K200CCNN-N13

Product

Standard LCD Module
176 x RGB x 220 Dots
2.0" 65K colors TFT display
Wide temperature
With white LED backlight

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1. Document revision history :

DOCUMENT REVISION	DATE	DESCRIPTION	PREPARED BY	APPROVED BY
01	2014.0.10	First Release.	XW Lee	

2. General Description

- 2.0"(diagonal), 176 x RGB x 220 dots, 65K colors, Normal white TN, TFT LCD module.
- Viewing Direction: 12 o'clock.
- LCD controller/driver: ILI9225G
- MPU 8-bits interface
- With internal voltage booster.
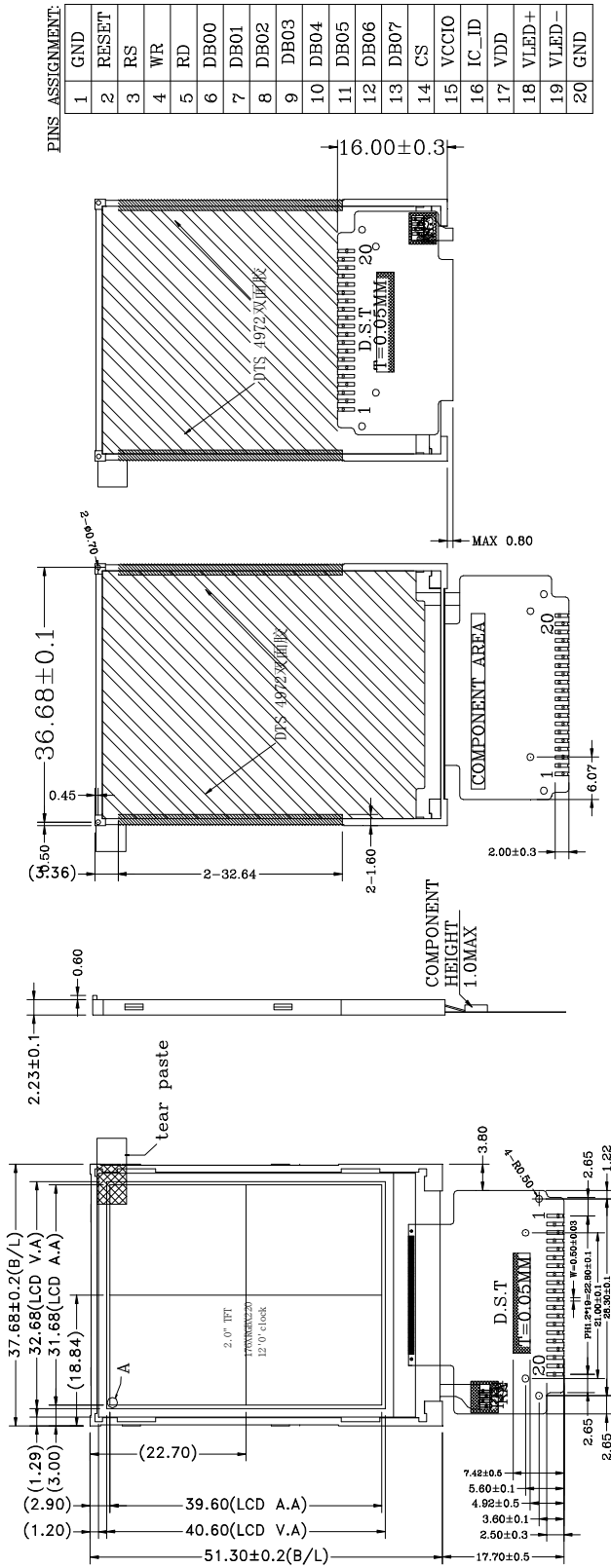- Logic voltage: 2.8V (typ.).

3. Mechanical Specifications

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

Parameter		Specifications	Unit
Outline dimensions		37.68(W) x 51.3(H) x 2.23(D) (Exclude FPC, cables of backlight)	mm
Color TFT 176xRGBx220	View area	32.68(W) x 40.6(H)	mm
	TP active area	--	mm
	LCD active area	31.68(W) x 39.6(H)	mm
	Display format	176 x RGB x 220	dots
	Color configuration	RGB Side-stripes	-
	Dot size	0. 17 (W) x 0.17(RGB)	mm
Weight		TBD	grams

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REV	Description	Date
01	First Issue	2014-01-09

PINS ASSIGNMENT:

1	GND
2	RESET
3	RS
4	WR
5	RD
6	DB00
7	DB01
8	DB02
9	DB03
10	DB04
11	DB05
12	DB06
13	DB07
14	CS
15	VCCIO
16	IC_ID
17	VDD
18	VLED+
19	VLED–
20	GND

16.00±0.3

MAX 0.80

36.68±0.1

COMPONENT AREA

2.00±0.3

COMPONENT HEIGHT 1.0MAX

tear paste

2.23±0.1

37.68±0.2(B/L)
32.68(LCD V.A)
31.68(LCD A.A)

2.0" TFT

(22.70)

(2.90)

39.60(LCD A.A)

(1.20)

40.60(LCD V.A)

51.30±0.2(B/L)

17.70±0.5

7.42±0.5
5.60±0.1
4.92±0.5
3.60±0.1
2.50±0.3

D.S.T T=0.05MM

Note:
1. Display type: 2.0" TFT LCD, 65K COLOR
2. Driver: COG ILI9225G
3. Operating Temperature: -20°C ~ 70°C
4. Storage Temperature: -30°C ~ 80°C
5. Backlight: 3 Chips LED Parallel

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SCALE:	FIT
SHEET:	1 OF 1
GENERAL TOL: ± 0.2	UNIT mm
PROJECTION	

PART TYP: Spec Sheet

MODEL NUMBER: K200CCNN

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APPROVALS	DATE
APP:	
CHK:	
DWN: XW Lee	

DO NOT SCALE THIS DRAWING.

Figure 1: Outline Drawing

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4. Interface signals

Pin No.	Symbol	Description
1	GND	Ground (0V)
2	RESET	Reset input
3	RS	Register/Data select input
4	WR	Write data signal
5	RD	Read data signal
6	DB0	Bi-directional data bus.
7	DB1	
8	DB2	
9	DB3	
10	DB4	
11	DB5	
12	DB6	
13	DB7	
14	CS	Chip select signal
15	VCCIO	Power supply for IO (1.65V~3.3V)
16	IC_ID	No connection
17	VDD	Power supply (2.5V~3.3V)
18	LED+	Anode of LED backlight
19	LED-	Cathode of LED backlight
20	GND	Ground (0V)

5. Absolute Maximum Ratings

5.1   Electrical Maximum Ratings – for IC Only

Parameter	Symbol	Min.	Max.	Unit	Note
Supply voltage	VDD	-0.3	+4.3	V	1
Input voltage	Vin	-0.3	VDD+0.3	V	

Note:

1. VDD, 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 $\leq$ 40°C < 50% RH for 40°C < Ta $\leq$ Maximum operating temperature				No condensation

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

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6. Electrical Specifications

At Ta = 25 °C, VDD= 2.8V, GND=0V.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply voltage (IO)	VCCIO-GND		1.65	2.8	3.3	V
Supply voltage (logic)	VDD-GND		2.5	2.8	3.3	V
Input signal voltage	VIH		**0.8VDD**	-	VDD	V
	VIL		**GND**	-	0.2VDD	V
Supply current (Logic & LCD)	IDD	VDD=2.8V	-	-	5	mA
LED Backlight Supply current	ILED	Forward voltage VLED≈3.2V @ 15mA	-	45	60	mA

Note (1): LED backlight required current constant power supply. LED circuit was 3 LEDs in parallel.
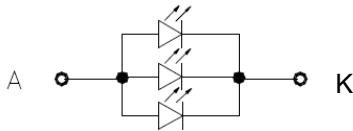
7. Optical Characteristics

Items		Symbol	Condition	Specifications			Unit	
				Min.	Typ.	Max.		
Contrast Ratio		CR		400	500	-	-	Note
Response Time		$T_R + T_F$		-	25	30	ms	
Viewing angle	Hor.	φ1(3 o'clock)	Center CR≥10	-	45	-	deg.	
		φ2(9 o'clock)		-	45	-		
	Ver.	θ2(12 o'clock)		-	45	-		
		θ1(6 o'clock)		-	25	-		
Brightness		**YL**		-	180	-	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
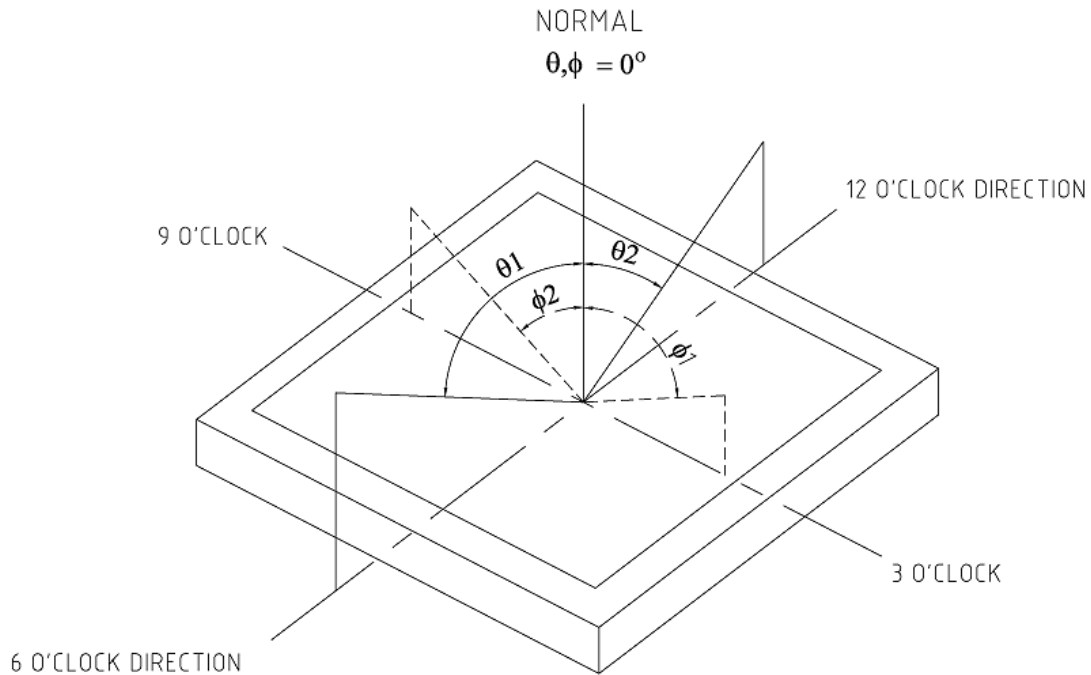
CR = CR (10)

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):
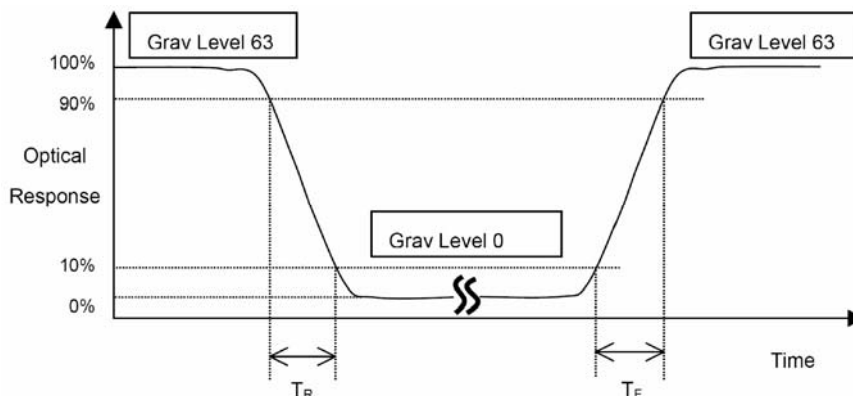
Note 3: Viewing Angle

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.

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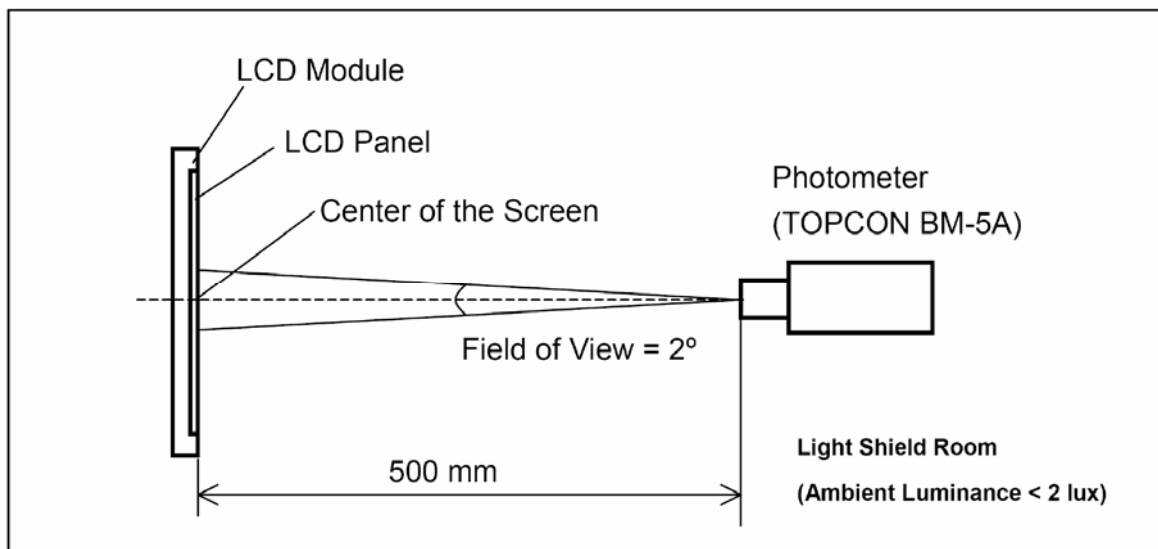
8. AC Characteristics

Please refer ILI9225G datasheet.

9. Reliability Test Item

Test Item	Test Condition	Test result determinant gist
High temperature storage	80±3℃; 120H	the inspection of appearance and function character.
Low temperature storage	-30±3℃; 120H	
High temperature /humidity storage	40℃±3℃,90%±3%RH; 120H	
High temperature operation	70±3℃; 120H	no objection of the function character; no fatal objection of the appearance.
Low temperature operation	-20±3℃; 120H	
Temperature Shock	-20±3℃, 30min→70±3℃, 30min; 10cycle	Non-operation
Electrostatic Discharge	Contact ±4kV, Class B Air ±8kV, Class B	
Image sticking	25℃, 4H	
Vibration	Frequency range : 10~55Hz Stoke : 1.5mm Sweep : 10~55~10Hz 2 Hours for each direction of X,Y,Z (total 6 Hours)	Non-operation JIS C7021, A-10 Condiction A : 15 minutes
Mechanical shock	100G, 6ms, ±X, ±Y, ±Z, 3 times for each direction	Non-operation JIS C7021, A-10 Condiction C
Vibration (with carton)	Random vibration : $0.015G^2$/Hz from 2~200Hz -6dB/Octave from 200~500Hz	ICE 68-34
Drop (with carton)	Height : 60cm 1 corner, 3 edges, 6 surfaces	
Pressure	5 kg, 5 sec	

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 Sample plan

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
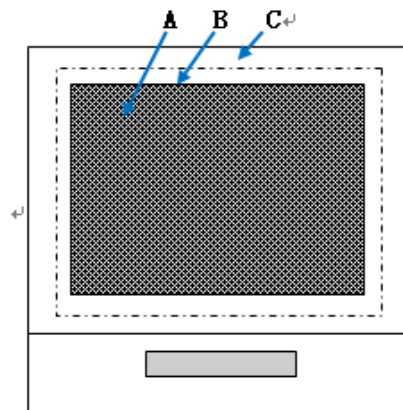
Inspection zones in an LCD

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.

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;

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11.3.1.2 Line defect;

11.3.1.3 There is serious distortion or sharp burr on mechanical housing;
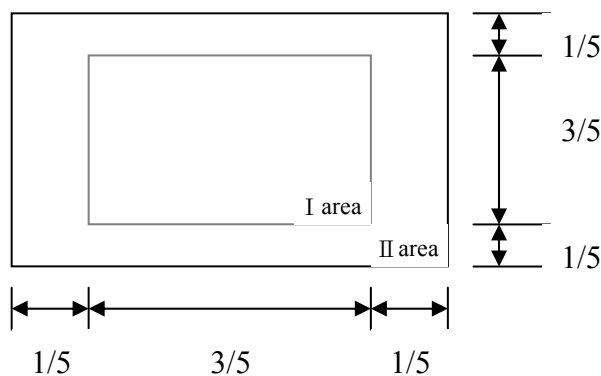
11.3.1.4 Glass breakage.

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.
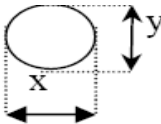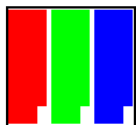
11.4 Inspection standards table:

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%	

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11.4.2 Cosmetic Defect (spot defect)

Item No	Items to be	Inspection Standard	Classification of defects
11.4.2.1	**Circular defect** Black and white Spot defect Pinhole, Foreign Particle, polarizer Dirt	For dark/white spot, size Φ is defined as $\Phi=(x+y)/2$	Minor

Zone Size(mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.1$	Ignore		
$0.10 < \Phi \leq 0.2$	2		Ignore
$\Phi > 0.20$	0		

(Classification of defects: Minor)

Item No	Items to be	Inspection Standard	Classification of defects
11.4.2.2	**Dot defect**	dot = sub-pixel Pixel and sub-pixel (Refer to below illustration) A pixel = (R sub-pixel + G sub-pixel + B sub-pixel)	Minor

	Acceptable Qty	
	A	B
Bright dot	1	
Dark dot	2	

The distance of two defect dot >5mm

11.4.3 Cosmetic Defect (linear defect)

Item No	Items to be	Inspection Standard	Classification of defects
11.4.3.1	**Line defect** Black line, White line, Foreign material on polarizer	(see table below)	Minor

Size(mm)		Acceptable Qty		
L(Length)	W(Width)	zone		
		A	B	C
Ignore	W≤0.03	Ignore		
L≤2.0	0.03<W≤0.05	2		Ignore
	W>0.05	Define as Circular defect		

11.4.4 Parts Defect

| Item No	Items to be	Inspection Standard	Classification of defects
11.4.4.1	**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

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11.4.4.2	**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
11.4.4.3	**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
11.4.4.4	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
   T.B.D.

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Appendent 1

TFT LCD MODULE NUMBER NOTATION:

K 200 C C N N - N 13 □
| | | | | | | | | |
 (1) (2) (3) (4)(5) (6) (7) (8) (9)
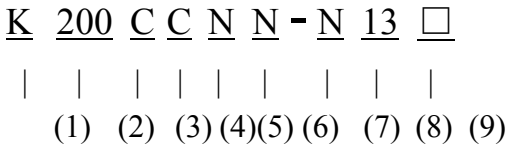
*(1) Module type
    "K": KENTEC standard module;
    Others for customer made or special module.

*(2) Display size (diagonal)
    "200": 2.0 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": MCU/MPU, 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