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Customer:
Model Name: OSD322404-6UFLWB
SPEC NO.:
Date: 8/22/07
Version: 5

For Customer's Acceptance

Approved by	Comment

Approved by	Reviewed by	Prepared by

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1. Table of Contents

No.	Contents	Page
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	12
12	Optical Characteristics	14
13	Reliability Test	17
14	Packaging	18
15	Precautions	19
16	Outline Drawing	21
17	Definition of Labels	22
18	Incoming Inspection Standards	24

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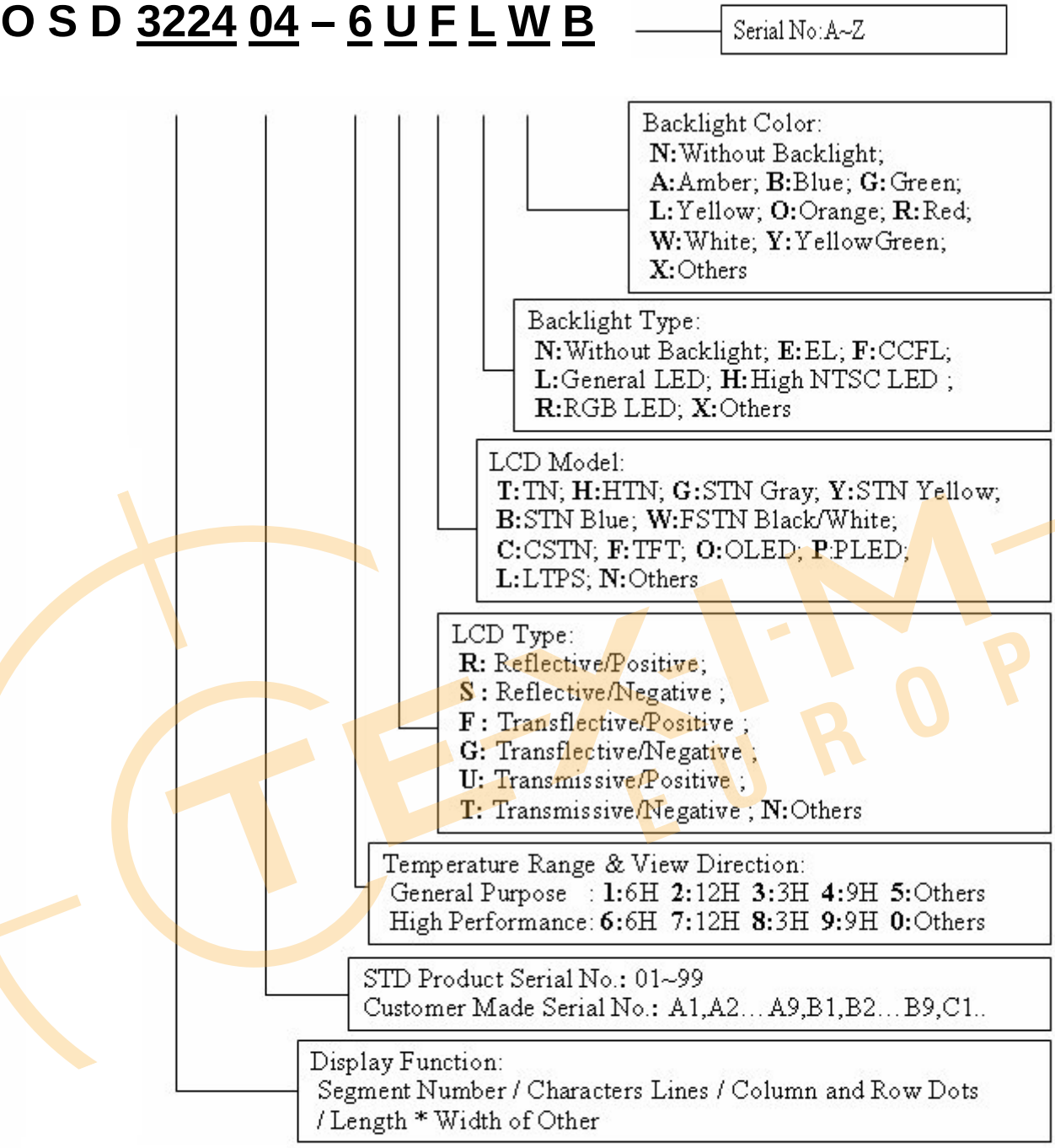
2. Record of Revisions

Rev.	Comments	Page	Date
1	Preliminary Specification was first issued.	All	3/3'07
2	Modify 3. Module Numbering System	4	4/10'07
	Modify 14. Packaging	18	4/10'07
	Modify 16. Outline Drawing	21	4/10'07
	Modify 17. Definition of Labels	22	4/10'07
3	Modify DE Mode	12	4/17'07
4	Modify 8.2 Backlight Unit	7	7/23'07
	Modify 16.Outline Drawing	21	7/23'07
	Add 18. Incoming Inspection Standards	24	7/23'07
5	Modify 6. General Specifications	5	8/22'07
	Modify 10. Input / Output Terminals Pin Assignment	10	8/22'07
	Modify 13. Reliability Test	17	8/22'07
	Modify 14. Packaging	18	8/22'07

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3. Module Numbering System

O S D 3224 04 – 6 U F L W B



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4. Application

This specification is applied to the 5.7 inch QVGA 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.

5. Features

- QVGA (320×240 pixels) resolution.
- Digital 18 bit parallel RGB.
- Line inversion mode with stripe type.
- DE mode.
- Transparent Touch panel
  - 4-Wire
  - Analog Resistive

6. General Specifications

Item	Specifications	Unit
Screen Size	5.7 (Diagonal)	inch
Display Format	320RGB(H)×240(V)	dot
Active Area	115.2(H)×86.4(V)	mm
Dot Size	0.120(H)×0.360(V)	mm
Pixel Configuration	RGB Vertical Stripe	-
Display Mode	TN Type Transmissive Mode Normally White	-
Surface Treatment	Anti-Glare	-
Viewing Direction	6 O’clock (The Gray Inversion will appear at this direction)	-
Outline Dimension	167.0(W)×109.0(H)×10.4(D)	mm
Weight	196.5	g

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7. Absolute Maximum Ratings

7.1 Absolute Ratings of Environment

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

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

(a) 90%RH Max. (Ta≦40°C).

(b) Wet-bulb temperature should be 39°C Max. (Ta>40°C).

(c) No condensation.

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	-	75	mA	(1)
Voltage of Backlight Unit	V_B	-	30	V	(1)

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

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8. Electrical Characteristics

8.1 TFT-LCD Module

(Ta=25±2°C)

Item	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Power Supply Voltage	VCC	3.0	3.3	3.6	V	-
Input High Threshold Voltage	VIH	0.7VCC	-	VCC	V	-
Input Low Threshold Voltage	VIL	0	-	0.3VCC	V	-
Power Consumption	P_L		(0.24)		W	(1)
Frame Frequency	F_V	-	60	-	Hz	-
Dot Clock	DCLK	-	6.4	7	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	-	60	-	mA	-
Voltage of Backlight Unit	V_B	-	23.1	-	V	I_B =60mA
Power Consumption	P_{BL}	-	(1.4)	-	W	I_B =60mA
LED Life Time(25℃)		40000	--	--	hr	(1)

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

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8.3 Transparent Touch panel

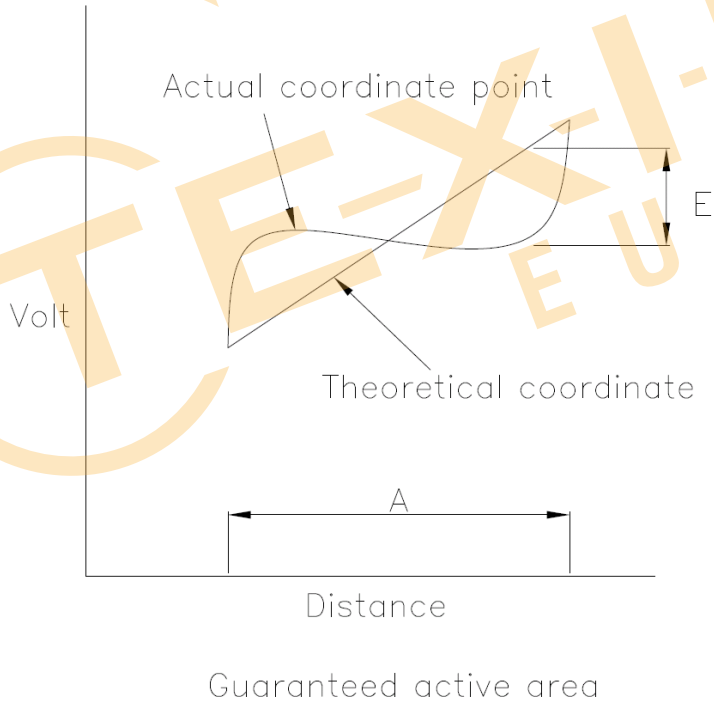
Electrical characteristics

Item		Value			Unit	Note
		Min.	Typ.	Max.		
Operating Voltage		-	5	7	V	-
Terminal Resistance	X-direction	300	-	900	Ω	At connector
	Y-direction	200	-	600	Ω	At connector
Insulation Resistance		≧ 10MΩ				At DC25V
Chatting		≦ 20 ms Max				At connector
Linearity		≦1.5%				(1)

Note(1): Measurement condition of Linearity

Difference between actual voltage & Theoretical voltage is an error at any points.

Linearity is the value max. Error voltage divided by voltage difference on active area.

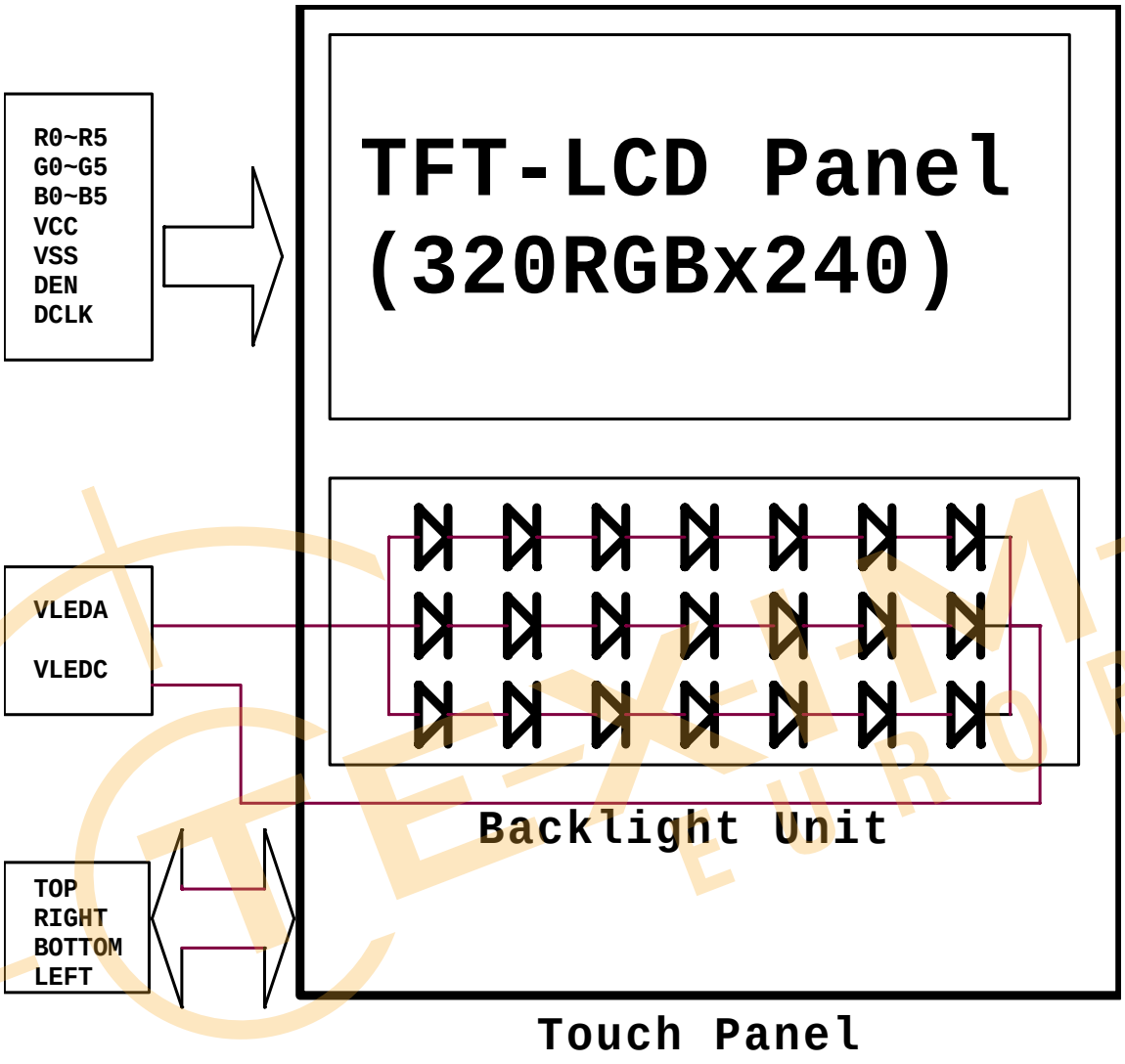


Guaranteed active area

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9. Block Diagram

TFT-LCD Module with Backlight Unit



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10. Input / Output Terminals Pin Assignment

10.1 TFT-LCD Module

Connector: CVILUX CF25401D0R0-05

Pin No	Symbol	Description	Pin No	Symbol	Description
1	VCC	Powr Supply for Logic	21	G4	Green data
2	VCC	Powr Supply for Logic	22	G3	Green data
3	VCC	Powr Supply for Logic	23	VSS	GND
4	VCC	Powr Supply for Logic	24	G2	Green data
5	NC	No Connection	25	G1	Green data
6	DEN	Input data enable control	26	G0	Green data
7	VSS	GND	27	VSS	GND
8	DCLK	Dot Clock	28	R5	Red data
9	VSS	GND	29	R4	Red data
10	NC	No Connection	30	R3	Red data
11	VSS	GND	31	VSS	GND
12	B5	Blue data	32	R2	Red data
13	B4	Blue data	33	R1	Red data
14	B3	Blue data	34	R0	Red data
15	VSS	GND	35	NC	No Connection
16	B2	Blue data	36	VSS	GND
17	B1	Blue data	37	NC	No Connection
18	B0	Blue data	38	NC	No Connection
19	VSS	GND	39	NC	No Connection
20	G5	Green data	40	NC	No Connection

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

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10.3 Transparent Touch Panel

Connector: CVILUX CF25041D0R0-10

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

10.4 Color Data Input Assignment

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

Color		Data Signal																	
		Red						Green						Blue					
		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

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11. Interface Timing

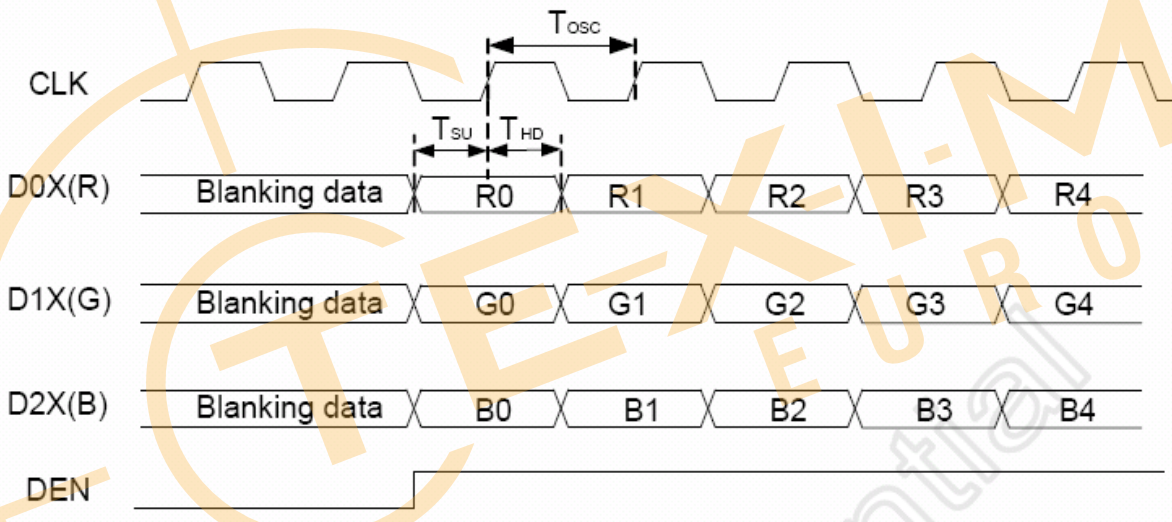
11.1 Input Signal Characteristics

Digital Parallel RGB Interface (960×240 resolution)

PARAMETER	Symbol	Min.	Typ.	Max.	Unit
CLK period	T_{OSC}	-	156	-	ns
Data setup time	T_{SU}	12	-	-	ns
Data hold time	T_{HD}	12	-	-	ns
DEN pulse width	T_{EP}	-	320	-	T_{OSC}
DEN-STH time	T_{DES}	-	1		T_{OSC}

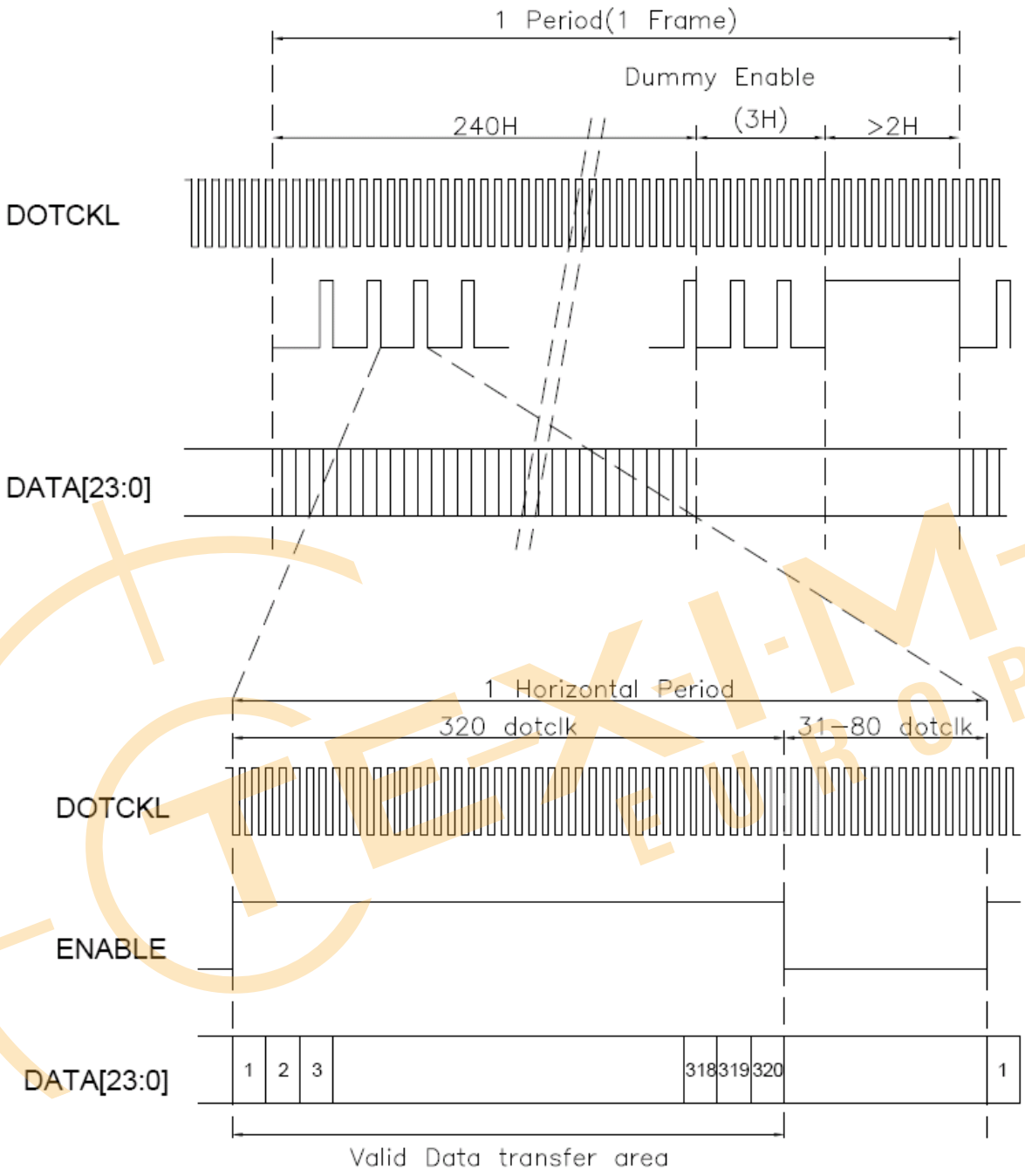
11.2 Waveform

11.2.1 Clock and Data Waveform



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11.2.2 DE Mode



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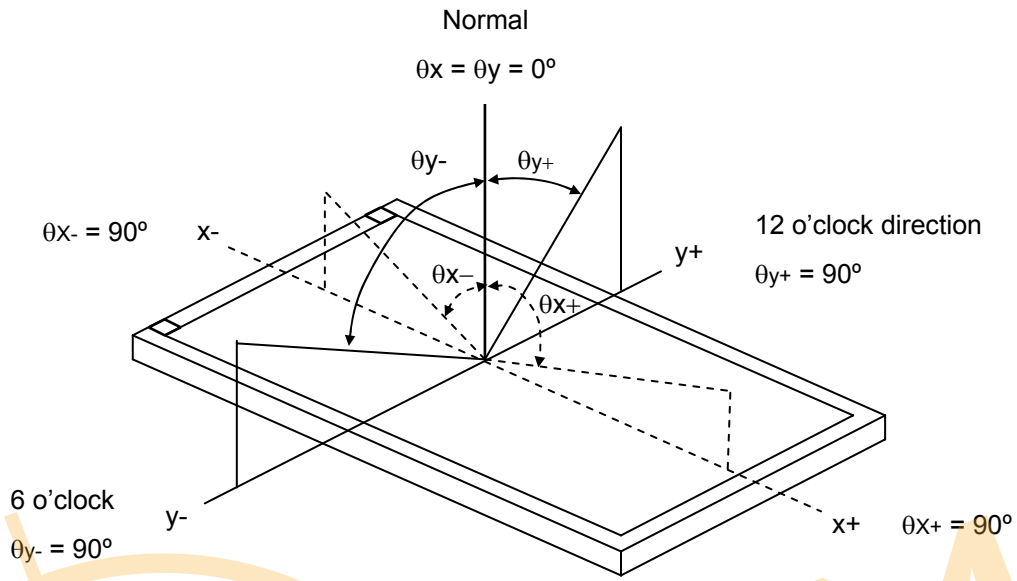
12. Optical Characteristics

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	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		200	(270)	-	cd/m^2	(4)
Brightness uniformity		BUNI		80	-	-	%	(5)
Color Chromaticity	Red	Rx		(0.590)	(0.640)	(0.690)	-	(1),(4)
		Ry		(0.294)	(0.344)	(0.394)	-	
	Green	Gx		(0.269)	(0.319)	(0.369)	-	
		Gy		(0.525)	(0.575)	(0.625)	-	
	Blue	Bx		(0.091)	(0.141)	(0.191)	-	
		By		(0.045)	(0.095)	(0.145)	-	
	White	Wx		(0.262)	(0.312)	(0.362)	-	
		Wy		(0.270)	(0.320)	(0.370)	-	
Viewing Angle	Horizontal	θ_x+	CR≥10	(55)	(60)	-	deg.	
		θ_x-		(55)	(60)	-		
	Vertical	θ_Y+		(45)	(50)	-		
		θ_Y-		(55)	(60)	-		

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



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

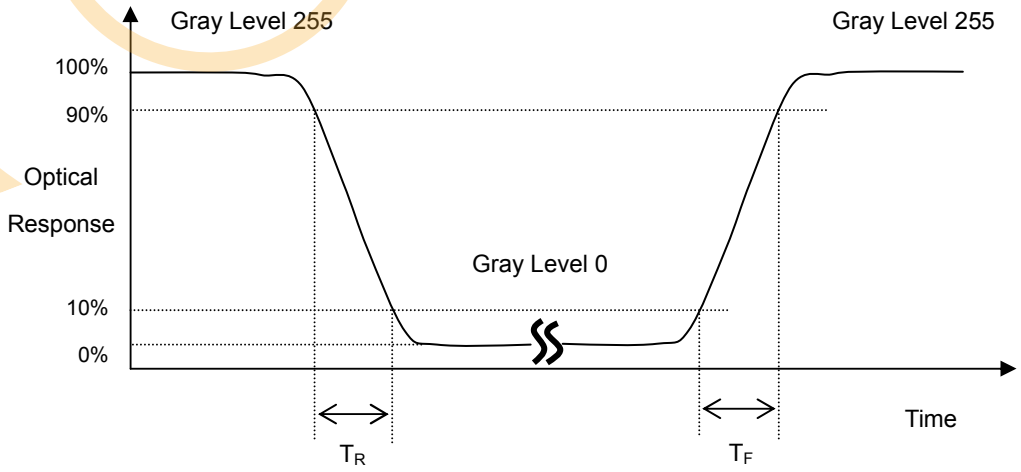
Measured at the center point of panel

Contrast Ratio (CR) = L255 / L0

L255: Luminance of gray level 255

L 0: Luminance of gray level 0.

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

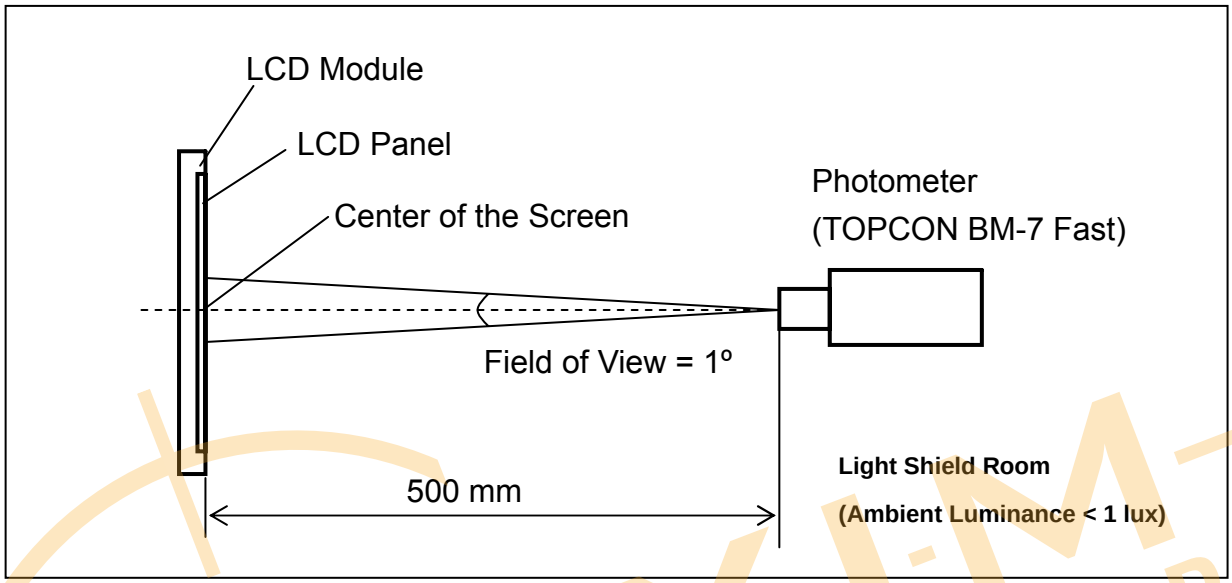


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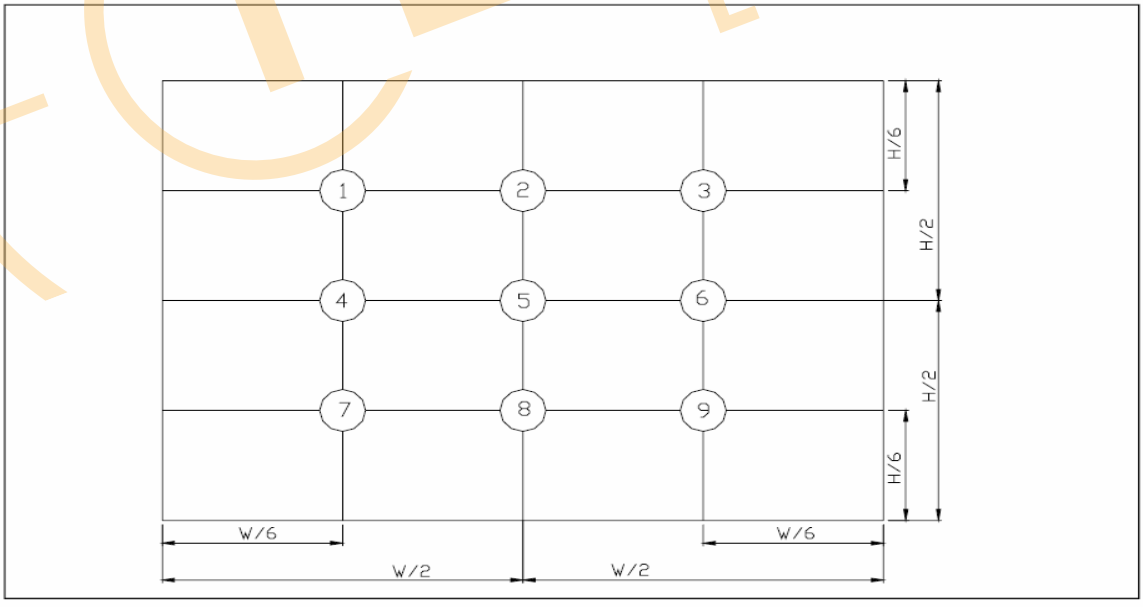
Note (4) Measurement Set-Up:

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



Note (5) Definition of brightness uniformity

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



(單位 ：mm)

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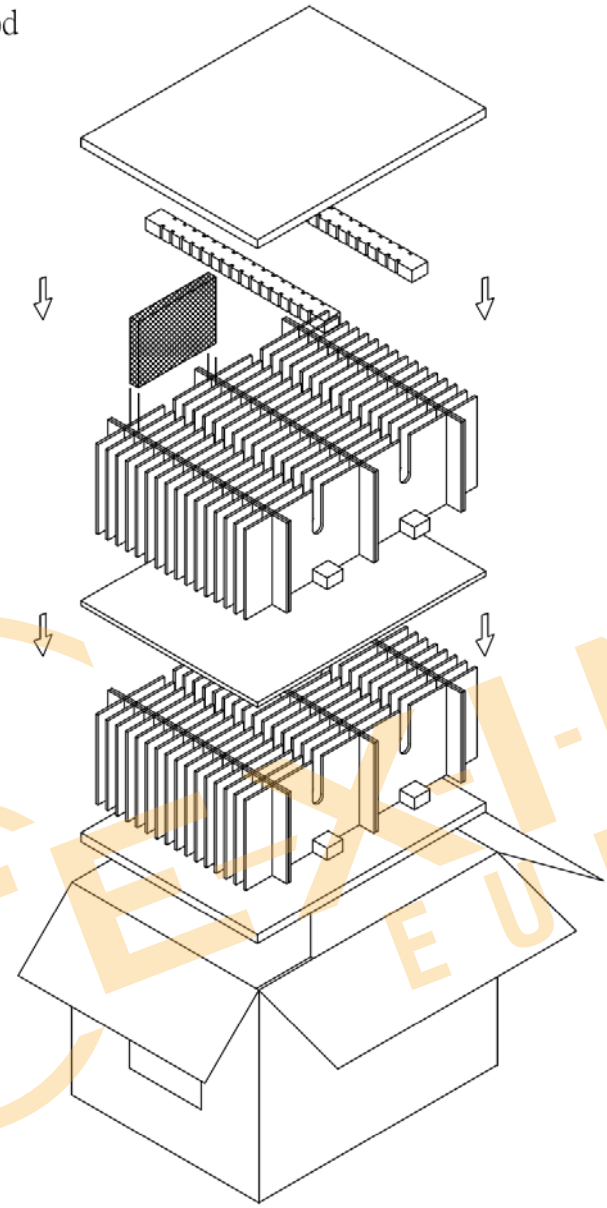
13. Reliability Test

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

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14. Packaging

Packing Method



	PARTS LIST				
	ITEM	SIZE(LxWxH) unit:mm	MATERIAL	Q.T.Y	NOTE
1	STATIC SHIEDING BAGS	200.0x145.0*0.09		60	
2	PU FOAM	440.0x340.0x15.0	SPONGE	2	
3	EPE PAD	345.0x30.0x20.0		8	
4	CARD BOARD	345.0x150.0x3.5	CARTON	12	
5	CARD BOARD	450.0x150.0x3.5	CARTON	32	
6	CARD BOARD	440.0x340.0x8.0	CARTON	1	
7	EXTERNAL BOX	460.0x360.0x355.0	CARTON	1	
8	PRODUCT	167.0x109.0x10.4		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 10ºC, the display quality might be reduced. For example, the response time will become slow.

15.2 Safety Precautions

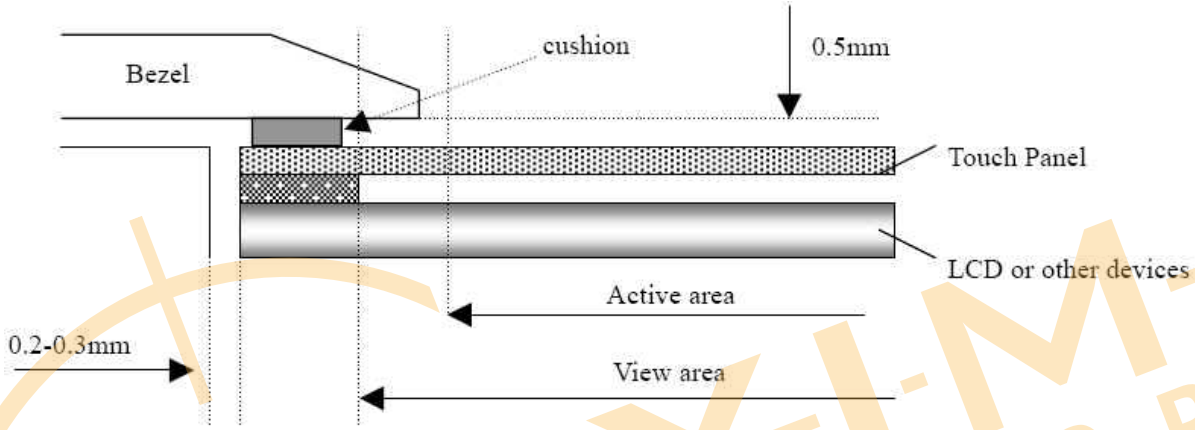
(1) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.

(2) After the module's end of life, it is not harmful in case of normal operation and storage.

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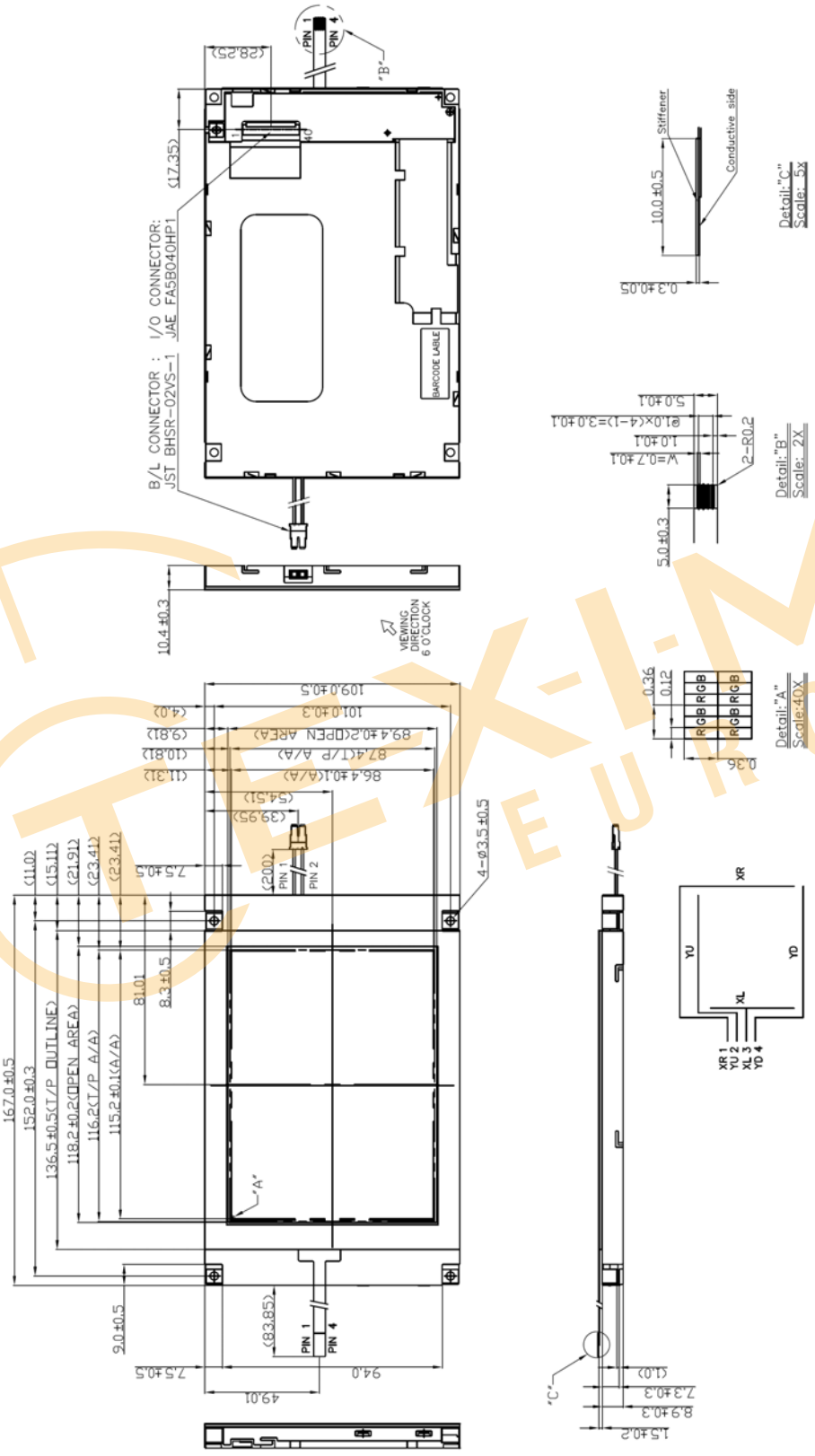
15.3 Cautions for installing and assembling

Bezel edge must be positioned in the area between the Active area and View area.
The bezel may press the touch screen and cause activation if the edge touches the active area. A gap of approximately 0.5mm is needed between the bezel and the top electrode. It may cause unexpected activation if the gap is too narrow. There is a tolerance of 0.2 to 0.3mm for the outside dimensions of the touch panel and tail. A gap must be made to absorb the tolerance in the case and connector.



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16.Outline Drawing



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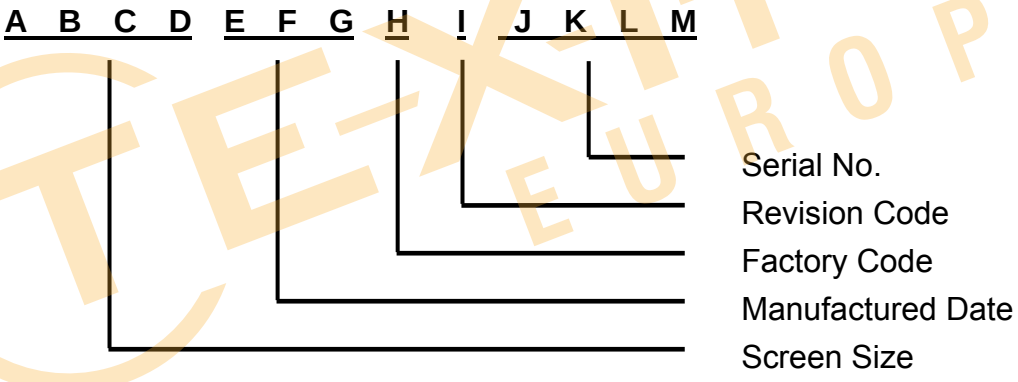
17.Definition of Labels

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



(a) Module Name: OSD322404-6UFLWB

(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

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Month (F)

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

Day (G)

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

(c) Factory Code (H):

(d) Revision Code (I):

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

(e) Serial No. (JKLM):

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

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18. Incoming Inspection Standards

18.1 The environmental condition of inspection

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

(1) Ambient temperature 25 ± 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

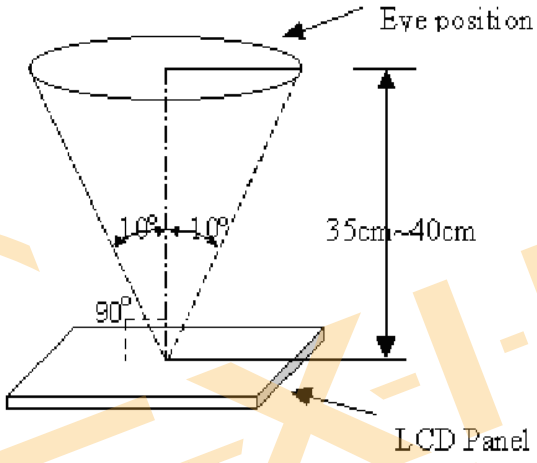


Fig _ 1

18.2 The defects classify of AQL as following:

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

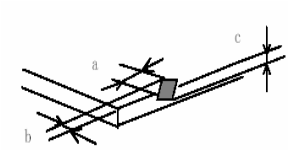
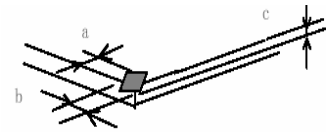
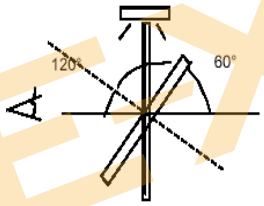
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18.3 Inspection Parameters

<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="7">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="6">Point Defect
(red,green,blue,dark)</td><td colspan="2" rowspan="2">Item</td><td colspan="3">Acceptable number</td><td rowspan="6">Note: 1、2、5、6、7</td></tr>
<tr><td>A</td><td>B</td><td>Total</td></tr>
<tr><td colspan="2">BRIGHT DOT</td><td>N≦2</td><td>N≦2</td><td rowspan="3">N≦7</td></tr>
<tr><td colspan="2">DARK DOT</td><td>N≦3</td><td>N≦4</td></tr>
<tr><td colspan="2">TOTAL DOT</td><td>N≦4</td><td>N≦5</td></tr>
<tr><td colspan="2">TWO ADJACENT DOT</td><td colspan="3">NOT ALLOWED</td></tr>
<tr><td colspan="2">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:3</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:4</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:4</td></tr>
</table>

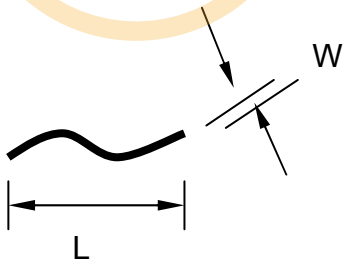
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Note1. Distance between point defect distance should be large than 5 mm.

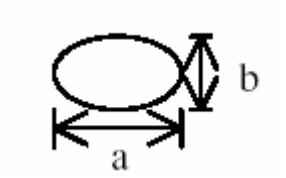
Item		Specification/Description		Note
Touch Panel	Glass chipping		a≦3mm b≦3mm c≦t (t：Glass think)	Note:8
			a≦3mm b≦3mm c≦t (t：Glass think)	Note:8
	Newton-ring	(In case of doubtful situations) Observe on 60° from the product surface under a while Fluorescent lamp(3-wavelength lamp). 	Average diameter≦7mm N≦1	Note:8

Note2. 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.

Note3.

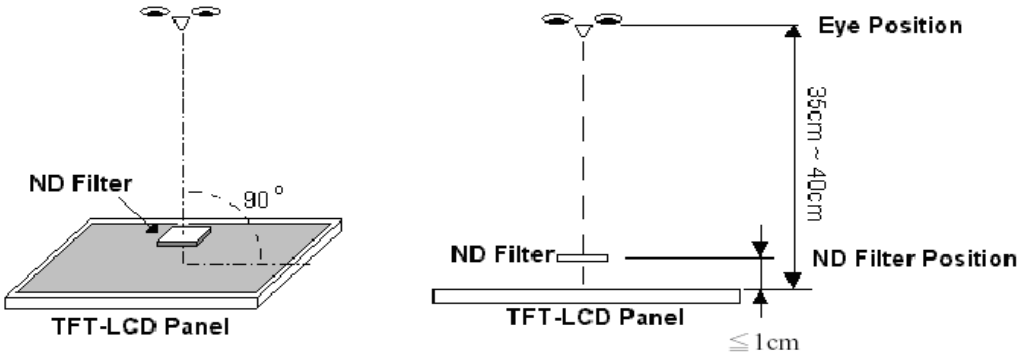


Note4. D：Diameter D=(a+b)/2



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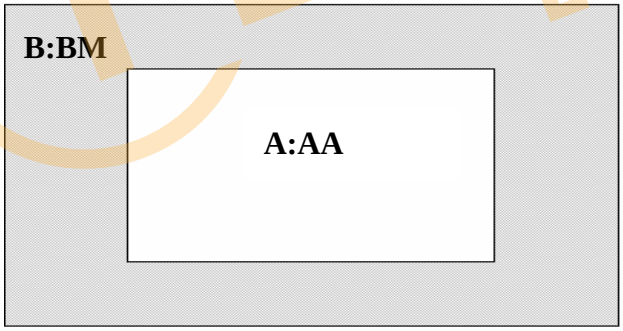
Note5. Bright dot is defined through 6% transmission ND Filter as following.



Note6. ADJACENT DOT

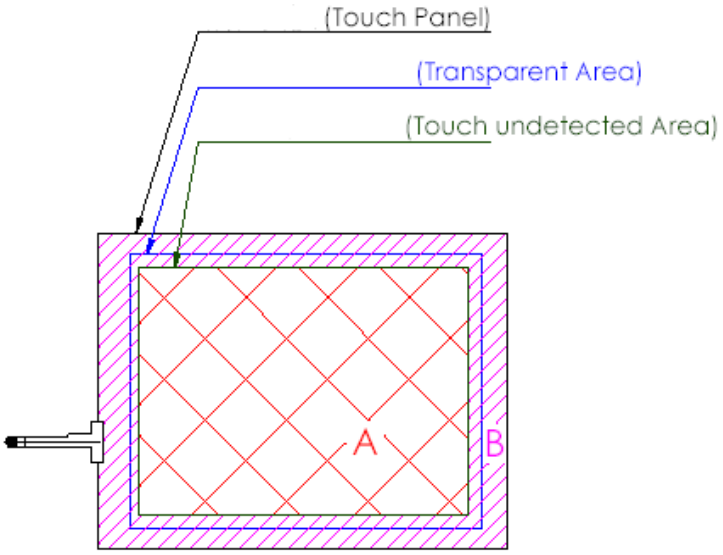


Note7.



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Note8.



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.

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Please contact us if you have any questions about the contents of the datasheet.

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