AZ DISPLAYS

SPECIFICATIONS FOR

LIQUID CRYSTAL DISPLAY

CUSTOMER APPROVAL			
※ **PART NO. :** ATM0700L26(AZ DISPLAYS) VER1.0			
APPROVAL		**COMPANY CHOP**	
CUSTOMER COMMENTS			

AZ DISPLAYS ENGINEERING APPROVAL		
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Document Revision History

Revision	Data	Page	Description	Changed BY
1.0	2015/06/05	--	First issue	

Contents

1. LCM Specification

1.1 Description

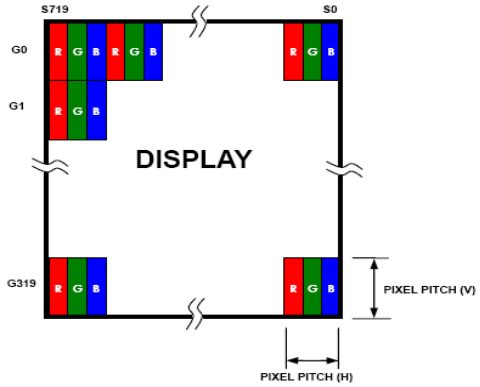
ATM0700L26 is a transmissive type color active matrix liquid crystal display (LCD) which uses amorphous thin film transistor (TFT) as switching devices. This product is composed of a TFT LCD panel, a drive IC, a FPC, and a WLED-backlight unit.The active display area is 7.0 inches diagonally measured and the native resolution is 1024*RGB*600. Features of this product are listed in the following table.

1.2 Functions & Features

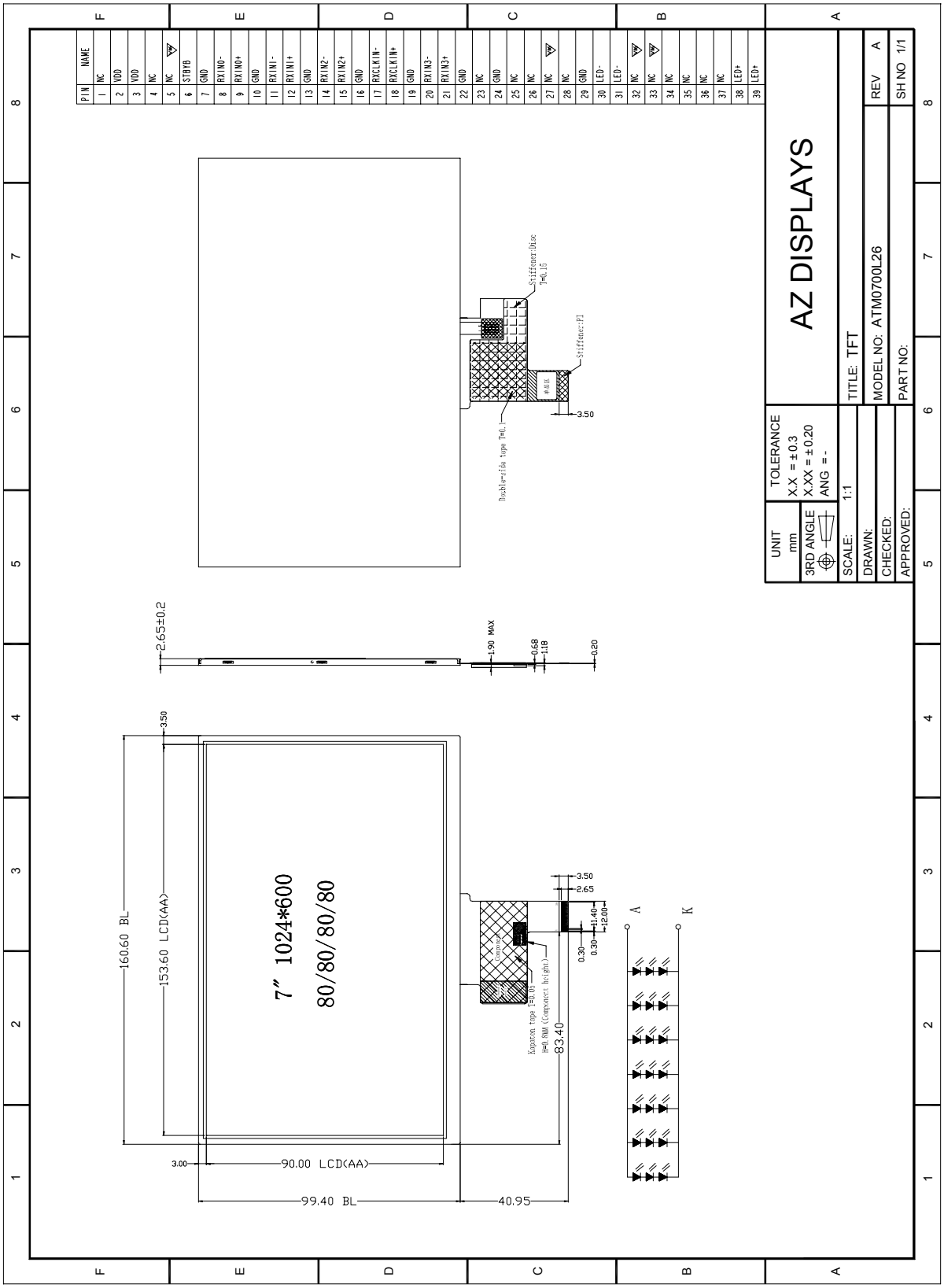
Table1.1 Module Functions & Features

Parameter	Value	Unit
LCD Mode	a-Si TFT/transmissive	-
Color	16.7M	-
Display Resolution	1024*3(RGB)*600	pixels
Outline Dimension	160.6(W) *99.4(H) *2.65(T)	mm
Active Area(A.A)	153.6*(W) *90(H)	mm
Pixel Arrangement	RGB-stripe	-
Viewing Direction	U/D/L/R free viewing direction	
Display Mode	Normally Black	
IC Package Type	COG	-
Surface Treatment	Anti-Glare,Hardness:3H	
Back-light	White LED*21CHIP	PCS
Operation Temperature	-20~60	℃
Storage Temperature	-30~70	℃

Pixel Arrangement



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	3.2	3.6	
	AVDD	V	-	9.0	-	
	VGH	V	19	20	23	-
	VGL	V	-6	-7	-8	
Input signal voltage	VCOM	V	3.0	3.6	4.2	
Operating Temperature	TOP	℃	-20		+60	
Storage Temperature	TST	℃	-30		+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	Common Voltage	NC
2	Digital Power	VDD
3	Digital Power	VDD
4	Not connect	NC
5	Not connect	NC
6	Standby mode, Normally pulled high STBYB = “1”, normal operation STBYB = “0”, timing controller, source driver will turn off, all output are High-Z	STBYB
7	Power ground	GND

8	- LVDS differential data input	RXIN0-
9	LVDS differential data input	RXIN0+
10	Power ground	GND
11	- LVDS differential data input	RXIN1-
12	LVDS differential data input	RXIN1+
13	Power ground	GND
14	- LVDS differential data input	RXIN2-
15	LVDS differential data input	RXIN2+
16	Power ground	GND
17	- LVDS differential clock input	RXCLKIN-
18	+LVDS differential clock input	RXCLKIN+
19	Power ground	GND
20	- LVDS differential data input	RXIN3-
21	LVDS differential data input	RXIN3+
22	Power ground	GND
23	Not connect	NC
24	Power ground	GND
25	Not connect	NC
26	Not connect	NC
27	Not connect	NC
28	Not connect	NC
29	Power ground	GND
30	LED Cathode	LED-
31	LED Cathode	LED-
32-37	Not connect	NC
38	LED Anode	LED+
39	LED Anode	LED+

3.3.1 Electrical characteristics (Ta=25℃)

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=20.0V	-	-	-	-
Gate off power current	IVGL	mA	VGL=-7.0V	-	-	-	-
Analog power current	IVDD	mA	VDD=3.2V	-	-	-	-
Analog power current	IAVDD	mA	AVDD=9.0V	-	-	-	

3.4 Back-light Specification

Table 3.3 Back-light Specification

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply Voltage	VF	Only Backlight	8.0	9.6	10.0	V
Supply Current	IF		20*7=140			mA
Average Brightness	IV	Backlight Current IF=140mA			-	Cd/m2
Uniformity	B	Backlight Current IF=140mA	80	-	-S	(%)
Color	White					

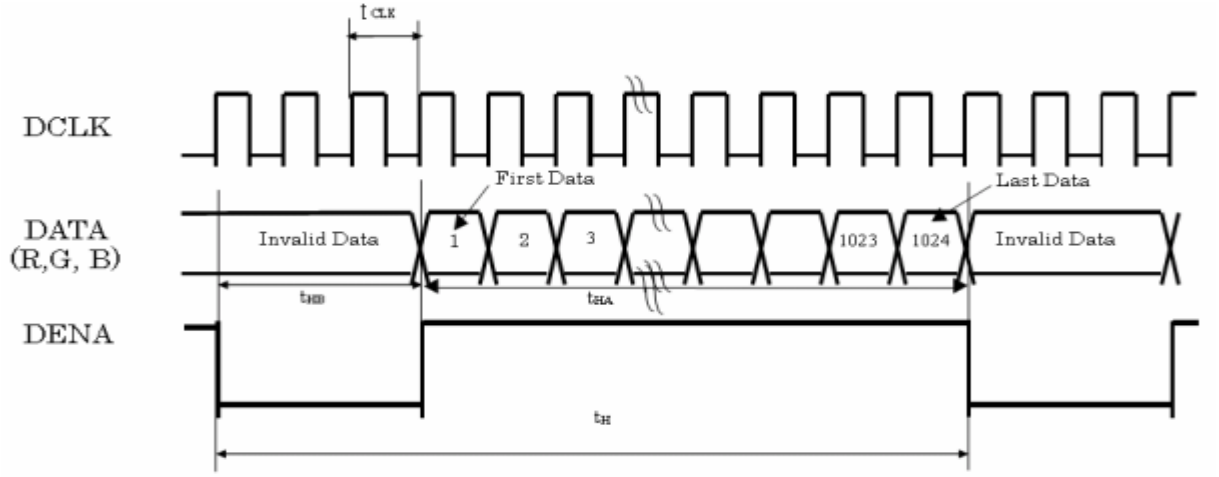
4.Timing Characteristics

4.1. Timing characteristics of input signals

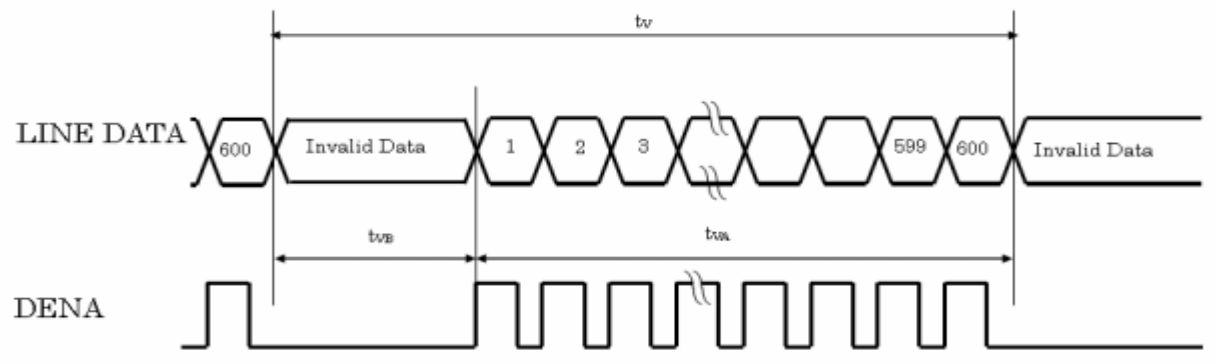
ITEM				SYMBOL	MIN	TYP	MAX	UNIT
LVDS input signal sequence	CLK Frequency			tclk	45	51.2	57	MHz
LCD input signal sequence (Input LVDS Transmitter)	DENA	Horizontal	Horizontal total Time	t_H	1324	1344	1364	tCLK
			Horizontal effective Time	t_{HA}		1024		tCLK
			Horizontal Blank Time	t_{HB}	300	320	340	tCLK
		Vertical	Vertical total Time	t_V	625	635	645	t_H
			Vertical effective Time	t_{VA}		600		t_H
			Vertical Blank Time	t_{VB}	25	35	45	t_H

4.2.Timing sequence(Timing chart)

4.2.1Horizontal Timing Sequence

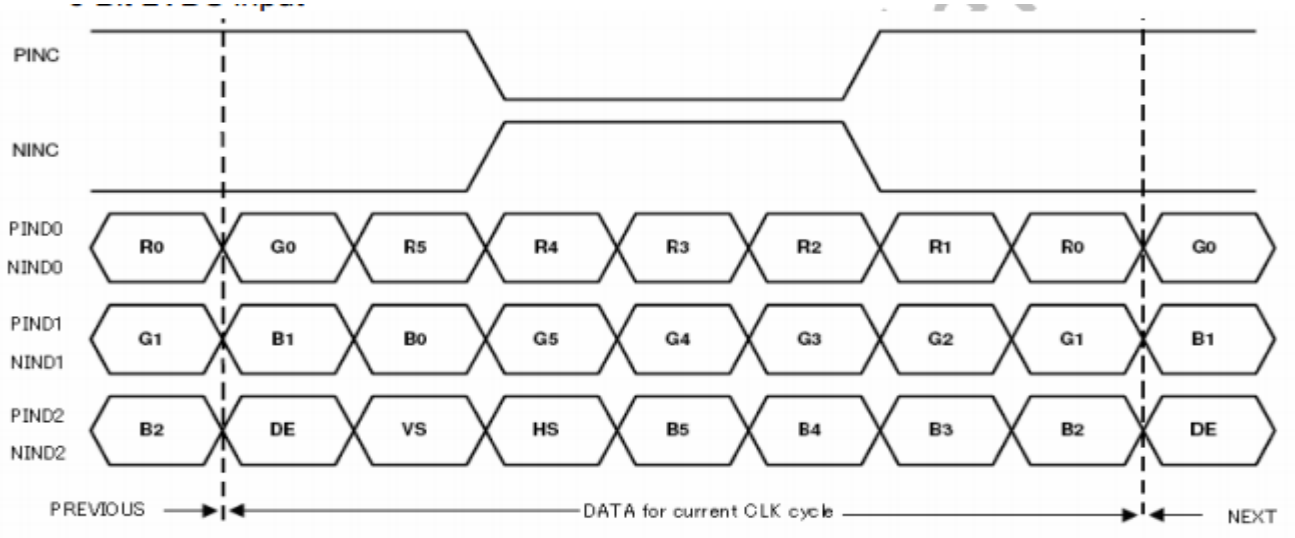


4.2.2 Vertical Timing Sequence

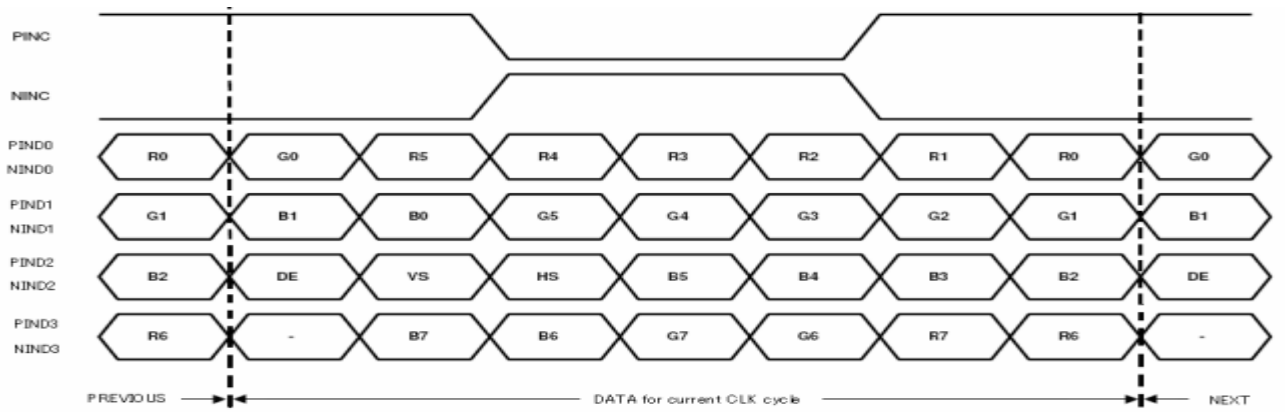


4.2.3 LVDS Input Data mapping

6Bit LVDS input



8Bit LVDS input



5 Optical Specifications

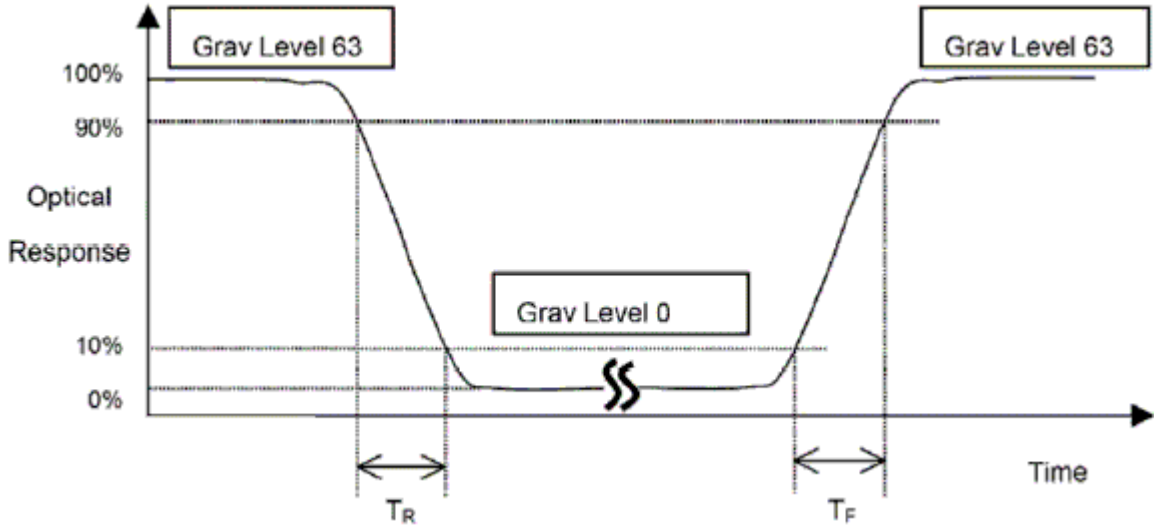
Item of electro-optical characteristics	Symbol		Condition	Min	Typ	Max	Unit	Remark
Contrast ratio	CR		Ø =0°	700	900	--		Note1
Surface Luminance	YL		-	250	280	--	Cd/M^2	Note1
Color saturation	NTSC		-	--		--	%	
Response time	Ton		Ø =0°	--	15		ms	Note2
	Tof			--	15			
Viewing angle range	Ø =0°		Top	70	80	--		Note3
			Bottom	70	80	--		
			Left	70	80	--		
			Right	70	80	--		
Module Chromaticity CIE(x,y)	White	x	Ø =0°		0.297			Note4
		y			0.337			
	Red	x		--	0.618	--		
		y		--	0.328	--		
	Green	x		--	0.282	--		
		y		--	0.538	--		
	Blue	x		--	0.142	--		
		y		--	0.168	--		
Transmittance	Trans		--	--	-	--	%	Note5
Cross talk	Ct		--	--	-	--	%	Note6

Notes(1) :1. All input terminals LCD panel must be ground while measuring the center area of the panel.

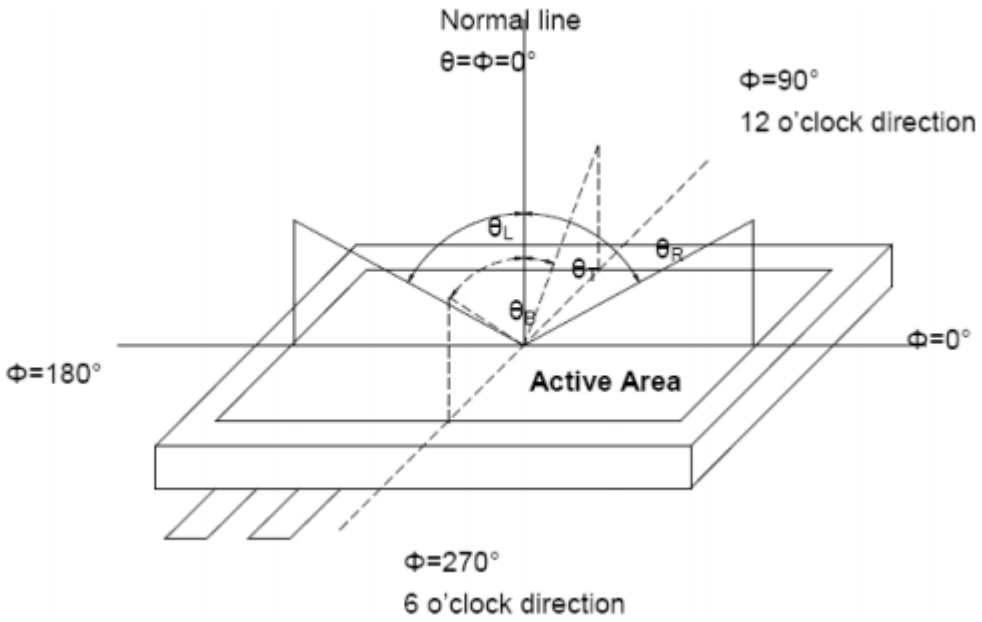
2. Contrast measurements shall be made at viewing angle of Θ= 0 and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state.
(see Figure 4) Luminance Contrast Ratio (CR) is defined mathematically

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

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



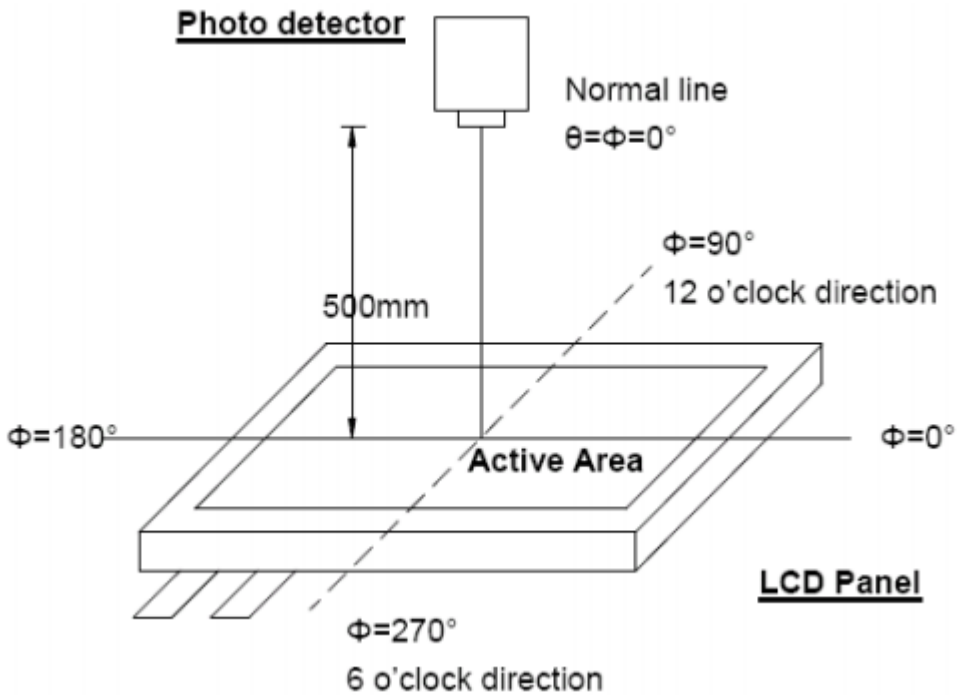
Note (3) Definition of viewing Angle:



Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or 3, 9 o‟ clock direction and the vertical or 6, 12 o‟ clock direction with respect to the optical axis which is normal to the LCD surface.

Note (4) Definition of optical measurement system.

The optical characteristics should be measured in dark room. The optical properties are measured at the center point of the LCD screen,(Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/Field of view :1 ° /Height 500mm.)



Note (5) Definition of Transmittance

Where LMOD defined as measured luminance at center point of MOD with ” White” state
LBL defined as measured luminance at center point of Backlight Unit with same MOD. The Backlight Unit has composite optical films, except “gain” characteristic optical films.

Tr% = (LMOD / LBL)*100%

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:

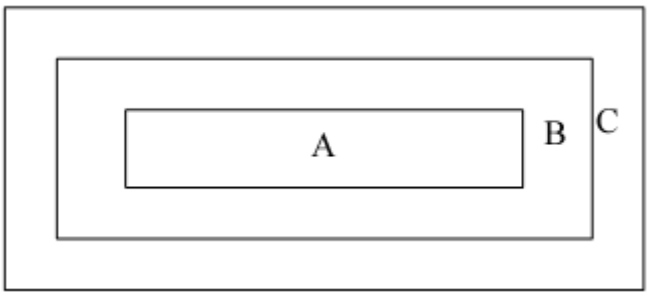
Major defect: AQL 0.65

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

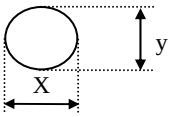
4 Inspection standards

4.1 Major Defect

Item NO.	Items to be Classification	Inspection Standard	Classificatio of defects
4.1.1	All functiona 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

<table>
<tr><th>Item NO</th><th>Items to be Classification</th><th>Inspection Standard</th><th>Classificatio of defects</th></tr>
<tr><td rowspan="2">4.2.1</td><td rowspan="2">Clear Spots
Black and white Spot defect
Pinhole, Foreign Particle, polarizer Dirt</td><td>For dark/white spot, size Φ is define as：
Φ=（X+Y）/2
 
</td><td rowspan="2">Minor</td></tr>
<tr><td>1.
<table>
<tr><th rowspan="2">Zone
Size（mm）</th><th colspan="3">Acceptable Qty</th></tr>
<tr><th>A</th><th>B</th><th>C</th></tr>
<tr><td>Φ≤0.1</td><td colspan="2">Ignore</td><td></td></tr>
<tr><td>0.1<Φ≤0.15</td><td colspan="2">2</td><td rowspan="3">Ignore</td></tr>
<tr><td>0.15<Φ≤0.2</td><td colspan="2">1</td></tr>
<tr><td>0.2 <Φ</td><td colspan="2">0</td></tr>
</table></td></tr>
</table>

OUTGOING QUALITY STANDARD	PAGE 3 OF 6

	Dim Spots Circle shaped and dim edged defects	3. <table><tr><td>Zone / Size（mm）</td><td colspan="3">Acceptable Qty</td></tr><tr><td></td><td>A</td><td>B</td><td>C</td></tr><tr><td>Φ≤0.20</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr><tr><td>0.20<Φ≤0.40</td><td colspan="2">2</td></tr><tr><td>0.40<Φ≤0.60</td><td colspan="2">1</td></tr><tr><td>0.60 <Φ</td><td colspan="2">0</td></tr></table>	Minor

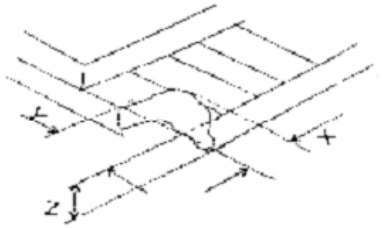
4.2.2 Line defect

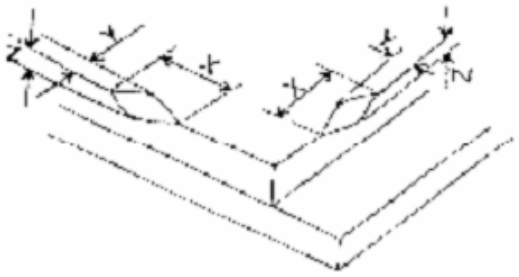
Item NO	Items to be Classification	Inspection Standard	Classificatio of defects
4.2.2	Line defect Black line, White line, Foreign material on polarizer	<table><tr><td colspan="2">size(mm)</td><td colspan="3">Acceptable Qty</td></tr><tr><td rowspan="2">L(Length)</td><td rowspan="2">W(Width)</td><td colspan="3">zone</td></tr><tr><td>A</td><td>B</td><td>C</td></tr><tr><td>Ignore</td><td>W≤0.02</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr><tr><td>L≤3.0</td><td>0.02＜W≤0.03</td><td colspan="2">2</td></tr><tr><td>L≤2.0</td><td>0.03＜W≤0.05</td><td colspan="2">1</td></tr><tr><td></td><td>0.05＜W</td><td colspan="2">Define as spot defect</td></tr></table>	Minor
	Foreign material on TP film	The line can be seen after mobile phone in the operating condition: <table><tr><td colspan="2">size(mm)</td><td colspan="3">Acceptable Qty</td></tr><tr><td rowspan="2">L(Length)</td><td rowspan="2">W(Width)</td><td colspan="3">zone</td></tr><tr><td>A</td><td>B</td><td>C</td></tr><tr><td>Ignore</td><td>W≤0.03</td><td colspan="2">Ignore</td><td rowspan="3">Ignore</td></tr><tr><td>L≤5.0</td><td>0.03＜W≤0.05</td><td colspan="2">3</td></tr><tr><td></td><td>0.05＜W</td><td colspan="2">Define as spot defect</td></tr></table>	Minor

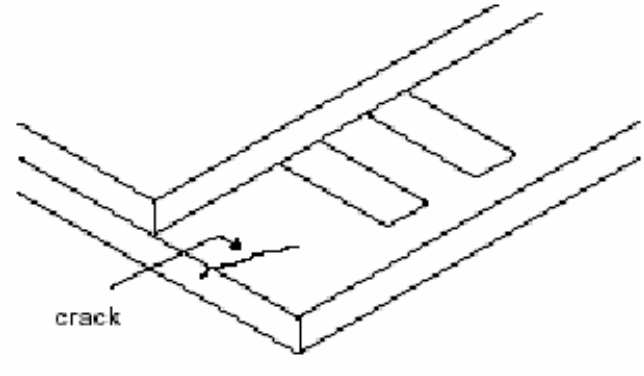
TITLE:FUNCTIONAL TEST & INSPECTION CRITERIA | LCM Product

<table>
<tr>
<td>4.2.4</td>
<td>Polarize
Air bubble</td>
<td>
<table>
<tr><td rowspan="2">Zone
Size（mm）</td><td colspan="3">Acceptable Qty</td></tr>
<tr><td>A</td><td>B</td><td>C</td></tr>
<tr><td>Φ≤0.20</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>0.20<Φ≤0.30</td><td colspan="2">2</td></tr>
<tr><td>0.30<Φ≤0.50</td><td colspan="2">1</td></tr>
<tr><td>0.50 <Φ</td><td colspan="2">0</td></tr>
</table>
</td>
<td>Minor</td>
</tr>
</table>

4.2.3 LCD chip defect

<table>
<tr><th>Item NO</th><th>Items to be Classification</th><th>Inspection Standard</th><th>Classificatio of defects</th></tr>
<tr>
<td>4.2.5</td>
<td>Glass defect</td>
<td>
(i) Chips on corner
A:LCD Glass defect

<table>
<tr><td>X（mm）</td><td>Y（mm）</td><td>Z（mm）</td></tr>
<tr><td>≤2.0</td><td>≤S</td><td>Disregard</td></tr>
</table>
Notes: S=contact pad length
Chips on the corner of terminal shall not be allowed to extend into
the ITO pad or expose perimeter seal.

(ii)Usual surface cracks
A:LCD Glass defect

</td>
<td>Minor</td>
</tr>
</table>

		(iii) Crack **Cracks tend to break are not allowed.**  	**Major**

4.3 Parts Defect

Item NO	Items to be Classification	Inspection Standard	Classificatio 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.**	