3.5	CARTON	6	
4	CARD BOARD	450.0x23.0x150.0	CARTON	16	
5	INTERNAL BOX	455.0x350.0x164.0	CARTON	2	
6	EXTERNAL BOX	475.0x370.0x375.0	CARTON	1	
7	PRODUCT	144.0x104.6x14.5		60	

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 10ºC, 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

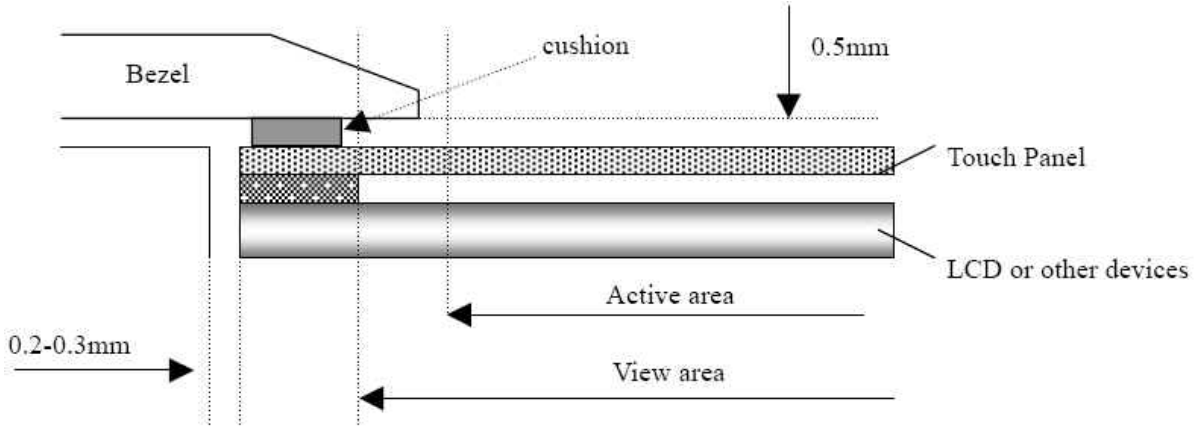
The period is within one month after the arrival of contracted commodity at the buyer's factory site.

(2) Applicable warrant period

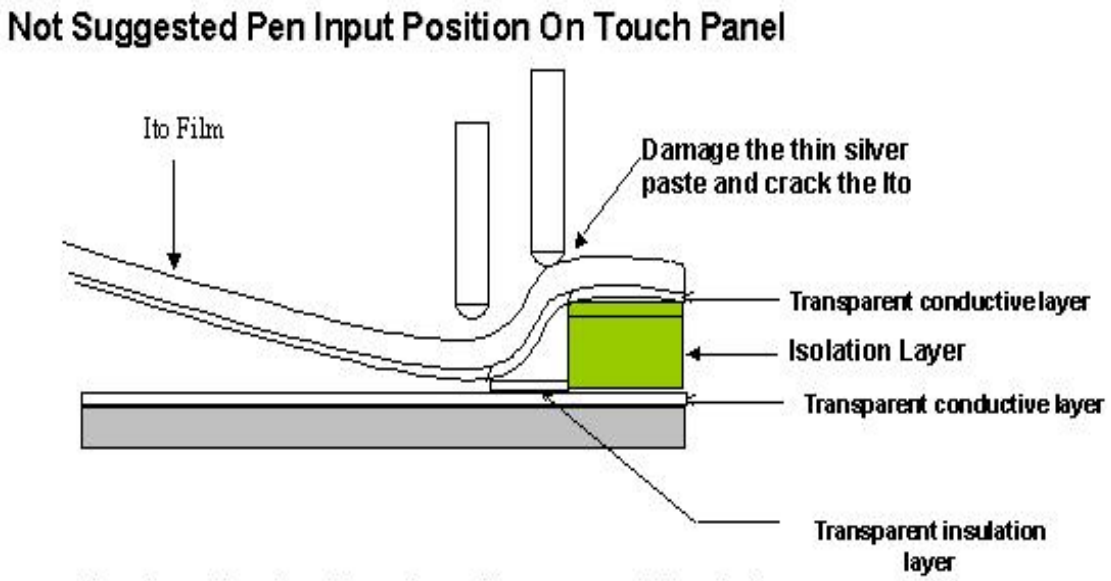
The period is within twelve months since the date of shipping out under normal using and storage conditions.

15.4 Cautions for 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.

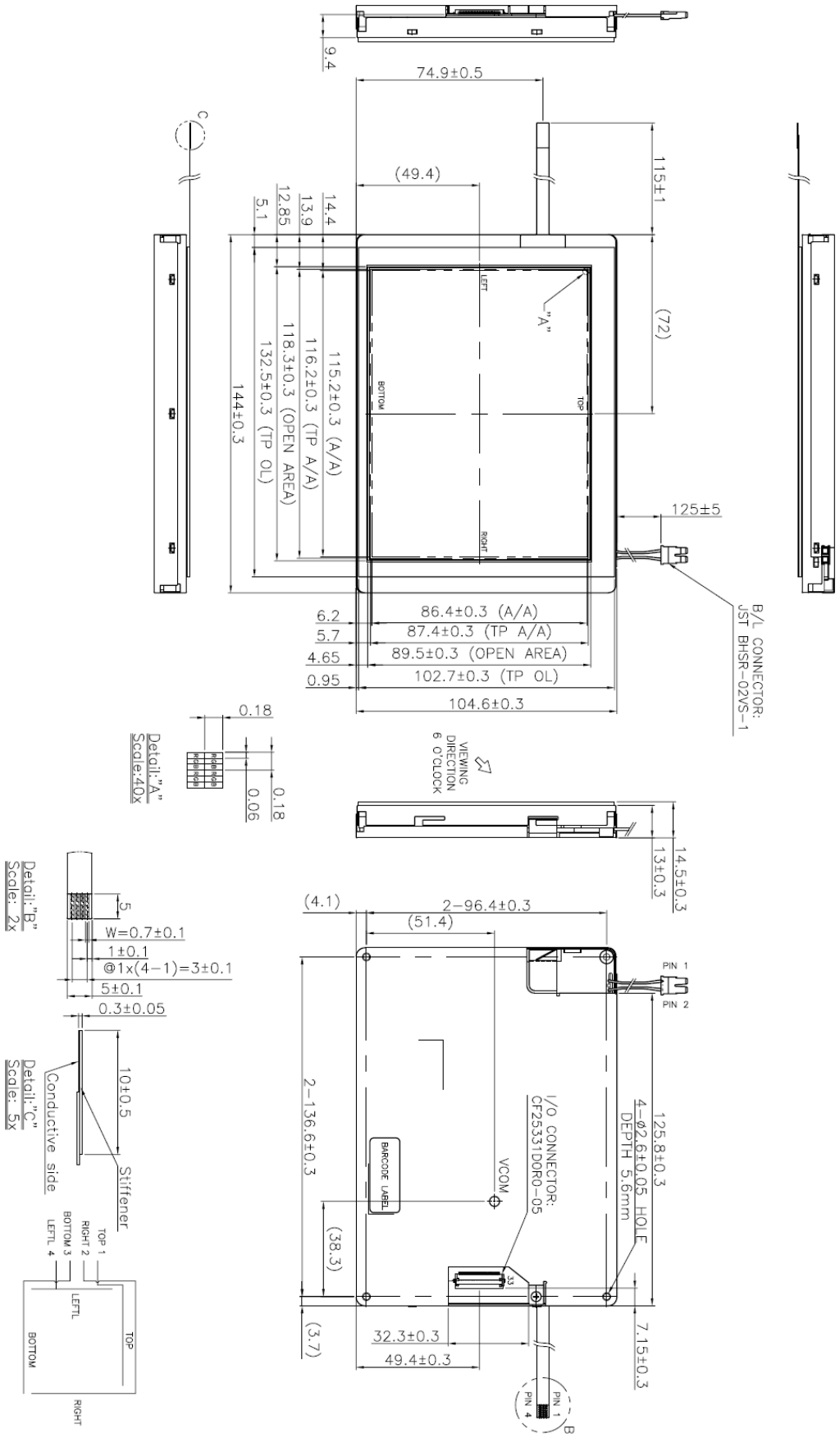


15.5 Operation Prohibit



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

16.Outline Drawing

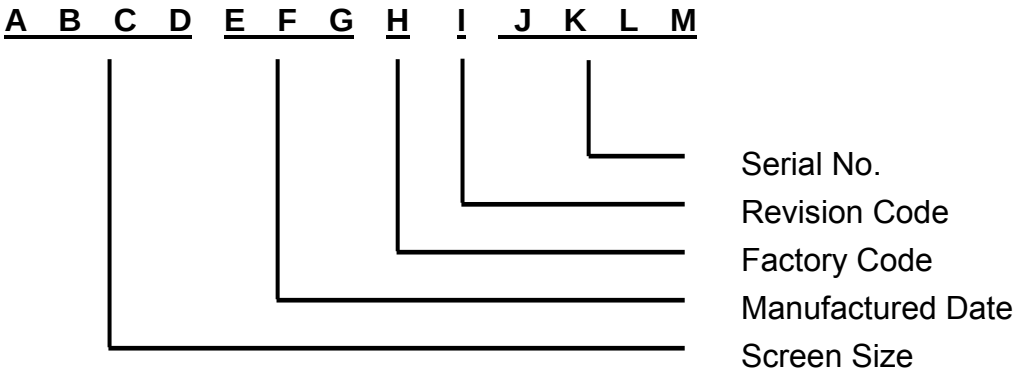


17.Definition of Labels

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

(a) Module Name: VGG6448A4-6UFLWA

(b) Serial ID:



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

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.

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 ± 5℃

(2) Humidity: 60 ± 5% RH

(3) Viewing distance is approximately 35 ~ 40 cm

(4)Viewing angle is normal to the LCD panel as Fig _1(10°)

(5) Ambient Illumination: 300 ~ 500 Lux for external appearance inspection

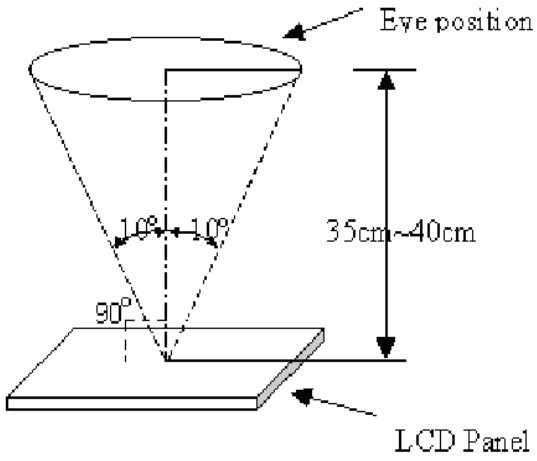


Fig _ 1

18.2 The defects classify of AQL as following:

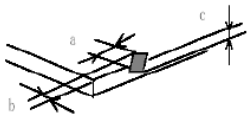
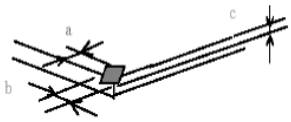
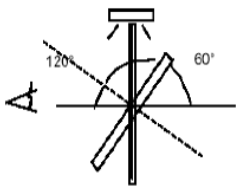
(1) Test method :According to ANSI/ASQC Z 1.4 .General Inspection Level Ⅱ take a single time

(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.

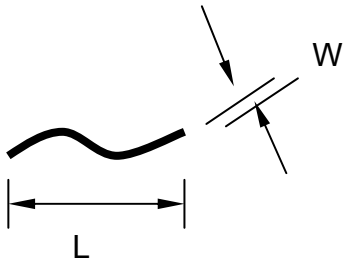
18.3 Inspection Parameters

<table>
<tr><th colspan="2">Item</th><th colspan="5">Specification/Description</th><th>Note</th></tr>
<tr><td rowspan="2">Display</td><td rowspan="2">Function</td><td colspan="5">No Display</td><td>-</td></tr>
<tr><td colspan="5">Malfunction</td><td>-</td></tr>
<tr><td rowspan="8">Operating</td><td>Contrast ratio</td><td colspan="5">Out of Spec</td><td>-</td></tr>
<tr><td>Line defect</td><td colspan="5">No obvious Vertical and Horizontal line defect in bright , dark and colored.</td><td>-</td></tr>
<tr><td rowspan="7">Point Defect (red,green,blue,dark, white)</td><td rowspan="2">Item</td><td colspan="3">Acceptable number</td><td rowspan="2">Total</td><td rowspan="7">Note: 1、4、5、6</td></tr>
<tr><td>A</td><td>B</td></tr>
<tr><td>BRIGHT DOT</td><td>N≦2</td><td>N≦2</td><td rowspan="3">N≦7</td></tr>
<tr><td>DARK DOT</td><td>N≦3</td><td>N≦4</td></tr>
<tr><td>TOTAL DOT</td><td>N≦4</td><td>N≦5</td></tr>
<tr><td>TWO ADJACENT DOT</td><td colspan="3">NOT ALLOWED</td></tr>
<tr><td>THREE OR MORE ADJACENT DOT</td><td colspan="3">NOT ALLOWED</td></tr>
<tr><td rowspan="3">External Inspection (non-operating)</td><td>Scratch on the polarizer</td><td colspan="5"><table><tr><td>L(mm)</td><td>W(mm)</td><td>Acceptable number</td></tr><tr><td>L≦2.5</td><td>W≦0.1</td><td>4</td></tr><tr><td>L＞2.5</td><td>W＞0.1</td><td>0</td></tr></table></td><td>Note:2</td></tr>
<tr><td>Dent or bubble on the polarizer</td><td colspan="5"><table><tr><td>Dimension(mm)</td><td>Acceptable number</td></tr><tr><td>D≦0.5</td><td>4</td></tr><tr><td>D≦0.15</td><td>Disregard</td></tr></table></td><td>Note:3</td></tr>
<tr><td>Foreign material on the polarizer</td><td colspan="5"><table><tr><td>Dimension(mm)</td><td>Acceptable number</td></tr><tr><td>D≦0.5</td><td>4</td></tr><tr><td>D≦0.15</td><td>Disregard</td></tr></table></td><td>Note:3</td></tr>
</table>

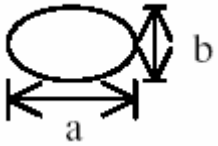
Item		Specification/Description			Note
Touch Panel	Scratch	L(mm)	W(mm)	Acceptable number	Note:2
		L≦10	W＜0.05	Disregard	
			0.05≦W＜0.1	N≦4	
			W≧0.1	0	
	Foreign Materials (Linear shape)	L≦10	W＜0.05	Disregard	Note:2
			0.05≦W＜0.1	N≦3	
			W≧0.1	0	
	Foreign Materials (Circular shape)	Dimension(mm)		Acceptable number	Note:3
		D≦0.25		Disregard	
		0.25＜D≦0.5		N≦6	
		D＞0.5		0	
	Glass chipping			a≦5mm b≦3mm c≦t (t：Glass think)	Note:7
				a≦3mm b≦3mm c≦t (t：Glass think)	Note:7
	Newton-ring	(In case of doubtful situations) Observe on 60° from the product surface under a while Fluorescent lamp(3-wavelength lamp). 		Average diameter ≦1/3 Touch Panel area Disregard.	Note:7
	Membrane Drum			H≦0.35mm	

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.

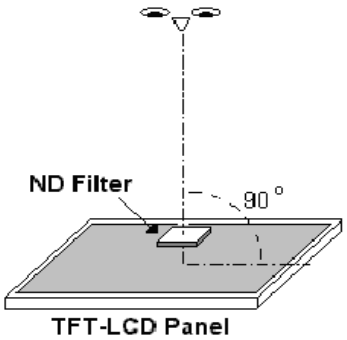
Note2.

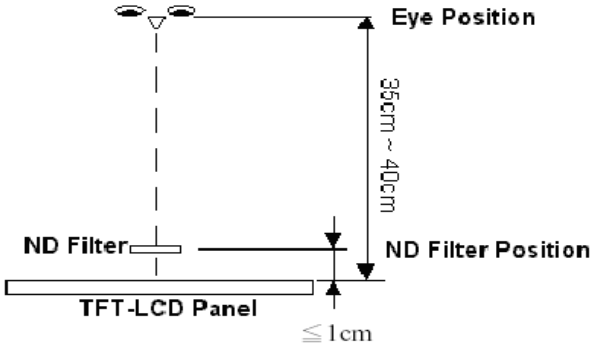


Note3. D：Diameter D=(a+b)/2



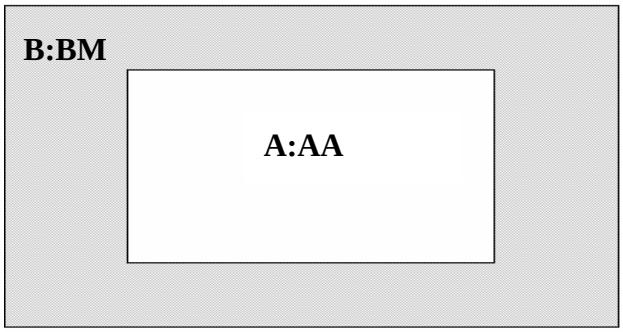
Note4. Bright dot is defined through 6% transmission ND Filter as following.



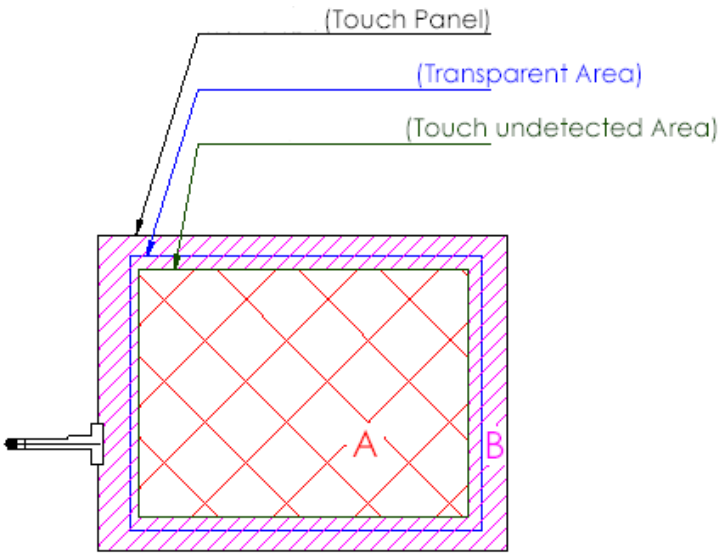


Note5. ADJACENT DOT

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.