

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. : VGG804838-0TSLWM(RoHS)

REVISION : 4

☐ APPROVAL FOR SPECIFICATIONS ONLY





☒ APPROVAL FOR SPECIFICATIONS AND SAMPLE

CUSTOMER :

STD.

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3. Module Numbering System

V G G 8048 38 – 0 T S L W M

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

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4. Application


This specification is applied to the 5 inch WVGA supported TFT-LCD module and can display true 16.7M colors(8 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" TFT-LCD panel, a driver circuit and backlight unit.

5. Features

- WVGA (800×480 pixels) resolution.
- Digital 24 bit parallel RGB.

6. General Specifications

Item	Specifications	Unit
Screen Size	5 (5:3 diagonal)	inch
Display Format	800RGB(H)×480(V)	dot
Active Area	108(H)×64.8(V)	mm
Pixel Pitch	0.135(H)×0.135(V)	mm
Pixel Configuration	RGB Vertical Stripe	-
Display Mode	IPS Type Transmissive Mode Normally Black	-
Surface Treatment	Anti-Glare	-
Viewing Direction	Full view angle	-
Outline Dimension	118.5(W)×77.55(H)×3.4(D)	mm
Weight	(53)	g
RoHS Compliance	RoHS Compliance	-

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7. Absolute Maximum Ratings

7.1 Absolute Ratings of Environment

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T _{ST}	-30	+85	°C	(1)(2)
Operating Temperature	T _{OP}	-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_{SS}=0V)


Item	Symbol	Value		Unit	Note
		Min.	Max.		
Digital Power Supply Voltage	V _{CC}	-0.3	4.0	V	-

7.2.2 Backlight Unit

(Ta=25±2°C)

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Current of Backlight Unit	I _B	-	90	mA	(1)
Voltage of Backlight Unit	V _B	-	35	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.		
Digital Power Supply Voltage	V _{CC}	3.0	3.3	3.6	V	-
Digital Current	I _{CC}	-	75	105	mA	(1)
Input High Threshold Voltage	V _{IH}	0.7xV _{CC}	-	V _{CC}	V	-
Input Low Threshold Voltage	V _{IL}	GND	-	0.3xV _{CC}	V	-
Pixel Clock	DCLK	-	25	-	MHz	-

Note (1) The specified power consumption is under the conditions at V_{CC} = 3.3V, FV=60Hz, DCLK=25 MHz, whereas a power dissipation check Pattern below is displayed.

White Pattern / 255 Gray



Active Area

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8.2 Backlight Unit

(Ta=25±2℃)

Item	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Current of Backlight Unit	I _B	-	60	-	mA	-
Voltage of Backlight Unit	V _B	-	(21.7)	-	V	I _B =60mA,(2)
Power Consumption	P _B	-	(1.302)	-	W	I _B =60mA
LED Life Time(25℃)	-	50000	60000	-	hr	(1)

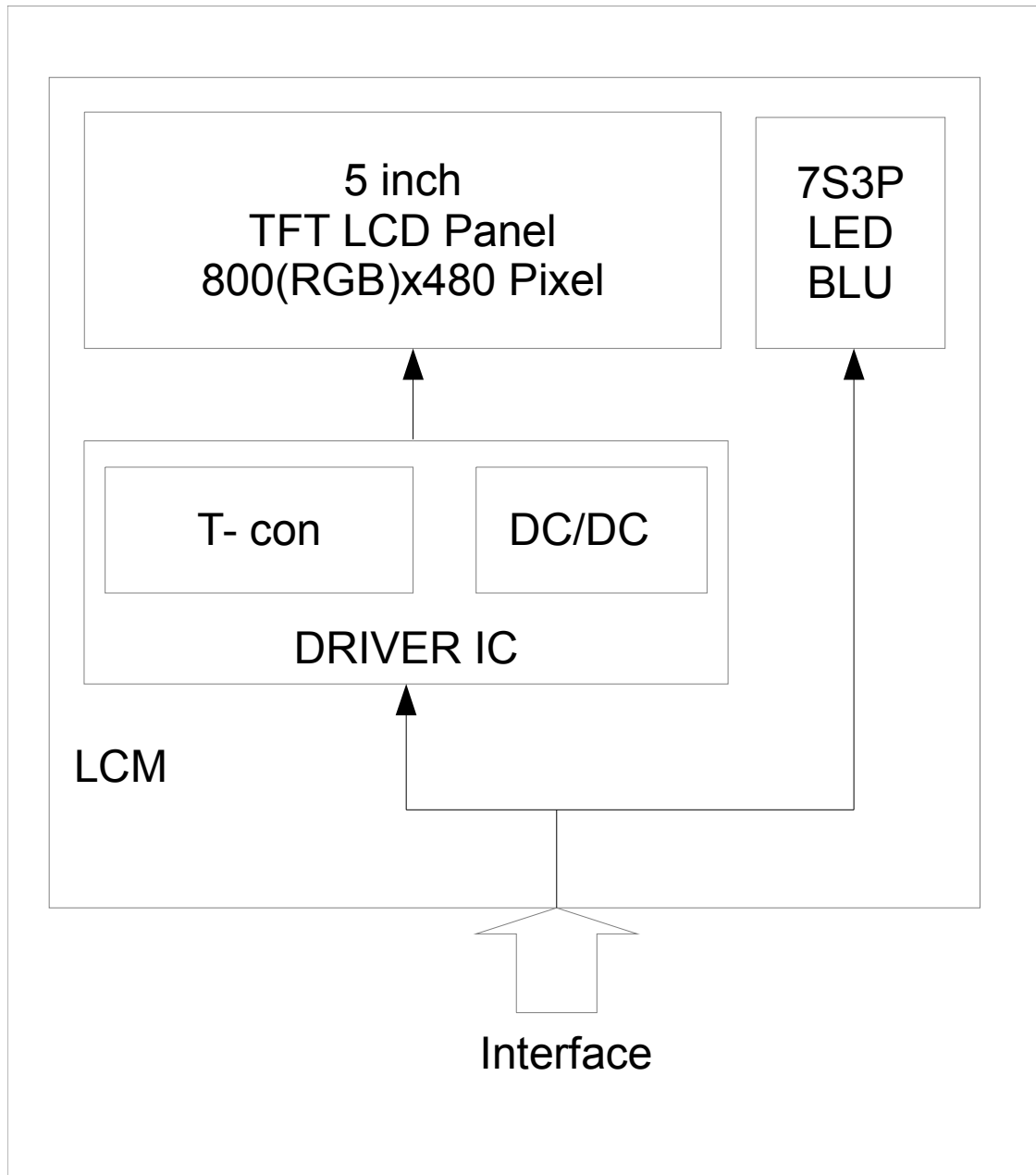
Note (1) : LED life time is defined as under 25±2℃ , when the average brightness decrease to 50% of original brightness.

Note (2) : The BLU is driven by constant current, the voltage value is for reference only.

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9. Block Diagram

9.1 TFT-LCD Module with Backlight Unit



10. Input / Output Terminals Pin Assignment

10.1 TFT-LCD Module

Pin No.	Symbol	I/O	Description
1	VLED-	I	LED Cathode
2	VLED+	I	LED Anode
3	GND	I	Ground
4	V _{CC}	I	Power supply
5	R0	I	RED data (LSB)
6	R1	I	RED data
7	R2	I	RED data
8	R3	I	RED data
9	R4	I	RED data
10	R5	I	RED data
11	R6	I	RED data
12	R7	I	RED data(MSB)
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
19	G6	I	GREEN data
20	G7	I	GREEN data(MSB)
21	B0	I	Blue data(LSB)
22	B1	I	Blue data
23	B2	I	Blue data
24	B3	I	Blue data
25	B4	I	Blue data
26	B5	I	Blue data
27	B6	I	Blue data
28	B7	I	Blue data(MSB)
29	GND	I	Ground
30	DCLK	I	Dot Clock See Note 1

Pin No.	Symbol	I/O	Description
31	DISP	I	DISP sets the display mode. DISP=" 1", Normal display mode DISP=" 0", Standby mode
32	HSYNC	I	Horizontal sync signal applied to the RGB interface, default is negative polarity. See Note 1
33	VSYNC	I	Vertical sync signal applied to the RGB interface, default is negative polarity. See Note 1
34	DE	I	Input data enable control. See Note 1
35	NC	I	No Connect
36	GND	I	Ground
37	NC	I	No Connect
38	NC	I	No Connect
39	NC	I	No Connect
40	NC	I	No Connect

Note 1:

RGB Mode Selection Table	DCLK	HSYNC	VSYNC	DE
SYNC - DE Mode	Input	Input	Input	Input
SYNC Mode	Input	Input	Input	GND
DE Mode	Input	GND	GND	Input

Note: "Input" means these signals are driven by host side

10.2 Color Data Input Assignment

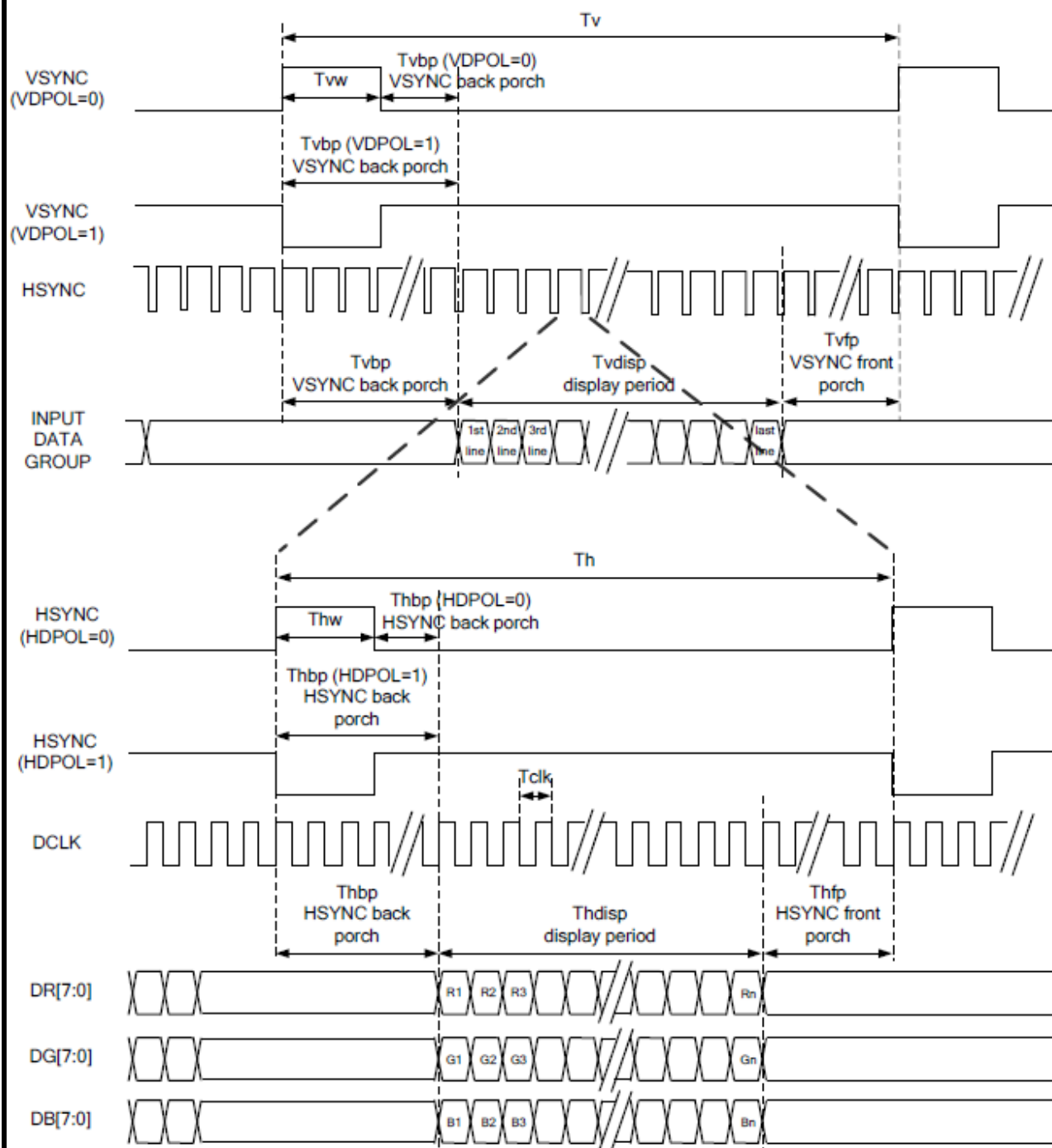
The brightness of each primary color(red, green and blue) is based on the 8 bit gray scale data input for the color. The higher the binary input, the brighter the color. The table provides the assignment of color versus data input.

Color		Data Signal																							
		Red								Green								Blue							
D07	D06	D05	D04	D03	D02	D01	D00	D17	D16	D15	D14	D13	D12	D11	D10	D27	D26	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	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	
	Green	0	0	0	0	0	0	0	0	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	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	
	Magenta	1	1	1	1	1	1	1	1	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	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	
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	
	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	
	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	
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	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	
	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	
	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	
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	
	Green(1)	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	1	0	0	0	0	0	0	0	0	0	
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	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	
	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	
	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	
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	
	Blue(1)	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	1	0	
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	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	Blue(253)	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	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	1	1	1	1	1	1	1	1	

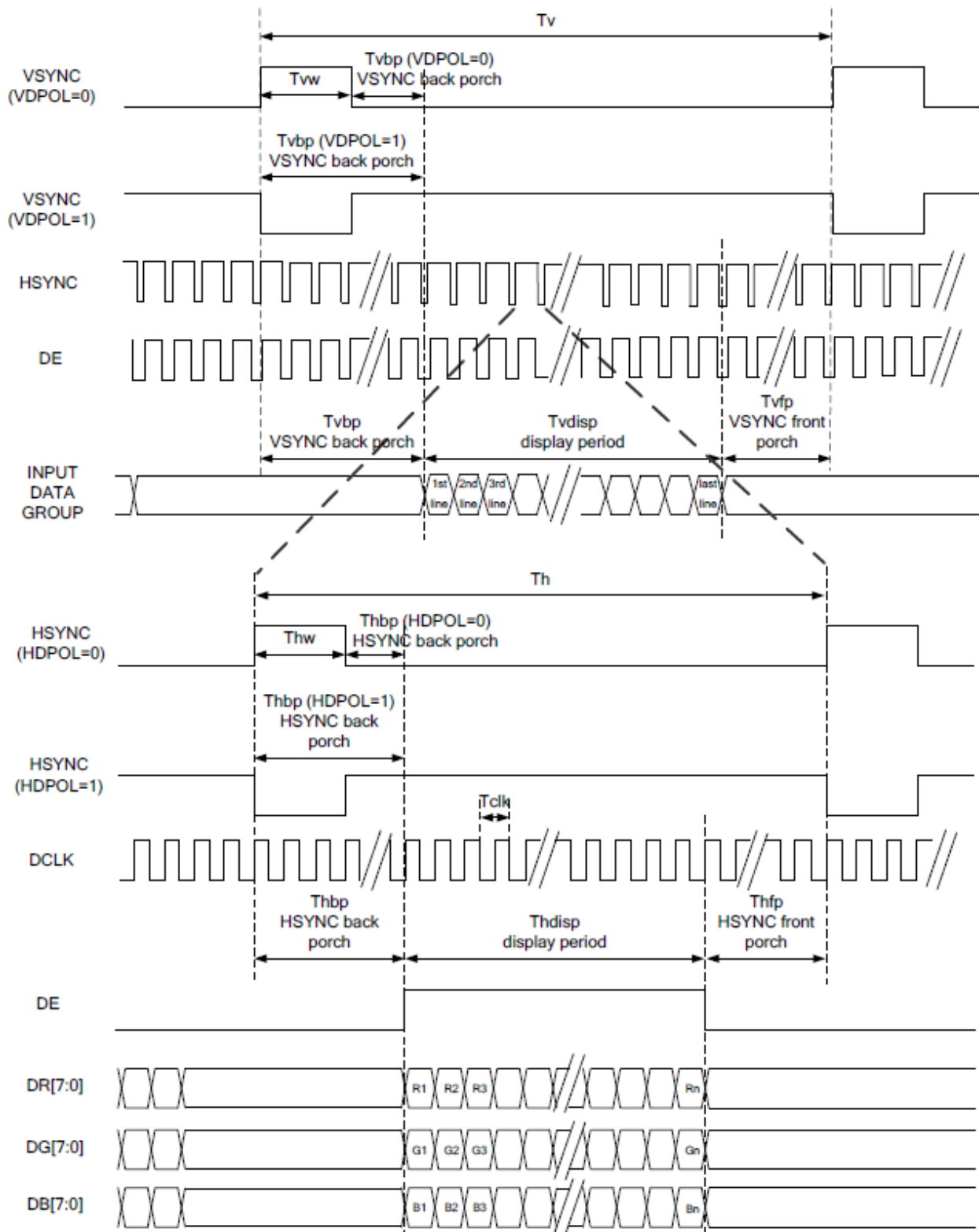
11. Interface Timing

11.1 Input Clock and Data Timing Diagram

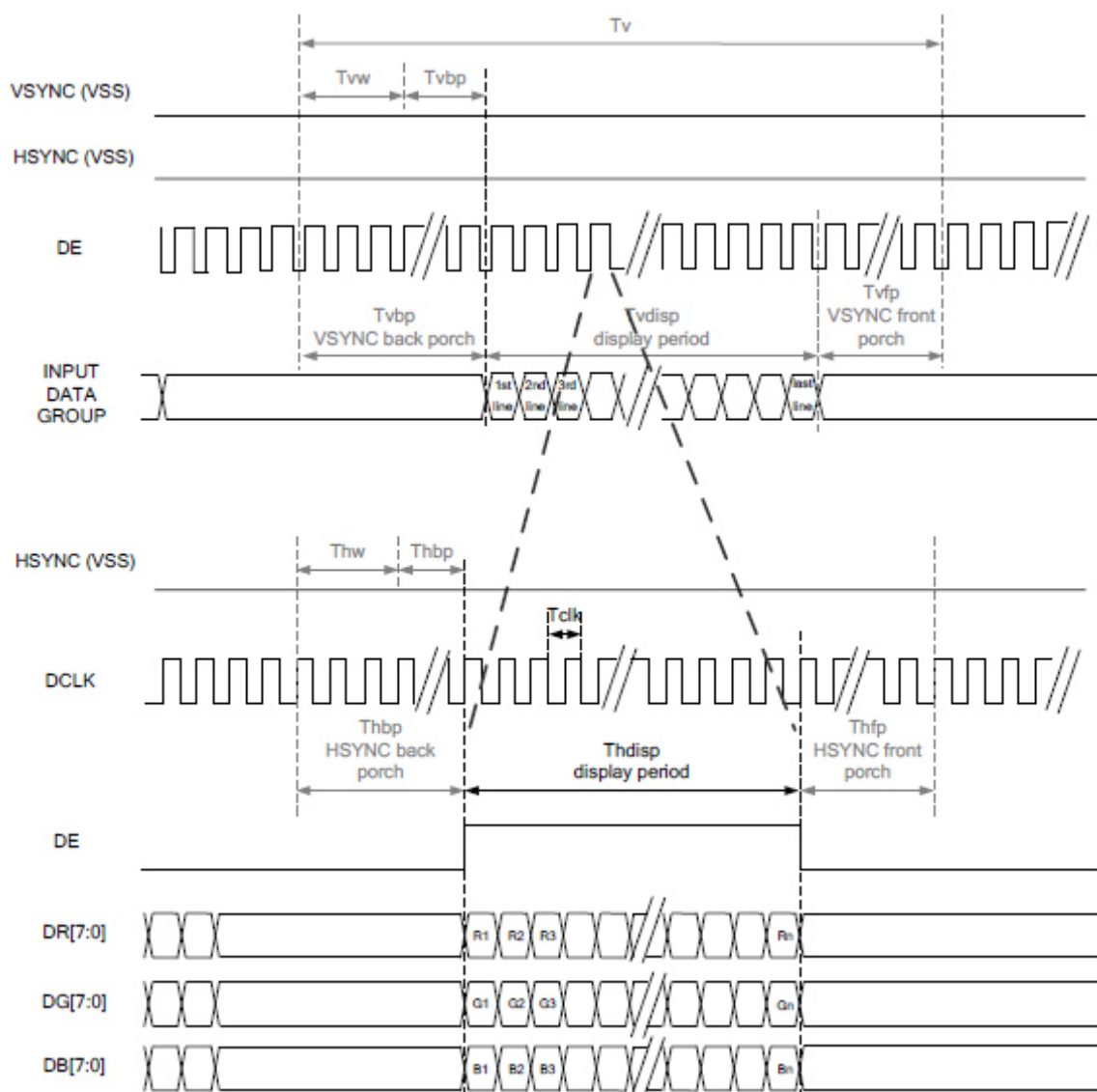
11.1.1 SYNC Mode



11.1.2 SYNC-DE Mode



11.1.3 DE Mode



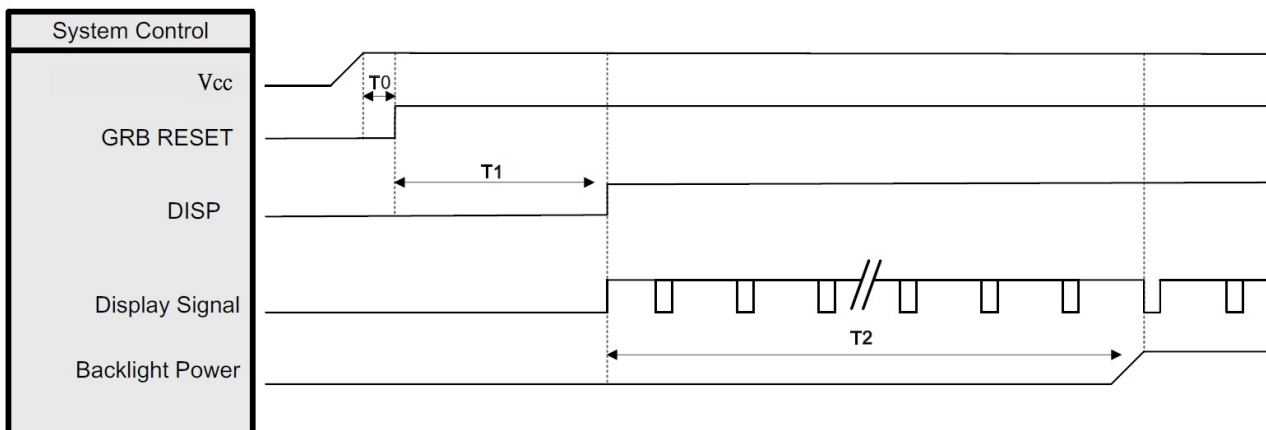
11.1.4 Parallel 24-bit RGB Input Timing Table

Parallel 24-bit RGB Input Timing (Vcc= 3.3V, GND= 0V, TA=25°C)

Parallel 24-bit RGB Interface Timing Table						
Item	Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK Frequency	Fclk	23	25	27	MHz	
HSYNC	Period Time	Th	808	816	896	DCLK
	Display Period	Thdisp	800			DCLK
	Back Porch	Thbp	4	8	48	DCLK
	Front Porch	Thfp	4	8	48	DCLK
	Pulse Width	Thw	2	4	8	DCLK
VSYNC	Period Time	Tv	488	496	504	HSYNC
	Display Period	Tvdisp	480			HSYNC
	Back Porch	Tvbp	4	8	12	HSYNC
	Front Porch	Tvfp	4	8	12	HSYNC
	Pulse Width	Tvw	2	4	8	HSYNC

11.2. POWER ON/OFF SEQUENCE

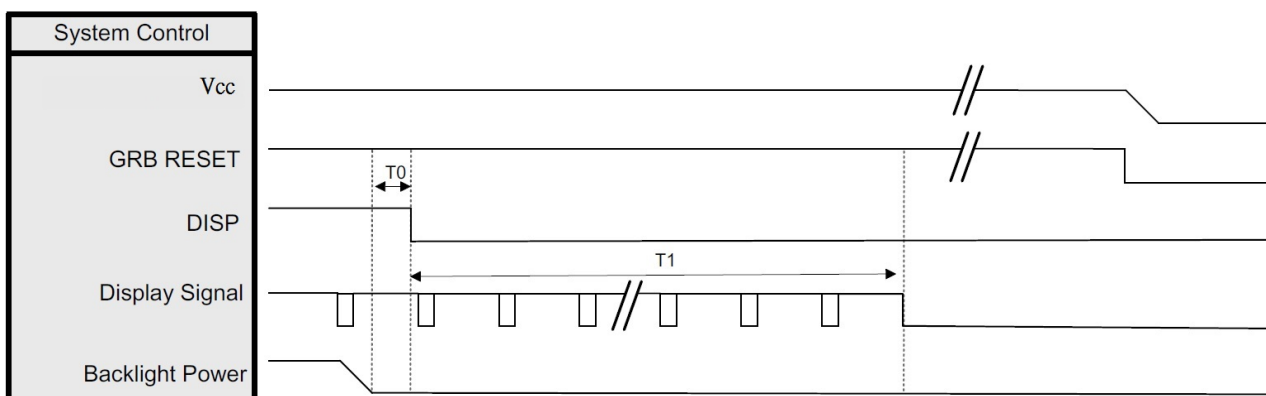
11.2.1 Power On Sequence



Symbol	Description	Min. Time	Unit
T0	System power stability to GRB RESET signal	0	ms
T1	GRB RESET= "High" to DISP="High"	10	ms
T2	Display Signal output to Backlight Power on	250	ms


Note: RGB interface Display signal: DCLK; VSYNC; HSYNC; DE; DR[7:0]; DG[7:0]; DB[7:0]

11.2.2 Power Off Sequence



Symbol	Description	Min. Time	Unit
T0	Backlight Power off to DISP="Low"	5	ms
T1	DISP="Low" to IC internal voltage discharge complete	100	ms

Note: RGB interface Display signal: DCLK; VSYNC; HSYNC; DE; DR[7:0]; DG[7:0]; DB[7:0]

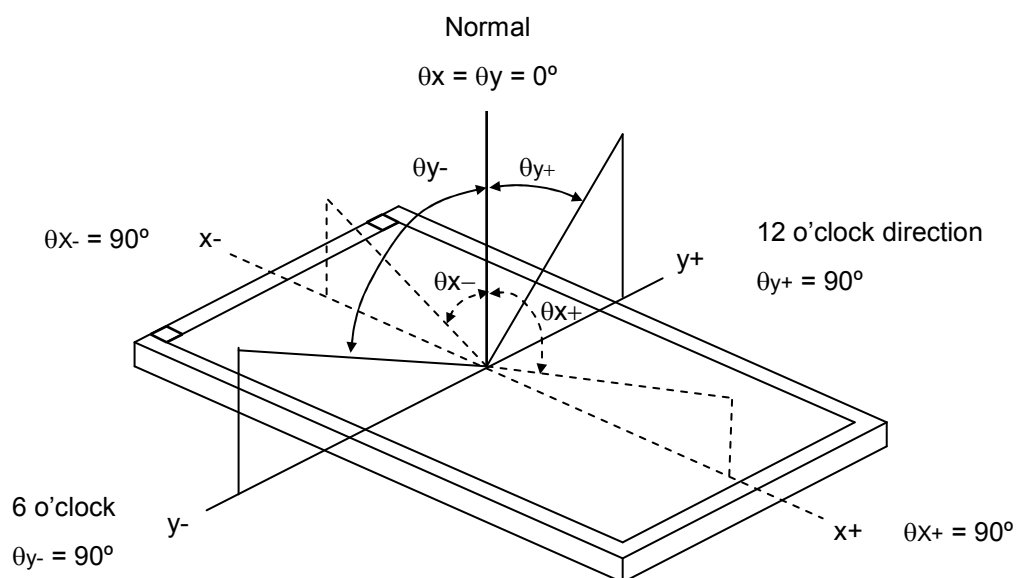
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12. Optical Characteristics

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	$\theta_x=0^\circ, \theta_y=0^\circ$ Normal Viewing Angle	800	(1000)	-	-	(2)
Response Time		T_R+T_F		-	30	40	ms	(3)
Luminance(Center)		Y		1200	(1300)	-	cd/m ²	(4)
Brightness uniformity		BUNI		75	(80)	-	%	(5)
Color Chromaticity	Red	Rx		0.540	0.590	0.640	-	(1),(4)
		Ry		0.305	0.355	0.405	-	
	Green	Gx		0.325	0.375	0.425	-	
		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	0.32	0.370	-	
		Wy		0.315	0.365	0.415	-	
Viewing Angle	Horizontal	θ_{x+}	CR \geq 10	70	(80)	-	deg.	
		θ_{x-}		70	(80)	-		
	Vertical	θ_{y+}		70	(80)	-		
		θ_{y-}		70	(80)	-		

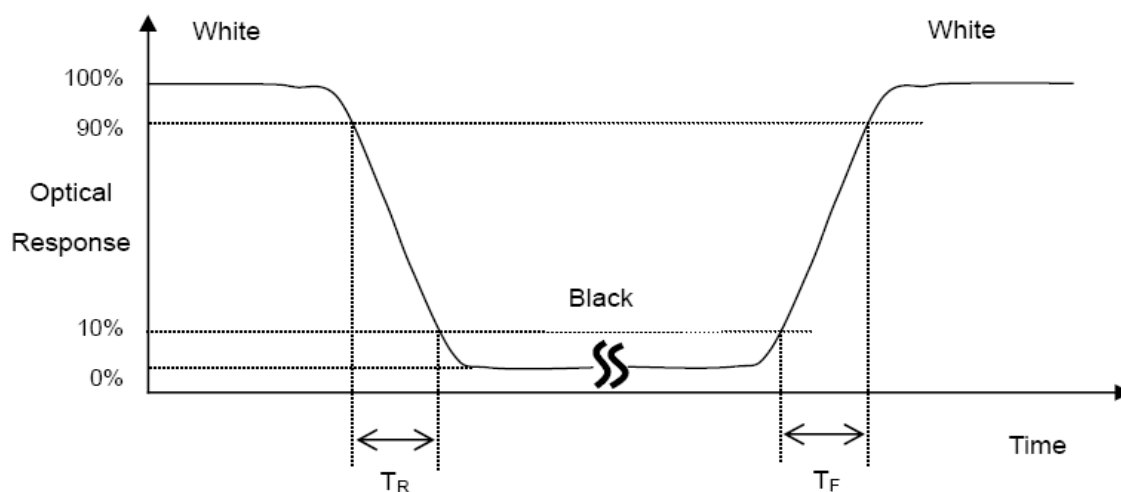
Note (1) Definition of Viewing Angle (θ_x , θ_y):



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

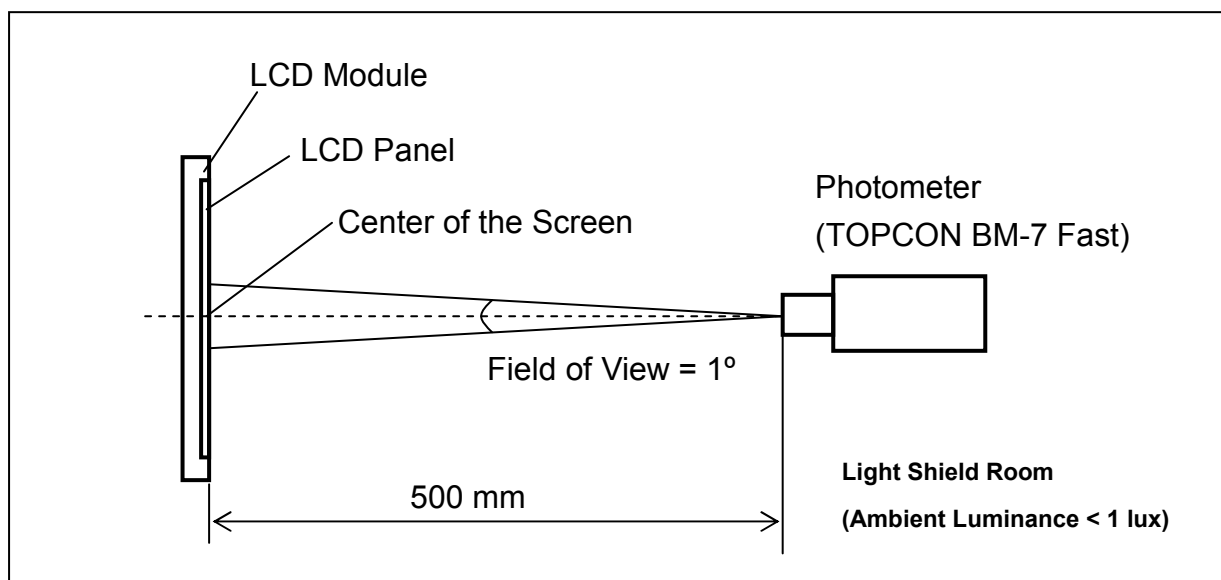
$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

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

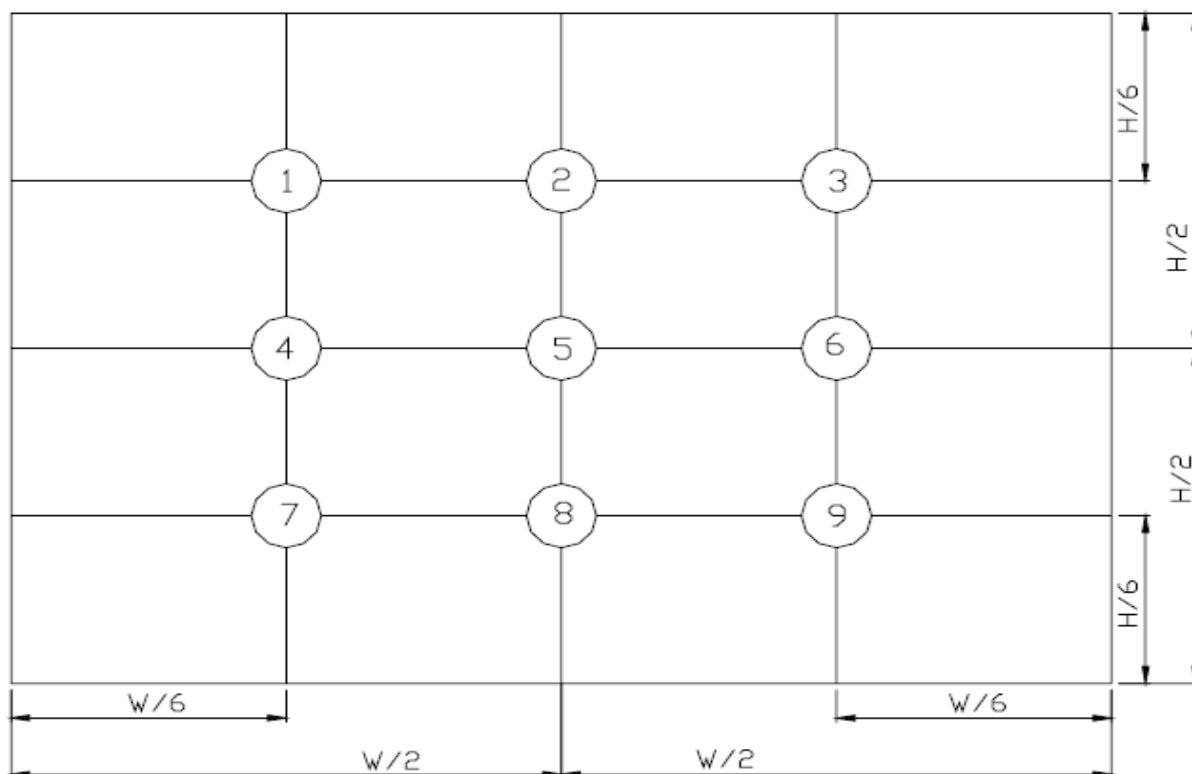



Note (4) Measurement Set-Up:

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%



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13. Reliability Test

No.	Test Items	Test Condition	Remark
1	High Temperature Storage Test	T _a = 85℃ 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 = 80℃ 240 hours	(2),(3),(4)
4	Low Temperature Operation Test	T _a = -30℃ 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: 80cm 1 corner, 3 edges, 6 surfaces	(3)

Note 1 : T_a is the ambient temperature of samples.

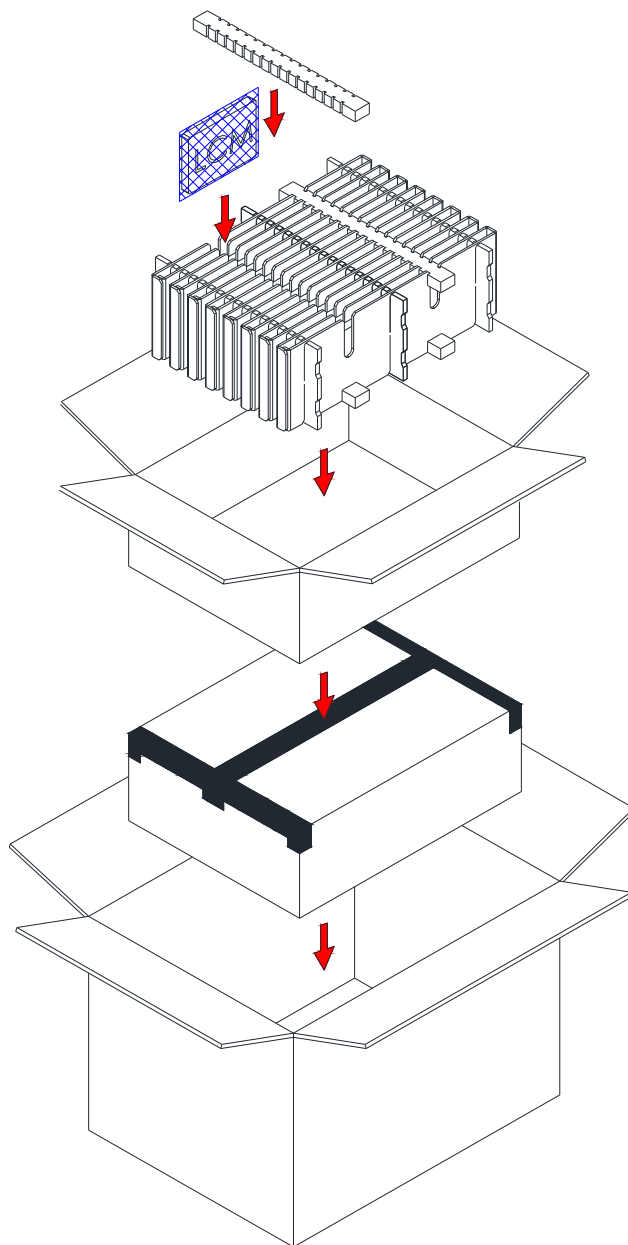
Note 2 : T_s is the temperature of panel's surface.

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.

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	118.5x77.55x3.4		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 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.

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15.4 Caution

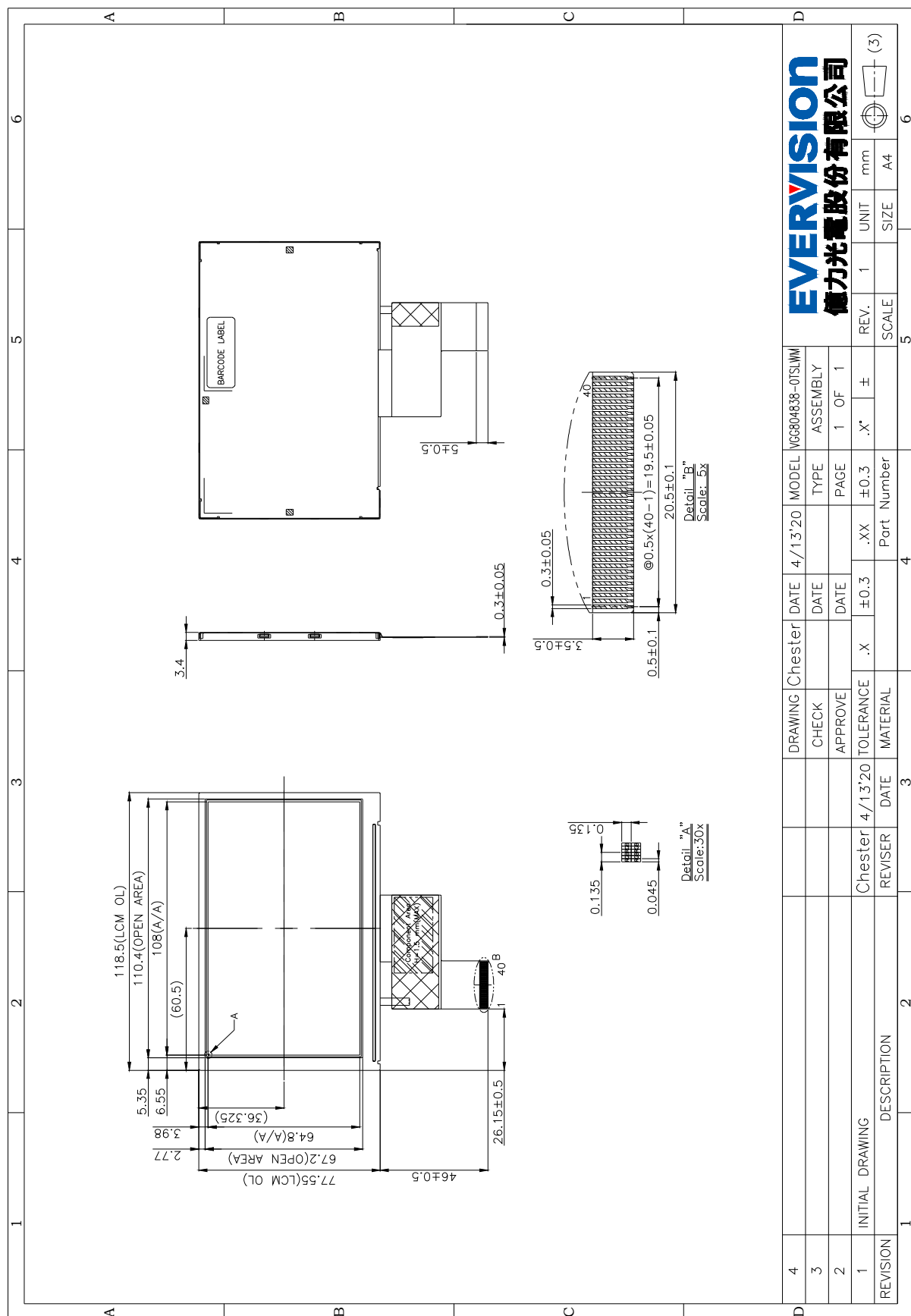
This Evervision LCD module has been specifically designed for use only in electronic devices in the areas of audio control, office automation, industrial control, home appliances, etc. The modules should not be used in applications where module failure could result in physical harm or loss of life, and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


15.5 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°C 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 Evervision, and do not unpack it.
- (4) Please do not stick any labels on the display surface for a long time, especially on the polarizer.

16.Outline Drawing



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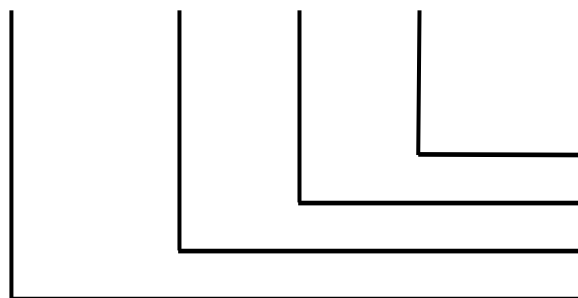
17. Definition of Labels

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



- (a) Module Name : VGG804838-0TSLWM
- (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
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) :

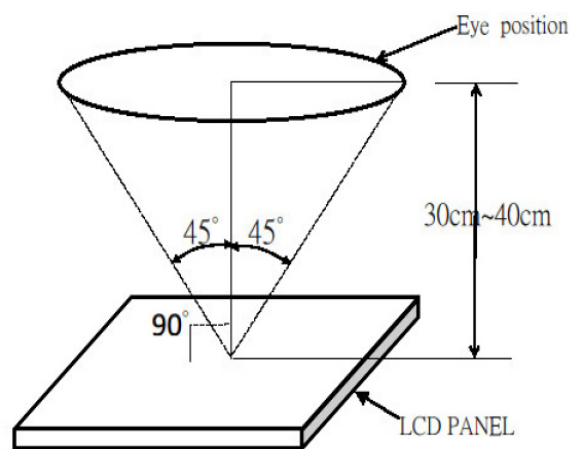
Manufacturing sequence of product, for example : 0001~9999.

18. Incoming Inspection Standards

1.The environmental condition of inspection

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

- (1) Ambient temperature $25 \pm 5^{\circ}\text{C}$
- (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

2.The defects classify of AQL as following:


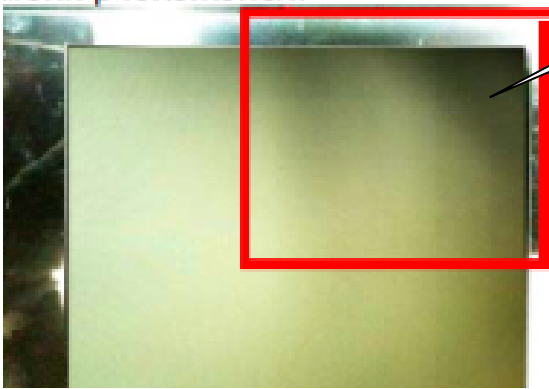
- (1) Test method :According to ANSI/ASQC Z 1.4 .General Inspection Level II take a single time
- (2) The defects classify of AQL as following:

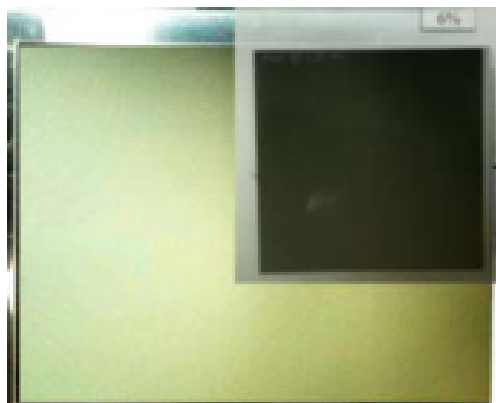
Class of defects	AQL	Definition
Major	0.65%	It is defect that is likely to result in failure or to reduce materially the usability of the intended function.
Minor	1.5%	It is a defect that will not result in functioning problem with deviation classified.


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3. Inspection Parameters

Item		Specification/Description		Note
Display	Function	No Display		-
		Malfunction		-
	Line defect	No obvious Vertical and Horizontal line defect in bright , dark and colored.		-
	Point Defect (red ,green ,blue ,dark ,white)	Item	Judgment criteria	Note: 1 、 4 、 5 、 6
		BRIGHT DOT	1	
		DARK DOT	2	
		TOTAL DOT	3	
		Minimum Distance Between Dots≥ 5 mm		
		TWO ADJACENT DOT	NOT ALLOWED	
		THREE OR MORE ADJACENT DOT	NOT ALLOWED	
	MURA	Has the non-uniform phenomenon		-
		Weak defect will be defined as mura if it can be observed through ND filter5%		



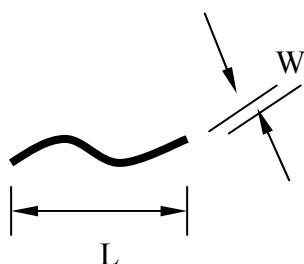


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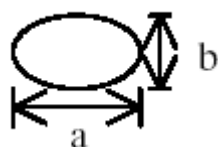
Item		Specification/Description			Note
Visual defect	Linear Foreign Material : Bright or Dark Line	L(mm)	W(mm)	Acceptable number	Note:2
		-	$W \leq 0.07$	Disregard	
		$L \leq 5$	$0.07 < W \leq 0.1$	3	
		$L > 5$	$W > 0.1$	0	
	Circular Foreign Material : Dark/ Bright Spot	Dimension(mm)		Acceptable number	Note:3
		$D \leq 0.25$		Disregard	
		$0.25 < D \leq 0.5$		4	
		$D > 0.5$		0	


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.

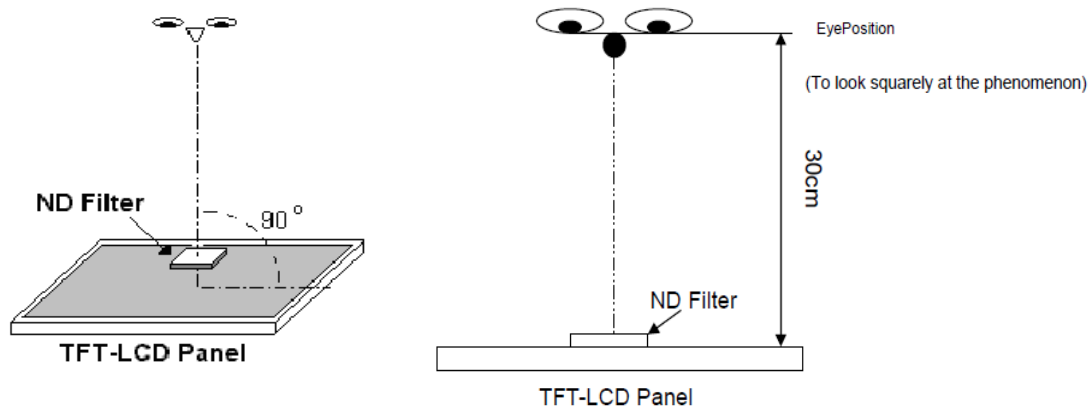


Note3. D : Diameter $D = (a+b)/2$



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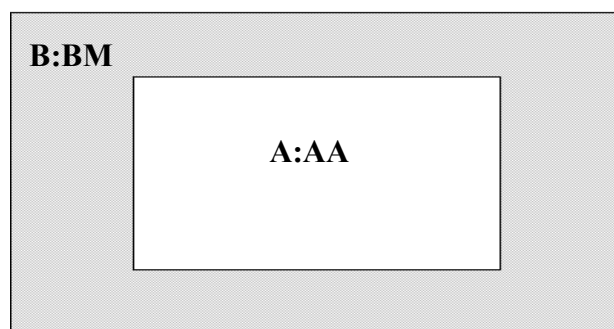
Note4. Bright dot is defined through 5% transmission ND Filter as following.



Note5. ADJACENT DOT



Note6.



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

B area : None-specify

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.