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.：VGG804830-0TSLWC(RoHS)

REVISION：3

□APPROVAL FOR SPECIFICATIONS ONLY

■APPROVAL FOR SPECIFICATIONS AND SAMPLE

CUSTOMER：	APPROVED BY：
STD.	

EVERVISION LCM R&D CENTER

APPROVED BY	CHECKED BY	PREPARED BY	
EVERVISION 2019.01.16 Allen Chang	EVERVISION 2019.01.16 Allen Chang	EVERVISION 2019.01.16 Ino Yu	EVERVISION 2019.01.16 Angus Lin
DIRECTOR	MANAGER	Mechanism Engineer	Electronic Engineer

億力光電股份有限公司總公司
EVERVISION ELECTRONICS CO., LTD.
新北市中和區建一路 186 號 6 樓
6F., No.186, Jian 1st Rd., Zhonghe Dist.,
New Taipei City 235, Taiwan
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 CO., LTD.
-Taichung Branch
台中市潭子區建國路 19 號
No.19, Jianguo Rd., Tanzi Dist.,
Taichung City 427, Taiwan
TEL：+886 4 2532-8889
FAX：+886 4 2532-6689

勁佳光電(昆山)有限公司
VBEST ELECTRONICS(KUNSHAN) Co., 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

勁佳光電(昆山)有限公司東莞分公司
VBEST ELECTRONICS(KUNSHAN)Co.,Ltd.
- DongGuan Branch
東莞市莞城區東縱大道天寶路 23 號
No.23 Tian Bao Rd.,Dong Zong St.,
Dong Guan City, Guang Dong,China.
TEL：+86 769 3887 5000
FAX：+86 769 3896 0580

http://www.evervisionlcd.com

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2. Record of Revisions

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1	Preliminary Specification was first issued.	All	9/6’18
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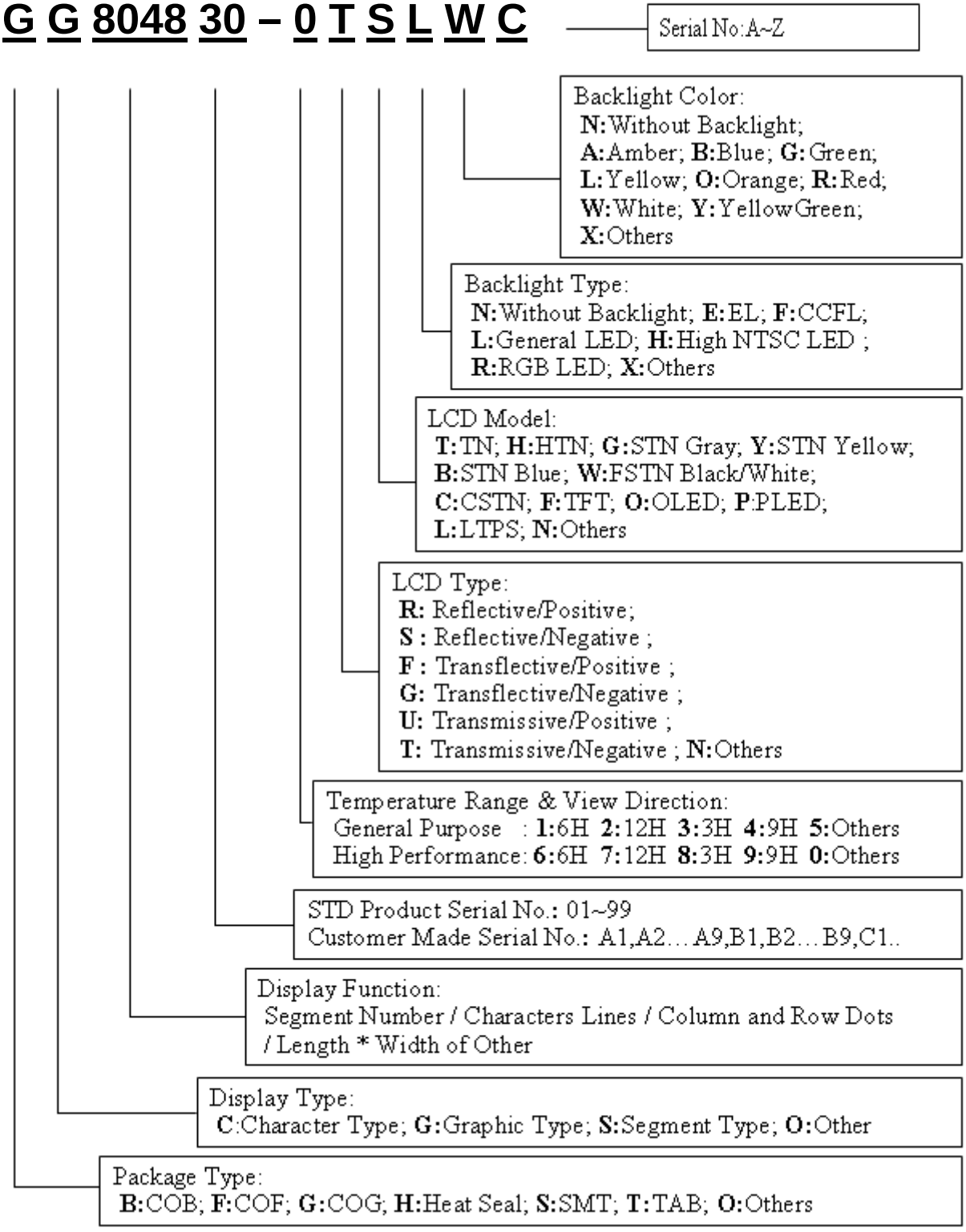
3. Module Numbering System

V G G 8048 30 – 0 T S L W C



4. Application

This specification is applied to the 4.3 inch supported TFT-LCD module, and can display true 16.2M colors(8 bit/ color).The module is designed for PMP, GPS application and other electronic products which require flat panel display of digital signal interface.

The model is composed of a TFT LCD panel, a driver circuit and a back-light system and used as the input devices for general electric appliances via both finger and Capacitive stylus pen.

5. Features

- WVGA (800×480 pixels) resolution.
- HDMI Interface.
- Projected Capacitive Touch
  - USB Interface
  - Multi Touch (Ten points)
  - 2048 x 2048 resolution

6. General Specifications

Item	Specifications	Unit
Screen Size	4.3 (Diagonal)	inch
Display Format	800RGB(H)×480(V)	dot
Active Area	95.04(H)×53.856(V)	mm
PIXEL Pitch	0.1188(H)×0.1122(V)	mm
Pixel Configuration	RGB Vertical Stripe	-
Display Mode	IPS Type / Transmissive Mode / Normally Black	-
Surface Treatment	Clear(7H)	-
Viewing Direction	Full view angle	-
Outline Dimension	125.5(W)×67.2(H)×10.3(D)	mm
Weight	（102）	g
RoHS Compliance	Eversion certifies this product to be in compliance with European Union Directive 2015/863/EU 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=V_{SS}=0V)

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	V_{CC}	-0.3	24	V	-
BLEN	PWM	-0.3	6	V	-

8. Electrical Characteristics

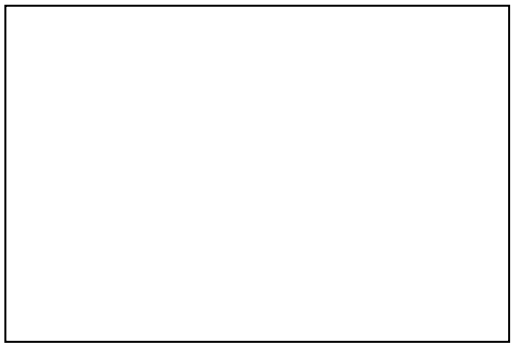
8.1 TFT-LCD Module

(Ta=25±2°C)

Item	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Power Supply Voltage	V_{CC}	4.5	5.0	5.5	V	-
Power Supply Current	I_{CC}	-	550	770	mA	(1)
Power Supply Voltage	V_{CC}	11.5	12.0	12.5	V	-
Power Supply Current	I_{CC}	-	200	280	mA	(1)
VSYNC Frequency	F_V	-	60	-	Hz	-
PWM signal Low voltage	V_{PWML}	0	-	0.8	V	-
PWM signal High voltage	V_{PWMH}	2.0	-	3.6	V	-
PWM frequency	f_{PWM}	0.1	-	200	kHz	Duty= 5%~100%
LED Life Time(25℃)	-	50000	60000	-	hr	(2)

Note (1) The specified power consumption is under the conditions at V_{CC}=5V or 12V, F_V=60Hz, whereas a power dissipation check pattern below is displayed.

White Pattern / 255 Gray



Active Area

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

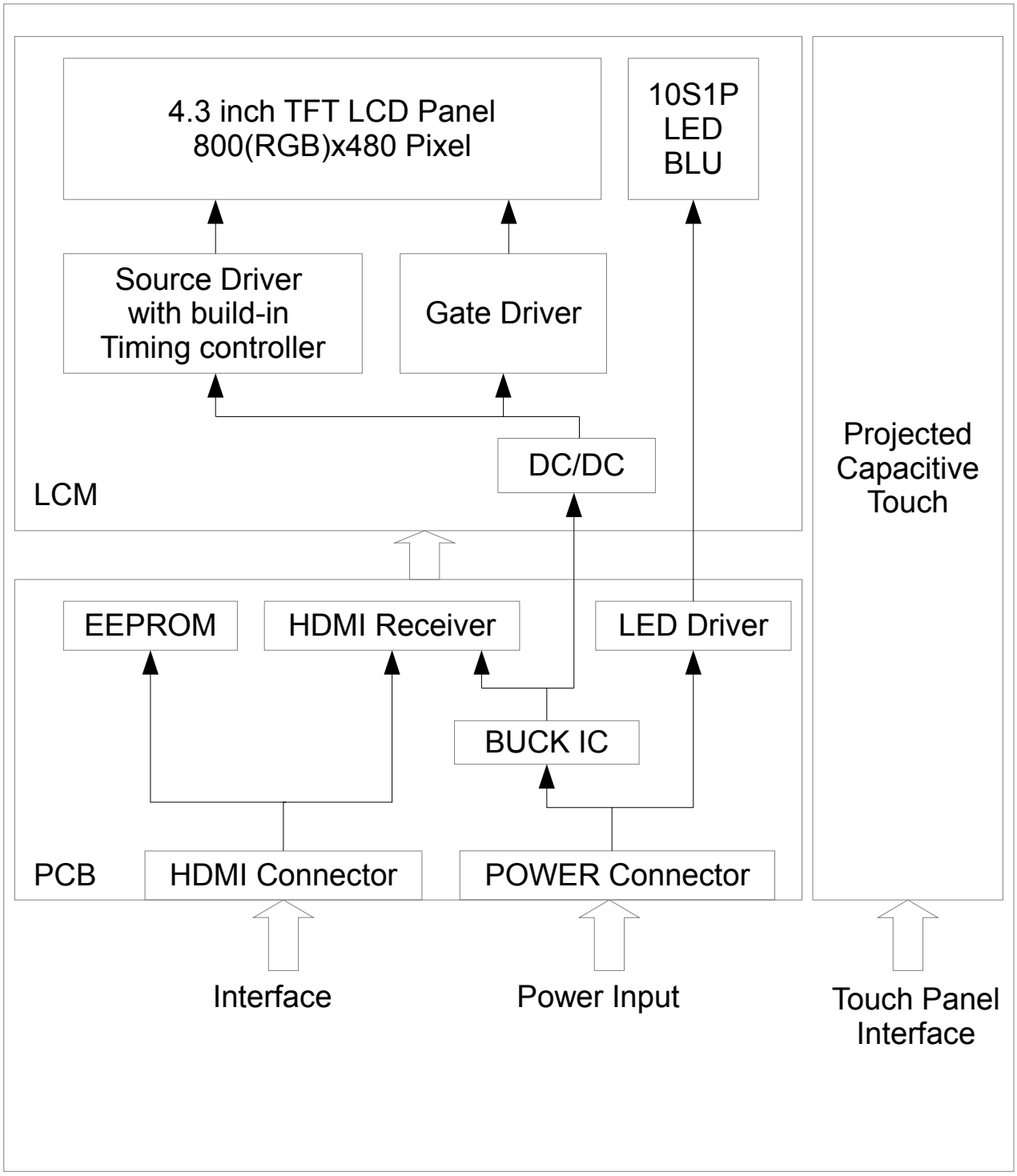
8.2 Projected Capacitive Touch

Item	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Operating Voltage	VDD	4.8	5.0	5.2	V	-
Output High Threshold Voltage	V_{OH}	2.8	-	-	V	V
Output Low Threshold Voltage	V_{OL}	-	-	0.8	V	V
Differential Input Sensitivity |(D+)-(D-)|	V_{DI}	0.2	-	-	V	V
Differential Input Common Mode Range	V_{CM}	0.8	-	2.5	V	V
Power Supply Current	IDD	-	30	42	mA	(1)
Power Consumption	P_L	-	150	210	mW	@5.0V
Report Rate	R_R	-	60	-	Hz	-
Interface		USB				-
Function		Multi Touch				-

Note (1) This test condition is touched with 10 points.

9. Block Diagram

TFT-LCD Module with Backlight Unit



10. Input / Output Terminals Pin Assignment

10.1 TFT-LCD Module

Connector: Mini-HDMI Connector

No.	Symbol	I/O	Description
1	TMDS Data2 Shield	I	Ground
2	TMDS Data2+	I	Channel-2 positive receiver input – Positive side of channel-2 TMDS low-voltage signal differential input pair. Channel-2 receives red-pixel data in active display and CTL2, CTL3 control signals in blank.
3	TMDS Data2–	I	Channel-2 negative receiver input – Negative side of channel-2 TMDS low-voltage signal differential input pair.
4	TMDS Data1 Shield	I	Ground
5	TMDS Data1+	I	Channel-1 positive receiver input – Positive side of channel-1 TMDS low-voltage signal differential input pair. Channel-1 receives green-pixel data in active display and CTL1 control signals in blank.
6	TMDS Data1–	I	Channel-1 negative receiver input – Negative side of channel-1 TMDS low-voltage signal differential input pair.
7	TMDS Data0 Shield	I	Ground
8	TMDS Data0+	I	Channel-0 positive receiver input – Positive side of channel-0. TMDS low-voltage signal differential input pair. Channel-0 receives blue pixel data in active display and HSYNC, VSYNC control signals in blank.
9	TMDS Data0–	I	Channel-0 negative receiver input – Negative side of channel-0. TMDS low-voltage signal differential input pair.

No.	Symbol	I/O	Description
10	TMDS Data0 Shield	I	Ground
11	TMDS Clock+	I	Clock positive receiver input – Positive side of reference clock. TMDS low-voltage signal differential input pair
12	TMDS Clock–	I	Clock negative receiver input – Negative side of reference clock. TMDS low-voltage signal differential input pair
13	DDC Ground	I	Ground
14	N.C.	I	Not Connection
15	DCC_SCL	I	Serial Clock for EEPROM
16	DCC_SDA	I	Serial Data for EEPROM
17	Reserved (N.C. on device)	I	Not Connection
18	+5V Power	I	5V for EEPROM
19	HPD	I	Hot Plug Detect High: Active link Low: Inactive link

10.2 Power Connector

Connector: CI4412M2HR0 or compatible connector

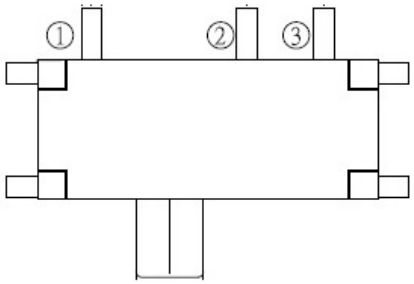
No.	Symbol	Functions
1	VCC	Power supply for LCM
2	VCC	Power supply for LCM
3	BLEN	PWM Dimmer
4	D+	USB data+ for PCT (Note 1)
5	D-	USB data- for PCT (Note 1)
6	VDD	+5V power supply for PCT
7	NC	Not Connection
8	NC	Not Connection
9	NC	Not Connection
10	NC	Not Connection
11	GND	Ground
12	GND	Ground

Note:

1. To avoid USB I/F IPCT damaged, please select only one connection method (Mini USB or Power Connector Pin 4 & 5 & 6) while using the module.

10.3 Slider Switch

Pin	Description	Note
1-2	PWM Dimmer	Default
2-3	HDMI Detection	-



10.4 Improved Projected Capacitive Touch

Connector: Mini USB Connector

No.	Symbol	Functions
1	VDD	+5V power supply for PCT
2	D-	USB data- for PCT
3	D+	USB data+ for PCT
4	ID	A type : connect to GND B type : keep floating
5	GND	Ground

Note: To avoid USB I/F IPCT damaged, please select only one connection method (Mini USB or Power Connector Pin 4 & 5 & 6) while using the module.

10.5 Color Data Input Assignment

The brightness of each primary color(red, green and blue) is based on the 8 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							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	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	0	0	0	0	0	0
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	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	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	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	Red(253)	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(255)	1	1	1	1	1	1	1	1	0	0	0	0	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	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
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	Green(253)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	Green(254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	Green(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	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	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	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	0	0	0	0	0	1	0
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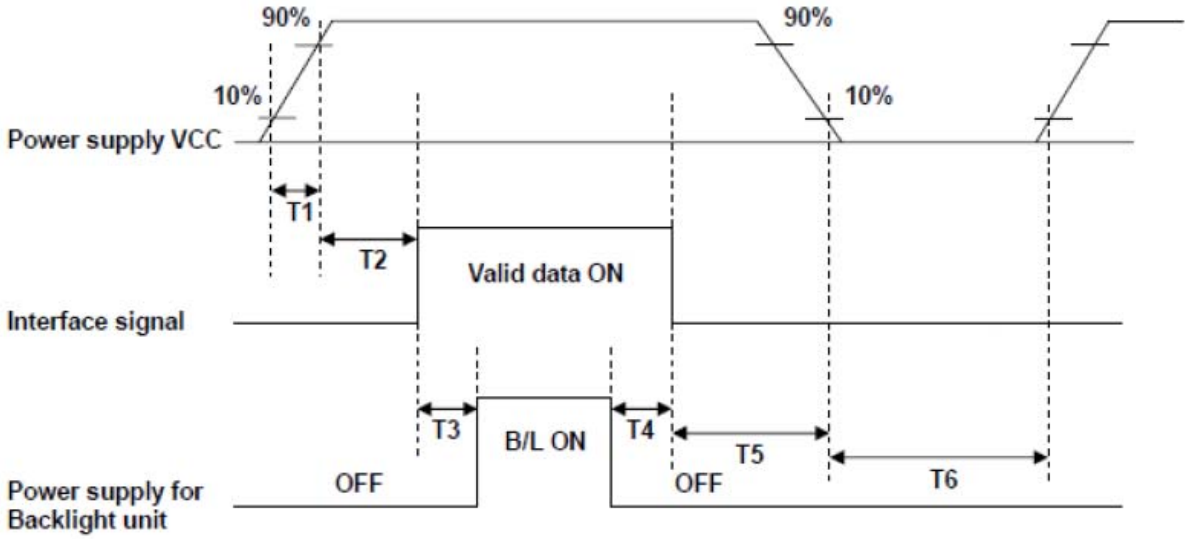
	Blue(253)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	Blue(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	Blue(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

10.6 Power ON/OFF Sequence



POWER SEQUENCE TABLE

Parameter	Value			Units
	Min.	Typ	Max.	
T1	0.5	-	10	ms
T2	40	-	80	ms
T3	200	-	-	ms
T4	200	-	-	ms
T5	40	-	80	ms
T6	1000	-	-	ms

11. Interface Timing

11.1. Timing Characteristic

Horizontal input timing

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Horizontal Display Area	thd		800		DCLK
DCLK Frequency	fclk	-	30	50	MHZ
One Horizontal Line	th	889	928	1143	DCLK
HS pulse width	thpw	1	48	255	DCLK
HS Back Porch (Blanking)	thb		88		DCLK
HS Front Porch	thfb	1	40	255	DCLK

Vertical input timing

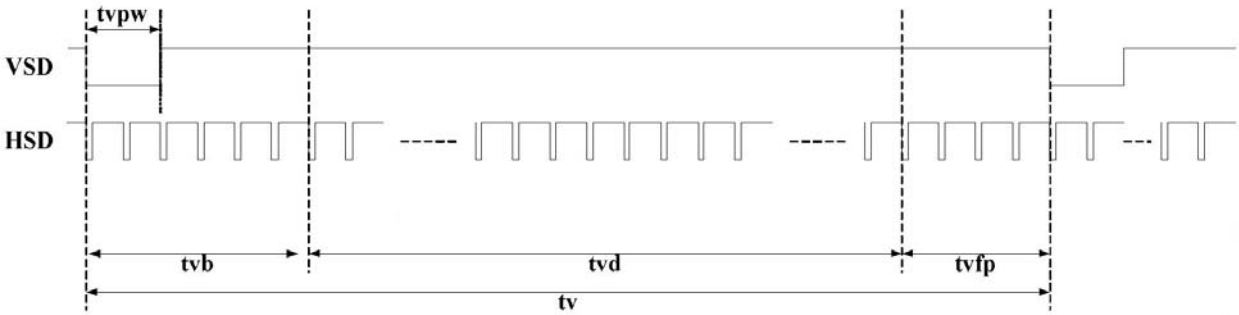
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Vertical Display Area	tvd		480		H
VS period time	tv	513	525	767	H
VS pulse width	tvpw	3	3	255	H
VS Back Porch (Blanjing)	tvb		32		H
VS Front Porch	tvfb	1	13	255	H

11.2. AC Electrical Characteristics (DVDD=VDD=3.0~3.6V, VSS=GND=0V)

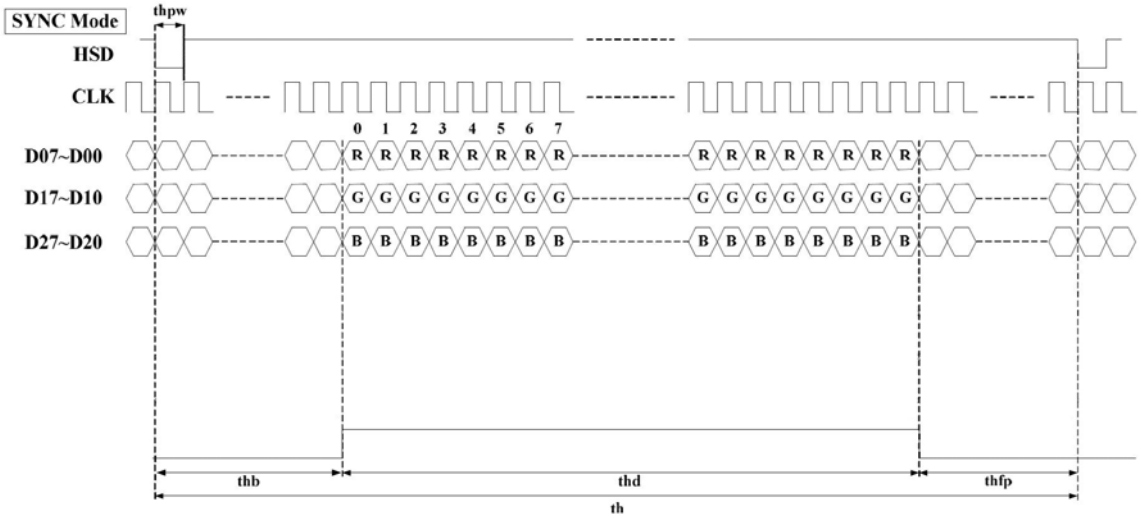
Parameter	Symbol	Min	Typ.	Max.	Unit	Conditions
VDD Power on Slew Rate	T_{POR}	-	-	20	ms	From 0V to 90% VDD
RSTB pulse width	T_{RST}	50	-	-	us	Clkin=50MHz
CLKIN cycle time	Tcph	20			ns	
CLKIN pulse duty	Tcwh	40	50	60	%	
VSD setup time	Tvst	8	-	-	ns	
VSD hold time	Tvhd	8	-	-	ns	
HSD setup time	Thst	8	-	-	ns	
HSD hold time	Thhd	8	-	-	ns	
Data setup time	Tdsu	8	-	-	ns	D[7:0], D1[7:0], D2[7:0] to clkin
Date hold time	Tdhd	8	-	-	ns	D[7:0], D1[7:0], D2[7:0] to clkin
Output stable time	Tsst	-	-	6	us	10% to 90% target voltage. CL=120pF, R=10Kohm

11.3. Data Input Format

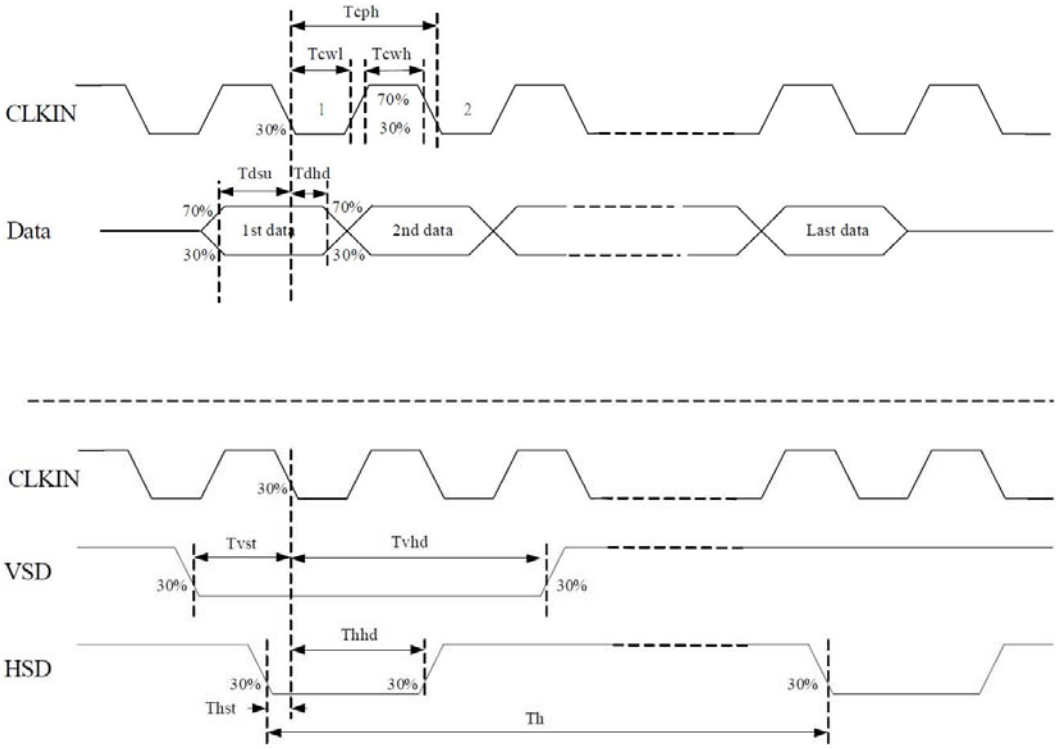
Vertical input timing



Horizontal input timing



Input Clock and Data Timing Diagram



11.4 USB Interface

11.4.1 Single Touch Function

Single Touch Function works with plug'n play under system Windows 2000 or later.

For other operating systems like Linux a driver must be programmed.

11.4.2 Multi Touch Function

The Multi Touch Function works with plug'n play under system Windows 7 or later.

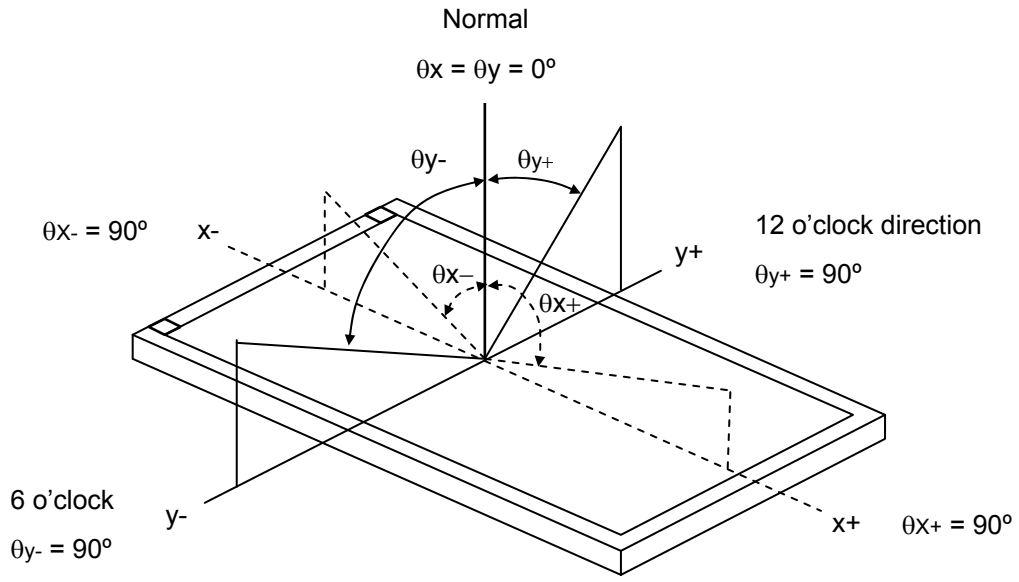
For older Windows systems or other operating systems a driver must be programmed.

12. Optical Characteristics

The optical characteristics should be measured in a dark environment (≦ 1 lux) or equivalent state with the methods shown in Note (5).

Item		Symbol	Conditions	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	θ_X=0°, θ_Y =0° Viewing Normal Angle	640	（900）	-	-	(2),(5)
Response Time		T_{R+} T_F		-	30	-	ms	(3)
Luminance（Center）		LC		560	（715）	-	cd/m^2	(4),(5)
Brightness uniformity		BUNI		70	（75）	-	%	(5),(6)
Color Chromaticity	Red	Rx		0.545	0.595	0.645	-	(1),(5)
		Ry		0.305	0.355	0.405	-	
	Green	Gx		0.315	0.365	0.415	-	
		Gy		0.535	0.585	0.635	-	
	Blue	Bx		0.095	0.145	0.195	-	
		By		0.065	0.115	0.165	-	
	White	Wx		0.290	0.340	0.390	-	
		Wy		0.305	0.355	0.405	-	
Viewing Angle	Horizontal	θ_X+	CR≥10	70	（80）	-	deg.	
		θ_X-		70	（80）	-		
	Vertical	θ_Y+		70	（80）	-		
		θ_Y-		70	（80）	-		

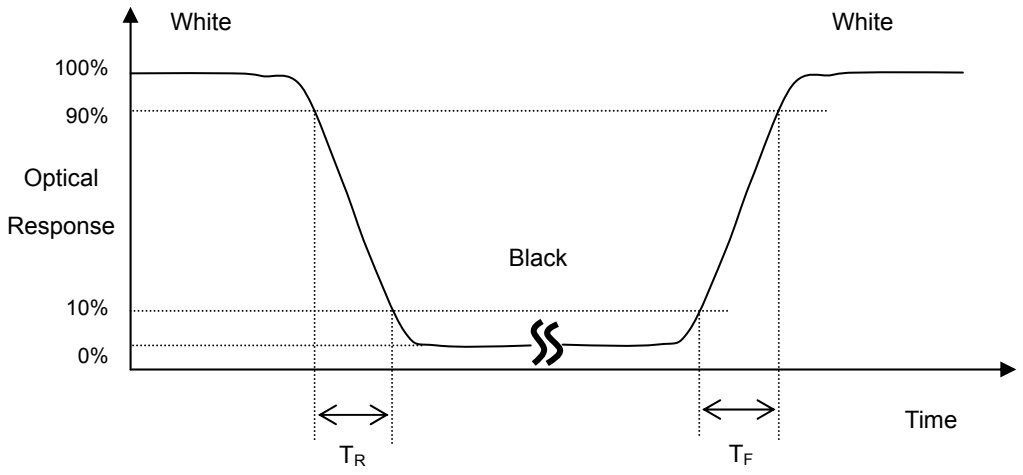
Note (1) Definition of Viewing Angle (θx, θy):



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

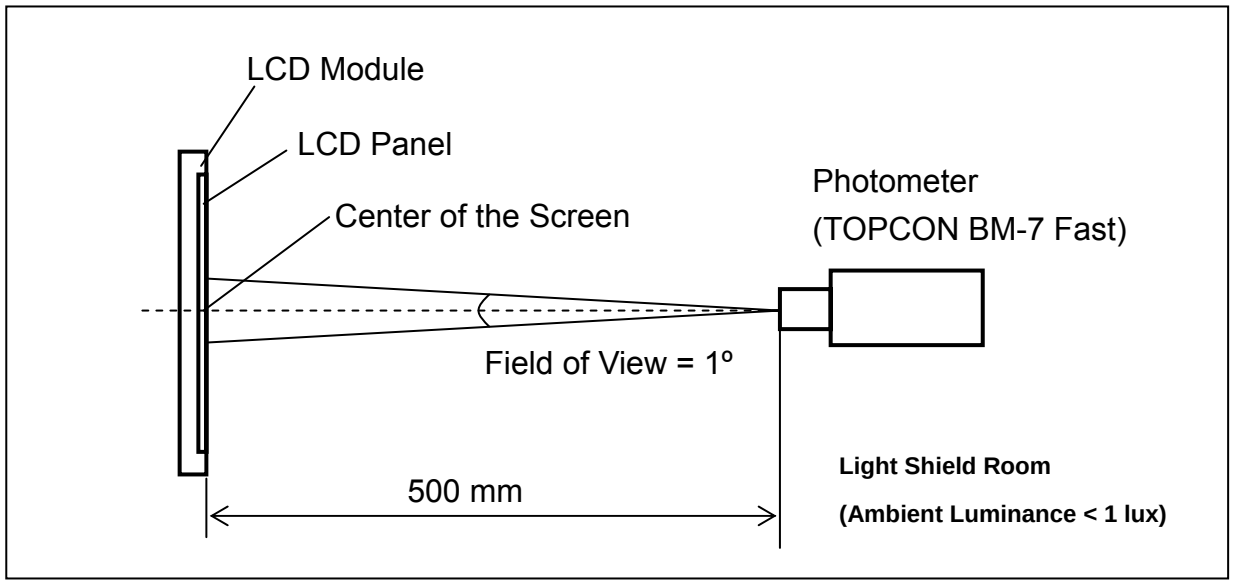
$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

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



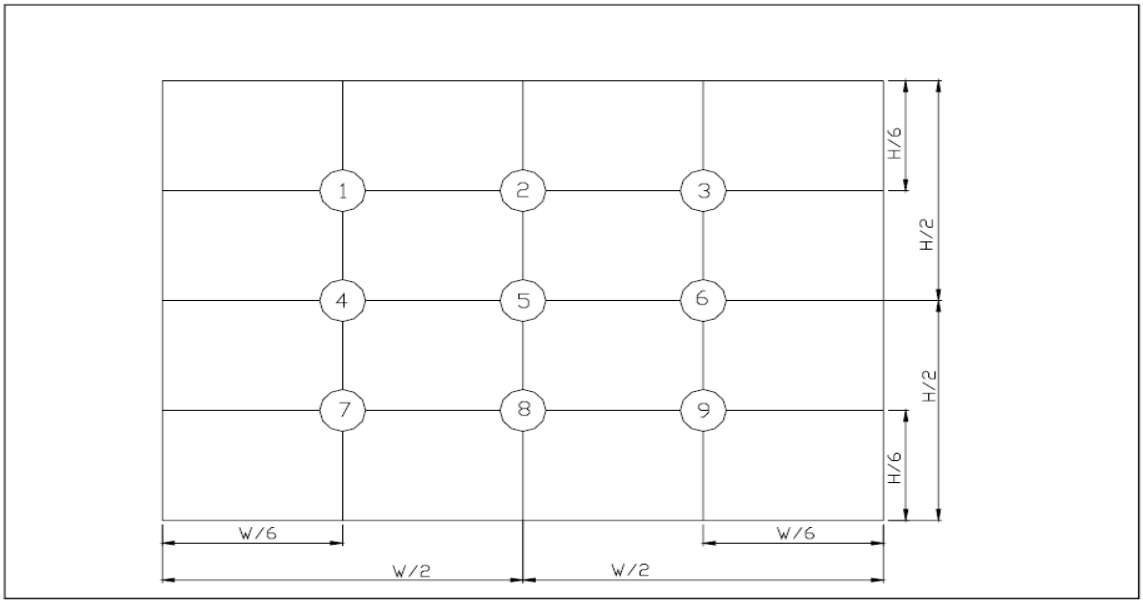
Note (4) Measurement Set-Up:

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)

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）, 10 cycles	（3）,（4）
10	Drop Test(with Carton)	Height：80㎝ 1 corner, 3 edges, 6 surfaces	（3）

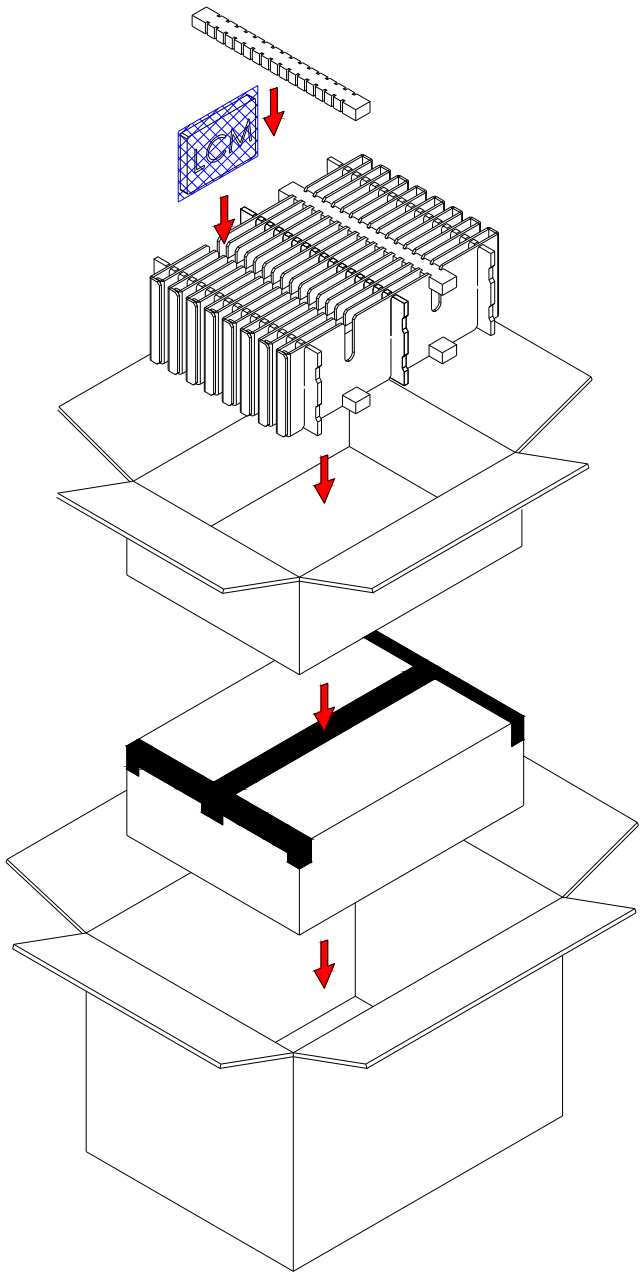
Note 1：Ta is the ambient temperature of samples.

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	300.0×145.0×0.09		60	
2	EPE PAD	345.0×30.0×20.0	EPE	8	
3	CARD BOARD	345.0×150.0×3.5	CARTON	6	
4	CARD BOARD	450.0×23.0×150.0	CARTON	16	
5	INTERNAL BOX	455.0×350.0×164.0	CARTON	2	
6	EXTERNAL BOX	475.0×370.0×375.0	CARTON	1	
7	PRODUCT	125.5×67.2×10.3		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

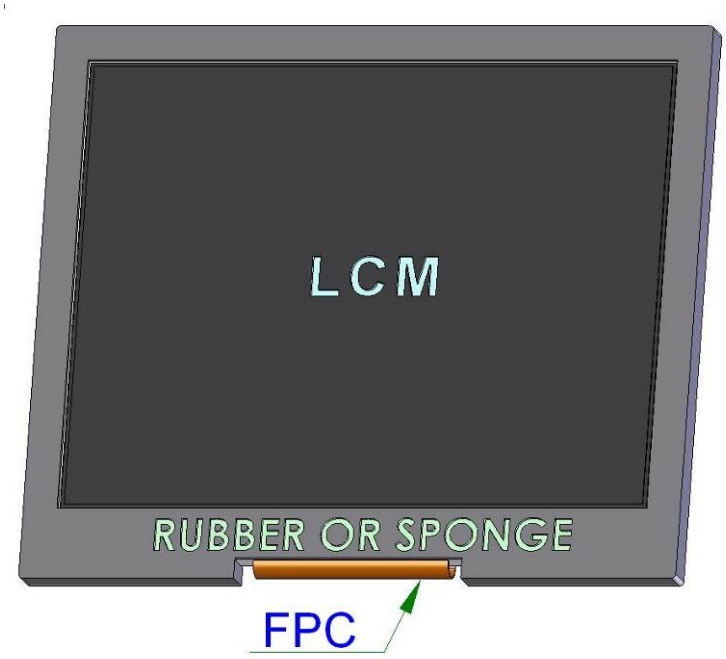
The period is within one month after the arrival of contracted commodity at the buyer's factory site.

(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 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.



15.5 Caution

This Eversion LCD module has been specifically designed for use only in electronic devices in the areas of audio control, office automation,industrial control, home appliances, etc. The modules should not be used in applications where module failure could result in physical harm or loss of life, and Eversion expressly disclaims any and all liability relating in any way to the use of the module in such applications.

15.6 Precautions of Storage

If the displays are going to be stored for years, please be aware the following notices.

(1) Please store the displays in a dark room to avoid any damages from sunlight and other sources of UV light.

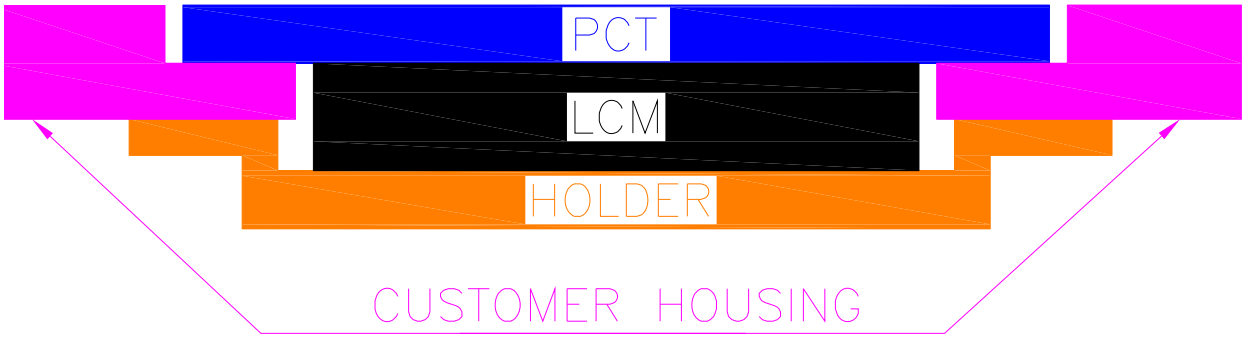
(2) The recommended long term storage temperature is between 10 ~35℃ and <60% humidity to avoid causing bubbles between polarizer and LCD glasses, and polarizer peeling from LCD glasses.

(3) It would be better to keep the displays in the container, which is shipped from Eversion, and do not unpack it.

(4) Please do not stick any labels on the display surface for a long time, especially on the polarizer.

15.7 Cautions for LCM installation

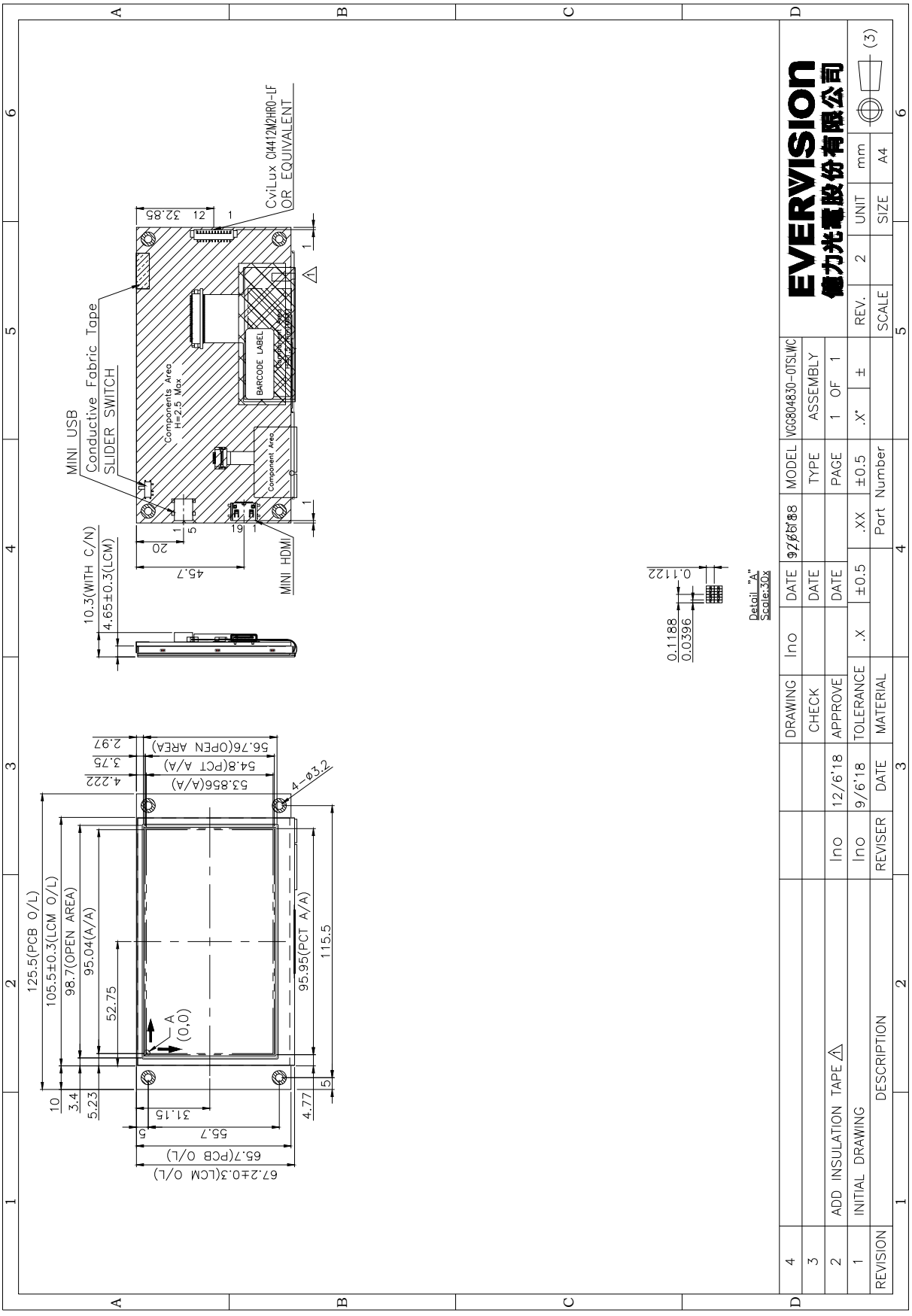
To secure the LCM within customer housing, having appropriate structural support underneath the LCM is a must. The recommended LCM installation with a holder type of the structure into the customer housing is shown below figure. By attaching ONLY the protruding edges of the PCT with cover lens onto the customer housing does not provide a proper structural support required for the LCM. Such construction may deteriorate the adhesivity between the PCT with cover lens and the TFT module, especially after a long period of time or from the vibrations encountered during product transportation.



15.8 Cautions for PCT

To prevent un-expected touch issue and suppress influence noise from system, the LCM metal frame should be connected to system ground in customer's device.

16.Outline Drawing

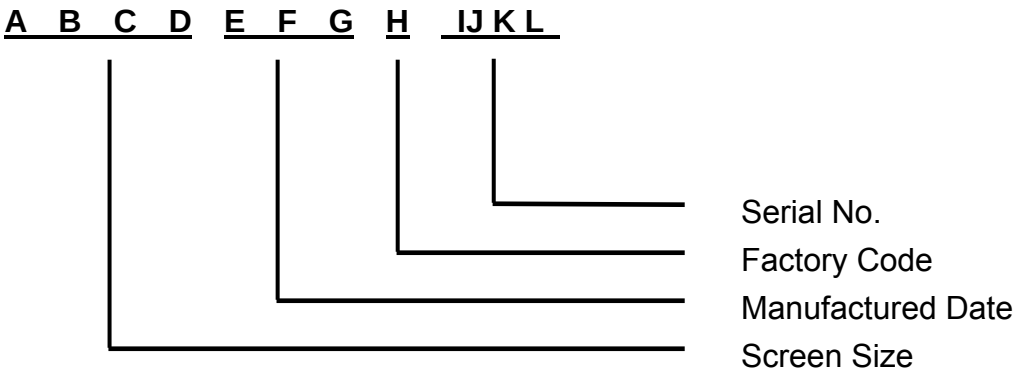


17.Definition of Labels

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

（a）Module Name：VGG804830-0TSLWC

（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
Year	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Mark	K	L	M	N	O	P	Q	R	S	T
Year	2030	2031	2032	2033	2034	2035				
Mark	U	V	W	X	Y	Z				

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

1.The environmental condition of inspection

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

(1) Ambient temperature 25 ± 5℃

(2) Humidity: 45 ~ 65 % RH

(3) Viewing distance is approximately 30 cm

(4)Viewing angle is normal to the LCD panel as Fig _1 (± 45°)

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

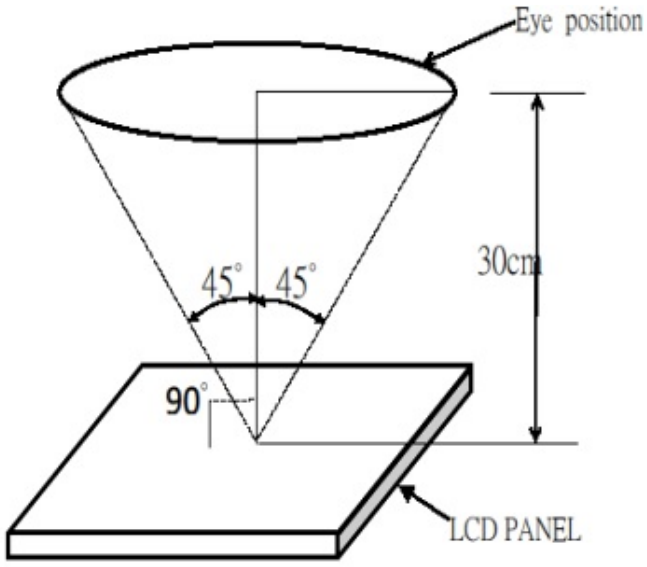


Fig_1

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.

3 Inspection Parameters

<table>
<tr><th colspan="2">Item</th><th>Specification/Description</th><th>Note</th></tr>
<tr><td rowspan="2">Display</td><td>Function</td><td>No Display</td><td>-</td></tr>
<tr><td></td><td>Malfunction</td><td>-</td></tr>
<tr><td rowspan="5">Operating</td><td>Contrast ratio</td><td>Out of Spec</td><td>-</td></tr>
<tr><td>Line defect</td><td>No obvious Vertical and Horizontal line defect in bright , dark and colored.</td><td>-</td></tr>
<tr><td rowspan="6">Point Defect
(red ,green ,blue ,dark ,white)</td><td colspan="3">
<table>
<tr><th rowspan="2">Item</th><th colspan="3">Acceptable number</th></tr>
<tr><th>A</th><th>B</th><th>Total</th></tr>
<tr><td>BRIGHT DOT</td><td>N≦1</td><td>N≦2</td><td rowspan="3">N≦6</td></tr>
<tr><td>DARK DOT</td><td>N≦2</td><td>N≦4</td></tr>
<tr><td>TOTAL DOT</td><td>N≦3</td><td>N≦4</td></tr>
<tr><td>Distance between Bright - Bright</td><td colspan="3">-</td></tr>
<tr><td>Distance between Dark - Dark</td><td colspan="3">≥5mm</td></tr>
<tr><td>Distance between Bright - Dark</td><td colspan="3">-</td></tr>
</table>
</td><td>Note:
1、4、
5、6</td></tr>
<tr><td rowspan="4">External Inspection
(non-operating or operating)</td><td>Scratch
(in display area)</td><td>
<table>
<tr><th>L(mm)</th><th>W(mm)</th><th>Acceptable number</th></tr>
<tr><td>L≦2.5</td><td>W≦0.1</td><td>3</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>Polarizer dent or bubble
(in display area)</td><td>
<table>
<tr><th>Dimension(mm)</th><th>Acceptable number</th></tr>
<tr><td>D≦0.25</td><td>Disregard</td></tr>
<tr><td>D≦0.5</td><td>4</td></tr>
</table>
</td><td>Note:3</td></tr>
<tr><td>Line Shape
(Particles and Lint in display area)</td><td>
<table>
<tr><th>L(mm)</th><th>W(mm)</th><th>Acceptable number</th></tr>
<tr><td>-</td><td>W≦0.07</td><td>Disregard</td></tr>
<tr><td>L≦5</td><td>W≦0.1</td><td>4</td></tr>
<tr><td>L≧5</td><td>W≧0.1</td><td>0</td></tr>
</table>
</td><td>Note:2</td></tr>
<tr><td>Dot Shape
(Particle in Display area)</td><td>
<table>
<tr><th>Dimension(mm)</th><th>Acceptable number</th></tr>
<tr><td>D≦0.25</td><td>Disregard</td></tr>
<tr><td>D≦0.5</td><td>4</td></tr>
</table>
</td><td>Note:3</td></tr>
</table>

Incoming Inspection Touch Panel

Circular Defects
Linear Defects
Scratch
Air Bubble
Crack

Y:
Long breakage

Z:
Wide breakage

D:
thickness
breakage

T:
single piece of glass thickness (Touch senor single thickness)

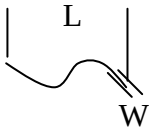
VA:
Touch control panel viewing area.

Sensor wide:
the size of the long side of the touch panel.

(1) Circular Defects ϕ =(L+W)/2

Diameter(mm)	Spec
$\phi \leqq 0.2$	No quantity limit
$0.2 < \phi \leqq 0.4$	Max 5 defect
$0.5 \leqq \phi$	Reject

(2) Linear Defects



Length	Width	Acceptable
8.0≧L	0.06≧W	Accept
8.0≧L	0.08≧W	Max 5 defect
L＞8.0	W＞0.08	Reject
The Min distance of defects must be above 15.0mm.		

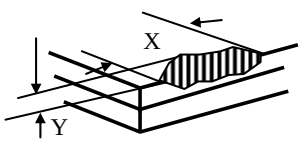
(3)Scratch

Length	Width	Acceptable
8.0≧L	0.06≧W	Accept
8.0≧L	0.08≧W	Max 5 defect
L＞12.0	W＞0.08	Reject
The Min distance of defects must be above 15.0mm.		

(4) Air Bubble

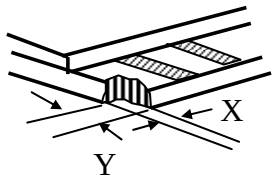
Diameter(mm)	Spec
$\phi \leqq 0.2$	No quantity limit
$0.2 < \phi \leqq 0.6$	Max 3 defect
The Min distance of defects must be above 10.0mm.	

(5)Crack



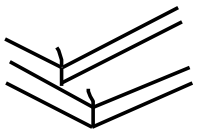
Z≦T,X≦1/8 Sensor wide
Y:Did not enter the VA

(Accept)



X≦3mm and Y≦1/3Thickness

(Accept)

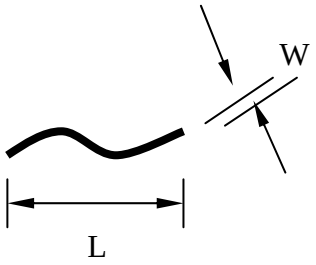


Crack

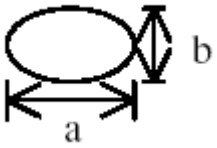
(Reject)

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.

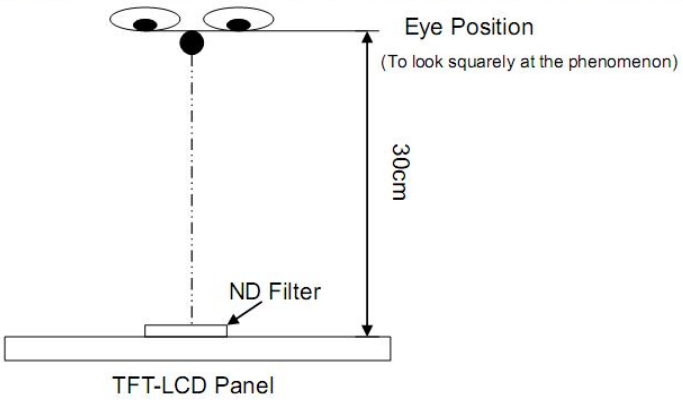
Note2.



Note3. D：Diameter D=(a+b)/2

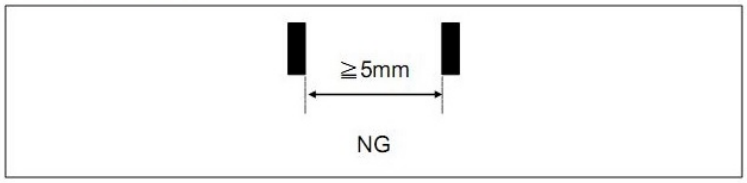


Note4. Bright dot, mura and leak are defined through transmission ND Filter as following.

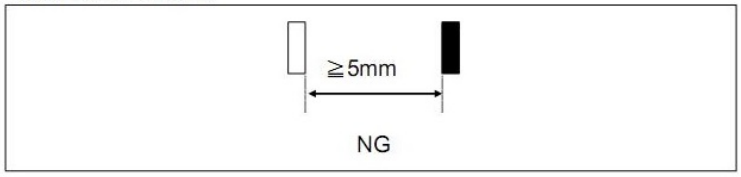


Note5. Minimum distance between dot defects

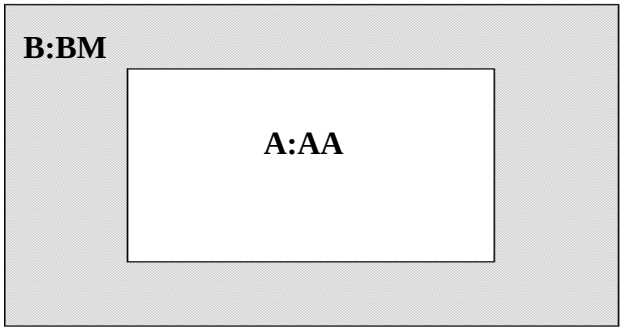
-Dark dot to Dark dot



- Bright dot to Dark dot



Note6.



18.5 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.