K240QCNN-N14B

Product

Standard LCD Module
240 x RGB x 320 Dots
2.4” 65K TFT LCD
Wide temperature
With white LED backlight

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CONTENTS

1. Document revision history :

DOCUMENT REVISION	DATE	DESCRIPTION	CHANGED BY	CHECKED BY
01	2014.07.18	First Release.	XW Lee	
02	2014.01.05	Revise typing error	XW Lee	

2. General Description

- 2.4”(diagonal), 240 x RGB x 320 dots, 65k colors, Transmissive, TFT LCD module.
- Viewing Direction: 12 o’clock.
- Driving IC: ILI9341 or equivalent TFT controller/driver.
- 16-bits or 8-bit data bus (I80 system interface).
- Logic voltage: 2.8V (typ.).

3. Mechanical Specifications

The mechanical detail is shown in Fig. 1 and summarized in Table 1 below.

Table 1

Parameter		Specifications	Unit
Outline dimensions		44.72(W) x 60.26(H) x2.46(D) (Exclude FPC, cables of backlight)	mm
Color TFT 240xRGBx320	LCD view area	37.72(W) x 49.96(H)	mm
	TP active area	-	mm
	LCD active area	36.72(W) x 48.96(H)	mm
	Display format	240 x RGB x 320	dots
	Color configuration	RGB stripes	-
	Dot pitch	0.153(RGB)(W) x 0.153(H)	mm
Weight		TBD	grams

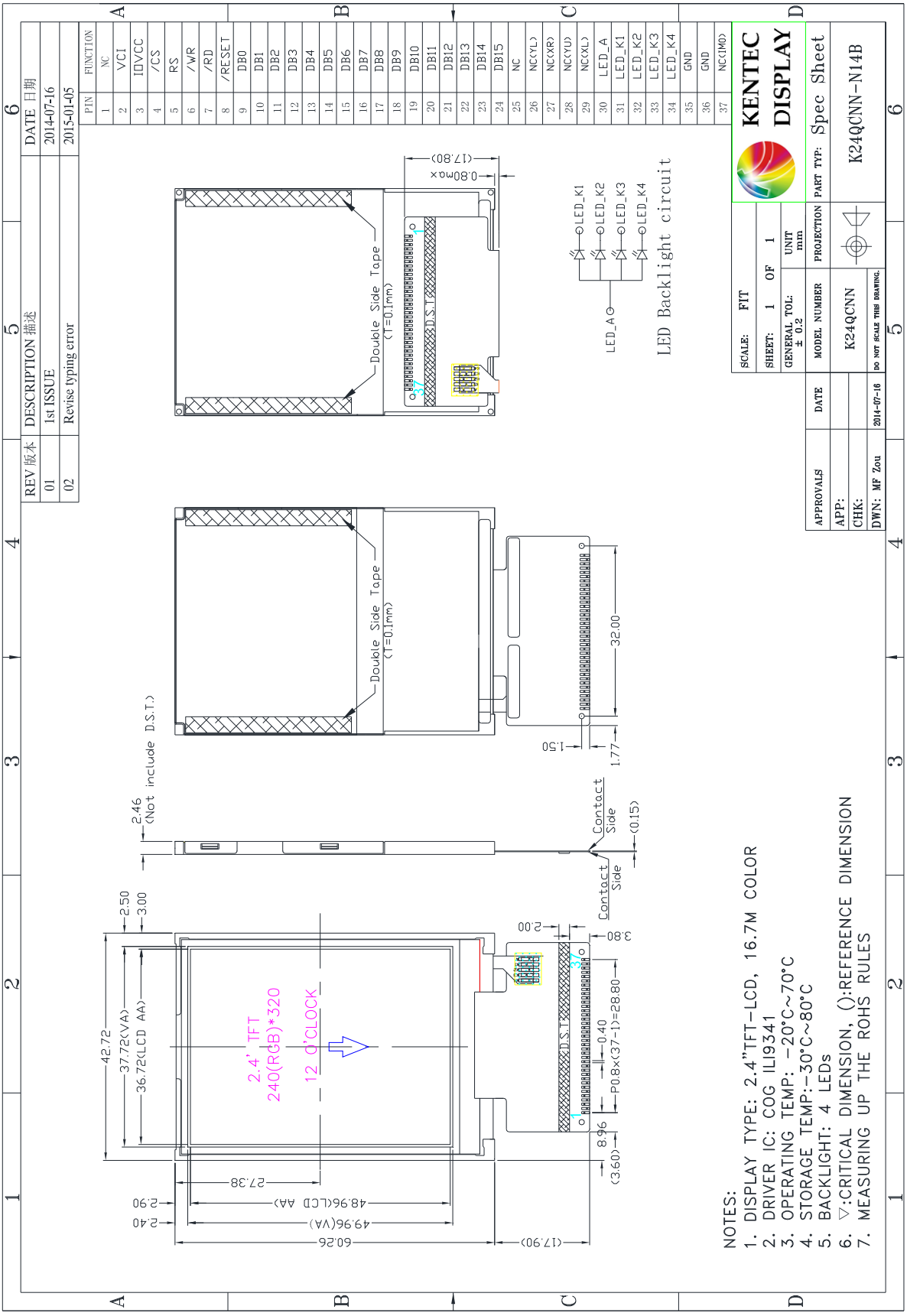


Figure 1: Outline Drawing

4. Interface signals

Pin No.	Symbol	Type	Description
1	FMARK/NC	-	No connection
2	VCI(2.8V)	P	Power supply for analog (2.8V)
3	IOVCC(1.8V/2.8V)	P	Supply voltage for digital IO (1.8V/2.8V)
4	/CS	I	Chip select pin
5	RS	I	Register/Data select
6	/WR	I	Write control signal
7	/RD	I	Read control signal
8	/RESET	I	Reset pin (Low active)
9-24	DB0-DB15	I/O	Data bus bit0-bit15
25	NC	-	No connection
26	YL(NC)	-	Terminal Reserved for touch panel.
27	XR(NC)	-	
28	YU(NC)	-	
29	XL(NC)	-	
30	LED_A	P	Power supply for LED backlight (Anode)
31	LED_K1	P	Power supply for LED backlight (Cathode)
32	LED_K2	P	
33	LED_K3	P	
34	LED_K4	P	
35	GND	-	Power supply (system ground)
36	GND	P	Power supply (system ground)
37	IM0	I	Leave it open

Note:

1) Type: P: Power supply, I: Input, O: Output.

5. Absolute Maximum Ratings

5.1 Electrical Maximum Ratings – for IC Only

Parameter	Symbol	Min.	Max.	Unit	Note
Analog supply voltage	VCI	-0.3	+3.3	V	1
Logic supply voltage	IOVCC	-0.3	+3.3	V	1

Note:

1. VCI/IOVCC, GND must be maintained.
2. The modules may be destroyed if they are used beyond the absolute maximum ratings.

5.2 Environmental Condition

Item	Operating temperature (Topr)		Storage temperature (Tstg) (Note 1)		Remark
	Min.	Max.	Min.	Max.	
Ambient temperature	-20°C	+70°C	-30°C	+80°C	Dry
Humidity (Note 1)	80% max. RH for Ta ≤ 40°C < 50% RH for 40°C < Ta ≤ Maximum operating temperature				No condensation

Note 1: Product cannot sustain at extreme storage conditions for long time.

6. Electrical Specifications

At Ta = 25 °C, VCI=IOVCC= 2.8V, GND=0V.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply voltage (logic)	IOVCC		1.8	2.8	3.3	V
Supply voltage (analog)	VCI		2.5	2.8	3.3	V
Supply current (Logic & LCD)	IDD	VCI=2.8V	-	-	10	mA
Supply current of LED backlight	IF	For each single LED	-	15	20	mA
Supply voltage of LED backlight	VF	IF=20mA	-	3.0	3.3	V

7. Optical Characteristics

Items		Symbol	Condition	Specifications			Unit	Note
				Min.	Typ.	Max.		
Contrast Ratio		CR		-	250	-	-	
Response Time		T_F+ T_R		-	30	-	ms	
Chromaticity	Red	X_R		-	0.612	-	-	
		Y_R		-	0.329	-	-	
	Green	X_G		-	0.299	-	-	
		Y_G		-	0.567	-	-	
	Blue	X_B		-	0.144	-	-	
		Y_B		-	0.110	-	-	
	White	X_W		-	0.308	-	-	
		Y_W		-	0.325	-	-	
Viewing angle	Hor.	ϕ1(3 o'clock)	Center CR≥10	-	45	-	deg.	
		ϕ2(9 o'clock)		-	45	-		
	Ver.	θ2(12 o'clock)		-	35	-		
		θ1(6 o'clock)		-	20	-		
Brightness		**B**		-	160	-	cd/m^2	

Note 1: Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

Contrast Ratio (CR) = L63 / L0

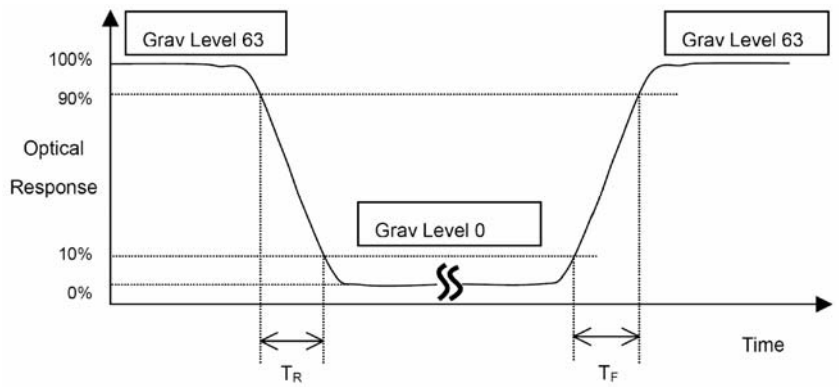
L63: Luminance of gray level 63

L0: Luminance of gray level 0

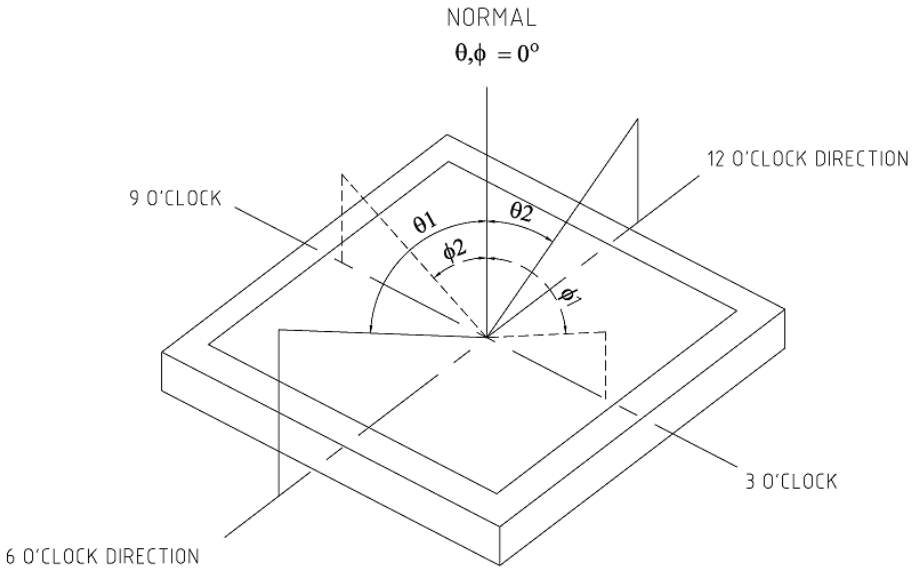
CR = CR (10)

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):



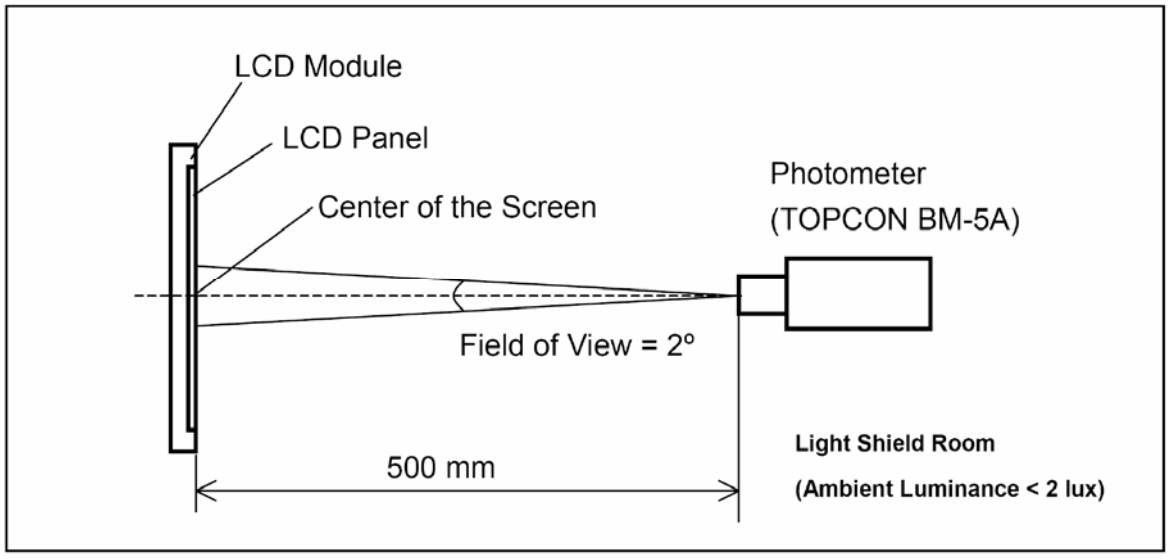
Note 3: Viewing Angle



The above "Viewing Angle" is the measuring position with Largest Contrast Ratio; not for good image quality. View Direction for good image quality is 6 O'clock. Module maker can increase the "Viewing Angle" by applying Wide View Film.

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.



8. AC Characteristics

Please refer ILI9341 datasheet.

9. Reliability Test Item

Test Item	Test Condition	Test result determinant gist
High temperature storage	80±3℃; 72H	the inspection of appearance and function character.
Low temperature storage	-30±3℃; 72H	
High temperature /humidity storage	40℃±3℃, 90%±3%RH; 72H	
High temperature operation	70±3℃; 72H	no objection of the function character; no fatal objection of the appearance.
Low temperature operation	-20±3℃; 72H	
Temperature Shock	-20±3℃, 30min→70±3℃, 30min; 10cycle	inspect the objections appearance、function & the whole structure
Vibration test	Packing, Frequency : 10-55Hz Amplitude : 1mm Each direction on X, Y axe 0.5 hours, circle 2 hours	inspect the objections appearance、function & the whole structure
Drop test	Pack products. Drop it from 80cm height to ground. Once for eache side of the carton.	

10. Suggestions for using LCD modules

10.1 Handling of LCM

1. The LCD screen is made of glass. Don't give excessive external shock, or drop from a high place.
2. If the LCD screen is damaged and the liquid crystal leaks out, do not lick and swallow. When the liquid is attach to your hand, skin, cloth etc, wash it off by using soap and water thoroughly and immediately.
3. Don't apply excessive force on the surface of the LCM.
4. If the surface is contaminated ,clean it with soft cloth. If the LCM is severely contaminated , use Isopropyl alcohol/Ethyl alcohol to clean. Other solvents may damage the polarizer . The following solvents is especially prohibited: water , ketone Aromatic solvents etc.
5. Exercise care to minimize corrosion of the electrode. Corrosion of the electrodes is accelerated by water droplets, moisture condensation or a current flow in a high-humidity environment.
6. Install the LCD Module by using the mounting holes. When mounting the LCD module make sure it is free of twisting, warping and distortion. In particular, do not forcibly pull or bend the I/O cable or the backlight cable.
7. Don’t disassemble the LCM.
8. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
    - Be sure to ground the body when handling the LCD modules.
    - Tools required for assembling, such as soldering irons, must be properly grounded.
    - To reduce the amount of static electricity generated, do not conduct assembling and other work under dry conditions.
    - The LCD module is coated with a film to protect the display surface. Exercise care when peeling off this protective film since static electricity may be generated.
9. Do not alter, modify or change the the shape of the tab on the metal frame.
10. Do not make extra holes on the printed circuit board, modify its shape or change the positions of components to be attached.
11. Do not damage or modify the pattern writing on the printed circuit board.
12. Absolutely do not modify the zebra rubber strip (conductive rubber) or heat seal connector
13. Except for soldering the interface, do not make any alterations or modifications with a soldering iron.
14. Do not drop, bend or twist LCM.

10.2 Storage

1. Store in an ambient temperature of 5 to 45 °C, and in a relative humidity of 40% to 60%. Don't expose to sunlight or fluorescent light.
2. Storage in a clean environment, free from dust, active gas, and solvent.
3. Store in antistatic container.

11. Inspection Standard

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

11.1 Sample plan and Inspection condition

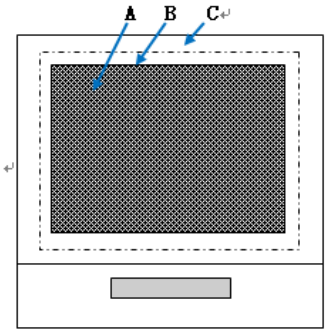
11.1.1 Sampling plan according to MIL-STD-105E , normal level 2 and based on:
Major defect: AQL 0.65; Minor defect: AQL 1.5.

11.1.2 Inspection condition

Viewing distance for cosmetic inspection is about 30cm 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.

11.2 Definition of inspection zone in LCD

Zone A: character/Digit area;
Zone B: viewing area except Zone A
(ZoneA+ZoneB=minimum Viewing area);
Zone C: Outside viewing area
(invisible area after assembly in customer's product);
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. Defects are classified as major defects and minor defects according to the degree of defectiveness defined herein.



Inspection zones in an LCD

11.3 Major defects and Minor defects

11.3.1 Major defects

A major defect is a defect that is likely to result in failure, or to reduce the usability of the product for its intended purpose.

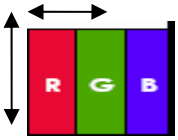
11.3.1.1 Abnormal operation: modules cannot display normally;
11.3.1.2 Line defect;
11.3.1.3 There is serious distortion or sharp burr on mechanical housing;
11.3.1.4 Glass breakage.

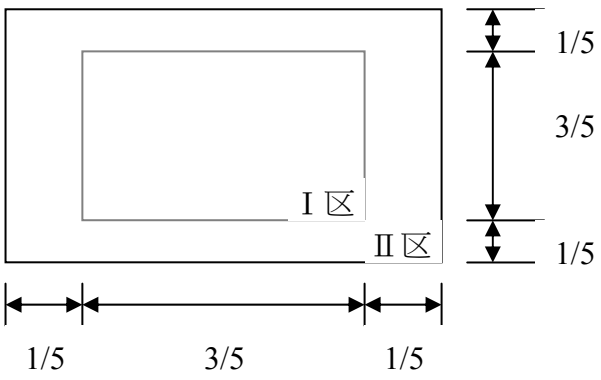
11.3.2 Minor defects:

A minor defect is a defect that is not likely to reduce the usability of the product for its intended purpose.

11.3.2.1 Dot defect:

11.3.2.1.1 Inspection pattern :
Full white, full black, red, green and blue screens;
11.3.2.1.2 Criteria: (acceptable);





Note: 1. Dot defect is defined as the defective area of the dot area is larger than 50% of the dot area . And the bright dot defect must be visible through 5% ND filter.

2. Except for the allowed numbers of adjacent dots, the distance between dot defects should be more than 3mm apart.

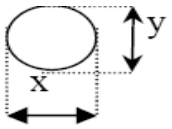
11.3.2.1.3 The definitions of the inner display area and outer display area.

11.4 Inspection standards table:

11.4.1 Major defect

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

11.4.2 Cosmetic Defect (spot defect)

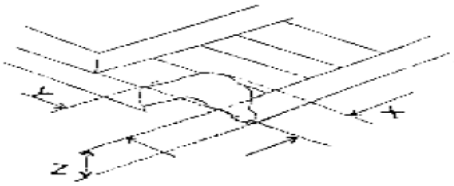
<table>
<tr><th>Item No</th><th>Itemsto be</th><th>Inspection Standard</th><th>Classification of defects</th></tr>
<tr><td rowspan="2">11.4.2.1</td><td rowspan="2">Clear Spots
Black and white
Spot defect
Pinhole,
Foreign Particle,
polarizer Dirt</td><td>For dark/white spot, sizeΦis defined as Φ=(x +y)/2  </td><td>Minor</td></tr>
<tr><td>
<table>
<tr><th>Zone
Size(mm)</th><th colspan="3">Acceptable Qty</th></tr>
<tr><th></th><th>A</th><th>B</th><th>C</th></tr>
<tr><td>Φ≤0.1</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>0.10＜Φ≤0.2</td><td colspan="2">3 (distance≥10)</td></tr>
<tr><td>0.2＜Φ≤0.25</td><td colspan="2">1</td></tr>
<tr><td>Φ＞0.25</td><td colspan="2">0</td></tr>
</table>
</td><td>Minor</td></tr>
<tr><td>11.4.2.2</td><td>Clear Spots
Polarizer Accidented</td><td>
<table>
<tr><th>Zone
Size(mm)</th><th colspan="3">Acceptable Qty</th></tr>
<tr><th></th><th>A</th><th>B</th><th>C</th></tr>
<tr><td>Φ≤0.2</td><td colspan="2">Ignore</td><td rowspan="3">Ignore</td></tr>
<tr><td>0.20＜Φ≤0.5</td><td colspan="2">2(distance≥10)</td></tr>
<tr><td>Φ＞0.5</td><td colspan="2">0</td></tr>
</table>
</td><td>Minor</td></tr>
<tr><td>11.4.2.3</td><td>Dim Spots
Circle shaped and dim edged defects</td><td>
<table>
<tr><th>Zone
Size(mm)</th><th colspan="3">Acceptable Qty</th></tr>
<tr><th></th><th>A</th><th>B</th><th>C</th></tr>
<tr><td>Φ≤0.1</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>0.10＜Φ≤0.2</td><td colspan="2">2(distance≥10)</td></tr>
<tr><td>0.2＜Φ≤0.3</td><td colspan="2">1</td></tr>
<tr><td>Φ＞0.3</td><td colspan="2">0</td></tr>
</table>
</td><td>Minor</td></tr>
</table>

<table>
<tr>
<td>11.4.2.4</td>
<td>Dot defect</td>
<td>dot =sub-pixel
<table>
<tr><td></td><td colspan="2">Acceptable Qty</td></tr>
<tr><td></td><td>I</td><td>II</td></tr>
<tr><td>Bright dot</td><td>0</td><td>2</td></tr>
<tr><td>Dark dot</td><td>1</td><td>2</td></tr>
</table>
The distance of two point >5mm</td>
<td>Minor</td>
</tr>
</table>

11.4.3 Cosmetic Defect (linear defect)

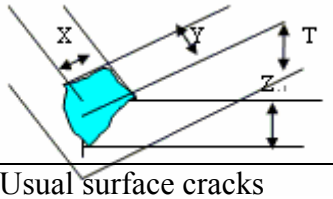
<table>
<tr><th>Item No</th><th>Items to be</th><th>Inspection Standard</th><th>Classification of defects</th></tr>
<tr>
<td>11.4.3.1</td>
<td>Line defect
Black line,
White line,
Foreign material on polarizer</td>
<td>
<table>
<tr><td colspan="2">Size(mm)</td><td colspan="3">Acceptable Qty</td></tr>
<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="4">Ignore</td></tr>
<tr><td>L≤3.0</td><td>0.03＜W≤0.05</td><td colspan="2">2</td></tr>
<tr><td>L≤2.0</td><td>0.05＜W≤0.08</td><td colspan="2">2</td></tr>
<tr><td></td><td>W＞0.08</td><td colspan="2">Define as spot defect</td></tr>
</table>
</td>
<td>Minor</td>
</tr>
<tr>
<td>11.4.3.2</td>
<td>Dim line defect
Polarizer &BL scratch
TP film scratch</td>
<td>If the scratch can be seen after mobile phone cover assembling or in the operating condition, judge by the line defect of 11.4.3.1. If the scratch can be seen only in non-operating condition or some special angle, judge by the following.
<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="4">Ignore</td></tr>
<tr><td>L≤3.0</td><td>0.03＜W≤0.05</td><td colspan="2">2</td></tr>
<tr><td>L≤2.0</td><td>0.05＜W≤0.08</td><td colspan="2">2</td></tr>
<tr><td></td><td>W＞0.08</td><td colspan="2">Define as spot defect</td></tr>
</table>
</td>
<td>Minor</td>
</tr>
<tr>
<td>11.4.3.3</td>
<td>Polarize
Air
bubble</td>
<td>Air bubbles between glass & polarizer
<table>
<tr><td></td><td colspan="2">Acceptable Qty</td><td></td></tr>
<tr><td></td><td>A</td><td>B</td><td>C</td></tr>
<tr><td>Φ≤0.2</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>0.20＜Φ≤0.4</td><td colspan="2">2(distance≥10)</td></tr>
<tr><td>0.4＜Φ≤0.6</td><td colspan="2">1</td></tr>
<tr><td>Φ＞0.6</td><td colspan="2">0</td></tr>
</table>
</td>
<td>Minor</td>
</tr>
</table>

11.4.4 Chipping Defect

<table>
<tr><th>Item No</th><th>Items to be</th><th>Inspection Standard</th><th>Classification of defects</th></tr>
<tr>
<td>11.4.4.1</td>
<td>Glass defect</td>
<td>Chips on corner
A:LCD Glass defect
 
<table>
<tr><td>X</td><td>Y</td><td>Z</td></tr>
<tr><td>≤0.2</td><td>≤S</td><td>Disregard</td></tr>
</table>
Notes: S=contact pad length</td>
<td>Minor</td>
</tr>
</table>

Chips on the corner of terminal shall not be allowed to extend into the ITO pad or expose perimeter seal.

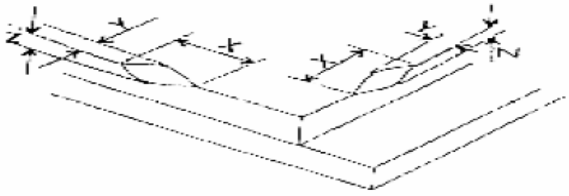
B:TP Glass defect



X	Y	Z
≤3.0	≤3.0	Disregard

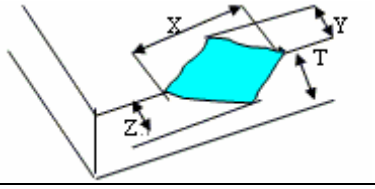
Usual surface cracks

A:LCD Glass defect



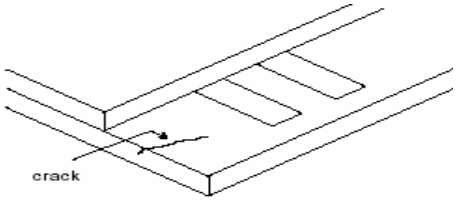
X	Y	Z
≤3.0	<Inner border line of the seal	Disregard

B:TP Glass defect



X	Y	Z
≤6.0	≤2.0	Disregard

Crack: Cracks tend to break are not allowed.



11.4.5 Parts Defect

Item No	Items to be	Inspection Standard	Classification of defects
11.4.5.1	Parts contra position	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
11.4.5.2	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.	Major
11.4.5.3	Backlight elements	1 Illumination source flickers when lit. 2 Spots or scratches that appear when lit must be judged using LCD spot, lines and contamination standards. 3 Backlight doesn't light or color is wrong	Major
11.4.5.4	Soldering	1 No unmelted solder paste may be present on the FPC 2 No cold solder joints, missing solder connections, oxidation or icicle. 3 No short circuits in components on FPC	Major

11. Packing

Packing Method

TBD

Appendent 1

TFT LCD MODULE NUMBER NOTATION:

K 240 Q C N N - N 14 □

(1) (2) (3) (4)(5) (6) (7) (8) (9)

*(1) Module type
"K": KENTEC standard module;
Others for customer made or special module.

*(2) Display size (diagonal)
"240": 2.4 inch

*(3) Display resolution
"C": QCIF
"Q": QVGA / WQVGA
"H": HVGA
"V": VGA / WVGA
"S": SVGA
"X": XGA / WXGA

*(4) Display interface type
"C": CPU/MPU (i8080, 6800 ect.)
"S": SPI
"R": RGB(TTL, Sync/DE mode)
"L": LVDS
"M": MIPI

*(5) Display mode
"N": TN, transmissive
"I": IPS
"R": Transflective
"W": Wide view

*(6) Backlight type
"N": Normal brightness
"H": High brightness
"S": Special backlight

*(7) Touch screen type
"N": Non-touch
"R": Resistive touch
"C": Capacitive touch
"S": Special touch type

*(8) Module version

*(9) Other special characteristic