Specification for Approval

Product No.: LCD0500WV20B-LCM-A0

Customer : _____

Prepared by	Checked by	Approved by

Customer Approval	⭘ Accept ⭘ Reject Comment: Approved by:_____

Your confirmation of this specification is very important! It's undoubted this attached specification will be regarded as your approval once you confirmed our LCM sample. Also, further mass production will subject to this specification .

Address: Otto-Lilienthal-Str. 13, D-76275 Ettlingen
Website: http://www.lcd-mikroelektronik.com

REVISION RECORD

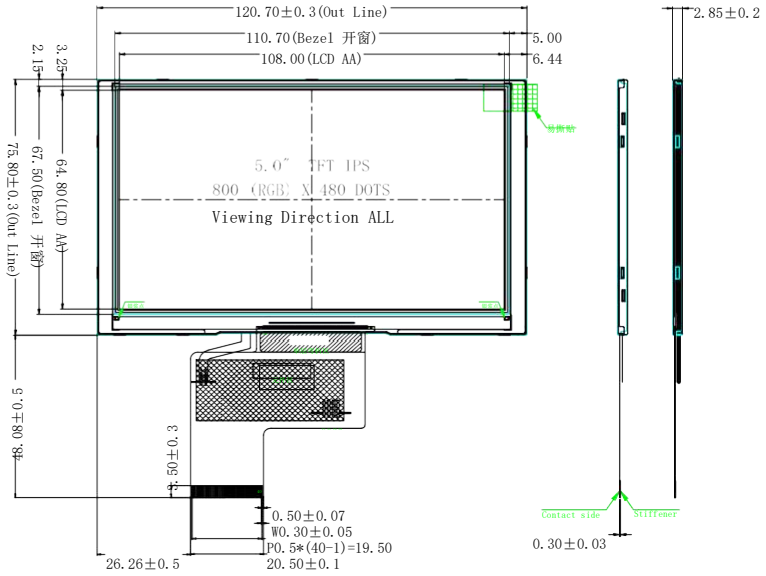
REV.	DESCRIPTION OF REVISION	DATE	Note
A0	First issue	2022-01-19	

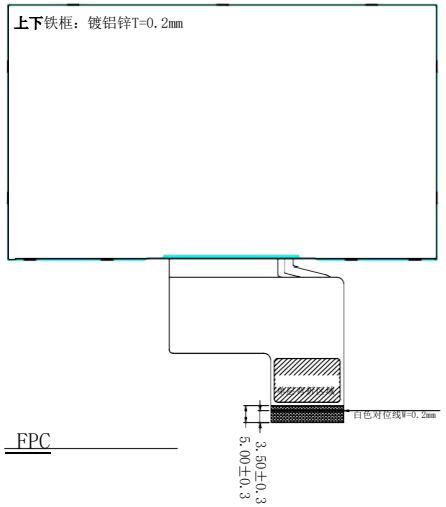
Contents

1. GENERAL INFORMATION

Item	Contents	Unit
Module size	5.0"	inch
LCD Type	TFT-LCD /TRANSMISSVIE	-
LCD Mode	Normally Black	-
Number of Dots	800*RGB*480	Dot
Outline dimensions	120.70(W)*75.80(H)*2.85(T)	mm
Active area	108 (H) x 64.8 (V)	mm
LCD Pixel pitch	0.135 (H) x 0.135 (V)	-
Pixel arrangement	RGB-Stripe	-
Interface type	RGB	-
Touch Panel	-	
LCM: All of LCM of material and process measure up to ROHS Europe		

Customer Approve By		REV	DESCRIPTION	MODIFY BY	DATE
		A0	1'ST DESIGN	LZZ	2021-08-18





1	LEDK
2	LEDA
3	GND
4	VDD
5	R0
6	R1
7	R2
8	R3
9	R4
10	R5
11	R6
12	R7
13	G0
14	G1
15	G2
16	G3
17	G4
18	G5
19	G6
20	G7
21	B0
22	B1
23	B2
24	B3
25	B4
26	B5
27	B6
28	B7
29	GND
30	PCLK
31	DISP
32	HSYNC
33	VSYNC
34	DE
35	NC
36	GND
37	NC/XR
38	NC/YD
39	NC/XL

If=40mA Vf=19.2V

LED CIRCUIT: B/L CIRCUIT DIAGRAM

Note: RoHS

1. Display Modle:	5.0'' TFT/IPS
2. Driving Condition:	VDD=2.8~3.3V
3. Viewing Direction:	ALL
4. Operating Temp:	-10~+60° C
Storage Temp:	-20~+70° C
5. LCD:	/IPS片 上0.13T 砂片 下0.13光片
6. IC:	ST7262
7. Backlight:	WHITE LED*12 LCM:350cd/m2（TYP）

8. Unspecified tolerance is ±0.20mm
9. ROHS Request

DRAWN BY :	CHECKED BY :	APPROVED BY :
LCD0500WV20B		LCD0500WV20B-LCM-A0

3. INTERFACE DESCRIPTION LCM

Pin No.	Symbol	Function
1	LED-K	Power Supply For LED Backlight Cathode Input.
2	LED-A	Power Supply For LED Backlight Anode Input.
3	GND	Ground.
4	VCC	Power supply .
5~12	DR0~DR7	Red Data.
13~20	DG0~DG7	Red Data.
21~28	DB0~DB7	Red Data.
29	GND	Ground.
30	DCLK	Colock signal.
31	DISP	Display on/off.
32	HSYNC	Horizontal sync input in RGB mode(short to GND if not used).
33	VSYNC	Vertical sync input in RGB mode(short to GND if not used) .
34	DEN	Data enable .
35	NC	NC.
36	GND	Ground.
37	（NC）XR	（NC）touch panel X-right.
38	（NC）YD	（NC）touch panel Y-bottom .
39	（NC）XL	（NC）touch panel X-left .
40	（NC）YU	（NC）touch panel Y-up.

4. BACKLIGHT CHARACTERISTICS

Item	Symbol	Condition	Min	Typ	Max	Unit
Forward Voltage	Vf	If=40mA	-	19.2	-	V
Uniformity (with L/G)	ΔB_p	If=40mA	75	80	-	%
Luminance for LCM	/	If=40mA	260	350	-	cd/m^2
Backlight Power Consumption	WBL	If=40mA	-	720	-	mW
Backlight Color	White					
Number of LED	12 PCS					

5. ELECTRICAL CHARACTERISTICS

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Analog Supply Voltage	V_{DD}	3.0	3.3	3.6	V	-
Input High Voltage	V_{IH}	0.7VDDI	-	VDDI	V	Digital input pins
Input Low Voltage	V_{IL}	DGND	-	0.3VDDI	V	Digital input pins
Output High Voltage	V_{oH}	VDDI-0.4	-	VDDI	V	Digital input pins
Output High Voltage	V_{oL}	DGND	-	DGND+0.	V	Digital input pins

6. OPTICAL CHARACTERISTICS

Item	Symbol	Condition	Min	Typ	Max	Unit	Remark	Note
Response time	Tr+Tf	Θ=0° Ø=0° Ta=25˚C	-	30	40	ms	FIG1	-
Contrast ratio	Cr		1000	1500	-	-	FIG2	-
Color gamut	S(%)		55	60	-	%	-	-
Luminance Uniformity	WHITE		70	-	-	%	FIG2	-
Viewing angle range	Θx+	CR≧10 Ta=25˚C	70	80	-	deg	FIG3	-
	Θx-		70	80	-	deg	FIG3	
	Θy+		70	80	-	deg	FIG3	
	Θy-		70	80	-	deg	FIG3	
Luminance LCM	Lv	Θ=0° Ø=0° Ta=25˚C	260	350	-	cd/m^2	-	-
Color Chromaticity (CF only with ITO,light source is C light, CIE 1931)	Wx		-0.03	0.318	+0.03	-	-	-
	Wy			0.341				
	Rx			0.638				
	Ry			0.338				
	Gx			0.296				
	Gy			0.575				
	Bx			0.137				
	By			0.124				

Note1.Response time is the time required for the display to transition from White to black(Rise Time,Tr)and from black to white(Decay Time,Tf).For additional information see FIG1.

Note2.contrast Ratio(CR) is defined mathematically by the following formula,For more information see FIG2.

Contrast Ratio(CR)=Average Surface Luminance with all white pixels/ Average Surface Luminance with all black pixels

Note3.The uniformity in surface luminance(WHITE) is determined by measuring luminance at eath test position,and then dividing the maximum luminance of all white pixels by minimum luminance of all

white pixels,For more information seeFIG2.

WHITE=Minimum Surface Luminance with all white pixels(P1,P2,.....)/Maximum Surface Luminance with all white pixels(P1,P2, ...)

Note4.Viewing angle is the angle at which contrast ratio is greater than a specific value.For TFT module,the specific value of contrast ratio is 10.For monochrome and color STN module,the specific value of contrast ratio is2.The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface.For more information see FIG3

Note5. Surface luminance is the LCD surface luminance with all white pixels,For more information see FIG2.

LV=Average Surface Luminance with all white pixels(P1,P2,.....)

Note6. CIE(X,Y) Chromaticity is the Center point value.For more information see FIG2.

Note7.For Viewing angle and response time testing,the testing date is base on Autronic-Melchers's ConScope.Series instruments.For contrast ratio,Surface Luminance,Luminance uniformity and CIE,the testing date is base on CS-2000 photo detector.

Note8.For TN type TFT transmissive module,Gray scale reverse occurs in the direction of panel viewing angle.

FIG1. The definition of Response time

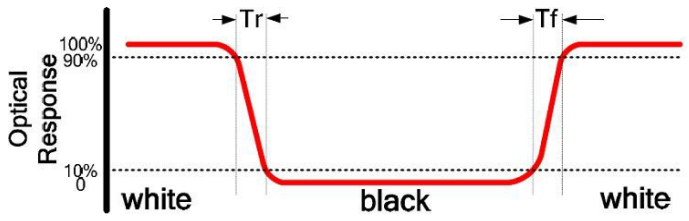
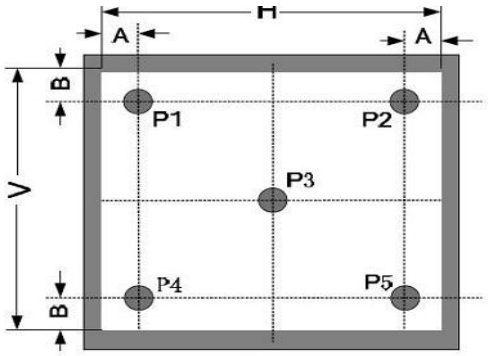
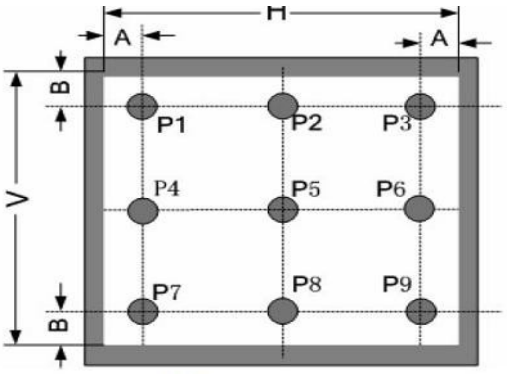


FIG2. Measuring method for Contrast ratio,surface luminance,Luminance uniformity, CIE(X,Y)chromaticity.

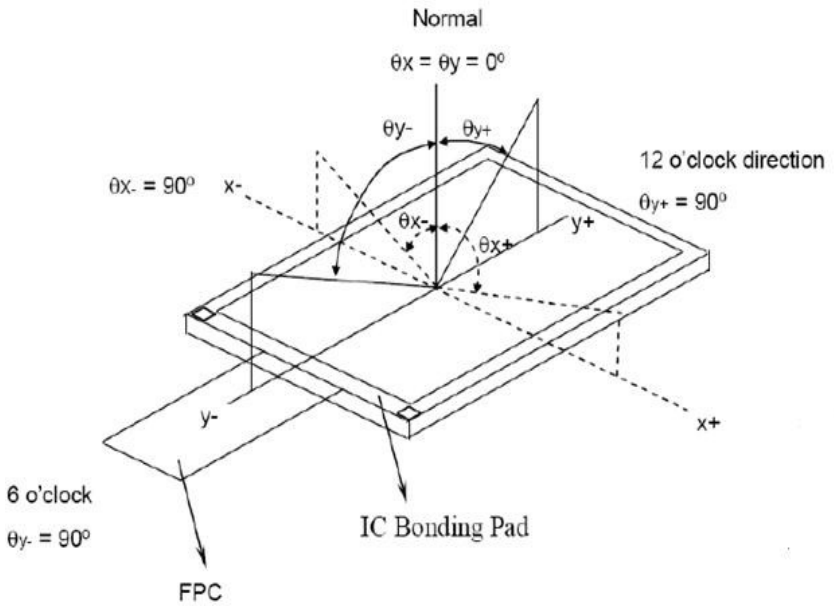


5 Points diagram



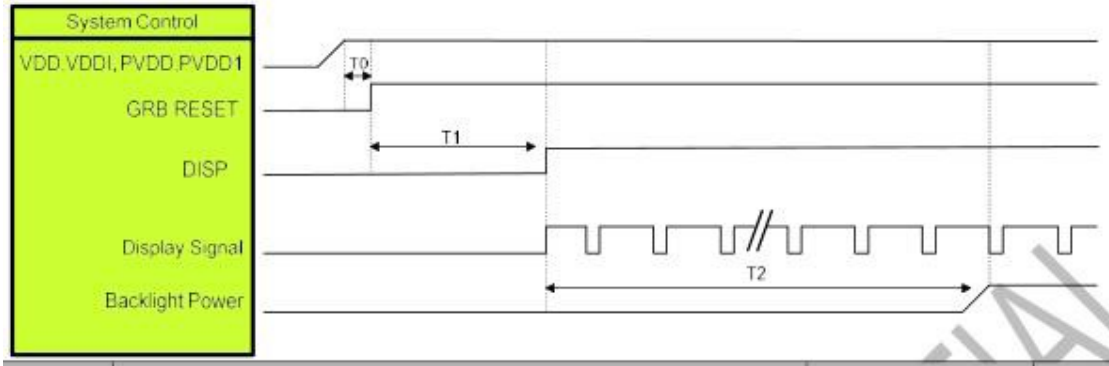
9 Points diagram

FIG3 The definition of viewing angle



7. AC CHARACTERISTICS

◆ Power 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

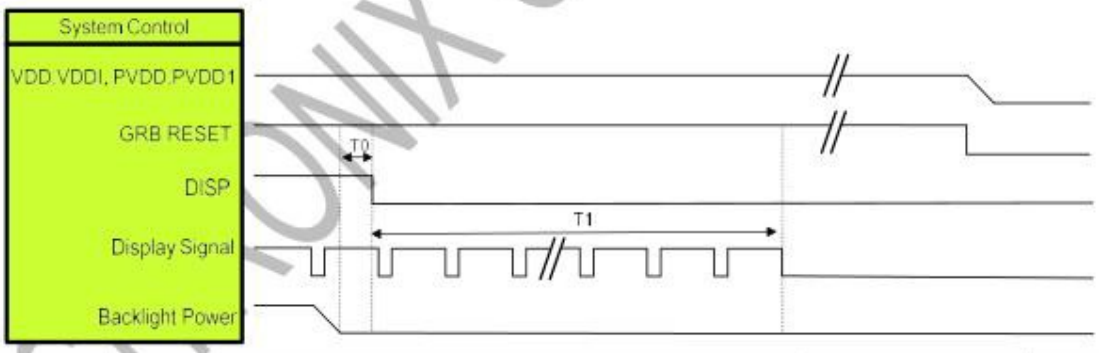
Note :

1. When DISP pull "H" or "L", IC will execute the internal power on or power off procedures .Please be careful about the timing of DISP and do not interrupt it during power on or power off procedure, otherwise unexpected errors will occur.

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

3: LVDS interface Display signal: DCLK P/N; RX[3:0]P/N

11.2 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 :

1. When DISP pull "H" or "L", IC will execute the internal power on or power off procedures. Please be careful about the timing of DISP and do not interrupt it during power on or power off procedure, otherwise unexpected errors will occur.
2. RGB interface Display signal: DCLK; VSYNC; HSYNC; DE; DR[7:0]; DG[7:0]; DB[7:0]
3. LVDS interface Display signal: DCLK P/N; RX[3:0]P/N

◆ Timing Characteristics

Parallel 24-bit RGB Input Timing Table

Parallel 24-bit RGB Input Timing (PVDD=PVDD1=VDD=VDDI= 3.3V, AGND= 0V, TA=25°C)

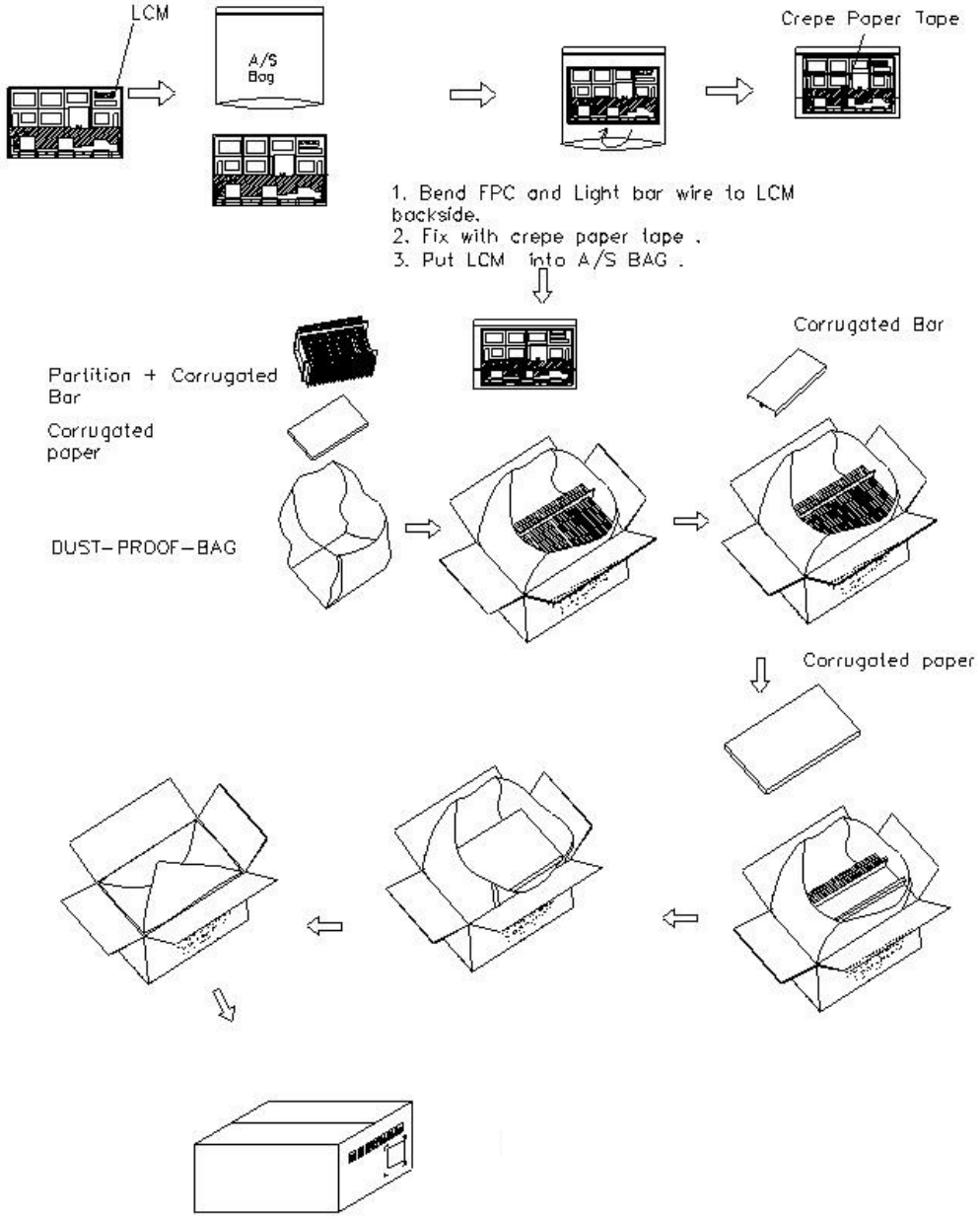
Parallel 24-bit RGB Interface Timing Table							
Item		Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK Frequency		Fclk	23	25	27	MHz	
HSYNC	Period Time	Th	808	816	896	DCLK	
	Display Period	Thdisp		800		DCLK	
	Back Porch	Thbp	4	8	48	DCLK	
	Front Porch	Thfp	4	8	48	DCLK	
	Pulse Width	Thw	2	4	8	DCLK	
VSYNC	Period Time	Tv	492	496	504	HSYNC	
	Display Period	Tvdisp		480		HSYNC	
	Back Porch	Tvbp	6	8	12	HSYNC	
	Front Porch	Tvfp	6	8	12	HSYNC	
	Pulse Width	Tvw	2	4	8	HSYNC	

Note: 1. The minimum blanking time depends on the GIP timing of the panel specification

2. To ensure the compatibility of different panels, it is recommended to use the typical setting.

NOTE : This section is only for reference,Details please refer to the IC specification.

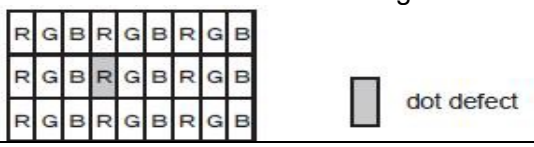
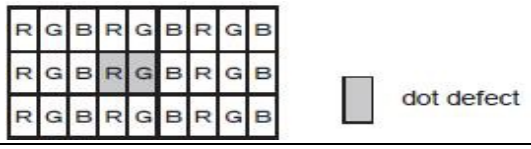
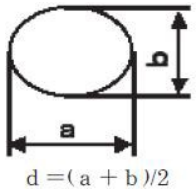
8. PACKING SPECIFICATION

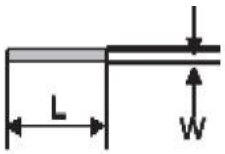


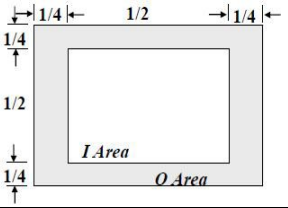
9. RELIABILITY TEST ITEMS

Test Item	Test Conditions	Test Time	Notes
High temperature Operation	70±2℃	120H	--
Low temperature Operation	-20±2℃	120H	--
High Temperature Storage	80±2℃	120H	--
Low Temperature Storage	-30±2℃	120H	--
Humidity Test	60±2℃ / 90% ± 5%RH	120H	--
Thermal Shock Test	-20℃(30min) → 25℃5min) → +70℃(30min)	10 cycles	Non operation state
Vibration Test(Packing)	Sweep for 1 min at 10～55～10HZ Amplitude：0.75mm Test direction：X,Y,Z axis Duration 15min/each axis		Non operation state
Drop test	One angle , three edges and six sides. 75cm above the ground(no weight difference)		Non operation state
Static Electricity	Contact=±4KV, class B Air=±8KV, class B		--

10. VISUALS SPECIFICATION:

<table>
<tr><td>General</td><td colspan="3">1. Customer identified anomalies not defined within this inspection standard shall be reviewed by Future, and an additional standard shall be determined by mutual consent.
2. This inspection standard about the image quality shall be applied to any defect within the effective viewing area and shall not be applicable to outside of the area.
3. Inspection conditions
Luminance : 500 Lux min.
Inspection distance : 300 mm.
Temperature : 25±5°C
Direction : Directly above</td></tr>
<tr><td rowspan="6">Definition of inspection item</td><td rowspan="3">Dot defect</td><td>Bright dot defect</td><td>The dot is constantly “on” when power applied to the LCD, even when all “Black” data sent to the screen. Inspection tool: 5% Transparency neutral density filter.Count dot: If the dot is visible through the filter. Don’t count dot: If the dot is not visible through the filter.
 
</td></tr>
<tr><td>Black dot defect</td><td>The dot is constantly “off” when power applied to the LCD, even when all “White” data sent to the screen.</td></tr>
<tr><td>Adjacent dot</td><td>Adjacent dot defect is defined as two or more bright dot defects or black dot defects.
 
</td></tr>
<tr><td rowspan="2">External inspection</td><td>Bubble ,scratch (foreign Particle polarizer, Cell, Backlight)</td><td>Visible operating (all pixels “Black” or “White”) and non operating.</td></tr>
<tr><td>Appearance inspection</td><td>Does not satisfy the value at the spec.</td></tr>
<tr><td>Others</td><td>LED wires</td><td>Damaged to the LED wires, connector, pin, functional failure or appearance failure.</td></tr>
<tr><td>Definition of Size</td><td colspan="2">Definition of circle
 

d =(a + b)/2
Definition of linear size
 

Definition Area I/O
 
</td></tr>
</table>

<table>
<tr><td>Classifica-tion</td><td>Inspection item</td><td colspan="3">Judgment Standard</td></tr>
<tr><td rowspan="9">Defect (in LCD glass)</td><td rowspan="9">Dot defect</td><td>Area</td><td>I</td><td>O</td></tr>
<tr><td>Bright dots(Note: Visible under ND5%)
D≤0.15mm: No count
D>0.15mm： acceptable: 2</td><td>N≤0</td><td>N≤2</td></tr>
<tr><td>Dark dots (0.15mm<D≤0.3mm), D>0.3mm
Not allowable</td><td colspan="2">N≤3</td></tr>
<tr><td>Bright dot-2 Adjacent</td><td colspan="2">N≤1</td></tr>
<tr><td>Dark dot-2 Adjacent</td><td colspan="2">N≤1</td></tr>
<tr><td>Dark or bright dots-3 and more adjacent</td><td colspan="2">N≤0</td></tr>
<tr><td>Total bright and dark dots</td><td colspan="2">N≤5</td></tr>
<tr><td>Minimum distance between bright dots</td><td colspan="2">5mm</td></tr>
<tr><td>Minimum distance between dark dots</td><td colspan="2">5mm</td></tr>
</table>

<table>
<tr><td rowspan="6"></td><td></td><td colspan="2">Minimum distance between bright and dark dots</td><td>5mm</td></tr>
<tr><td rowspan="5">Other</td><td rowspan="5">White dot ,dark dot (circle)</td><td>Size (mm)</td><td>Acceptable number</td></tr>
<tr><td>d≤0.2</td><td>Neglected</td></tr>
<tr><td>0.2mm<D≤0.3mm</td><td>N≤4</td></tr>
<tr><td>0.3mm<D≤0.4mm</td><td>N≤2</td></tr>
<tr><td>D>0.4mm</td><td>Not allowable</td></tr>
<tr><td rowspan="5">Visual defect</td><td rowspan="2">Foreign partial</td><td colspan="2">Circular foreign material: dark/bright spot</td><td>Visible under ND5%
1:D≤0.2mm:No count
2:0.15mm<D≤0.3mm,N≤4
3:D>0.3mm:Not allowable</td></tr>
<tr><td colspan="2">Linear foreign material: bright or dark line</td><td>Invisible under ND5%
0.1mm<W≤0.3mm,
0.3mm<L≤1.5mm,N≤4

Visible under ND5%
0.05mm≤w≤0.1mm,
0.3mm≤L≤0.7mm,N≤4</td></tr>
<tr><td rowspan="2">Polarizer</td><td colspan="2">Linear scratch</td><td>1:BM:No Count
2:Pixel area
0.05mm≤w≤0.2mm,
1.0mm≤L≤5.0mm,N≤4</td></tr>
<tr><td colspan="2">Bubble peeling</td><td>1:BM:No Count
2:Pixel area
0.15mm≤D<0.3mm,N≤4</td></tr>
<tr><td colspan="3">Mura & leak</td><td>ND5%</td></tr>
</table>

11. PRECAUTIONS FOR USING LCD MODULES

1. Handing precautions

1.1 The display panel is made of glass and polarizer.As glass is fragile.It tends to become or chipped during handing especially on the edges.Please avoid dropping or jarring.Do not subject it to a mechanical shock by dropping it or impact.

1.2 Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.Do not touch the display with bare hands,This will stain the display area and degraded insulation between terminals(some cosmetics are determined to the polarizer)

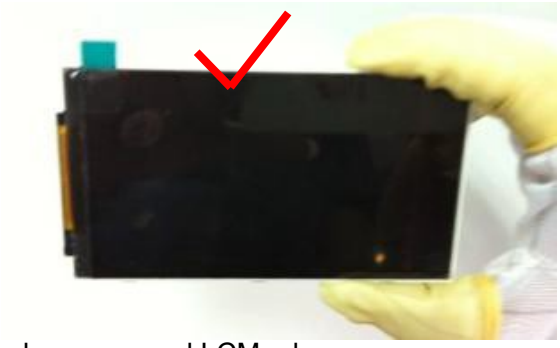
1.3 The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.Do not touch,push or rub the exposed polarizers with anything harder than an HB pencil lead(glass,tweezers,etc)Do not put or attach anything on The display area to avoid leaving marks on it.Condensation on the surface and contact with terminals due to cold will damage,stain or dirty the polarizer.After products are tested at low temperature they must be warmed up in container before coming in to contact with room temperature air.

1.4 Tools required for assembling,such as soldering irons,must be properly grounded.Make certain the AC power source for the soldering iron does not leak.When using an electric screwdriver to attach LCM,the screwdriver should be of ground potentiality to minimize as much as possible any transmission of electromagnetic waves produced sparks coming from the commutator of the motor.

2. Handing precaution for LCM

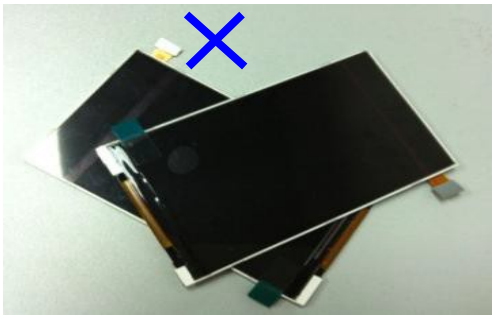
2.1 LCM is easy to be damaged.Please note below and be careful for handing.

2.2 Correct handing

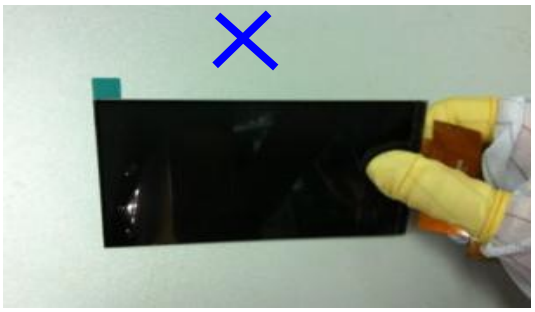


As above picture,Please handle with anti-static glovers around LCM edges.

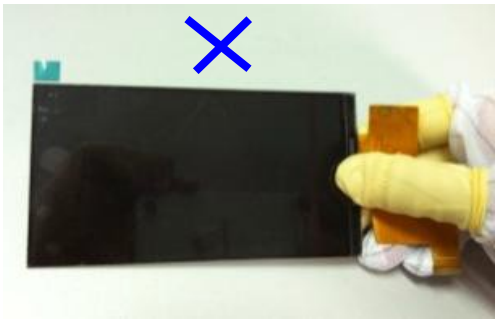
2.3 Incorrect handing



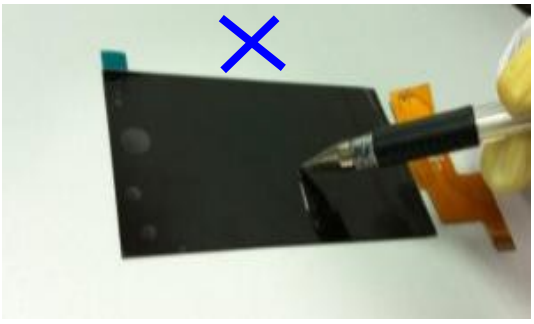
Please don't stack LCM



Please don't hold the surface of panel



Please don't hold the surface of IC



Please don't operate with sharp stick such as pens

2.4 Input logic voltage before apply analog high voltage such as LCD driving voltage when power on.Remove analog high voltage before logic when power off the module.Input each signal after the positive/negative voltage becomes stable.

2.5 If the LCD modules have been operating for a long time showing the same display pattens,the display patterns may remain on the screen as ghost images and a slight contrast irregularity may also appear.A normal operating status can be regained by suspending use for some time.It should be noted that this phenomenon does not adversely affect performance reliability.

2.6 Please keep the temperature within the specified range for use and storage.Polarization degradation,bubble generation or polarizer peel-off may occur with high temperature and high humidity.

3. Storage Precautions

3.1 When storing the LCD modules,the following precaution are necessary.

3.2 Store them in sealed polyethylene bag.If properly sealed,there is no need for the desiccant.

3.3 Store them in a dark place.Do not expose to sunlight or fluorescent light,keep the temperature between0~35℃,and keep the relative humidity between40 ％ RH and 60％RH.

3.4 The polarizer surface should not come in contact with any other objects(We advise you store them in the anti-static electricity container in which they were shipped).

4. Transportation Precautions

4.1 During shipment,pleas handle with care.The packaging bag can not be broken,step on trap.Packing Carton layer height can not be over two meters .

4.2 The transportation process should pay attention to the waterproof and moisture-proof measures.Product can not be watering.Ethylene sealed bags can not be unsealed.