



CUSTOMER' S APPROVAL SPECIFICATIONS

MODEL: CH090PDL-RT1

(Complied with RoHS)

ISSUE:JUL.05.2012

Spec Condition:preliminary

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CUSTOMER	CHEFREE		
APPROVAL	APPROVAL	CHECKER	PREPARE
	<i>ch lee</i>	<i>ch lee</i>	<i>cloud</i>

3.MECHANICAL SPECIFICATIONS

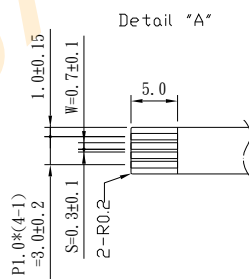
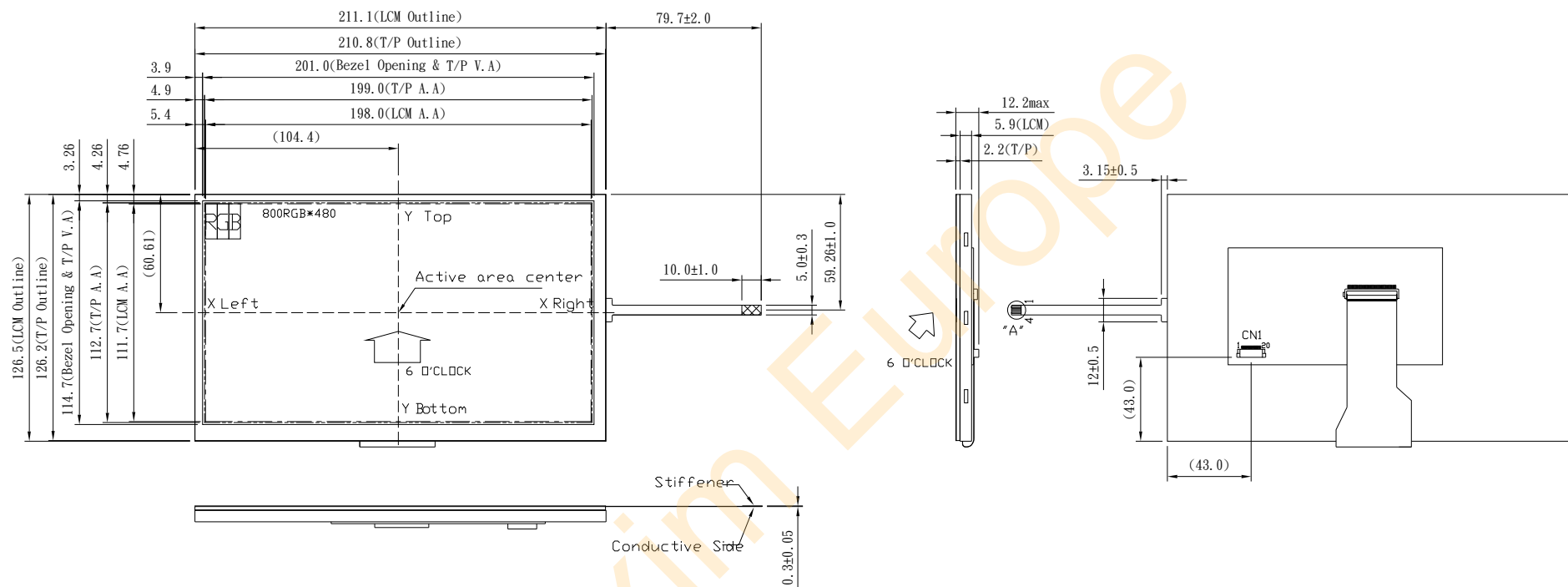
(1)	Number Of Dots (Dots)	800(R.G.B) X 480
(2)	Module Size(mm)	213.7(H) X 131.94(V) X 12.2(D) (**)
(3)	Active Area(mm)	198.0(H) X 111.7(V)
(4)	Pixel Pitch(mm)	0.2327 (H) X 0.2327(V)
(5)	LCD / Polarizer Model	TFT , Transmissive, Normally/White
(6)	Touch Panel Type	4-w resistive, Anti-Glare
(7)	Backlight Color	White,LED
(8)	Viewing Direction	12 O'clock
(9)	Gray Scale Inversion Direction	6 O'clock
(10)	Electrical Interface	LVDS Interface
(11)	Color Configuration	R.G.B Stripe
(12)	Module Weight(g)	(TBD)

(**)Module include PCB and component.

1	2	3	4
文件題目	圖號	頁	次頁
發行日	舊版日	登入號碼	機密等級

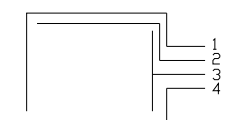
7		8 樣式 QT3-RD-E-0004-003	
No.	修訂區塊	修訂內容	作成
		新版	Bella
		PCB與CNT位置修正	Alan
			修訂日期
			2012.06.18
			2012.07.05

4. OUTLINE DIMENSIONS



Connector Pin Assignment

Pin#	Assignment
1	X Left
2	Y Top
3	X Right
4	Y Bottom



NOTE:
 1. Unit:mm
 2. Without Tolerance ±0.3
 3. CN1: Hirose DF14A-20P-1.25H(55) or Kingfont MPHTG-120TTADF1 or Compatible (Gold Plated)

A
B
C
D
E
F

5. INTERFACE PIN CONNECTION

5.1 LCM PANEL DRIVING SECTION

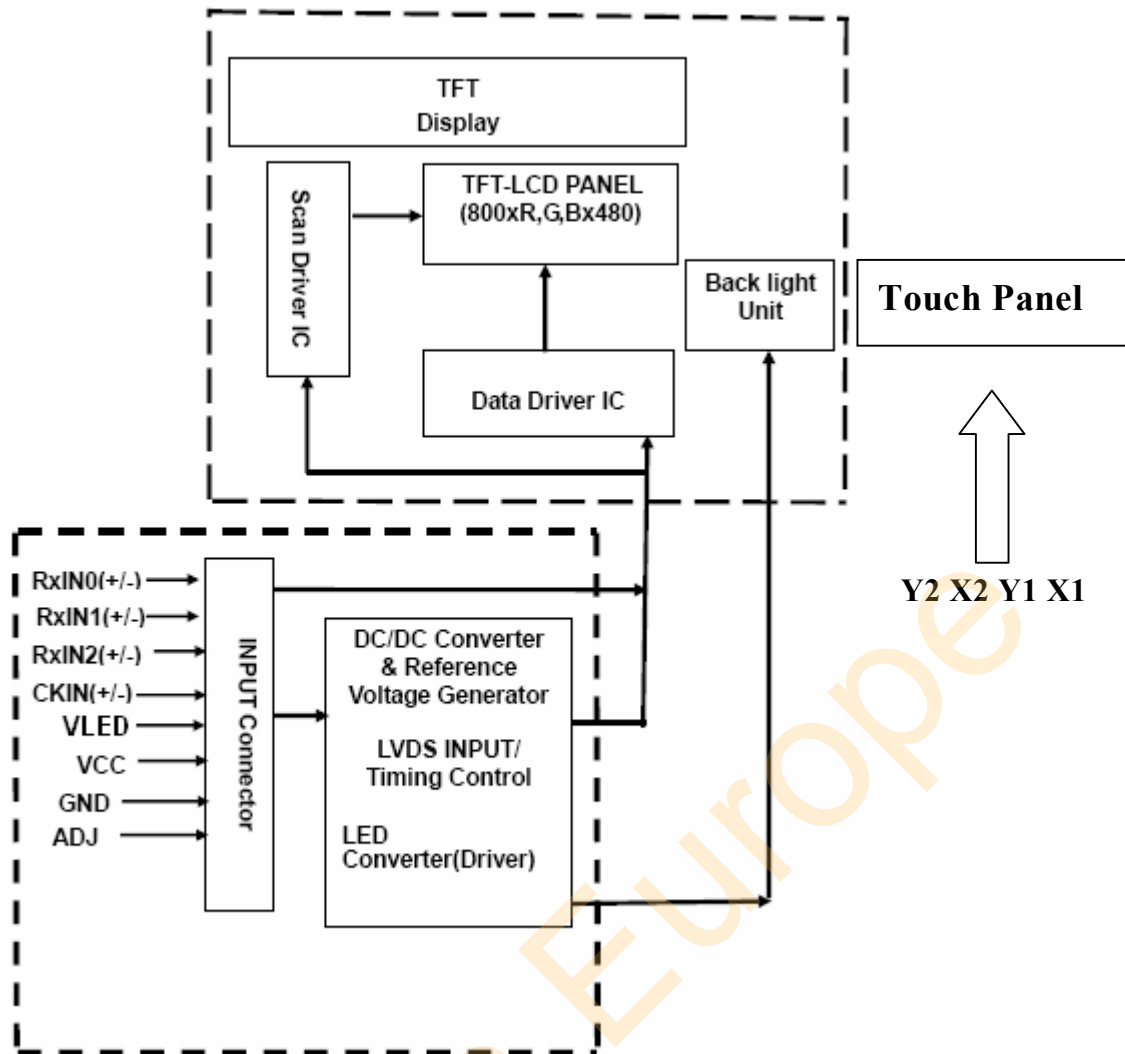
Hirose DF14A-20P-1.25H(55) or Kingfont MPHTG-120TTADF1 or Compatible(Gold Plated)

PIN NO.	SIGNAL	FUNCTION
1	VCC	Power Supply For Digital Circuit
2	VCC	Power Supply For Digital Circuit
3	GND	Ground
4	GND	Ground
5	RxIN0-	Differential Data Input, CH0(Negative)
6	RxIN0+	Differential Data Input, CH0(Positive)
7	GND	Ground
8	RxIN1-	Differential Data Input, CH1(Negative)
9	RxIN1+	Differential Data Input, CH1(Positive)
10	GND	Ground
11	RxIN2-	Differential Data Input, CH2(Negative)
12	RxIN2+	Differential Data Input, CH2(Positive)
13	GND	Ground
14	CKIN-	Differential Clock Input(Negative)
15	CKIN+	Differential Clock Input(Positive)
16	GND	Ground
17	VLED	Power Supply For LED Driver Circuit
18	VLED	Power Supply For LED Driver Circuit
19	GND	Ground
20	ADJ	Brightness Control For LED B/L

5.2 TOUCH PANEL PIN

PIN NO.	SIGNAL	FUNCTION
1	X1	Touch Panel Signal (X – Left)
2	Y1	Touch Panel Signal (Y – TOP)
3	X2	Touch Panel Signal (X – Right)
4	Y2	Touch Panel Signal (Y – Bottom)

6. BLOCK DIAGRAM



7. ABSOLUTE MAXIMUM RATINGS

7.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
Supply Voltage	VCC	-0.3	+5.0	V	
	VLED	-4.5	+36	V	

7.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	OPERATING		STORAGE		REMARK
	MIN.	MAX.	MIN.	MAX.	
Ambient Temperature(°C)	-20	80	-30	80	Note 1,2,3
Humidity(% RH)	-	90	-	90	Note 4

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 : Operation $T_a=70^{\circ}\text{C}$ & $-20^{\circ}\text{C} \leq 240\text{Hrs}$.

Note 4 : Operation $T_a=60^{\circ}\text{C}$ & $\text{RH}=90\% \leq 240\text{Hrs}$.

8.ELECTRICAL CHARACTERISTICS

8.1 ELECTRICAL CHARACTERISTICS OF LCD

Ta=25°C

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
Power Voltage For LCD	VCC	3.0	3.3	3.6	V
	ICC	-	200	250	mA

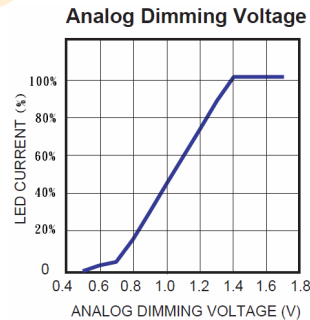
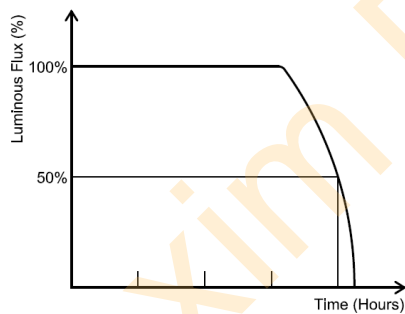
Note 1 : Test condition : VCC=3.3V ; Test Pattern : Black

8.2 BACKLIGHT UNITS

Ta=25°C

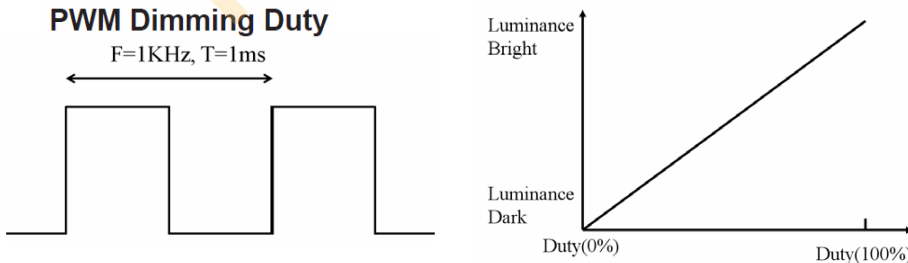
ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
LED Driving Voltage	VLED	4.5	5	15	V
	ILED	-	1000	1200	mA
ADJ Input Analog Dimming Voltage	-	0.7	-	1.4	V _{DC}
ADJ Input PWM Dimming Voltage	-	1.4	-	5.0	V _{p-p}
ADJ frequency	-	100	-	1000	Hz
LED Life Time (For Reference only)	Ta=25°C 60-70%RH(Note 1)	20,000	52,222		h

Note 1 : The LED of B/L is drive by current only, drive voltage is for reference only, drive voltage can make driving current under safety area(current between minimum and maximum).
Life time minimum hours reduce the current 50% under the conditions.

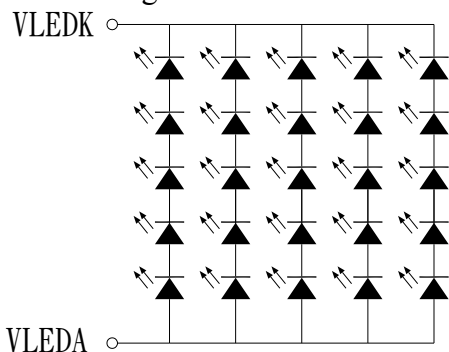


Note 2: When the ADJ pin voltage rises from 0.7V_{DC} to 1.4V_{DC}, the LED current will change from 0% to 100% of the maximum LED current:

Note 3: ADJ signal V_{p-p} = 1.4~5.0V, operation frequency: 100Hz ~ 1 kHz.



Note 4 : The figure below shows the connection of backlight LED.



9. OPTICAL CHARACTERISTICS

Ta=25°C

ITEM	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT	REMARK
Contrast Ratio	CR	Viewing Normal Angle $\Theta_x=\Theta_y=0^\circ$	400	500	-	-	Note (1)
Response Time	TR		-	10	20	ms	Note (2)
	TF		-	15	30	ms	
Chromaticity	White	x	(0.25)	(0.31)	(0.36)	-	Note (4)
		y	(0.28)	(0.33)	(0.38)	-	
Viewing Angle	Hor.	θ_{x+}	60	70	-	Deg.	Note (3)
		θ_{x-}	60	70	-		
	Ver.	θ_{y+}	40	50	-		
		θ_{y-}	60	70	-		
Luminance	L	PWM=100%	320	400	-	cd/m ²	
Luminance Uniformity	YU		70	75	-	%	Note (5)

*Note (1) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

$$\text{Contrast Ratio (CR)} = L_{63} / L_0$$

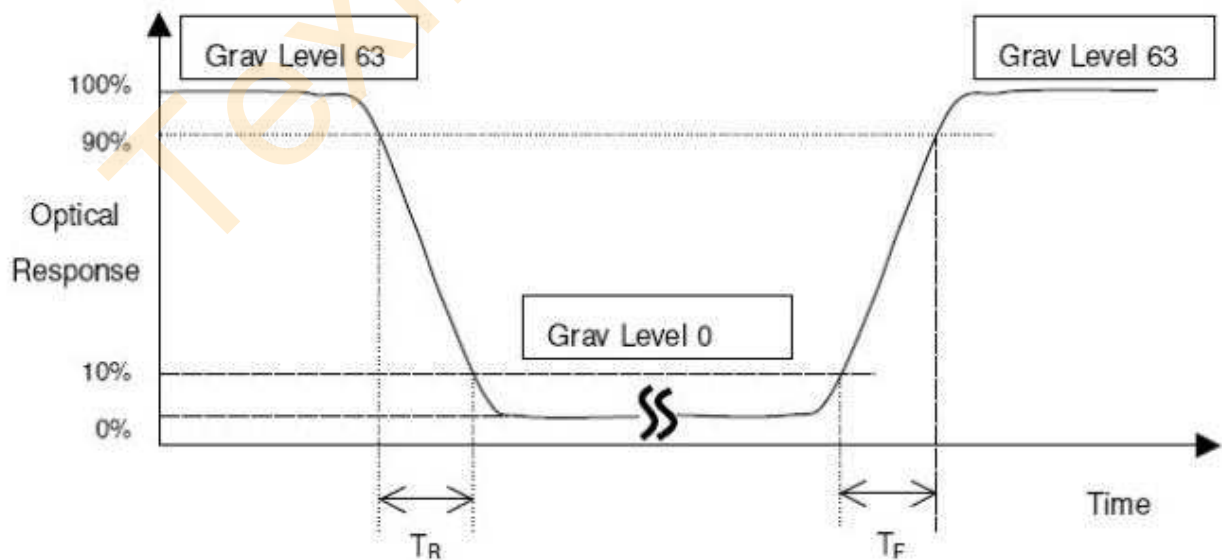
L63: Luminance of gray level 63

L 0: Luminance of gray level 0

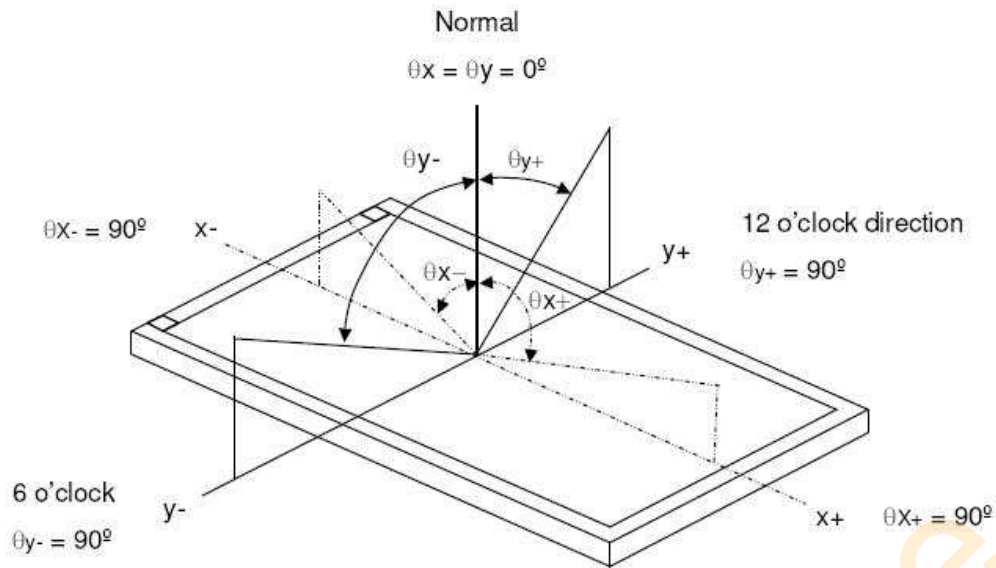
$$CR = CR (5)$$

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (5).

*Note (2) Definition of Response Time (T_R , T_F):

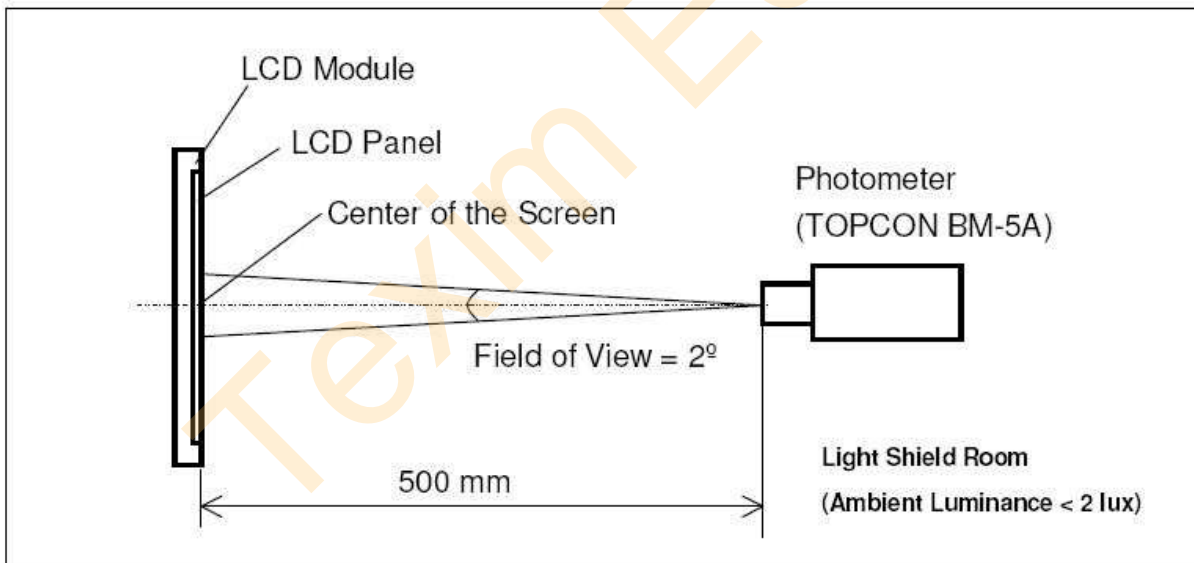


*Note(3) Definition of Viewing Angle

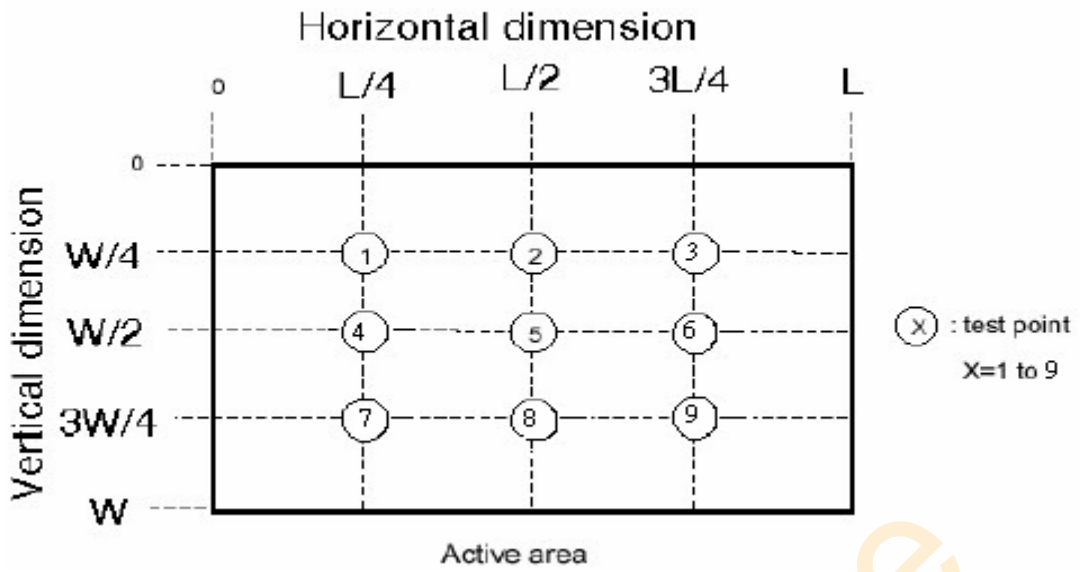


*Note (4) Measurement Set-Up:

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



*Note (5)



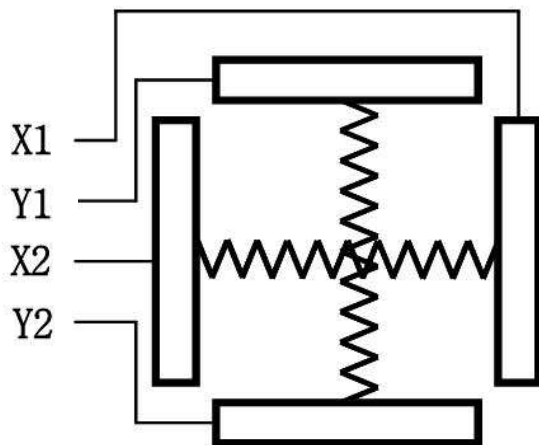
$$\left(1 - \frac{\text{MAX Luminance} - \text{Average Luminance}}{\text{Average Luminance}} \right) \times 100\% > 70\%$$

10. TOUCH PANEL SPECIFICATIONS

10.1 ELECTRICAL CHARACTERISTICS

ITEM		SPECIFICATIONS
(1)	Supply Voltage	DC 5V
(2)	Loop Resistance	X : 200~900Ω, Y : 200~900Ω
(3)	Linearity	$X \leq 1.5\%$, $Y \leq 1.5\%$
(4)	Response	$\leq 10\text{ms}$
(5)	Insulation	$\geq 20\text{M}\Omega/\text{DC } 25\text{V}$
(6)	Endurance	No acting damage at DC 50V/60sec.

10.2 TOUCH SCREEN PANEL



Top View

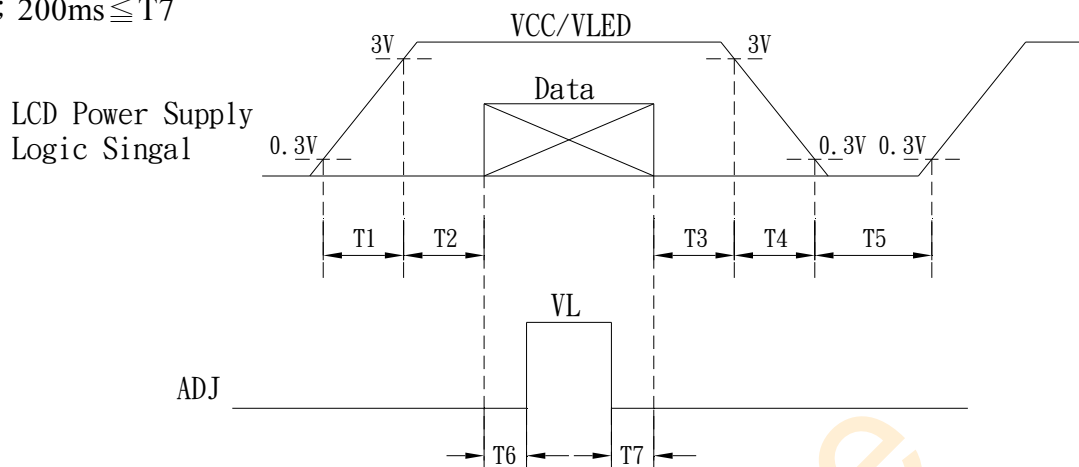
X : Upper electrode
Y : Lower electrode

PIN NO	SYMBOL	FUNCTION
1	X1	Touch Panel Signal (X – Right)
2	Y1	Touch Panel Signal (Y – TOP)
3	X2	Touch Panel Signal (X – Left)
4	Y2	Touch Panel Signal (Y – Bottom)

11. TIMING SPECIFICATIONS

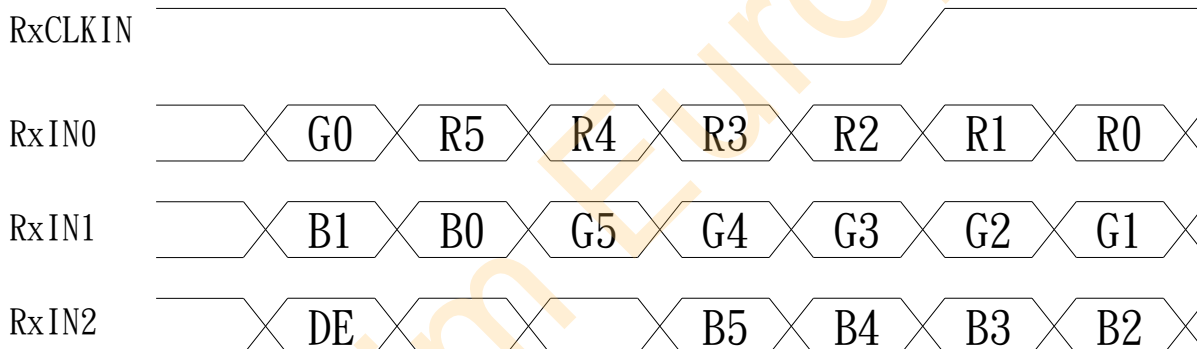
11.1 POWER SIGNAL SEQUENCE

- $T1 \leq 10\text{ms}$; $1\text{sec} \leq T5$
- $200\text{ms} \leq T2$; $200\text{ms} \leq T6$
- $0 \leq T3 \leq 50\text{ms}$; $200\text{ms} \leq T7$
- $0 \leq T4 \leq 10\text{ms}$



Data : RGB Data , DLCK , DE

11.2 THE INPUT DATA FORMAT



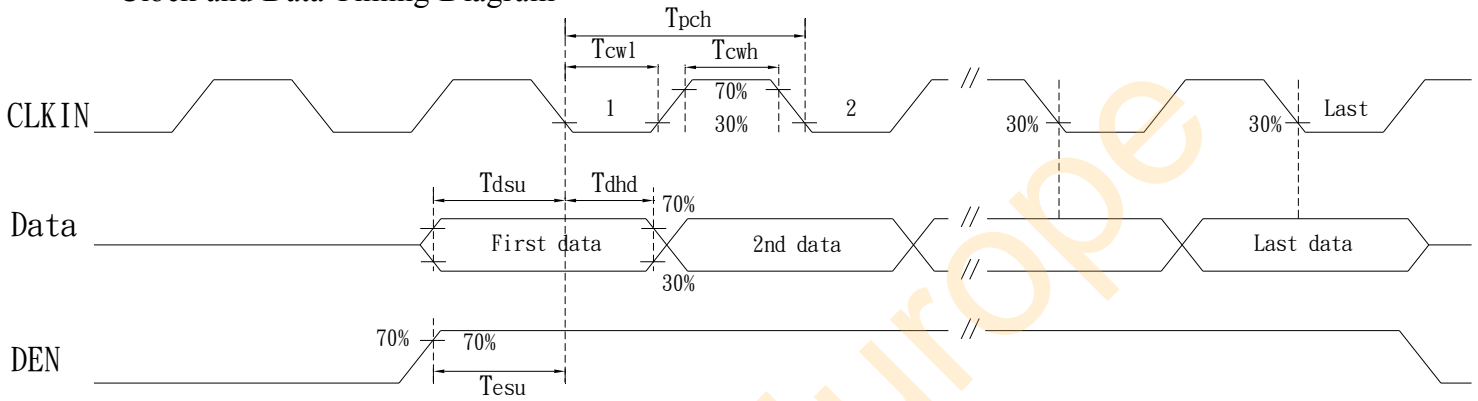
SIGNAL NAME	DESCRIPTION	REMARK
R5	Red Data 5	Red-pixel Data 6Bits LVDS input MSB : R5 ; LSB : R0
R4	Red Data 4	
R3	Red Data 3	
R2	Red Data 2	
R1	Red Data 1	
R0	Red Data 0	
G5	Green Data 5	
G4	Green Data 4	
G3	Green Data 3	
G2	Green Data 2	
G1	Green Data 1	
G0	Green Data 0	
B5	Blue Data 5	Blue-pixel Data 6Bits LVDS input MSB : B5 ; LSB : B0
B4	Blue Data 4	
B3	Blue Data 3	
B2	Blue Data 2	
B1	Blue Data 1	
B0	Blue Data 0	
RxCLKIN	LVDS Data Clock	
DE	Data Enable Signal	When the signal is high, the pixel data shall be valid to be displayed.

11.3 AC TIMING CHARACTERISTICS

PARAMETER		SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
Clock	Frequency	$1/T_c$	31.95	33.26			Note 1
	Clk pulse duty	T_{cwh}	40	50	60	%	Note 1
	Clk cycle time	T_{cph}	25	-	-	ns	Note 1
Data	Setup time	T_{dsu}	5	-	-	ns	Note 1
	Hold time	T_{dhd}	5	-	-	ns	Note 1
ENAB signal	Setup time	T_{esu}	5	-	-	ns	Note 1
	Hold time	T_{ehd}	5			ns	Note 1

Note 1 : Frame rate is 60 Hz at 3.3V VCC

Clock and Data Timing Diagram



12. RELIABILITY TEST

ENVIRONMENTAL TEST				
NO.	ITEM	CONDITIONS	TIME PERIOD	REMARK
1	High Temperature Storage	80°C	240HRS	
2	Low Temperature Storage	-30±3°C	240HRS	
3	High Temperature Operation	80°C	240HRS	
4	Low Temperature Operation	-20°C	240HRS	
5	Temperature Cycle	-20°C ← 25°C → 80°C (30min) (5min) (30min)	100CYCLE	
6	High Temperature Humidity Operation	60°C 90%RH	240HRS	

NOTE 1: a. THE MODULE SHOULD WORK 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 MODLUE 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.

13.1 VIBRATION TEST :

13.1.1 TEST EQUIPMENT :

NAME	LABEL	MODEL	SERIAL NO.
Electrodynamic Vibration Testing Machine	Seismograph	VS-1000VH-51	3693
Controller	Dactron	COMET Shaker Control System	12182413
Control accelerometers	PCB	J353B32	94256

13.1.2 STATE LABORATORY ENVIRONMENT :

Room temperature : $25\pm 3^{\circ}\text{C}$

Relative humidity : $55\pm 20\% \text{RH}$

13.1.3 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

13.2 MECHANICAL SHOCK TEST :

13.2.1 TEST EQUIPMENT :

NAME	LABEL	MODEL	SERIAL NO.
Shock Test System	VIBRATION SOURCE TECHNOLOGY	SHOCK-100	1093
Data Acquisition & Analysis System	CTZA	1.0.1	---
ICP Accelerometer	PCB	BW24112	00646

13.2.2 STATE LABORATORY ENVIRONMENT :

Room temperature : $25\pm 3^{\circ}\text{C}$

Relative humidity : $55\pm 20\% \text{RH}$

13.2.3 TEST METHOD / SPECIFICATION :

Sample Status : Non-packaged single state

Waveform : Half-sine

Acceleration : 80G

Shock Time : 6ms

Impact direction : 6 Directions ($\pm X, \pm Y, \pm Z$ axes)

Number of shocks : Each direction 3 Secondary , Altogether 18 Secondary

14. LCM INSPECTION STANDARD

14.1 INSPECTION AND ENVIRONMENT CONDITIONS

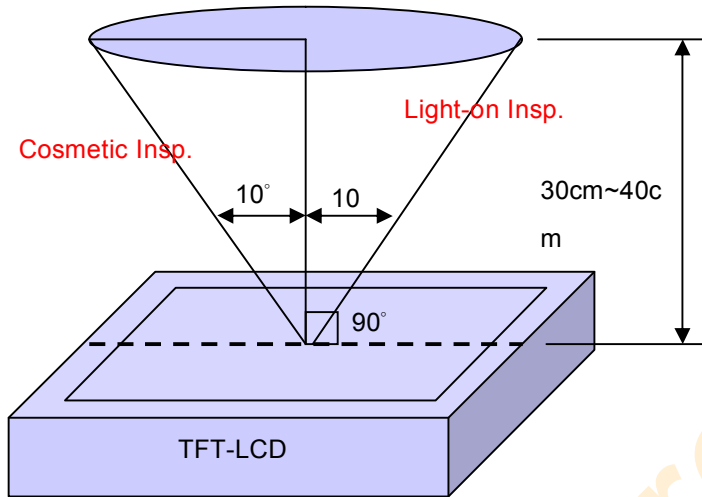
14.1.1 Inspection Conditions:

(1) Inspection Distance: 35 cm±5cm

(2) View Angle:

Light-on Inspection Angle : ±10°

Cosmetic Inspection Angle : ±10°



14.1.2 Environment Conditions:

Ambient Temperature		20~25°C
Ambient Humidity		50±10%RH
Ambient Illumination	Cosmetic Inspection	300~700 Lux
	Functional Inspection	300~700 Lux

14.1.3 Sampling Conditions:

(1) Lot Size: Quantity of shipment lot per model

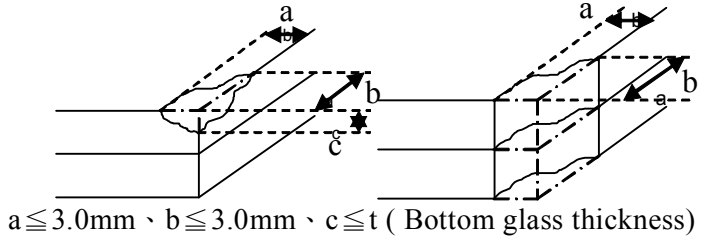
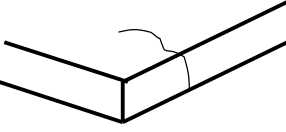
(2) Sampling Method:

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

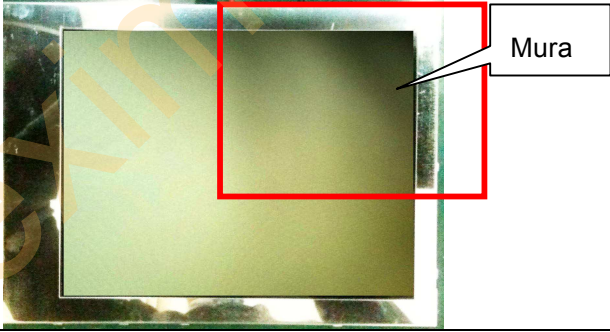
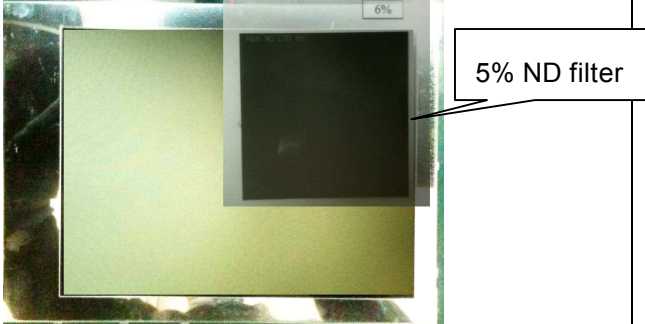
(3) The classification of Major(MA) and Minor(MI) defects is shown as 4. Inspection Criteria.

14.2 INSPECTION CRITERIA

14.2.1 Cosmetic Inspection(Panel):

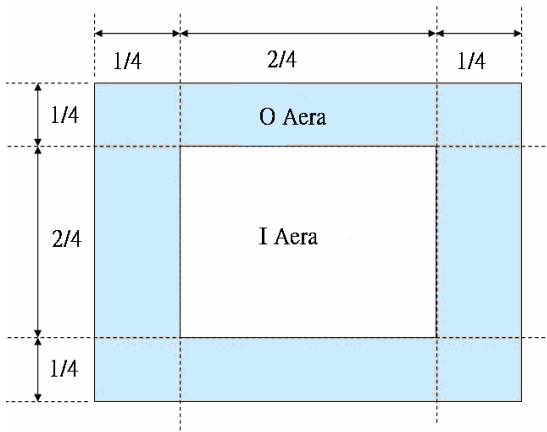
ITEM	JUDGMENT CRITERIA	CLASSIFICATION	ZONE
Chipping on Panel/Touch Panel	 <p>$a \leq 3.0\text{mm}$、$b \leq 3.0\text{mm}$、$c \leq t$ (Bottom glass thickness)</p>	MA	C
Scratch on Panel/Touch Panel *Note-2	$W \leq 0.03\text{mm}$: Ignored $0.03\text{mm} < W \leq 0.05\text{mm}$ and $L \leq 3.0\text{mm}$: $N \leq 4$ $0.05\text{mm} < W \leq 0.1\text{mm}$ and $L \leq 2.0\text{mm}$: $N \leq 2$ $W > 0.1\text{mm}$: Not allowed	MI	C
Bubble or Dent on Panel/Touch Panel *Note-3	$D \leq 0.2\text{mm}$: Ignored/不計 $0.2\text{mm} < D \leq 0.3\text{mm}$: $N \leq 2$ $D > 0.3\text{mm}$: Not allowed	MI	C
Panel/Touch Panel Crack	 <p>Not Allowed crack</p>	MA	C
Bezel Deformation	Obvious deformation is not allowed	MI	C
Bezel Oxidation	Not allowed if it rusts continuously over 1 cm (It is out of warranty with rusted tin plate)	MI	C
*Note-2 Bezel Scratch	Non-feeling abrasion: Ignored feeling abrasion , $L \leq 20\text{mm}$, $W \leq 0.3\text{ mm}$, $N \leq 7$ Not allowed	MI	C
*Note-3 Metal Squash Dent /Flange(Front Side)	$D(W) \leq 1\text{ mm}$, $L \leq 3$, $N \leq 4$;	MI	C
B/L High Voltage Wire Denudation	Not allowed	MA	C
Polarizer flaw or leak out resin	Defect is defined as the active area.	MI	C
Outline Dimension	Must in Spec, refer to related product spec.	MI	C

14.2.2 Functional Inspection:

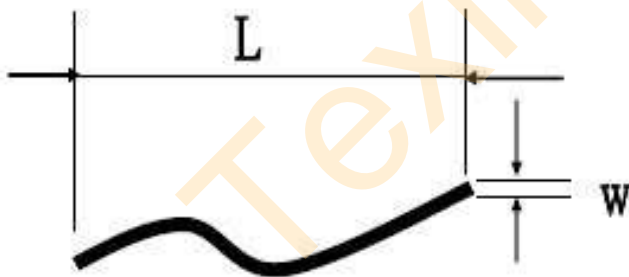
ITEM	JUDGMENT CRITERIA			CLASSIFICATION	ZONE	
Point Defect *Note-6~10	Bright dot	Random	3	MI	A	
		2 dots adjacent	1			
	Dark dot	Random	4			
		2 dots adjacent	1			
	Total Dot Defect					6
	Distance *Note-11	Distance between Bright and Bright dot	$L \geq 15\text{mm}$			
		Distance between Bright and Dark dot	$L \geq 15\text{mm}$			
		Distance between Dark dot	$L \geq 5\text{mm}$			
	Bubble	Average diameter D(mm)	Maximum number acceptable	MI	A , B	
		$D \leq 0.3$	Ignore			
$0.3 < D \leq 1.0$		$N \leq 3$				
$1.0 < D \leq 1.5$		$N \leq 1$				
Line Defect	Obvious vertical or horizontal line defect is not allowed.			MA	A , B	
Mura	<p>1. Mura Definition: Under the normal examination angle of view, the picture has the non-uniform phenomenon.</p> 			MI	A , B	
	<p>2. Weak defect will be defined as Mura if it can be Observed through ND filter 5%</p> 					

ITEM	JUDGMENT CRITERIA	CLASSIFICATION	ZONE
*Note-4 Foreign Material in spot shape	$D \leq 0.2\text{mm}$: Ignored $0.2\text{mm} < D \leq 0.3\text{mm}$: $N \leq 4$, $0.3\text{mm} < D \leq 0.5\text{mm}$: $N \leq 3$ $D > 0.5\text{mm}$: Not allowed	MI	A
*Note-3 Foreign Material in line or spiral shape	$W \leq 0.01\text{mm}$: Ignored $0.03\text{mm} < W \leq 0.1\text{mm}$ and $L \leq 5\text{mm}$: $N \leq 4$ $W > 0.1\text{mm}$ or $L > 5\text{mm}$ Not allowed	MI	
Display Function Abnormal	No Malfunction can be allowed	MA	A , B
Touch panel Malfunction	No Malfunction can be allowed in AA area.	MA	

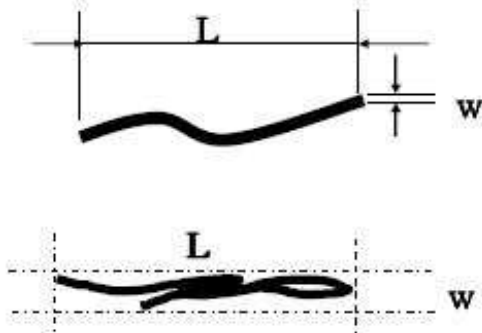
Note 1 : I/O Area Definition



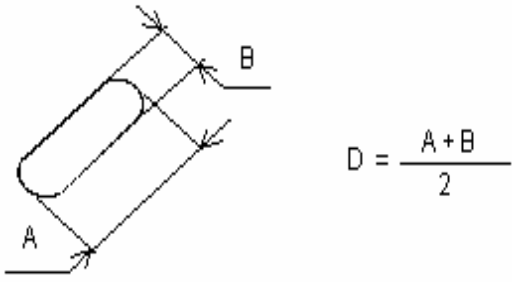
Note 2 : Polarizer Scratch



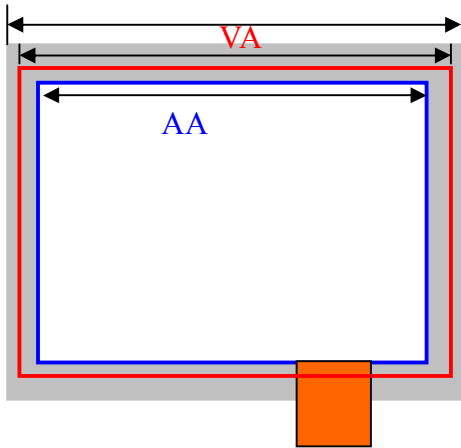
Note 3 : Line or Spiral Foreign Material



Note 4 : Spot Foreign Material



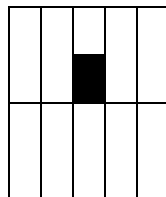
Note 5 : TP Inspection Area Definition



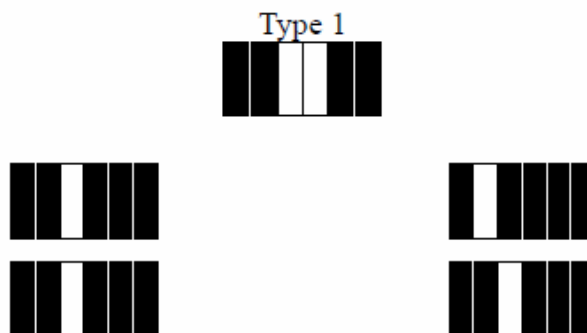
Note 6 : Bright dot defect description:



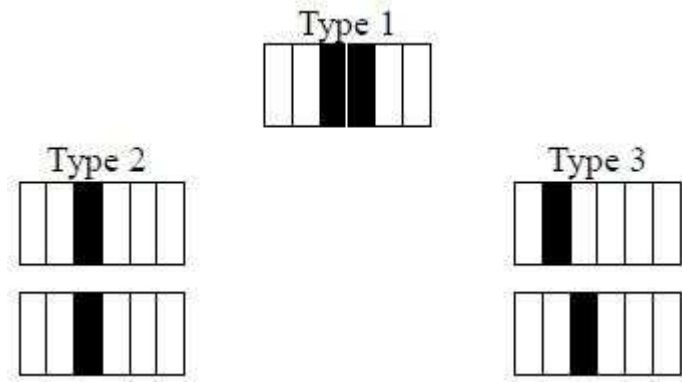
Note 7 : Dark dot defect description:



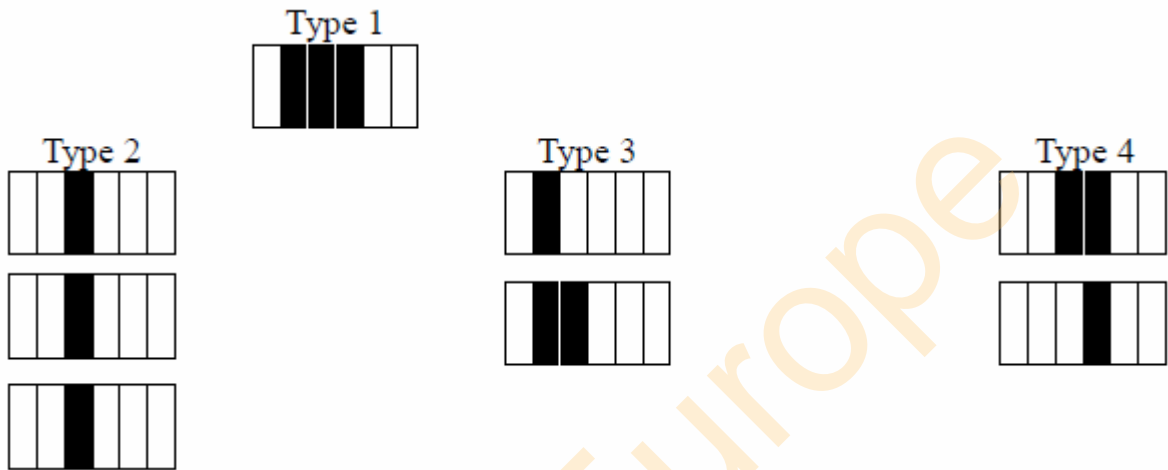
Note 8 : Bright dot defect description- Two adjacent.



Note 9 : Dark dot defect description- Two adjacent.

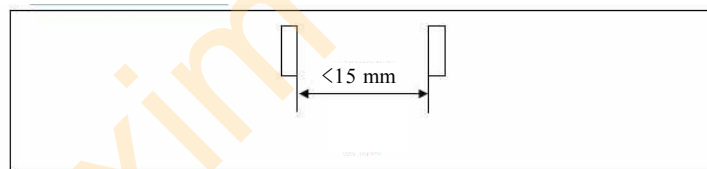


Note 10 : Dark dot defect description- Three adjacent.

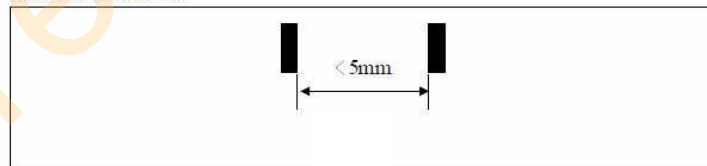


Note 11 : Minimum distance between dot defects

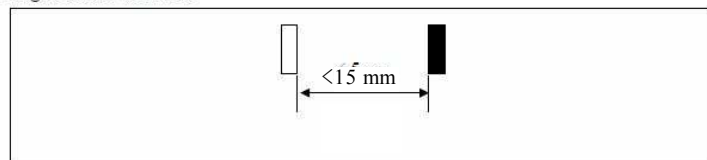
Bright dot to bright dot.



Dark dot to dark dot



Bright dot to dark dot



15. PRECAUTIONS FOR USE

15.1 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.

15.2 STORAGE CONDITIONS

- (1) Store the panel or module in a dark place where the temperature is $23\pm 5^{\circ}\text{C}$ and the humidity is below $50\pm 20\%\text{RH}$.
- (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.

15.3 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.

15.4 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.

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