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TFT LCD MODULE
10.1" 1024*RGB*600 DOTS
MODULE NO.: XW101CM02

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1. LCM Specification

1.1 Description

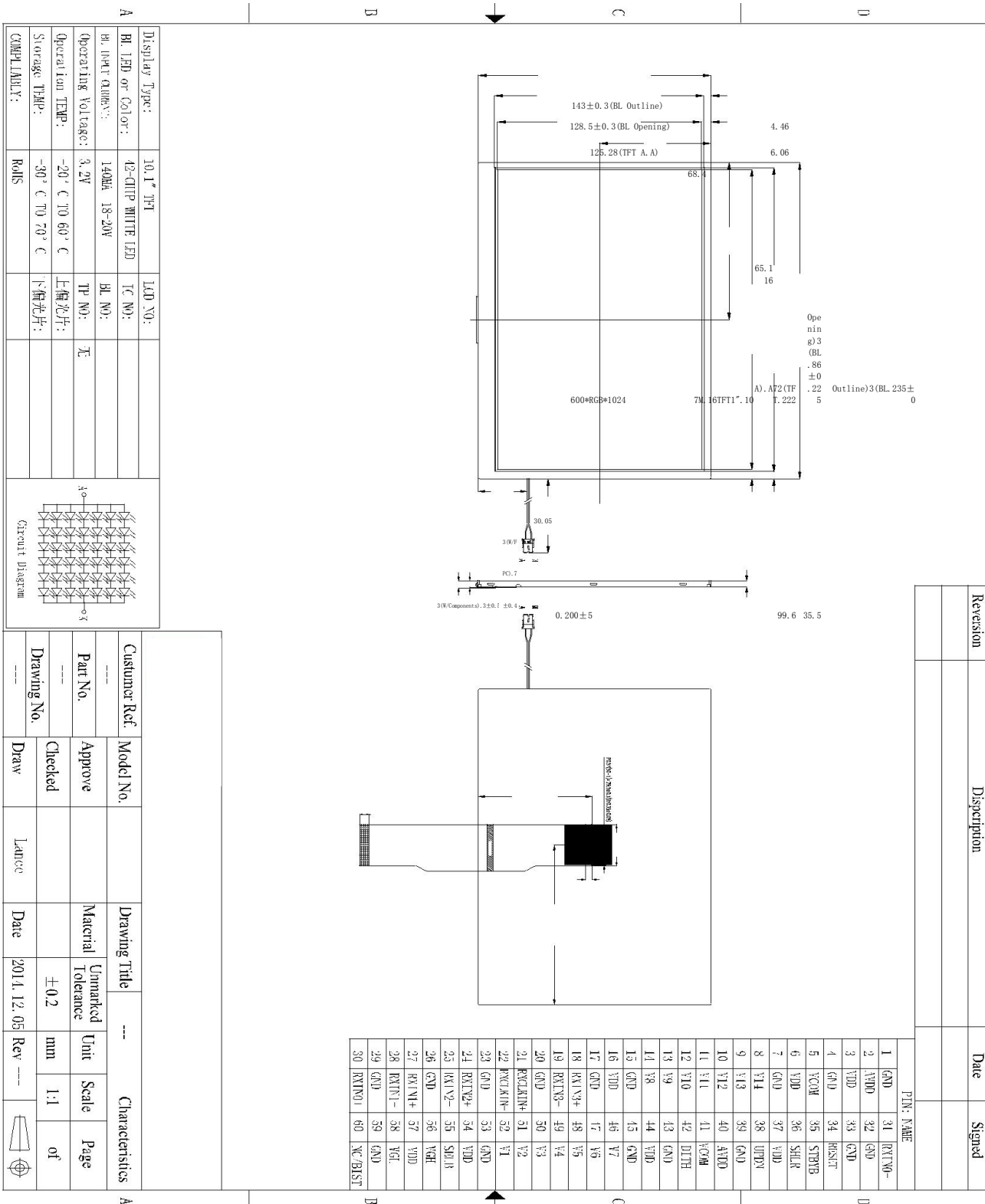
TC101CM02 is a transmissive type color active matrix liquid crystal display (LCD) which uses amorphous thin film transistor (TFT) as switching devices. This product is composed of a TFT LCD panel, a drive IC, a FPC, and a WLED-backlight unit. The active display area is 10.1 inches diagonally measured and the native resolution is 1024*RGB*600. Features of this product are listed in the following table.

1.2 Functions & Features

Table1.1 Module Functions & Features

Parameter	Value	Unit
LCD Mode	a-Si TFT/transmissive	-
Color	16.2M	-
Display Resolution	1024*3(RGB)*600	pixels
Outline Dimension	235.0(W) *143.0(H) *4.5(T)	mm
Active Area(A.A)	222.72*(W) *125.28(H)	mm
Pixel Arrangement	RGB-stripe	-
Viewing Direction	6 O'clock	
Display Mode	Normally WHITE	
IC Package Type	COG	-
Surface Treatment	Anti-Glare,Hardness:3H	
Back-light	White LED*42CHIP	pcs
Operation Temperature	-20~60	°C
Storage Temperature	-30~70	°C

2. Mechanical Specification



3. Electrical Units

3.1 Electrical Specification

<Table3. Electrical specifications>

Item	Symbol	Unit	Value			Note
			Min	Typ	Max	
Power voltage	DVDD	V	3.0	3.3	3.6	
	AVDD	V	8.722	8.9	9.08	
	VGH	V	14.55	15	15.45	-
	VGL	V	-7.35	-7.0	-6.65	
Input signal voltage	VCOM	V		3.5		
Operating Temperature	TOP	°C	-20 to		+60	
Storage Temperature	TST	°C	-30 to		+70	

Notes:

1. VGH is TFT Gate operating voltage.
2. VGL is TFT Gate operating voltage. The low voltage level of VGL signal must be fluctuates with same phase as Vcom.
3. Be sure to apply DVDD and VGL to the LCD first, and then apply VGH.
4. DVDD setting should match the signals output voltage (refer to Note 3) of customer' s system board.
5. DCLK,HS,VS,RESET,U/D, L/R,DE,R0~R7,G0~G7,B0~B7,MODE,DITHB.

3.2 Pin Descriptions

3.2.1 TFT LCD Panel interface FPC Pin Description

Pin NO.	Function Descriptions	Symbol
1	Power ground	GND
2	Power for Analog Circuit	AVDD
3	Digital Power	VDD
4	Power ground	GND
5	Common Voltage	VCOM
6	Digital Power	VDD
7	Power ground	GND
8-14	Gamma correction voltage reference	V14-V8

15	Power ground	GND
16	Digital Power	VDD
17	Power ground	GND
18	+ LVDS differential clock input	RXIN3+
19	-LVDS differential clock input	RIN3-
20	Power ground	GND
21	+ LVDS differential clock input	RXCLKIN+
22	-LVDS differential clock input	RXCLKIN-
23	Power ground	GND
24	+LVDS differential data input	RXIN2+
25	- LVDS differential data input	RXIN2-
26	Power ground	GND
27	+LVDS differential data input	RXIN1+
28	- LVDS differential data input	RXIN1-
29	Power ground	GND
30	+LVDS differential data input	RXIN0+
31	- LVDS differential data input	RXIN0-
32	Power ground	GND
33	Power ground	GND
34	Global rest pin	RESET
35	Standby mode, Normally pulled high STBYB = “1” , normal operation STBYB = “0” , timing controller, source driver will turn off, all output are High-Z	STBYB
36	Left or right display control	SHLR
37	Digital Power	VDD
38	Up/down display control	UPDN
39	Power ground	GND
40	Power for Analog Circuit	AVDD
41	Common Voltage	VCOM
42	Dithering function enable control. Normally pull low. DITHER="1", LVDS input data is 8 bits	DITH

	DITHER="0",LVDS input data is 6bits	
43	Power ground	GND
44	Digital Power	VDD
45	LED Anode	GND
46-52	Gamma correction voltage reference	V7-V1
53	Power ground	GND
54	Digital Power	VDD
55	6bit/8bit mode select	SELB
56	Gate ON Voltage	VGH
57	Digital Power	VDD
58	Gate OFF Voltage	VGL
59	Power ground	GND
60	Not connect	NC

Note1: If LVDS input data is 6 bits ,SELB must be set to High;
If LVDS input data is 8 bits ,SELB must be set to Low.

Note2: When L/R=" 0" , set right to left scan direction.
When L/R=" 1" , set left to right scan direction.
When U/D=" 0" , set top to bottom scan direction.
When U/D=" 1" , set bottom to top scan direction.

3.3.1 Electrical characteristics (Ta=25°C)

3.3.2 TFT-LCD Current Consumption

Table 3.2:

Item	Symbol	Unit	Test Condition	Min	Typ.	Max	Note
Gate on power current	IVGH	mA	VGH=15V	-	5.6		-
Gate off power current	IVGL	mA	VGL=-7.0V	-	8.1		-
Analog power current	IVDD	mA	VDD=3.3V	-	12.2		-
Analog power current	IAVDD	mA	AVDD=89V	-	29.7		

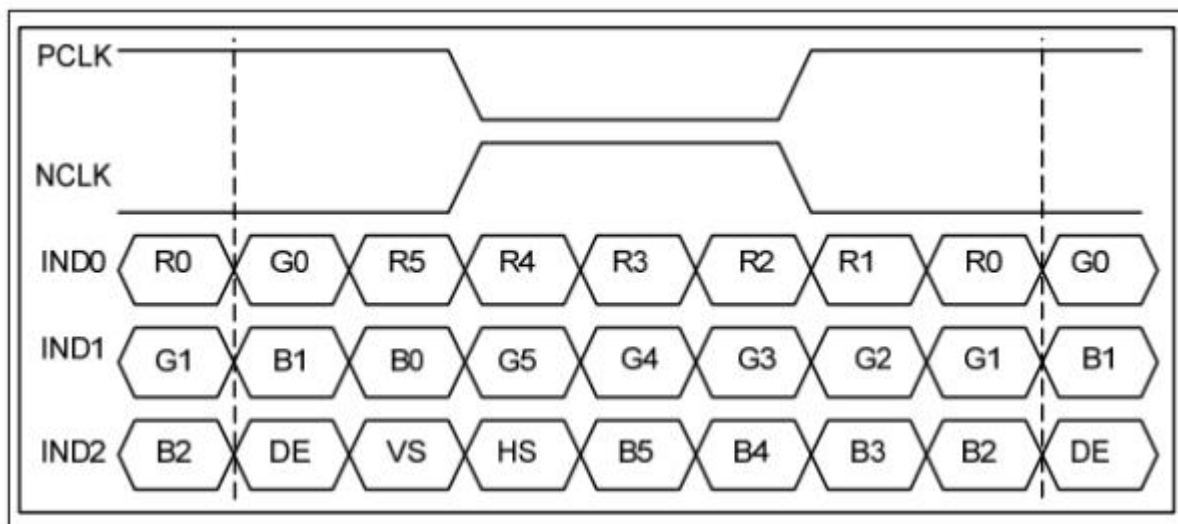
3.4 Back-light Specification

Table 3.3 Back-light Specification

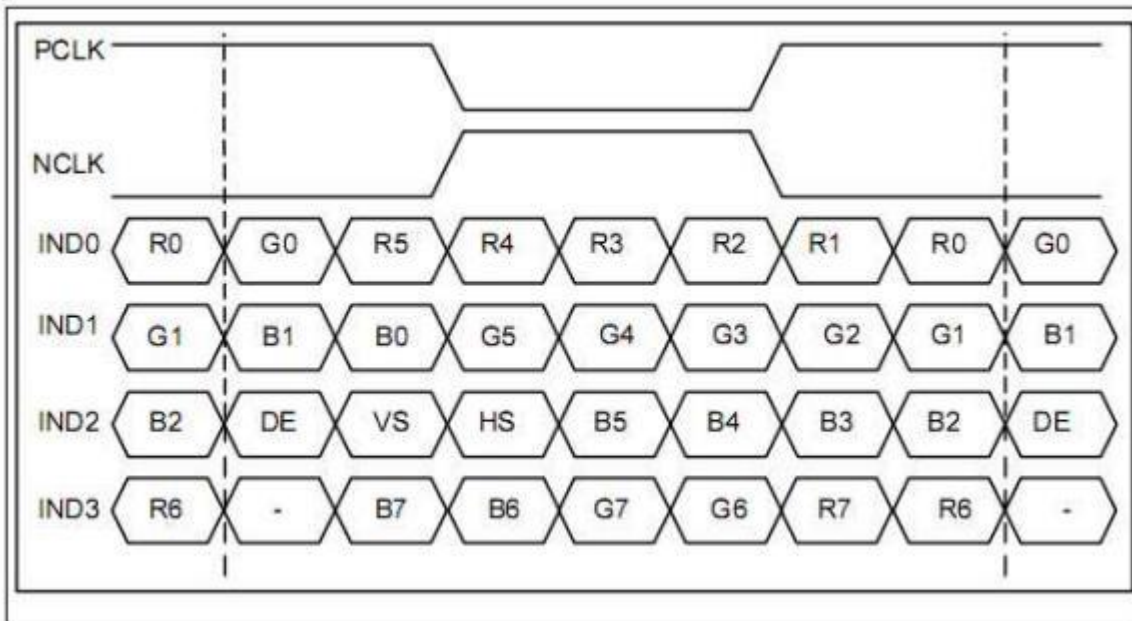
Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply Voltage	VF	Only Backlight		2.1		V
Supply Current	IF		20*7=140			mA
Average Brightness	IV	Backlight Current IF=140mA		--		Cd/m2
CIE Color Coordinate	X	Backlight Current IF=140mA	-	0.274	-	-
	Y		-	0.286	-	
Uniformity	B	Backlight Current IF=140mA	80	-	-S	(%)
Color	White					

4. Timing Characteristics

4.1. 6bit LVDS input



4.2. 8bit LVDS input

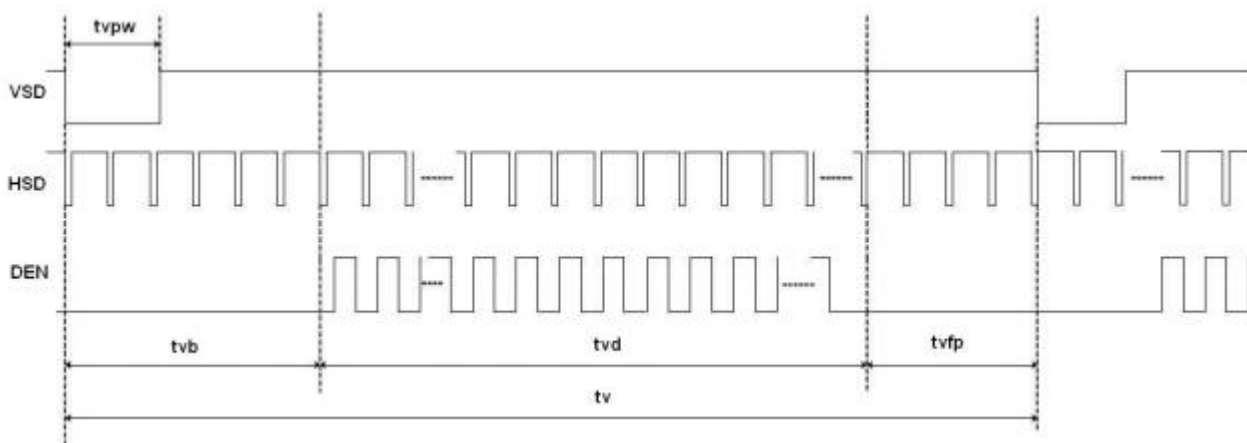


4.3 Interface Timing (DE mode)

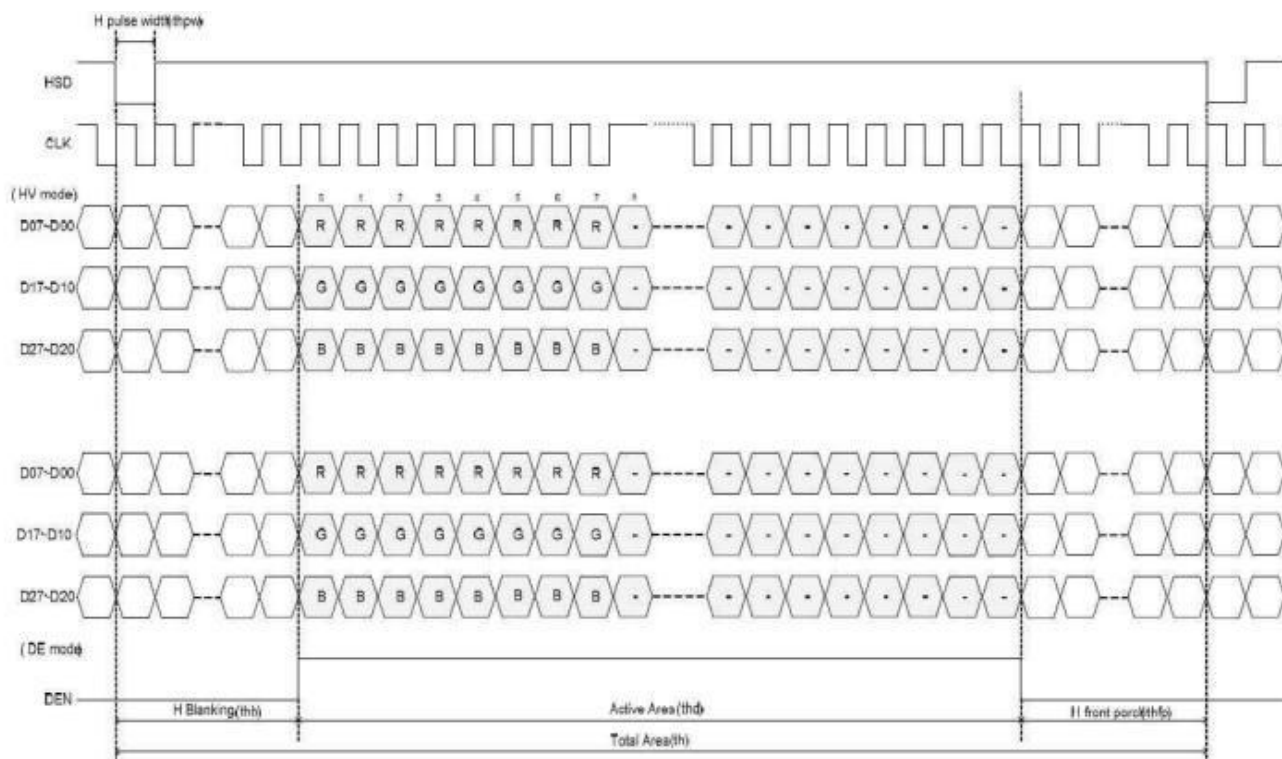
Item	Symbol	Min.	Typ.	Max.	Unit
Frame Rate	--	55	60	65	Hz
Frame Period	t1	610	635	800	line
Vertical Display Time	t2	600	600	600	line
Vertical Blanking Time	t3	10	35	200	line
1 Line Scanning Time	t4	1114	1344	1400	clock
Horizontal Display Time	t5	1024	1024	1024	clock
Horizontal Blanking Time	t6	90	320	376	clock
Clock Rate	t7	37.4	51.2	72.8	MHz

Timing Diagram of Interface Signal (DE mode)

(1) Vertical input timing



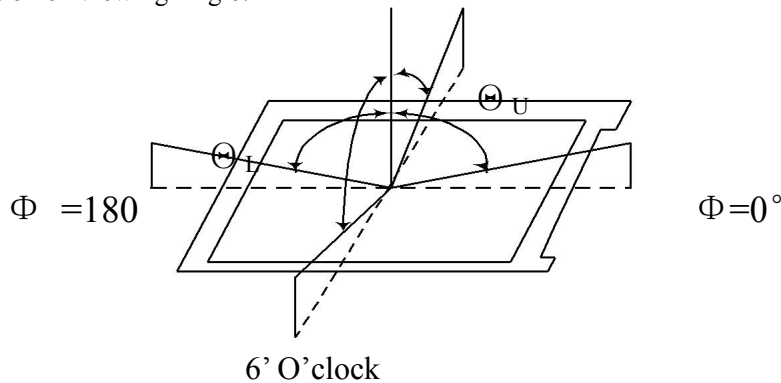
(2) Horizontal Vertical input timing



5 Optical Specifications

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note	
Transmittance (With PZ)	T		—	-	—			
Contrast	CR	$\Theta = 0$ Normal viewing angle	400	500	—		(1)(2)	
Response time	Rising		TR	—	4	8	msec	(1)(3)
	Falling		TF	—	12	24		
White luminance(center)	YL				380	-	cd/m ²	I=140mA
Color gamut	S			—	50	—	%	C light
Color chromaticity (CIE1931)	White		Wx	0.263	0.313	0.363		(1)(4) CF Glass C light
			Wy	0.279	0.329	0.379		
	Red		Rx	0.555	0.605	0.655		
			Ry	0.277	0.327	0.377		
	Green		Gx	0.236	0.286	0.336		
		Gy	0.476	0.526	0.576			
	Blue	Bx	0.100	0.150	0.200			
		By	0.095	0.145	0.195			
Viewing angle	Hor.	Θ L	70	80	—		CR>10	
		Θ R	70	80	—			
	Ver.	Θ U	60	70	—			
		Θ D	70	80	—			
Optima View Direction Optima View Direction	6 O' clock						(5)	

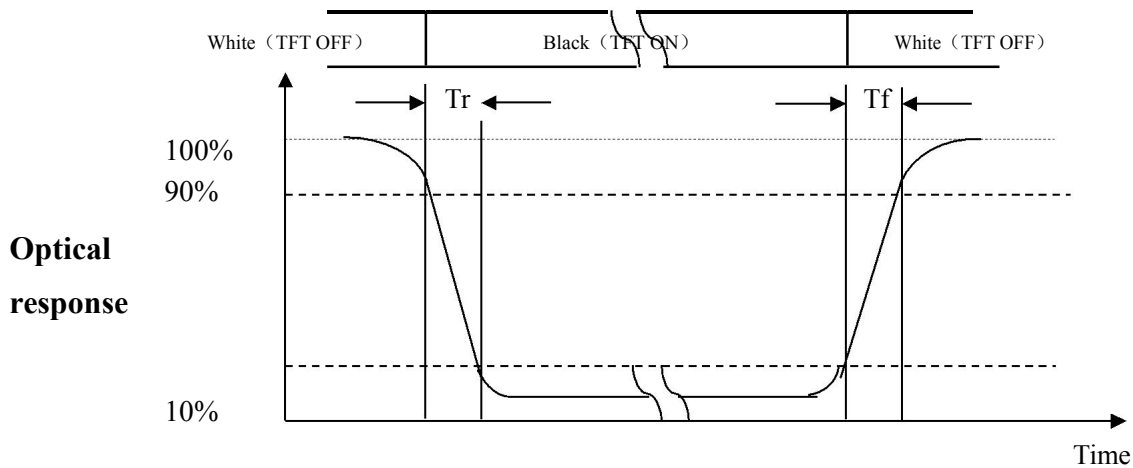
Note (1) Definition of Viewing Angle: 12' O'clock



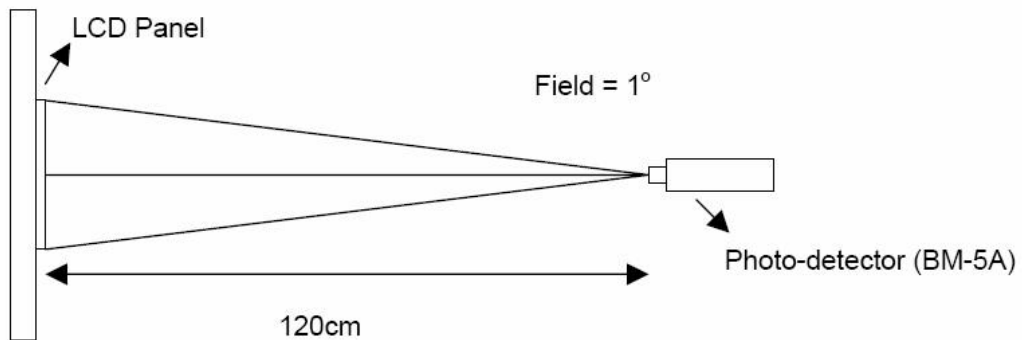
Note (2) Definition of Contrast Ratio (CR):
measured at the center point of pane

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

Note (3) Definition of Response Time: Sum of T_R and T_F



Note (4) Definition of optical measurement setup



Note (5) Rubbing Direction (The different Rubbing Direction will cause the different optimal view direction).

6 Reliability Test Items

NO.	Test Item	Test Condition	Check Time
1	High temp storage	T=70	240hrs
2	Low temp storage	T=-30	240hrs
3	High temp operation	T=60	240hrs
4	Low temp operation	T= -20	240hrs
5	High temp&high humidity	T=50 H=90%	240hrs

Reliability Test Criteria:

Display function should be no change under normal operating condition.

7. Handling Precautions

7.1 Safety

The liquid crystal in the LCD is poisonous. Keep away from your mouth and eyes. If the liquid crystal contacts with your skin, mouse or clothes, use soap to wash it off immediately.

7.2 Handling

- i. The LCD panel is made by thin glass. Prevent the panel from mechanical shock or putting excessive force on its surface.
- ii. The polarizer attached on the display is very easy to be damaged, handle it with special attention.
- iii. To avoid contamination on the display surface, do not touch the display surface with bare hands.
- iv. The transparent electrodes may be disconnected if you use the LCD panel under dew-condensing environment.
- v. The characteristics of the semiconductor devices may be affected when they are exposed to light, possibly resulting in malfunctioning of the ICs. To prevent such malfunctioning of the ICs, make sure the application and the mounting of the panel are designed so that the IC is not exposed to light.

7.3 Static Electricity

Ground soldering iron tips, tools and testers when you operate. Also ground your body when handling the products and store the products in an anti-electrostatic container.

7.4 Storage

Store the products in a dark place where the temperature is within the range of 25±10 and with low humidity (65%RH or less). Do not store the LCD product in an atmosphere containing organic solvents or corrosive gases.

7.5 Cleaning

Do not wipe the polarizer with dry cloth, as it might cause scratching. Wipe the polarizer with a soft cloth soaked with petroleum IPA. Other chemical might damage the panel.

8. INSPECTION CRITERION

OUTGOING QUALITY STANDARD	PAGE 1 OF 6
TITLE:FUNCTIONAL TEST & INSPECTION CRITERIA	LCM Product

This specification is made to be used as the standard acceptance/rejection criteria for Color mobile phone LCM with touch panel.

1 Sample plan

Sampling plan according to GB/T2828.1-2003/ISO 2859-1: 1999, normal level 2 and based on:

Major defect: AQL 0.65

Minor defect: AQL 1.5

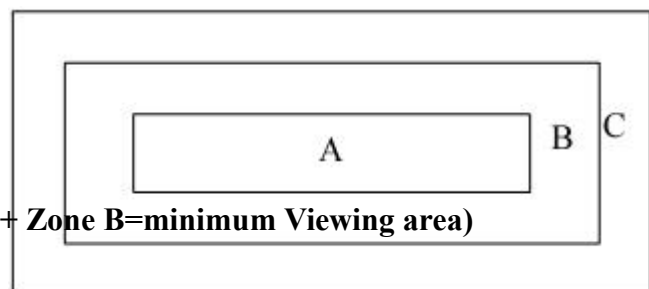
2 Inspection condition

Viewing distance for cosmetic inspection is about 30 cm with bare eyes, and under an environment of 20~40W light intensity, all directions for inspecting the sample should be within 45° against perpendicular line.

3 Definition of inspection zone in LCD

Zone A: character/Digit area

Zone B: viewing area except Zone A (Zone A + Zone B=minimum Viewing area)



Zone C: Outside viewing area (invisible area after assembly in customer’s product)

Fig.1 Inspection zones in an LCD.

Note: As a general rule, visual defects in Zone C are permissible, when it is no trouble for quality and assembly of customer’s product.

OUTGOING QUALITY STANDARD	PAGE 2 OF 6
TITLE:FUNCTIONAL TEST & INSPECTION CRITERIA	LCM Product

4 Inspection standards

4.1 Major Defect

Item NO.	Items to be Classification	Inspection Standard	Classification of defects
4.1.1	All functional defects	1) No display 2) Display abnormally 3) Missing vertical, horizontal segment defects 4) Short circuit 5) Back-light no lighting, flickering and abnormal lighting.	Major
4.1.2	Missing	Component Missing	
4.1.3	Outline dimension	Overall outline dimension beyond the drawing is not allowed.	
4.1.4	linearity	No more than 1.5%	

4.2 Cosmetic Defect

4.2.1 Spots defect

Item NO	Items to be Classification	Inspection Standard	Classification of defects
4.2.1	Clear Spots Black and white Spot defect Pinhole, Foreign Particle,	For dark/white spot, size Φ is define as: $\Phi = \frac{(X+Y)}{2}$ 1.	Minor

polarizer Dirt	Zone Size (mm)	Acceptable Qty			
		A	B	C	
		Ignore			
		2			
		0			
Clear Spots TP Dirt	Zone Size (mm)	Acceptable Qty			Minor
		A	B	C	
		Ignore			
		3			
		0			

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TITLE:FUNCTIONAL TEST & INSPECTION CRITERIA

LCM Product

Dim Spots Circle shaped and dim edged defects	Zone Size (mm)	Acceptable Qty			Minor
		A	B	C	
		Ignore			
		2			
		0			

4.2.2 Line defect

Item NO	Items to be Classification	Inspection Standard	Classificatio of defects
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4.2.2	Line defect Black line, White line, Foreign material on polarizer	<table border="1"> <thead> <tr> <th colspan="2">size(mm)</th> <th colspan="3">Acceptable Qty</th> </tr> <tr> <th rowspan="2">L(Length)</th> <th rowspan="2">W(Width)</th> <th colspan="3">zone</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>Ignore</td> <td>$W \leq 0.02$</td> <td colspan="3">Ignore</td> </tr> <tr> <td>$L \leq 3.0$</td> <td>$0.02 < W \leq 0.03$</td> <td colspan="3">2</td> </tr> <tr> <td>$L \leq 2.0$</td> <td>$0.03 < W \leq 0.05$</td> <td colspan="3">1</td> </tr> <tr> <td></td> <td>$0.05 < W$</td> <td colspan="3">Define as spot defect</td> </tr> </tbody> </table>	size(mm)		Acceptable Qty			L(Length)	W(Width)	zone			A	B	C	Ignore	$W \leq 0.02$	Ignore			$L \leq 3.0$	$0.02 < W \leq 0.03$	2			$L \leq 2.0$	$0.03 < W \leq 0.05$	1				$0.05 < W$	Define as spot defect			Minor
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	$0.05 < W$	Define as spot defect																																		
4.2.3	Foreign material on TP film	<p>The line can be seen after mobile phone in the operating condition:</p> <table border="1"> <thead> <tr> <th colspan="2">size(mm)</th> <th colspan="3">Acceptable Qty</th> </tr> <tr> <th rowspan="2">L(Length)</th> <th rowspan="2">W(Width)</th> <th colspan="3">zone</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>Ignore</td> <td>$W \leq 0.03$</td> <td colspan="3">Ignore</td> </tr> <tr> <td>$L \leq 5.0$</td> <td>$0.03 < W \leq 0.05$</td> <td colspan="3">3</td> </tr> <tr> <td></td> <td>$0.05 < W$</td> <td colspan="3">Define as spot defect</td> </tr> </tbody> </table>	size(mm)		Acceptable Qty			L(Length)	W(Width)	zone			A	B	C	Ignore	$W \leq 0.03$	Ignore			$L \leq 5.0$	$0.03 < W \leq 0.05$	3				$0.05 < W$	Define as spot defect			Minor					
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	$0.05 < W$	Define as spot defect																																		
4.2.3	Dim line Defect Polarizer scratch TP film scratch	<p>If the scratch can be seen after mobile phone cover assembling or in the operating condition, judge by the line defect of 4.2.2.</p> <p>If the scratch can be seen only in non-operating condition or some special angle, judge by the following.</p> <table border="1"> <thead> <tr> <th colspan="2">size(mm)</th> <th colspan="3">Acceptable Qty</th> </tr> <tr> <th rowspan="2">L(Length)</th> <th rowspan="2">W(Width)</th> <th colspan="3">zone</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>Ignore</td> <td>$W \leq 0.03$</td> <td colspan="3">Ignore</td> </tr> <tr> <td>$5.0 < L \leq 10.0$</td> <td>$0.03 < W \leq 0.05$</td> <td colspan="3">2</td> </tr> <tr> <td>$L \leq 5.0$</td> <td>$0.05 < W \leq 0.08$</td> <td colspan="3">1</td> </tr> <tr> <td></td> <td>$0.08 < W$</td> <td colspan="3">0</td> </tr> </tbody> </table>	size(mm)		Acceptable Qty			L(Length)	W(Width)	zone			A	B	C	Ignore	$W \leq 0.03$	Ignore			$5.0 < L \leq 10.0$	$0.03 < W \leq 0.05$	2			$L \leq 5.0$	$0.05 < W \leq 0.08$	1				$0.08 < W$	0			Minor
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OUTGOING QUALITY STANDARD			PAGE 4 OF 6																																	
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		Zone Size (mm)	Acceptable Qty			
			A	B	C	
4.2.4	Polarize Air bubble	$\Phi \leq 0.20$		Ignore		Minor
		$0.20 < \Phi \leq 0.30$		2		
		$0.30 < \Phi \leq 0.50$		1	Ignore	
		$0.50 < \Phi$		0		

4.2.3 LCD chip defect

Item NO	Items to be Classification	Inspection Standard	Classification of defects
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(i) Chips on corner
A:LCD Glass defect

X (mm)	Y (mm)	Z (mm)
≤ 2.0	$\leq S$	Disregard

Notes: S=contact pad length

4.2.5	Glass defect	Chips on the corner of terminal shall not be allowed to extend into the ITO pad or expose perimeter seal. B:TP Glass defect	Minor
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X (mm)	Y (mm)	Z (mm)
≤ 3.0	≤ 3.0	Disregard

(ii)Usual surface
cracks A:LCD Glass
defect

OUTGOING QUALITY STANDARD			PAGE 5 OF 6												
TITLE:FUNCTIONAL TEST & INSPECTION CRITERIA			LCM Product												
		<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">X (mm)</td> <td style="text-align: center;">Y (mm)</td> <td style="text-align: center;">Z (mm)</td> </tr> <tr> <td style="text-align: center;">≤3.0</td> <td style="text-align: center;"><Inner border line of the seal</td> <td style="text-align: center;">Disregard</td> </tr> </table> <p>B:TP Glass defect</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">X (mm)</td> <td style="text-align: center;">Y (mm)</td> <td style="text-align: center;">Z (mm)</td> </tr> <tr> <td style="text-align: center;">≤6.0</td> <td style="text-align: center;">≤2.0</td> <td style="text-align: center;">Disregard</td> </tr> </table>	X (mm)	Y (mm)	Z (mm)	≤3.0	<Inner border line of the seal	Disregard	X (mm)	Y (mm)	Z (mm)	≤6.0	≤2.0	Disregard	Minor
X (mm)	Y (mm)	Z (mm)													
≤3.0	<Inner border line of the seal	Disregard													
X (mm)	Y (mm)	Z (mm)													
≤6.0	≤2.0	Disregard													
		<p>(iii) Crack Cracks tend to break are not allowed.</p>	Major												

4.3 Parts Defect

Item NO	Items to be Classification	Inspection Standard	Classification of defects
4.3.1	Parts contraposition	1、 Not allow IC and FPC/heat-seal lead width is more than 50% beyond lead pattern. 2、 Not allow chip or solder component is off center more than 50% of the pad outline.	Major
4.3.2	SMT	According to the <Acceptability of electronic assemblies> IPC-A-610C class 2 standard. Component missing or function defect are Major defect, the others are Minor defect.	