HY-LINE®
COMPUTER COMPONENTS

TFT-Display Datasheet

ONation
Model: OT121ZXWDLL-00

Brief spec.:

Main Feature	Landscape Type
	White LED Backlight
	Wide Viewing Angle

Active Screen Area	245.76 x 184.32 (mm)
Diagonal | Format	12,1" | 4:3
Resolution	1024 x 768
Colors	R.G.B Stripe
Backlight	LED, White
Brightness	330 cd/m²
LED Life Time	30,000h (Typ.)
Interface	LVDS
Viewing Angle	-70~80(H), -70~80 (V)
Touchscreen	No
Power Supply	3,3V (Typ.)
Module Outline	279 x 209 x 9 (mm)
Operation Temperature	-20... +70 °C
Storage Temperature	-30... +80 °C
Surface Treatment	Anti-Glare & Hardness

HY-LINE Computer Components Vertriebs GmbH
Inselkammerstr. 10, 82008 Unterhaching bei München
Tel.: +49 89 614 503 40 | Fax: +49 89 614 503 50
computer@hy-line.de | www.hy-line.de/computer

ONation Corporation

TFT COLOR LCD MODULE

MODEL: OT121ZXWDLL-00
(COMPLIED WITH RoHS)

XGA
LVDS interface (1port)

Version: V4.0

Customer : _____

Approved By : _____

Date: _____

ONATION		
APPROVAL	**CHECKER**	**PREPARE**
Jun	Josh	Aiden

All information is subject to change without notice.
Please confirm the sales representative before starting to design your system

C O N T E N T S

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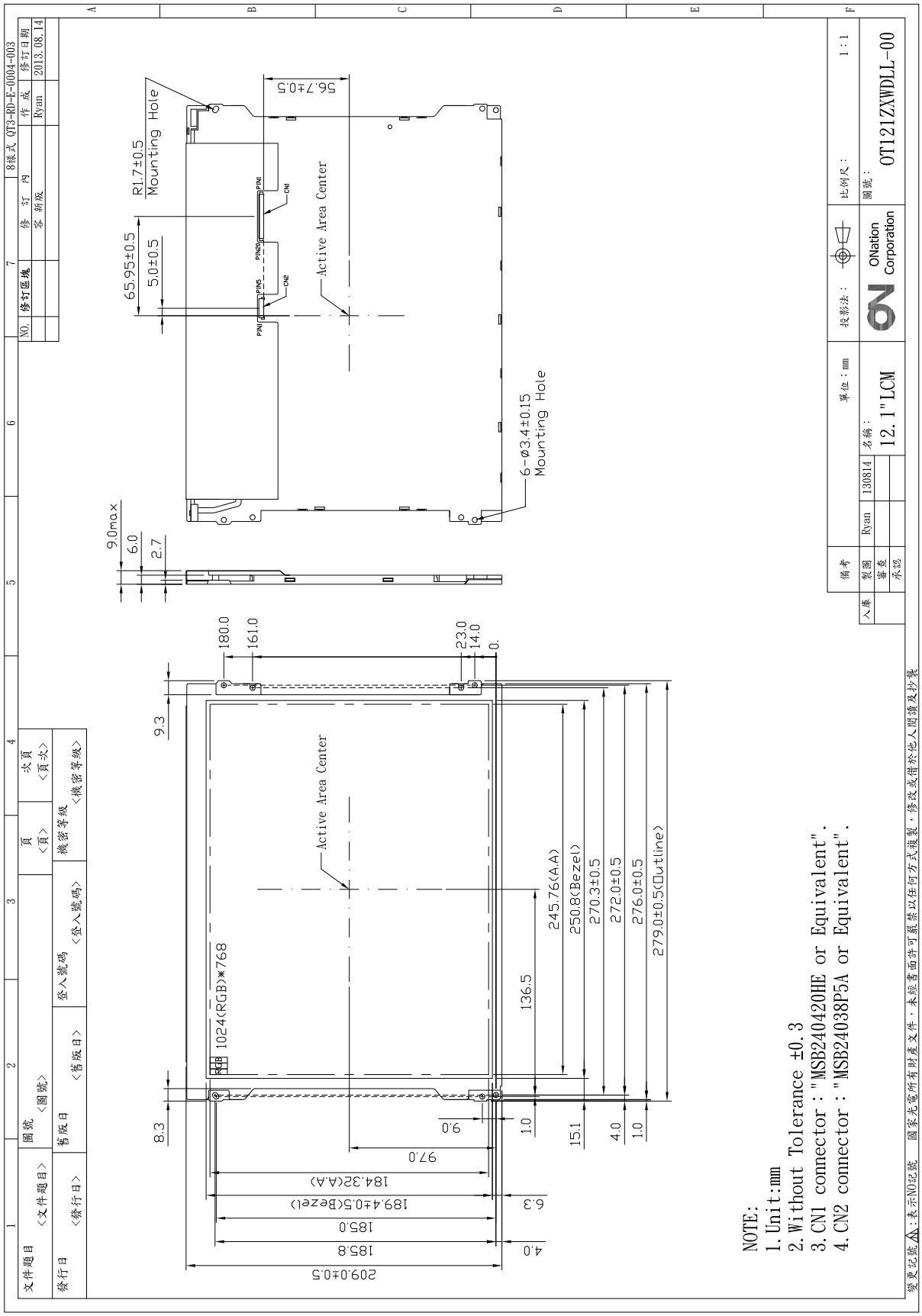
1.RECORD OF REVISION

<table>
<tr><th>REV</th><th>DATE</th><th>PAGE</th><th>SUMMARY</th></tr>
<tr><td>0.1</td><td>2013.10.21</td><td>ALL</td><td>Preliminary specification was first issued.</td></tr>
<tr><td rowspan="2">0.2</td><td rowspan="2">2014.03.13</td><td>8</td><td>IDD=TBD(typ),TBD(max) → IDD=265(typ),320(max)
ILED =TBD(typ),TBD(max) → IDD=450(typ),530(max)</td></tr>
<tr><td>9</td><td>L=315(typ),350(max) → L=300(typ),330(max)</td></tr>
<tr><td rowspan="3">0.3</td><td rowspan="3">2014.06.04</td><td>1</td><td>Change:
(11)Module Weight(g): (545) → 510±5%</td></tr>
<tr><td>6</td><td>Change:
Response Time: TBD(Max) → 19(MAX)</td></tr>
<tr><td>15</td><td>Change:
<table>
<tr><th>LCM Model</th><th>LCM Qty. in the box</th><th>Inner Box Size (mm)</th><th>Weight</th><th>REMARK</th></tr>
<tr><td>OT121ZXWDLL-00</td><td>TBD</td><td>TBD</td><td>TBD</td><td></td></tr>
</table>
↓
<table>
<tr><th>LCM Model</th><th>LCM Qty. in the box</th><th>Inner Box Size (mm)</th><th>Weight</th><th>REMARK</th></tr>
<tr><td>OT121ZXWDLL-00</td><td>15PCS</td><td>440*390*300</td><td>9.6Kg</td><td></td></tr>
</table></td></tr>
<tr><td>1.0</td><td>2014.06.04</td><td>ALL</td><td>Official specification was first issued</td></tr>
<tr><td>2.0</td><td>2014.07.24</td><td>15</td><td>Add: 13 PACKAGE INFORMATION</td></tr>
<tr><td>3.0</td><td>2014.07.30</td><td>15-21</td><td>Add:12. LCM INSPECTION STANDARD</td></tr>
<tr><td>4.0</td><td>2014.09.11</td><td>14</td><td>Change: 11.MODEL NUMBER SYSTEM</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

2.MECHANICAL SPECIFICATIONS

(1)	Number Of Dots (Dots)	1024(R.G.B) X 768
(2)	Module Size(mm)	279.0(H) X 209.0(V) X9.0(D)
(3)	Active Area(mm)	245.76(H) X 184.32(V)
(4)	Pixel Pitch(mm)	0.24 (H) X 0.24(V)
(5)	LCD / Polarizer Model	TFT , Transmissive, Normally/White, Anti-Glare & Hardness 3H
(6)	Backlight Color	White, LED
(7)	Viewing Direction	Wide Viewing Angle Horizontal：Right side 80°(typ.), Left side 80°(typ.) Vertical：Up side 80°(typ.), Down side 80°(typ.)
(8)	Gray Scale Inversion Direction	No GSI
(9)	Electrical Interface	LVDS Interface
(10)	Color Configuration	R.G.B Stripe
(11)	Module Weight(g)	510±5%

3. OUTLINE DIMENSIONS



4. INTERFACE PIN CONNECTION

4.1 LCM PANEL DRIVING SECTION

CN1 Connector：STM MSB240420HE or Equivalen

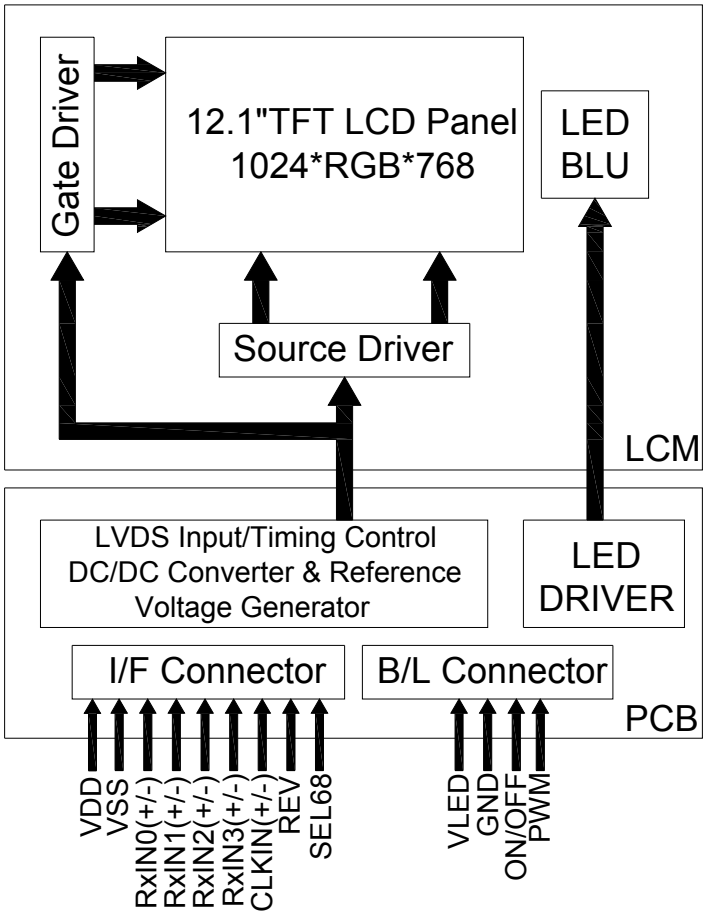
PIN NO.	SIGNAL	FUNCTION
1	VDD	Power Supply For Digital Circuit
2	VDD	Power Supply For Digital Circuit
3	VSS	Ground
4	REV	Reverse Scan selection {High:2.5(min),3.3(typ),3.6(max);Low:0.5(max)}
5	RxIN0-	Differential Data Input, CH0(Negative)
6	RxIN0+	Differential Data Input, CH0(Positive)
7	VSS	Ground
8	RxIN1-	Differential Data Input, CH1(Negative)
9	RxIN1+	Differential Data Input, CH1(Positive)
10	VSS	Ground
11	RxIN2-	Differential Data Input, CH2(Negative)
12	RxIN2+	Differential Data Input, CH2(Positive)
13	VSS	Ground
14	CLKIN-	Differential Clock Input(Negative)
15	CLKIN+	Differential Clock Input(Positive)
16	VSS	Ground
17	RxIN3-	Differential Data Input, CH3(Negative)
18	RxIN3+	Differential Data Input, CH3(Positive)
19	SEL68	6/8 Bits LVDS data input selection(H:8bit L/NC:6bit)
20	NC	Non Connection(open)

4.2 INPUT LED SIGNAL PIN ASSIGNMENT

CN2 Connector: STM MSB24038P5A or Equivalen

PIN NO.	SIGNAL	FUNCTION
1	VLED	12V Input
2	GND	Ground
3	ON/OFF	(5V-ON,0V-OFF)
4	PWM	Dimming
5	NC	NO connection

5. BLOCK DIAGRAM



6. ABSOLUTE MAXIMUM RATINGS

6.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
Supply Voltage	VDD	-0.5	5	V	

6.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	OPERATING		STORAGE		REMARK
	MIN.	MAX.	MIN.	MAX.	
Ambient Temperature(℃)	-20	70	-30	80	Note 1,2
Humidity(% RH)	Note 3		Note 3		Without condensation

Note 1 : The response time will become lower when operated at low temperature.
Note 2 : Background color changes slightly depending on ambient temperature.
Note 3 : Ta≦50℃: 85%RH max , without condensation.
Ta＞50℃: Absolute humidity shall be less than the value of 85%RH at 50℃ without conclensation

7. ELECTRICAL CHARACTERISTICS

7.1 ELECTRICAL CHARACTERISTICS OF LCD

Ta=25℃

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
Power Voltage For LCD	VDD	3.0	3.3	3.6	V	
	IDD	-	265	320	mA	Note1
Differential Input Threshold Voltage	VTH	-	-	+100	mV	Note2
	VTL	-100	-	-	mV	Note2

Note 1 : Test Condition: VDD=3.3V ; Test Pattern: Black.
Note 2 : VTH and VTL is defined in RxIN0+/-、RxIN1+/-、RxIN2+/-、RxIN3+/-、CLKIN+/- signal voltage level.

7.2 BACKLIGHT UNITS

Ta=25℃

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
LED Driving Voltage	V_{LED}	10.8	12	12.6	V	
LED Driving Current	I_{LED}	-	450	530	mA	
LED Life Time	-	(30,000)	-	-	Hr	Note1 I_{LED}=450mA

Note1:The LED life time define as the estimated time to 50% degradation of initial luminous.
Note2:Operating temperature 25℃,humidity 55%RH.
Note3:A higher LED power supply voltage will result in better power efficiency. Keep the VLED between 12V and 12.6V is strongly recommended.

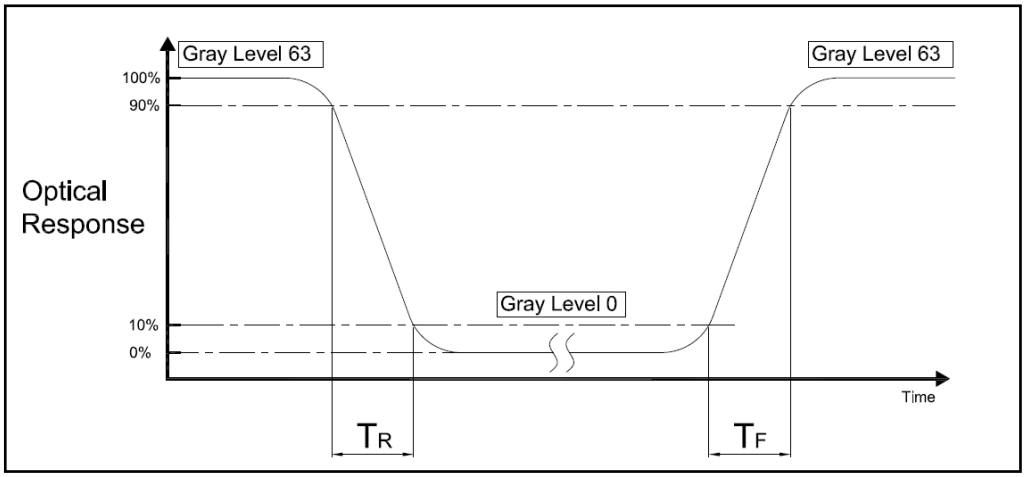
8. OPTICAL CHARACTERISTICS

Ta=25℃

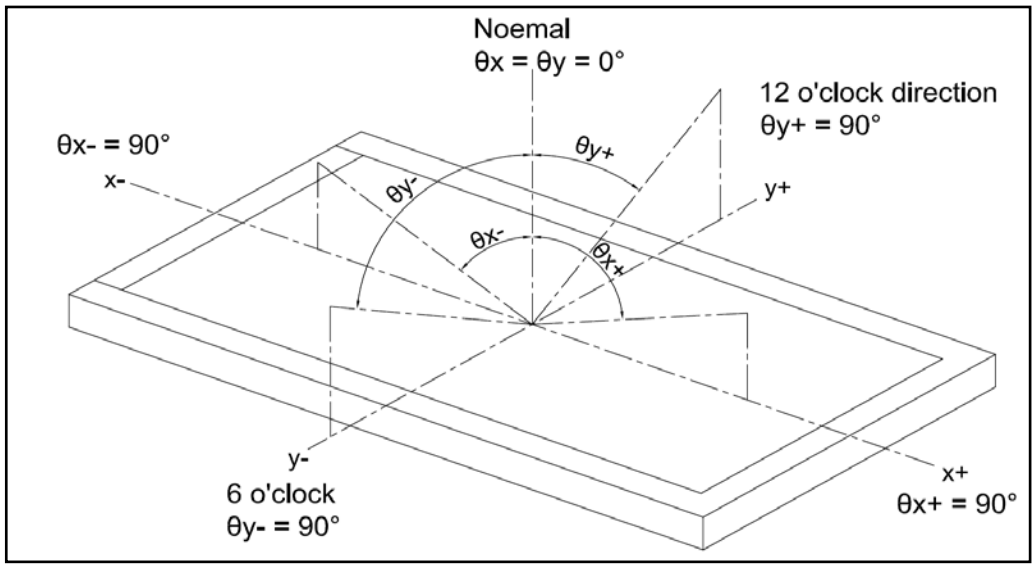
ITEM		SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT	REMARK
Contrast Ratio		CR	Viewing Normal Angle Θx=Θy=0°	720	800	-	-	Note 1
Response Time		TR+TF		-	16	19	ms	Note 2
Chromaticity	White	x		0.255	0.305	0.355	-	Note 4
		y		0.275	0.325	0.375	-	
Viewing Angle	Hor.	θx+	Viewing Angle Θx=Θy=0° CR≧10	70	80	-	Deg.	Note 3
		θx -		70	80	-		
	Ver.	θy+		70	80	-		
		θy -		70	80	-		
Luminance		L	PWM=100%	300	330	-	cd/m2	Center
Luminance Uniformity		YU		75	80	-	%	Note 5

Note 1：Definition of Contrast Ratio (CR)：
The contrast ratio can be calculated by the following expression.
Contrast Ratio (CR) = L63/L0
L63：Luminance of gray level 63
L0：Luminance of gray level 0
CR = CR(5)
CR(X) is corresponding to the Contrast Ratio of the point X at Figure in Note 5

Note 2：Definition of Response Time (TR.TF)

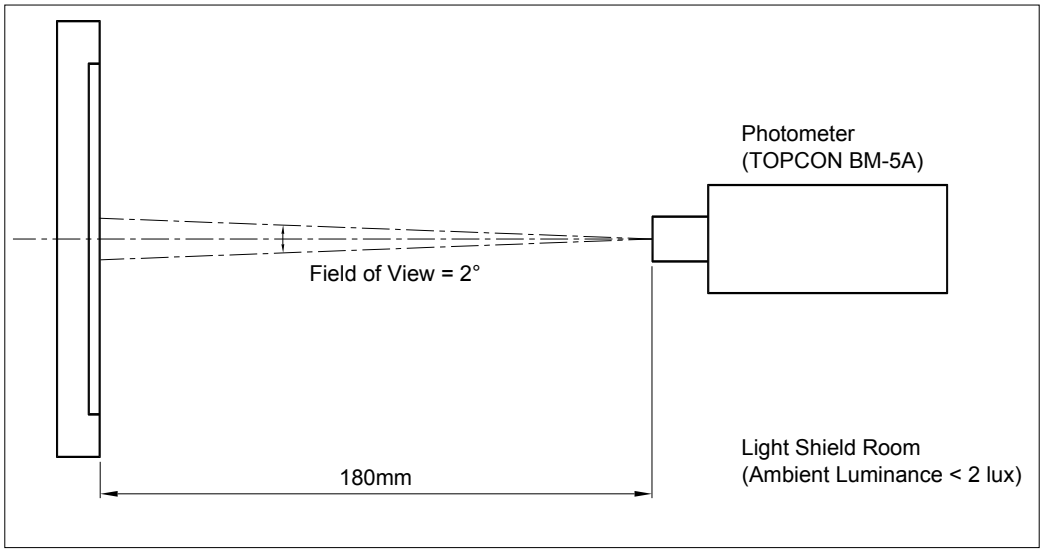


Note 3：Definition of Viewing Angle

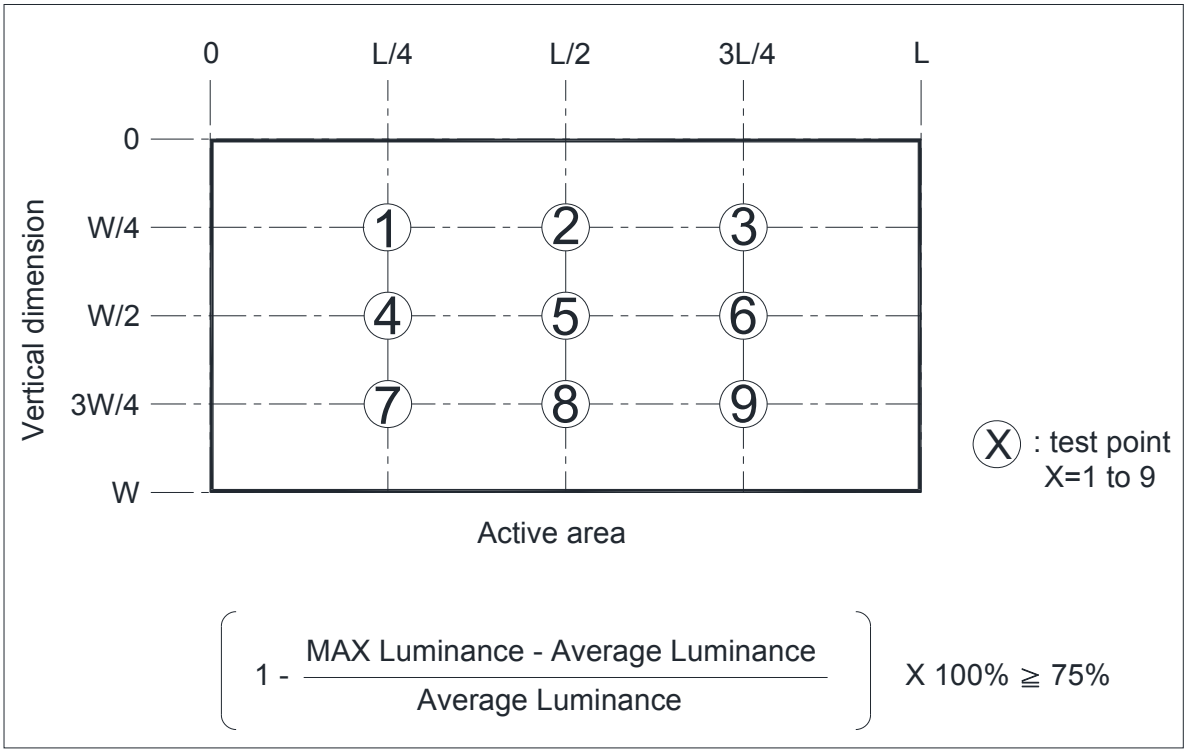


Note 4：Measurement Set-Up:

The LCD module should be stabilized at a given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.



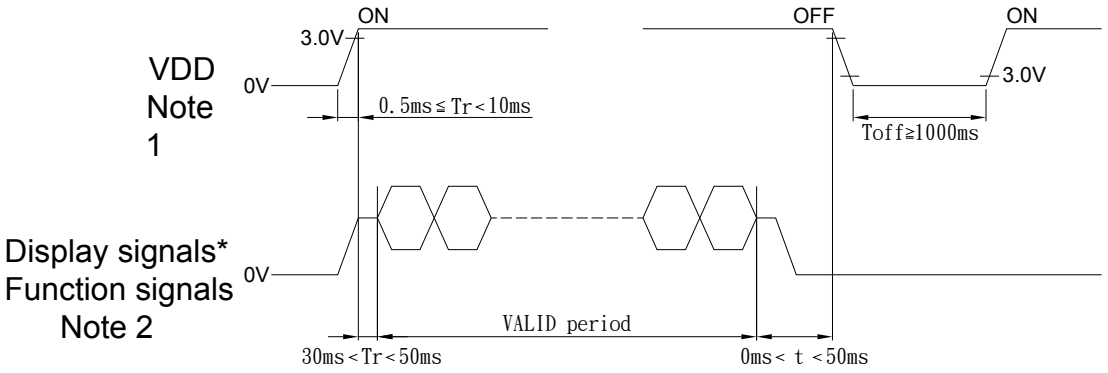
Note 5：


0
L/4
L/2
3L/4
L
0
W/4
W/2
3W/4
W
Vertical dimension
1
2
3
4
5
6
7
8
9
Active area
X : test point
X=1 to 9
1 - MAX Luminance - Average Luminance / Average Luminance
X 100% ≧ 75%

9. TIMING SPECIFICATIONS

9.1 POWER SUPPLY VOLTAGE SEQUENCE

9.1.1 LCD panel signal processing board

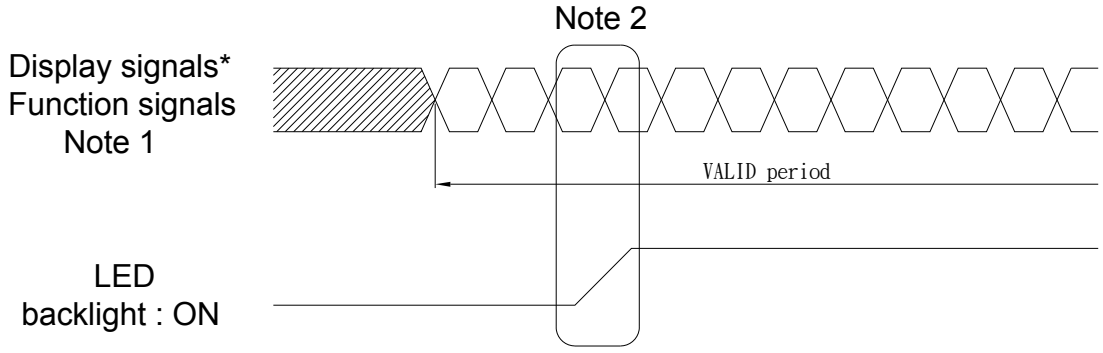


*These signals should be measured at the terminal of 100? resistance

Note1: If there is a voltage variation (voltage drop) at the rising edge of VDD below 3.0V, there is a possibility that a product does not work due to a protection circuit.

Note2: Display signals (RxIN0+/-, RxIN1+/-, RxIN2+/-, RxIN3+/-and CLKIN+/-), except the VALID period (See above sequence diagram), in order to avoid the circuitry damage. If some of display and function signals of this product are cut while this product is working, even if the signal input to it once again, it might not work normally. If a customer stops the display and function signals, VDD also must be shut down.

9.1.2 LCD driver board

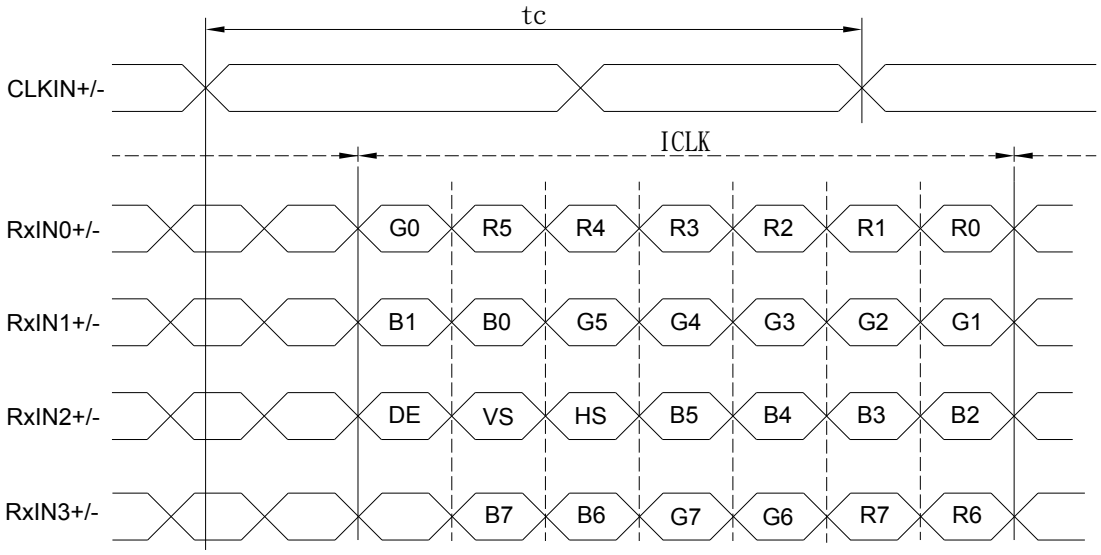


Note1: These are the display and function signals for LCD panel signal processing board.

Note2: The backlight should be turned on within the valid period of display and function signals, in order to avoid unstable data display.

9.2 INTERFACE TIMING

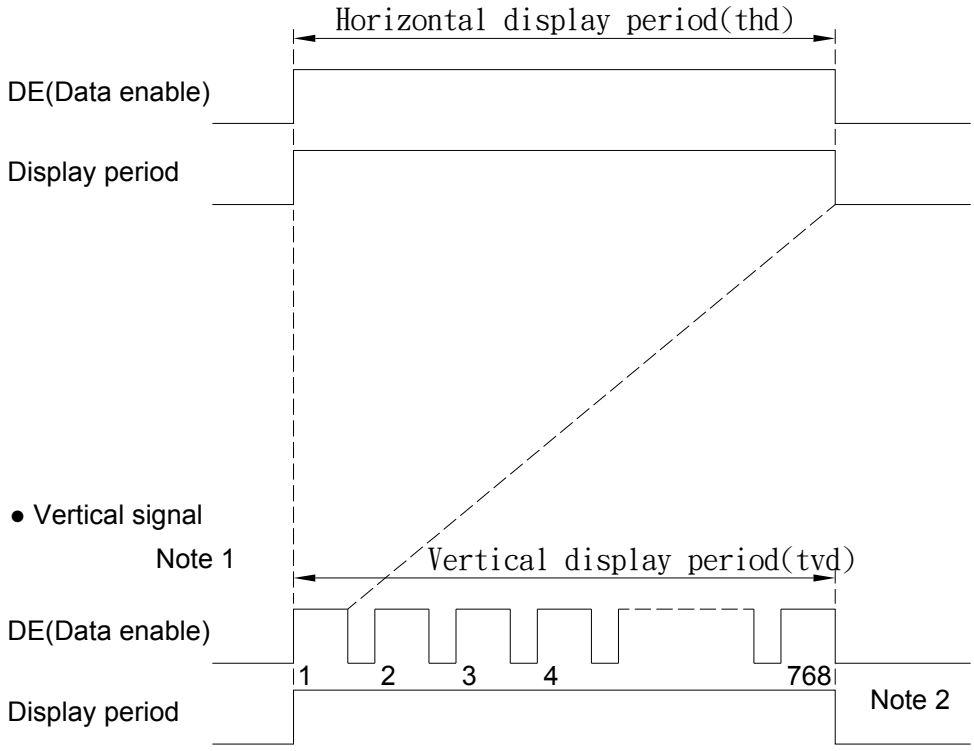
9.2.1 INPUT DATA SIGNAL



9.2.2 OUTLINE OF INPUT SIGNAL TIMINGS

● Horizontal signal

Note 1



● Vertical signal

Note 1

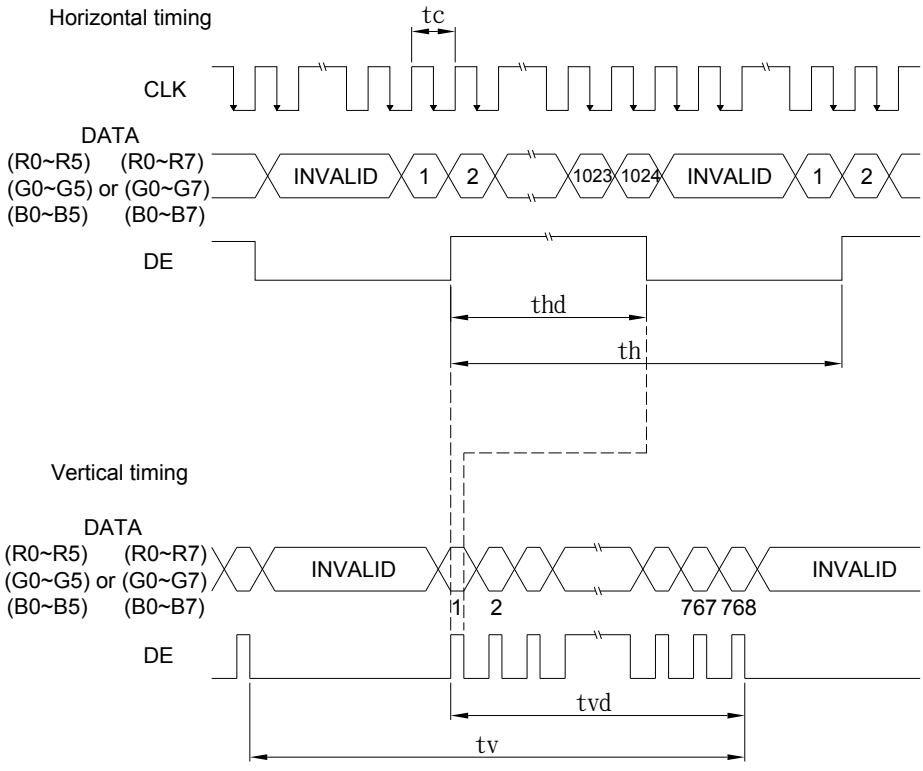
Note 1:This diagram indicates virtual signal for set up to timing.
Note 2:See "**9.2.4 Input signal timing chart**" for the pulse number.

9.2.3 TIMING CHARACTERISTICS

ITEM			SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARKS
CLK	Frequency		1/tc	60.0	65.0	68.0	MHz	15.384ns (typ.)
	Duty		-	-			-	-
	Rise time, Fall time		-				ns	
DATA	CLK-DATA	Setup time	-	-			ns	-
		Hold time	-				ns	
	Rise time, Fall time		-				ns	
DE	Horizontal	Cycle	th	19.76	20.676	22.4	us	48.36Hz(typ.)
				-	1344	-	CLK	
		Display period	thd	1024			CLK	
	Vertical (One frame)	Cycle	tv	15.384	16.666	18.181	ms	60.0Hz(typ.)
				-	806	-	H	
		Display period	tvd	768			H	
	CLK-DE	Setup time	-	-			ns	-
		Hold time	-				ns	
	Rise time, Fall time		-				ns	

Note1: Definition of parameters is as follows.
tc=1CLK, th=1H
Note2: See the data sheet of LVDS transmitter.
Note3: Vertical cycle(tv) should be specified in integral multiple of Horizontal cycle(th).

9.2.4 Input signal timing chart



10. RELIABILITY TEST

ENVIRONMENTAL TEST				
NO.	ITEM	CONDITIONS	TIME PERIOD	REMARK
1	High Temperature Storage	80℃	240HRS	
2	Low Temperature Storage	-30℃	240HRS	
3	High Temperature Operation	70℃	240HRS	
4	Low Temperature Operation	-20℃	240HRS	
5	Temperature Cycle	-30℃~80℃	1HRS/ 100CYCLE	
6	High Temperature Humidity Operation	50℃ 85%RH	240HRS	

NOTE 1：a. The module should word properly.
b. Before and after function test, The difference of consumptive current. Should be within 10%.
NOTE 2：a. The module should work properly.
b. The module won't be deformative, Color changeable or broken.
c. The modules can't be apart.
NOTE 3：a. Before cosmetic and function test, The product must have enough recovery time, At least 2 hours at room temperature.

10.1 VIBRATION TEST：

10.1.1 STATE LABORATORY ENVIRONMENT：

Room temperature： 25±3℃
Relative humidity：55±20％RH

10.1.2 TEST METHOD / SPECIFICATION：

Sample Status： Non-packaged single state
Waveform： Sine
Frequency：10~55~10Hz
Full amplitude：1.5mm
Vibration direction：X,Y,Z Axis (3 Axial)
Test time： Each 2Hour / X,Y,Z Axis， Altogether 6 Hour

10.2 MECHANICAL SHOCK TEST：

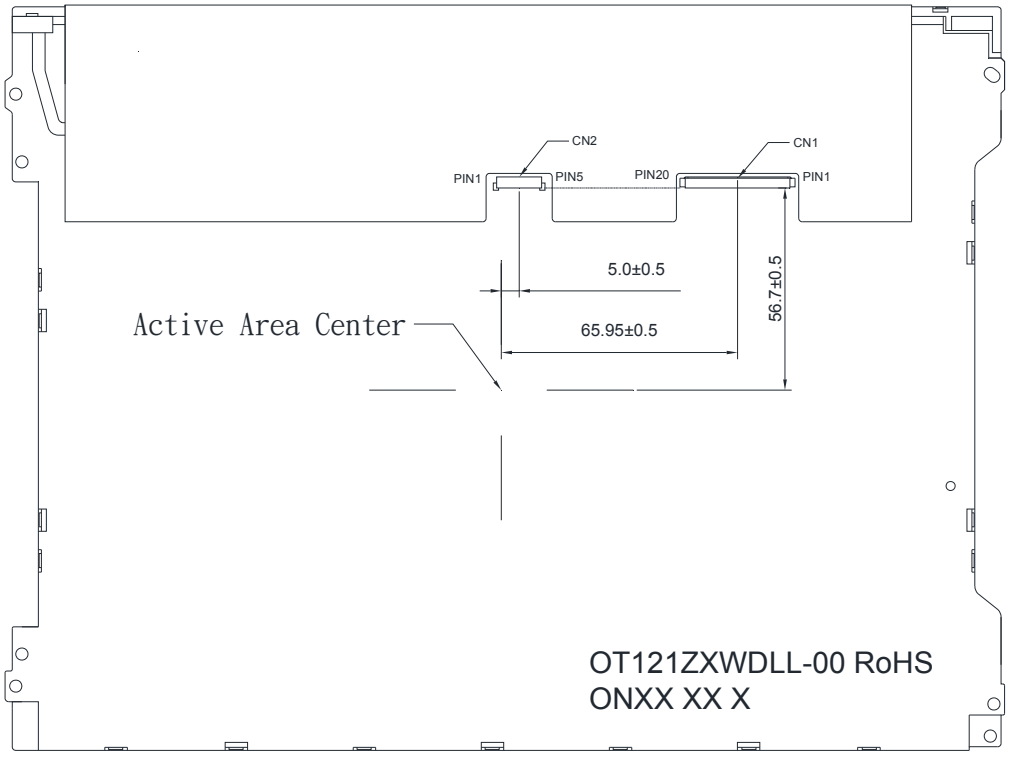
10.2.1 STATE LABORATORY ENVIRONMENT：

Room temperature： 25±3℃
Relative humidity：55±20％RH

10.2.2 TEST METHOD / SPECIFICATION：

Sample Status： Non-packaged single state
Waveform： Half-sine
Acceleration：1.5G
Shock Time：6ms
Impact direction：6 Directions (±X, ±Y, ±Z axes)
Number of shocks： Each direction 3 Secondary， Altogether 18 Secondary

11.MODEL NUMBER SYSTEM



(a) MODEL NAME：OT121ZXWDLL-00 RoHS
(b) LOT NO：XX XX X

CODE	MEANING	DESCRIPTION
XX	Year	2013=13, 2014=14, 2015=15, ….
XX	Month	01,02,03,04,05,06,07,08,09,10,11,12
X	Week	1,2,3,4,5,6

12. LCM INSPECTION STANDARD

12.1 QUALITY LEVEL

INSPECTION PLAN:

SAMPLING LEVEL : II, normal inspection, single sampling inspection

Sampling Plan		MIL-STD-105E Normal Inspection, Single Sampling Level II
AQL	Major Defect	1.0%
	Minor Defect	2.5%

12.2 ENVIRONMENT CONDITIONS:

Ambient Temperature		25±℃
Ambient Humidity		65±5%RH
Ambient Illumination	Cosmetic Inspection	300~700 Lux
	Functional Inspection	300~700 Lux

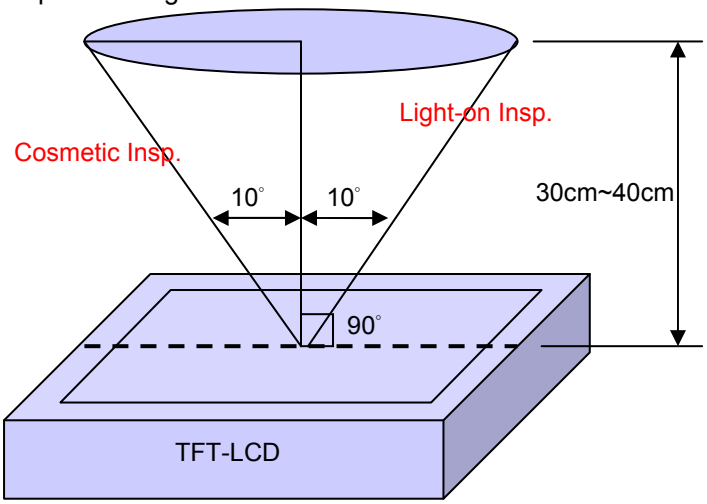
12.3 INSPECTION CONDITION

(1) Inspection Distance: 35 cm±5cm

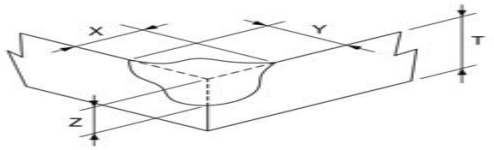
(2) View Angle:

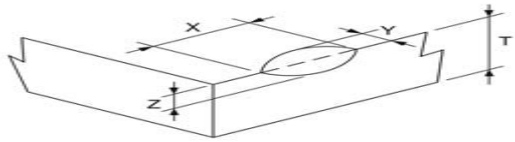
Light-on Inspection Angle：±10°

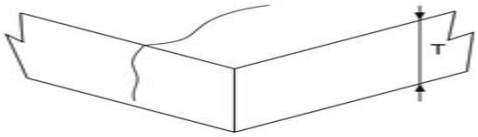
Cosmetic Inspection Angle：±10°

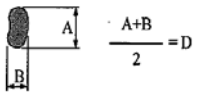


12.4 COSMETIC INSPECTION(Panel):

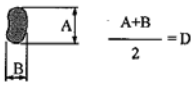
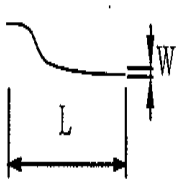
<table>
<tr><th>ITEM</th><th>JUDGMENT CRITERIA</th><th>CLASSIFICATION</th></tr>
<tr><td>Corner Flaw</td><td> 

X≦3.0mm,Y≦3.0mm,Z≦T</td><td>MI</td></tr>
<tr><td>Edge Flaw</td><td> 

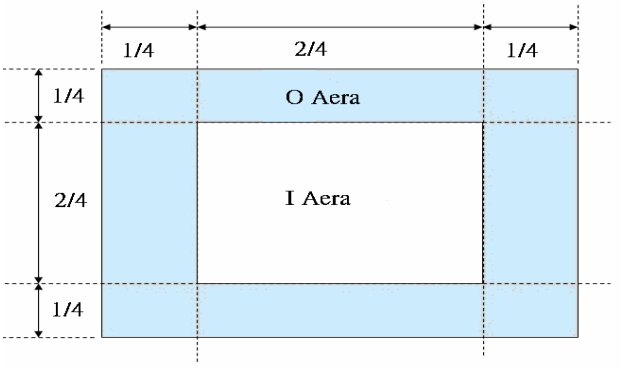
X≦3.0mm,Y≦3.0mm,Z≦T</td><td>MI</td></tr>
<tr><td>Progressive Flaw</td><td> 

Not allowed</td><td>MI</td></tr>
<tr><td>Scratch on Panel
*Note-2</td><td>W≦0.05mm, Ignored
0.05mm<W≦0.1mm and L≦5mm: N≦5
W>0.1mm or L>5mm, Not allowed</td><td>MI</td></tr>
<tr><td>Bubble or Dent on Panel *Note-3</td><td>
<table>
<tr><th>尺寸（mm）</th><th>容許個數</th><th rowspan="5"> 
</th></tr>
<tr><td>D≦0.3</td><td>不計</td></tr>
<tr><td>0.3＜D≦0.5</td><td>6</td></tr>
<tr><td>D＞0.5</td><td>0</td></tr>
<tr><td>D＞0.8</td><td>0</td><td>AR Flim 氣泡</td></tr>
</table>
</td><td>MI</td></tr>
<tr><td>Bezel Deformation</td><td colspan="2">Obvious deformation is not allowed</td><td>MI</td></tr>
<tr><td>Bezel Oxidation</td><td colspan="2">Not allowed if it rusts continuously over 1 cm (It is out of warranty with rusted tin plate)</td><td>MI</td></tr>
<tr><td>Bezel Scratch</td><td colspan="2">Non-feeling abrasion: Ignored
feeling abrasion ,L≦20mm , W≦0.3 mm , N≦7</td><td>MI</td></tr>
<tr><td>Metal Squash Dent /Flange(Front Side)</td><td colspan="2">D(W)≦1 mm , L≦3,N≦4;</td><td>MI</td></tr>
<tr><td>B/L High Voltage Wire Denudation</td><td colspan="2">Not allowed</td><td>MA</td></tr>
<tr><td>Polarizer flaw or leak out resin</td><td colspan="2">Defect is defined as the active area.</td><td>MI</td></tr>
<tr><td>Outline Dimension</td><td colspan="2">Must in Spec, refer to related product spec.</td><td>MI</td></tr>
</table>

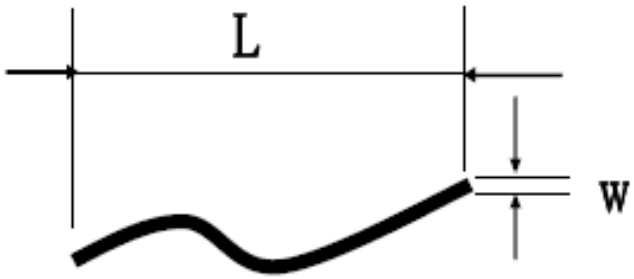
12.5 FUNCTIONAL INSPECTION:

<table>
<tr><th>ITEM</th><th colspan="3">JUDGMENT CRITERIA</th><th>CLASSIFICATION</th></tr>
<tr><td rowspan="11">Point Defect</td><td rowspan="3">Bright dot</td><td>Random</td><td>4</td><td rowspan="11">MI</td></tr>
<tr><td>2 dots adjacent</td><td>1</td></tr>
<tr><td>3 dots adjacent or more</td><td>0</td></tr>
<tr><td rowspan="3">Dark dot</td><td>Random</td><td>5</td></tr>
<tr><td>2 dots adjacent</td><td>1</td></tr>
<tr><td>3 dots adjacent or more</td><td>0</td></tr>
<tr><td colspan="2">Total Dot Defect</td><td>8</td></tr>
<tr><td rowspan="3">Distance</td><td>Distance between Bright and Bright dot</td><td>L≧5.0mm</td></tr>
<tr><td>Distance between Bright and Dark dot</td><td>L≧15mm</td></tr>
<tr><td>Distance between Dark dot</td><td>L≧15mm</td></tr>
<tr><td colspan="3">(1) 缺陷大小＞0.5dot 定義爲點缺陷
It is defined as Point Defect if defect area＞0.5dot
(2) 缺陷大小≦0.5dot 不計
It is ignored if defect area≦0.5dot
(3) 微弱亮透過 ND Filter 6%仍可視計爲點缺陷
(全黑畫面檢查)
Weak point defect will be defined as Bright Dot if it can be Observed through ND filter 6%
(Full Screen Black Inspection)</td></tr>
<tr><td>Line Defect</td><td colspan="3">Obvious vertical or horizontal line defect is not allowed.</td><td>MA</td></tr>
<tr><td>Mura</td><td colspan="3">Not allowed if it can be observed through ND Filter 6 %</td><td>MI</td></tr>
<tr><td>Foreign Material in spot shape
*Note-3</td><td colspan="3"><table><tr><td>尺寸（mm）</td><td>容許個數</td></tr><tr><td>D≦0.3</td><td>不計</td></tr><tr><td>0.3＜D≦0.5</td><td>5</td></tr><tr><td>D＞0.5</td><td>0</td></tr></table>  </td><td>MI</td></tr>
<tr><td>Foreign Material in line or spiral shape *Note-4</td><td colspan="3"><table><tr><td colspan="2">尺寸（mm）</td><td rowspan="2">容許個數</td></tr><tr><td>L</td><td>W</td></tr><tr><td>≦5</td><td>≦0.05</td><td>不計</td></tr><tr><td>5＜L≦8</td><td>0.05＜W≦0.1</td><td>6</td></tr><tr><td>＞8</td><td>＞0.1</td><td>0</td></tr></table>  </td><td>MI</td></tr>
<tr><td>Display Function Abnormal</td><td colspan="3">No Malfunction can be allowed</td><td>MA</td></tr>
<tr><td>Touch panel Malfunction</td><td colspan="3">No Malfunction can be allowed in AA area.</td><td>MA</td></tr>
</table>

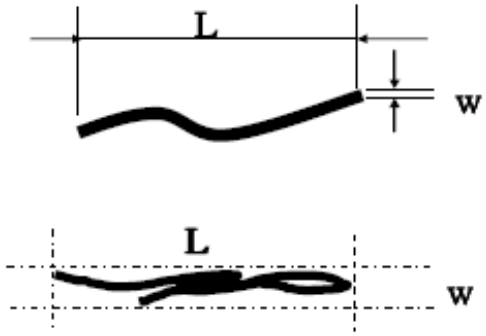
Note1: I/OArea Definition



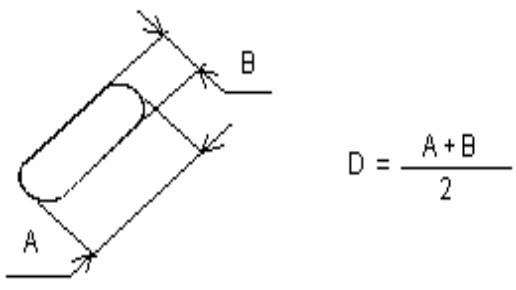
Note 2：Polarizer Scratch



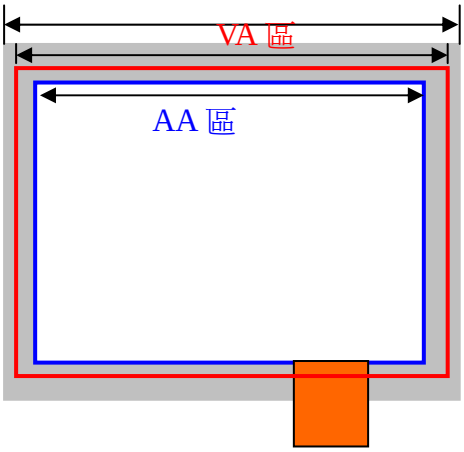
Note 3：Line or Spiral Foreign Material



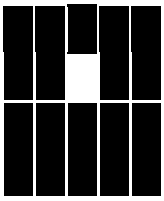
Note 4：Spot Foreign Material



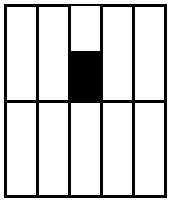
Note 5:TP Inspection Area Definition



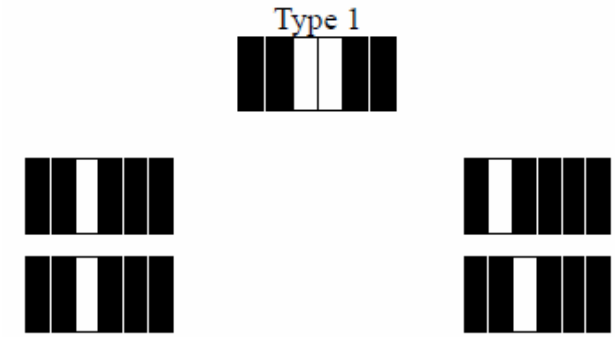
Note 6 : Bright dot defect description:



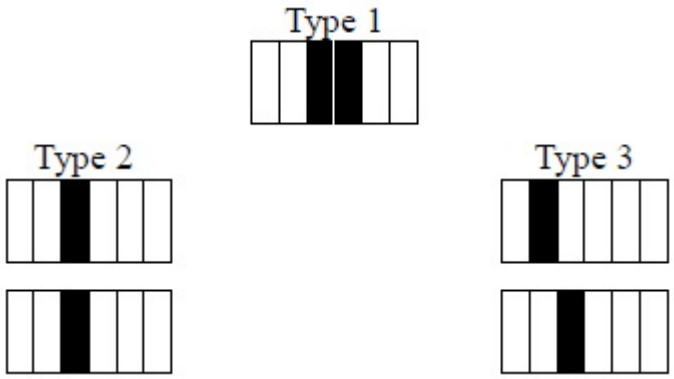
Note 7 : Dark dot defect description:



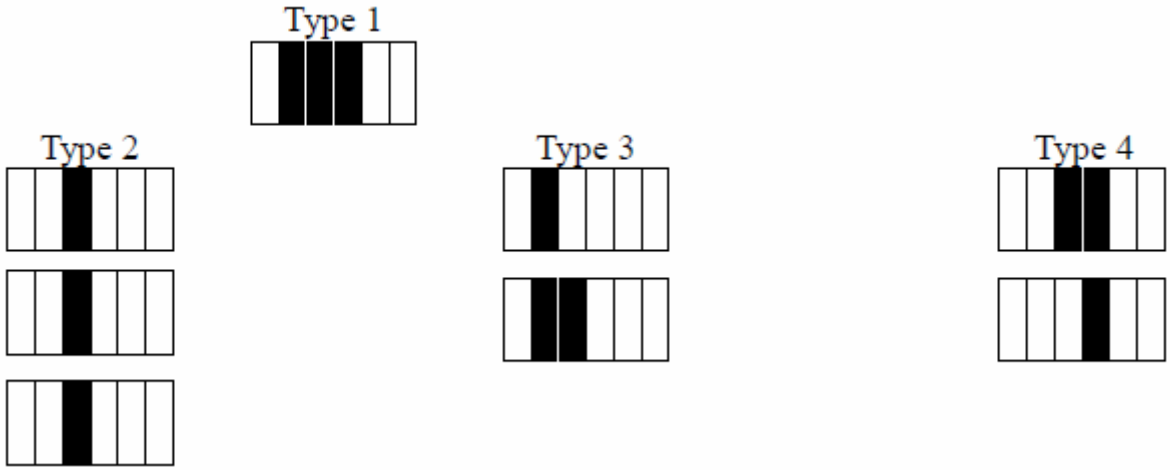
Note 8 : Bright dot defect description- Two adjacent.



Note 9 : Dark dot defect description- Two adjacent.

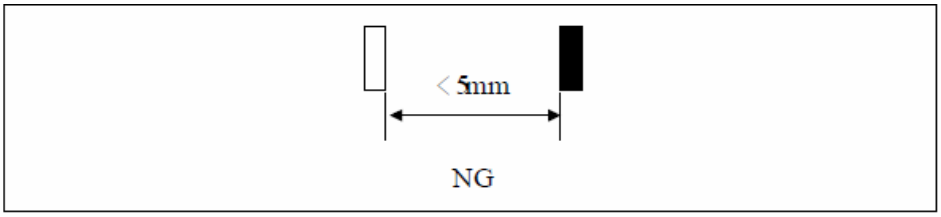


Note 10 : Dark dot defect description- Three adjacent.

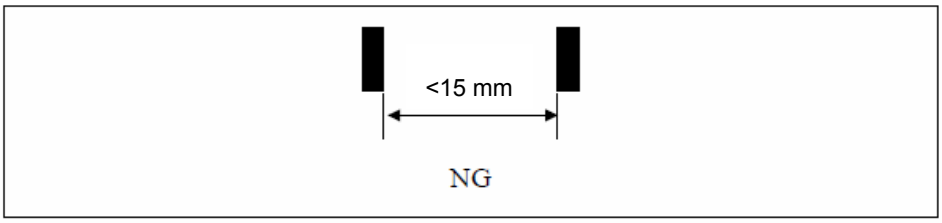


Note 11 : Minimum distance between dot defects :

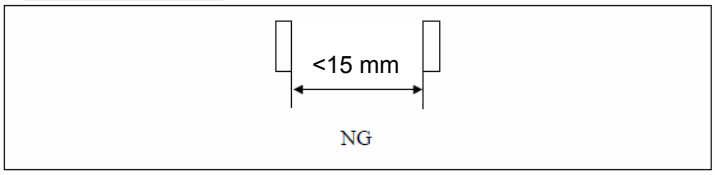
Bright dot to bright dot.



Dark dot dark dot

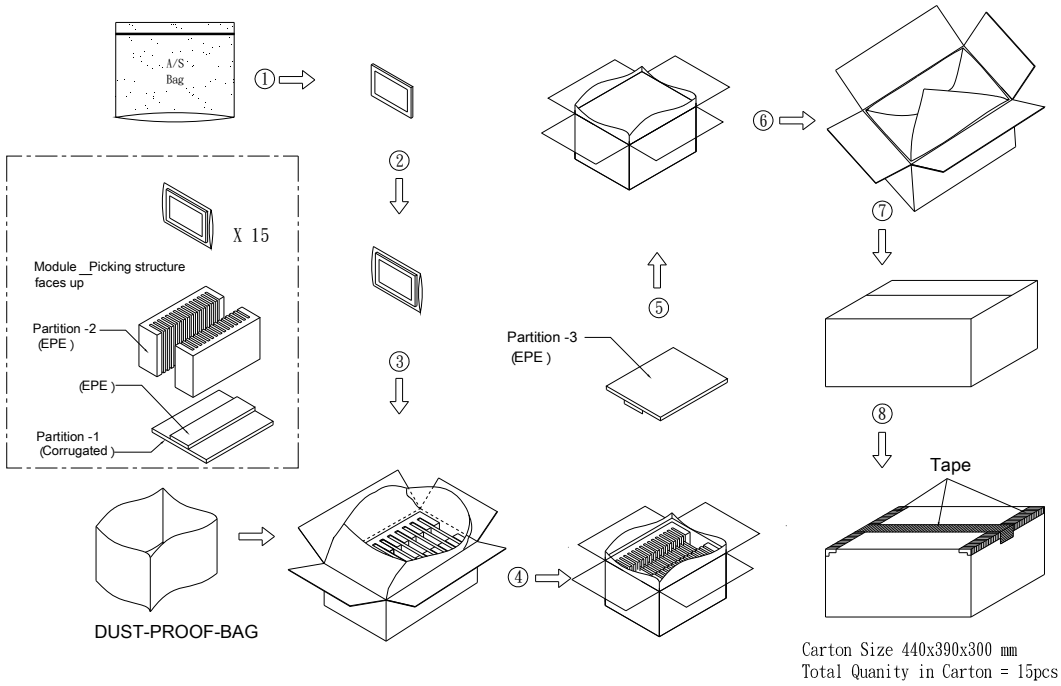


Bright dot to dark dot



13 PACKAGE INFORMATION

LCM Model	LCM Qty. in the box	Inner Box Size (mm)	Weight	REMARK
OT121ZXWDLL-00	15PCS	440*390*300	9.6Kg	



14.PRECAUTIONS FOR USE

14.1 SAFETY

(1) Do not swallow any liquid crystal, even if there is no proof that liquid crystal is poisonous.
(2) If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.
(3) If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.

14.2 STORAGE CONDITIONS

(1) Store the panel or module in a dark place where the temperature is 23±5°C and the humidity is below 50±20%RH.
(2) Store in anti-static electricity container.
(3) Store in clean environment, free from dust, active gas, and solvent.
(4) Do not place the module near organics solvents or corrosive gases.
(5) Do not crush, shake, or jolt the module.

14.3 HANDLING PRECAUTIONS

(1) Avoid static electricity which can damage the CMOS LSI.
(2) The polarizing plate of the display is very fragile. So, please handle it very carefully.
(3) Do not give external shock.
(4) Do not apply excessive force on the surface.
(5) Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the Surface of plate.
(6) Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.
(7) Do not operate it above the absolute maximum rating.
(8) Do not remove the panel or frame from the module.
(9) When the module is assembled, it should be attached to the system firmly, Be careful not to twist and bend the module.
(10) Wipe off water droplets or oil immediately . If you leave the droplets for a long time, staining and discoloration may occur.
(11) 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, legs or clothes, it must be washed away thoroughly with soap.

14.4 WARRANTY

(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 12 months since the date of shipping out under normal using and storage conditions.