SPECIFICATION

PV024002YP40C-R

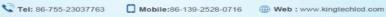☐ Preliminary Specification

☐ Final Specification

Kingtech:

Made By:
Checked By:
Approved By:
Quality:
Date:
Note:

Customer:

Approved By:
Date:
Note:

Records of Revision

DATE	REF.PAGE PARAGRAPH DRAWING No.	REVISED No.	SUMMARY	REMARK
2016-12-16		V01	First Issue	
2017-05-03		V02	Add Color Coordinate	
2017-05-12		V03	Add Supply Current(LCM) Modify Contrast Ratio	
2017-05-15		V04	Modify Luminance (max)	
2017-05-16		V05	Add the min/max values of contrast ratio Modify color coordinate tolerance($\pm$0.04)	
2017-05-18		V06	Modify color coordinate tolerance(white Y $\pm$0.02)	
2017-07-13		V07	Update drawing	
2017-07-25		V08	Update drawing	
2017-08-23		V09	Update drawing	
2017-08-30		V10	Update drawing	

Contents

1. General Specification

Item	Contents	Unit
LCD TYPE	TFT/TRANSMISSIVE	
MODULE SIZE (W*H*T)	42.72x60.26x3.85	MM
ACTIVE SIZE (W*H)	36.72*48.96	MM
PIXEL PITCH (W*H)	0.153*0.153	MM
NUMBER OF DOTS	240*320	
DIVER IC	ST7789VI	
INTERFACE TYPE	MCU	
TOP POLARIZER TYPE	ANTI-GLARE	
RECOMMEND VIEWING DIRECTION	6	O'CLOCK
GRAY SCALE INVERSION DIRECTION	12	O'CLOCK
BACKLIGHT TYPE	5-DIES WHITE LED	
TOUCH PANEL TYPE	RESISTIVE	

2. Mechanical Drawing

PIN DESCRIPTION

PIN NO	SYMBOL
1	GND
2	YD
3	XL
4	YU
5	XR
6	NC
7	VDD
8	IOVDD
9	NC
10	/CS
11	D/C
12	/WR
13	/RD
14	DB0
15	DB1
16	DB2
17	DB3
18	DB4
19	DB5
20	DB6
21	DB7
22	DB8
23	DB9
24	DB10
25	DB11
26	DB12
27	DB13
28	DB14
29	DB15
30	RES
31	IM0
32	NC
33	GND
34	LED_K1
35	LED_K2
36	LED_K3
37	LED_K4
38	LED_A
39	GND
40	NC

Display Type	TFT
	TRANSMISSIVE,POSITIVE
Optimum Viewing Direction	6 O'CLOCK
Upper Ploarizer Type	Anti-Glare
LCD Driver IC	ST7789vi
Operating Voltage	VCI=3.3V; IOVCC=3.3V
Operation Temperature	-20℃ TO 70℃
Storage Temperature	-30℃ TO 80℃
Interface	MCU
Backlight	5-CHIP WHITE LED
Surface luminance	800cd/m2 (TYP.)640cd/m2 (MIN.)
White X/Y	

DRAWING NO. **PV024002YP40C-R**

UNIT	mm	SCALE	FIT
3rd Angle		SHEET 1 OF 1	

Kingtech Group Co.,Ltd

KINGTECH PV024002YP40C-R WW/YY

fpc 弯折示意图 （展开出货）

LED CIRCUIT DIAGRAM 2.8V~3.4V@100mA
LEDA LEDK1 LEDK2 LEDK3 LEDK4

27.7±0.5
41.22±0.2
0.75
0.55
0.5±0.1
2.5±0.3
2.43
P0.5*39=19.5±0.1
W=0.35 P=0.5
3-Ø1±0.1
0.5
3.85±0.3
1.3±0.1
0.3±0.05
0.153
REAR / FRONT
REMOVE PAPER
RED STIFFENER
STIFFENER(P)
CONTACT SIDE

PIN OUT

	PIN	OUT	
	4	YU	
	3	XL	
	2	YD	
	5	XR	

Pixtel Detail
R G B R
R G B R
0.153

2.4" TFT 240*(RGB)*320
VIEWING DIRECTION

42.72±0.2(OUT LINE)
42.32±0.2(TP OD)
39.32(V.A BZ)
38.92±0.2(POL)
38.32(TP V.A)
37.52(TP A.A)
37.01(OPEN WINDOW)
36.72(LCD A.A)
(3.02)
2.82
(2.85)
(2.62)
(2.37)
(1.92)
(1.72)
0.2±0.2
(1.7)
(1.9)
(2.2)
(2.6)
0.2±0.2

48.96(LCD A.A)
49.36(OPEN WINDOW)
49.76(TP A.A)
50.26(TP V.A)
51.16±0.2(POL)
51.56(V.A BZ)
59.26±0.2(TP OD)
60.26±0.2(OUT LINE)

39
20.5±0.1
4±0.5
(11.11)
(2.2)
(13.2)
30±0.5

NOTES:
1. General Tolerance: ±0.2
2. ( )reference dimension.
3. Recommended Case Open Area Should Be Less Than Module V.A
4. ROHS MUST BE COMPLIANT

The FPC length of TP is 15mm

VER.	SYMBOL	AMENDMENT	SIGN	DATE		
V04				2017.08.30	DRAWN	ME.CHECKED
V03				2017.08.16	EE.CHECKED	APPROVED
V02				2017.07.18		
V01				2017.07.12	CUSTOMER'S APPROVAL	
V00		First issue		2016.12.16		

3. Block Diagram

VDD
IOVDD
IM0
/CS
D/C
/WR
/RD
/RESET
GND

"SITRONIX"
ST7789VI
(COG)
LCD
Controller/
Driver or
Equivalent

DB[00:15]

16 BIT

Gate:320

2.4″
TFT LCD Panel
240(RGB)*320

Source:240*RGB

XR
YU
XL
YD

TOUCH PANEL

LEDA
LEDK1_K4

BL Circuit(5-Dies LED)

4. Interface Pin Function

Pin No.	Symbol	Description
1	GND	Power ground
2	YD	TP PIN
3	XL	TP PIN
4	YU	TP PIN
5	XR	TP PIN
6	NC	No connect
7	VDD	Supply voltage for analog
8	IOVDD	Supply voltage for logic
9	NC	No connect
10	/CS	Chip select input pin ("Low" enable)
11	D/C	Display data/command selection pin in parallel interface
12	/WR	Write data signal
13	/RD	Read data signal
14	DB0	Data bus
15	DB1	Data bus
16	DB2	Data bus
17	DB3	Data bus
18	DB4	Data bus
19	DB5	Data bus
20	DB6	Data bus
21	DB7	Data bus
22	DB8	Data bus
23	DB9	Data bus
24	DB10	Data bus
25	DB11	Data bus
26	DB12	Data bus
27	DB13	Data bus
28	DB14	Data bus
29	DB15	Data bus
30	RES	Reset pin
31	IM0	When IM0=Low,16 bit is selected;When IM0=High,8 bit is selected.
32	NC	No connect
33	GND	Power ground
34	LED_K1	Cathode of LED backlight
35	LED_K2	Cathode of LED backlight
36	LED_K3	Cathode of LED backlight
37	LED_K4	Cathode of LED backlight
38	LEDA	Anode of LED backlight
39	GND	Power ground
40	NC	No connect

5. Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply voltage for analog	VDD	-0.3	4.6	V
Supply voltage for logic	IOVDD	-0.3	4.6	V
Supply current (One LED)	I_{LED}		30	mA
Operating temperature	T_{OP}	-20	+70	°C
Storage temperature	T_{ST}	-30	+80	°C

Note : The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

6. Electrical Characteristics

6.1 Input Power

Item	Symbol	Min	Typ.	Max	Unit	Applicable terminal
Supply Voltage for Analog	VDD	2.4	3.3	3.5	V	
Supply Voltage for Logic	IOVDD	1.65	1.8	3.3	V	
Input Voltage	V_{IL}	GND	-	0.3IOVDD	V	
	V_{IH}	0.8 IOVDD	-	IOVDD		
Input leakage Current	I_{LKG}	-1	-	1	μA	
Supply Current	IDD	5.2	6.4	7.2	mA	

6.2 Backlight Driving Conditions

Item	Symbol	Value			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED Backlight	V_F	2.7	3.05	3.4	V	I_L =100mA
Current for LED Backlight	I_L	75	100	125	mA	
Power Consumption	P		0.305		W	
LED Life Time		30,000	50,000		Hr	Note

Note: Brightness to be decreased to 50% of the initial value at ambient temperature TA=25℃

7. Optical Characteristics

ITEM		SYMBOL	CONDITIONS	SPECIFICATIONS			UNIT	NOTE
				MIN	TYP.	MAX		
Luminance		L	I_L =100mA	640	800	1120	Cd/m^2	
Contrast Ratio		CR	θ=0°	250	528	1000		
Response Time		T_{ON}	25℃		30		ms	
		T_{OFF}						
CIE Color Coordinate	Red	X_R	Viewing normal angle	0.543	0.583	0.623		
		Y_R		0.309	0.349	0.389		
	Green	X_G		0.310	0.350	0.390		
		Y_G		0.538	0.578	0.618		
	Blue	X_B		0.104	0.144	0.184		
		Y_B		0.042	0.082	0.122		
	White	X_W		0.263	0.303	0.343		
		Y_W		0.295	0.315	0.335		
Viewing Angle	Hor.	θ_{X+}	CR≥10		45		Degree	Gray scale inversion
		θ_{X-}			45			
	Ver.	θ_{Y+}			45			
		θ_{Y-}			20			
Uniformity		Un		80			%	

Note 1: Definition of Viewing Angle θx and θy:

Note 2: Definition of contrast ratio CR:

$$CR = \frac{\text{Luminance of white state}}{\text{Luminance of black state}}$$
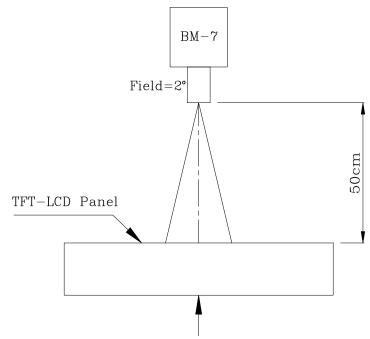
Note 3: Definition of Response Time(Tr,Tf)
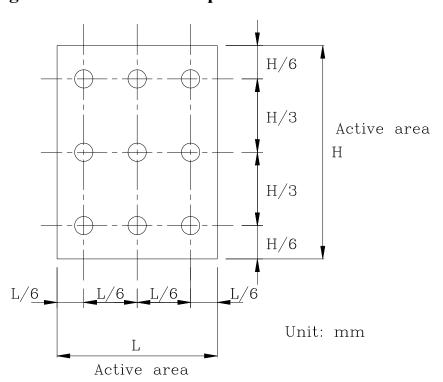
Note 4: Definition of Luminance

①**The Brightness Test Equipment Setup**

Field=2° (As measuring "black" image, field=2° is the best testing condition)

BM-7

Field=2°

50cm

TFT-LCD Panel

The center of the screen

②**The Brightness Test Point Setup**

H/6

H/3

H/3

H/6

Active area
H

L/6 L/6 L/6 L/6

L

Active area

Unit: mm

8. Touch Panel Characteristics

Item	Min	Typ	Max	Unit
Linearity	-	-	1.5	%
Circuit Resistance X-Axis	200	-	600	Ω
Circuit Resistance Y-Axis	250	-	900	Ω
Insulation Resistance	20	-	-	MΩ
Operating Voltage	-	-	5	V
Chattering	-	-	15	ms
Activation Force	100	-	-	g
Pen Writing Durability	100,000	-	-	Characters
Pitting Durability	1,000,000	-	-	Touches
Surface Hardness	3	-	-	H

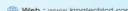# 9. Timing Characteristics

9.1 MCU interface characteristic

Figure 1 Parallel Interface Timing Characteristics (8080-Series MCU Interface)

VDDI=1.65 to 3.3V, VDD=2.4 to 3.3V, AGND=DGND=0V, Ta=25℃

Signal	Symbol	Parameter	Min	Max	Unit	Description
D/CX	T_AST	Address setup time	0		ns	-
	T_AHT	Address hold time (Write/Read)	10		ns	
CSX	T_CHW	Chip select "H" pulse width	0		ns	-
	T_CS	Chip select setup time (Write)	15		ns	
	T_RCS	Chip select setup time (Read ID)	45		ns	
	T_RCSFM	Chip select setup time (Read FM)	355		ns	
	T_CSF	Chip select wait time (Write/Read)	10		ns	
	T_CSH	Chip select hold time	10		ns	
WRX	T_WC	Write cycle	66		ns	
	T_WRH	Control pulse "H" duration	15		ns	
	T_WRL	Control pulse "L" duration	15		ns	
RDX (ID)	T_RC	Read cycle (ID)	160		ns	When read ID data
	T_RDH	Control pulse "H" duration (ID)	90		ns	
	T_RDL	Control pulse "L" duration (ID)	45		ns	
RDX (FM)	T_RCFM	Read cycle (FM)	450		ns	When read from frame memory
	T_RDHFM	Control pulse "H" duration (FM)	90		ns	
	T_RDLFM	Control pulse "L" duration (FM)	355		ns	
D[17:0]	T_DST	Data setup time	10		ns	For CL=30pF

T_DHT	Data hold time	10		ns	
T_RAT	Read access time (ID)		40	ns	
T_RATFM	Read access time (FM)		340	ns	
T_ODH	Output disable time	20	80	ns	

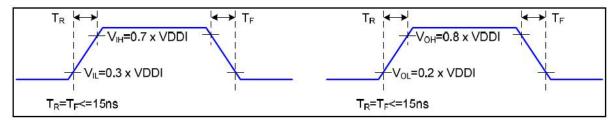**Table 4 8080 Parallel Interface Characteristics**
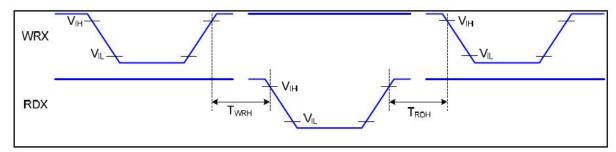

Figure 2 Rising and Falling Timing for I/O Signal

Figure 3 Write-to-Read and Read-to-Write Timing

Note: The rising time and falling time (Tr, Tf) of input signal and fall time are specified at 15 ns or less. Logic high and low levels are specified as 30% and 70% of VDDI for Input signals.
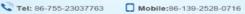
10. Standard Specification for Reliability

10.1 Standard Specification for Reliability of LCD Module

No.	Item	Description	Remarks
01	High temperature operation	The sample should be allowed to stand at 70℃ for 240 hours under driving condition and then returning it to normal temperature condition, and allowing it stand for 2 hours.	Note 1 IEC60068-2-2, GB2423.2-89
02	Low temperature operation	The sample should be allowed to stand at -20℃ for 240 hours under driving condition and then returning it to normal temperature condition, and allowing it stand for 2 hours.	Note2 IEC60068-2-1 GB2423.1-89
03	High temperature storage	The sample should be allowed to stand at 80℃ for 240 hours under no-load condition, and then returning it to normal temperature condition, and allowing it stand for 2 hours.	IEC60068-2-2 GB2423.2-89
04	Low temperature storage	The sample should be allowed to stand at -30℃ for 240 hours under no-load condition, then returning it to normal temperature condition, and allowing it stand for 2 hours.	IEC60068-2-1 GB/T2423.1-89
05	Moisture storage	The sample should be allowed to stand at 60℃,90%RH MAX for 240 hours under no-load condition, then taking it out and drying it at normal temperature for 2 hours.	IEC60068-2-1 GB/T2423.3-2006
06	Thermal shock storage	The sample should be allowed to stand the following 10 cycles : -30℃ for 30 minutes → normal temperature for 5 minutes → +80℃ for 30 minutes → normal temperature for 5 minutes, as one cycle.	Start with cold temperature,end with high temperature IEC60068-2-14, GB2423.22-87
07	Packing vibration	Frequency range : 10Hz ~ 55Hz Amplitude of vibration : 1.5mm　Sweep time: 12 min X,Y,Z 2 hours for each direction.	IEC61000-2-6 GB/T2423.5-1995
08	Packing drop test	According to ASTM-D-5327.	IEC60068-2-32 GB/T2423.8-1995
09	Electrical Static Discharge	Air: ±4KV 150pF/330Ω 5 times Contact: ±2KV 150pF/330Ω 5 time	IEC61000-4-2 GB/T17626.2-1998

Note:1.Ts is the temperature of panel's surface.
2.Ta is the ambient temperature of sample.
3.Sample size for each test item is 3~5pcs.

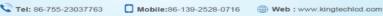## 10.2 Testing Conditions and Inspection Criteria

For the final test, the testing sample must be stored at room temperature for 24 hours. After the tests listed in Table 9.2, standard specifications for reliability will be executed in order to ensure stability.

No.	Item	Test Model	In section Criteria
01	Current Consumption	Refer To Specification	The current consumption should conform to the product specification.
02	Contrast	Refer To Specification	After the tests have been executed, the contrast must be larger than half of its initial value prior to the tests.
03	Appearance	Visual inspection	Defect free.

10.3 MTBF

MTBF	Functions, performance, appearance, etc. shall be free from remarkable deterioration within 50,000 hours under ordinary operating and storage conditions room temperature (25±5℃), normal humidity (50±10% RH), and in area not exposed to direct sun light.

11. Specification of Quality Assurance

This standard of Quality Assurance confirms to the quality of LCD module products supplied by Kingtech Group Co.,Ltd.

11.1 Quality Test

Before delivering, the supplier should conduct the following tests to confirm the quality of products.

- Electrical-Optical Characteristics: According to the individual specification to test the product.
- Appearance Characteristics: According to the individual specification to test the product.
- Reliability Characteristics: According to the definition of reliability on the specification for testing products.

11.2 Delivery Test

Before delivering, the supplier should conduct the delivery test.

- Test method: According to MIL-STD105E.General Inspection Level Ⅱ take a single Time.
- The defects classify of AQL as following:
  Major defect: AQL = 0.65
  Minor defect: AQL = 2.5
  Total defects: AQL = 2.5
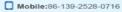
11.3 Non-conforming Analysis & Deal With Manners

11.3.1 Non-conforming Analysis

- Purchaser should provide the data detail of non-conforming sample and the non-conforming.
- After receiving the data detail from purchaser, the analysis of non-conforming should be finished within two weeks.
- If the analysis can't be finished on time, supplier must notice purchaser 3 days in advance.

11.3.2 Disposition of non-conforming

- If any product defect be found during assembling, supplier must change the good for every defect after confirmation.
- Both supplier and customer should analyze the reason and discuss the disposition of non-conforming when the reason of nonconforming is not sure.
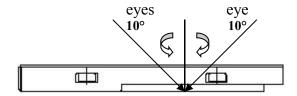
11.4 Agreement items

   Both parties should negotiate together when the following problems happen.
- There is any problem of standard of quality assurance, and both sides should agree that it must be modified.
- There is any argument item which does not record in the standard of quality assurance.
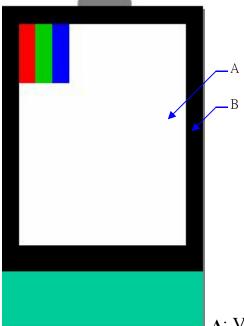- Any other special problem.

11.5 Standard of The Product Appearance Test

11.5.1 Manner of appearance test

- The test must be under 20W × 2 or 40W fluorescent light, and the distance of view must be at 30±5cm.
- When test the model of transmissive product must add the reflective plate.
- The test direction is base on around 10° of vertical line.
- Temperature: 25±5℃   Humidity: 60±10%RH

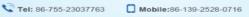- Definition of area:

A: Viewing area B: Outside viewing area

11.5.2 Basic principle

● When the standard can not be described, AQL will be applied.
● The sample of the lowest acceptable quality level must be negotiated by both supplier and customer when any dispute happened.
● New item must be added on time when it is necessary.

11.6 Inspection Specification

NO.	Item	Criterion	AQL
01	Electrical Testing	1.1 Missing vertical, horizontal segment, segment contrast defect. 1.2 Missing character, dot or icon. 1.3 Display malfunction. 1.4 No function or no display. 1.5 Current consumption exceeds product specifications. 1.6 LCD viewing angle defect. 1.7 Mixed product types. 1.8 Flicker	**0.65**
02	Black or White spots or Bright spots or Color spots on LCD (Display only)	2.1 White and black or color spots on display < 0.25mm, no more than one spots. 2.2 Densely spaced: No more than three spots within 3mm.	**2.5**
03	LCD and Touch Panel black spots, white spots, contamination (non – display)	3.1 Round type: As following drawing $\Phi = (X+Y) / 2$ (see drawing below) | Size(mm)	Acceptable Q'ty
---	---
$\Phi \leqq 0.10$	Accept no dense
$0.10 < \Phi \leqq 0.20$	1
$0.20 < \Phi \leqq 0.25$	1
$0.25 < \Phi \leqq 0.30$	1
$0.30 < \Phi$	0 | * Densely spaced: No more than two spots within 3mm. 3.2 Line type: (As following drawing) | Length(mm)	Width(mm)	Acceptable Q'ty
---	---	---
---	$W \leqq 0.02$	Accept no dense
L<2.5	W<0.08	1
---	$0.08 \leqq W$	Rejection | * Densely spaced: No more than two lines within 3mm.	**2.5** **2.5**

NO.	Item	Criterion			AQL
04	Polarizer bubbles	If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction	Size Φ(mm)	Acceptable Q'ty	2.5
			Φ≦0.30	Accept no dense	
			0.30< Φ≦0.50	0	
			0.50< Φ≦1.00	0	
			1.00< Φ	0	
			Total Q'ty	0	
05	Scratches	Follow NO.3 -2 Line Type.			
06	Chipped glass	(see below)			2.5

Symbols:
x: Chip length   y: Chip width   z: Chip thickness
k: Seal width   t: Glass thickness a: LCD side length
L: Electrode pad length
6.1 General glass chip:
6.1.1 Chip on panel surface and crack between panels:

z: Chip thickness	y: Chip width	x: Chip length
Z≦1/2t	Not over viewing area	x≦1/8a
1/2t< z≦2t	Not exceed 1/3k	x≦1/8a

⊙ Unit: mm
⊙ If there are 2 or more chips, x is the total length of each chip
6.1.2 Corner crack:

z: Chip thickness	y: Chip width	x: Chip length
Z≦1/2t	Not over viewing area	x≦1/8a
1/2t< z≦2t	Not exceed 1/3k	x≦1/8a

⊙ Unit: mm
⊙ If there are 2 or more chips, x is the total length of each chip

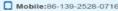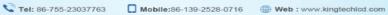| NO.	Item	Criterion	AQL
07	Glass crack	Symbols: x: Chip length y: Chip width z: Chip thickness k: Seal width t: Glass thickness a: LCD side length L: Electrode pad length 7.2 Protrusion over terminal: 7.2.1 Chip on electrode pad: | y: Chip width	x: Chip length	z: Chip thickness
y≦0.5mm	x≦1/8a	0< z≦t | 7.2.2 Non-conductive portion: | y: Chip width	x: Chip length	z: Chip thickness
y≦L	x≦1/8a	0< z≦t | ⊙ If there chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications. ⊙ If the product will be heat sealed by the customer, the alignment mark must mot be damaged. 7.2.3 Substrate protuberance and internal crack | y: width	x: length
y≦1/3L	X≦a		2.5

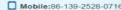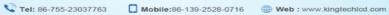| NO.	Item	Criterion	AQL
08	Cracked glass	No crack is allowed.	2.5
09	Backlight elements	9.1 Illumination source flickers when lit. 9.2 Spots or scratches that appear when lit must be judged. Using LCD spot, lines and contamination standards. 9.3 Backlight doesn't light or color is wrong.	2.5 2.5 0.65
10	Bezel	No scratches with W>0.1 and Length>2.5mm.	2.5
11	PCB、COB	11.1 COB seal may not have pinholes larger than 0.2mm or contamination. 11.2 COB seal surface may not have pinholes through to the IC. 11.3 The height of the COB should not exceed the height indicated in the assembly diagram. 11.4 There may not be more than 2mm of sealant outside the seal area on PCB. And there should be no more than three places. 11.5 Parts on PCB must be the same as on the production characteristic chart, There should be no wrong parts, missing parts or excess parts. 11.6 The jumper on the PCB should conform to the product characteristic chart.	2.5 2.5 2.5 2.5 0.65 0.65
12	FPC	FPC damage per IPC guidelines.(IPC-A-610) Nicks or damage along the edges of the flexible printed cir-cuitry and cutouts,providing the penetration does not exceed 50% of the distance from the edge to the nearest conductor to 2.5mm[0.1in], Whichever is less.	2.5
13	Soldering	13.1 No cold solder joints, missing solder connections, oxidation or icicle. 13.2 No short circuits in components on PCB or FPC. 13.3 Soldering per IPC guidelines.(IPC-A-610)	2.5 0.65

NO.	Item	Criterion	AQL
14	Touch Panel Chipped glass	Symbols: x: Chip length y: Chip width z: Chip thickness k: Seal width t: Touch Panel Total thickness a: LCD side length L: Electrode pad length 14.1 General glass chip: 14.1.1 Chip on panel surface and crack between panels: ⊙ Unit: mm ⊙ If there are 2 or more chips, x is the total length of each chip 14.1.2 Corner crack: ⊙ Unit: mm ⊙ If there are 2 or more chips, x is the total length of each chip	2.5

14.1.1 table:

z: Chip thickness	y: Chip width	x: Chip length
$Z \leqq t$	$\leqq 1/2$ k and not over viewing area	$x \leqq 1/8a$

14.1.2 table:

z: Chip thickness	y: Chip width	x: Chip length
$z \leqq t$	$\leqq 1/2$ k and not over viewing area	$x \leqq 1/8a$

NO.	Item	Criterion	AQL
15	Touch Panel(Fish eye、dent and bubble on film)	<table><tr><td>SIZE(mm)</td><td>Acceptable Q'ty</td></tr><tr><td>Φ≦0.2</td><td>Accept no dense</td></tr><tr><td>0.2< D ≦0.4</td><td>5</td></tr><tr><td>0.4< D ≦0.5</td><td>2</td></tr><tr><td>0.5< D</td><td>0</td></tr></table>	2.5
16	Touch Panel Newton ring	Newton ring dimension ≦ 1/2 touch panel area and not affect font and line distortion(≦2.5%) , it is acceptable.	2.5
17	Touch Panel Linearity	Less than 2.5% is acceptable.	2.5
18	LCD Ripple	Touch the touch panel , can not see the LCD ripple. Pen: R 1.0mm silicon rubber. Operation Force: 80g	2.5
19	General appearance	19.1 Pin type must match type in specification sheet. 19.2 LCD pin loose or missing pins. 19.3 Product packaging must the same as specified on packaging specification sheet. 19.4 Product dimension and structure must conform to product specification sheet. 19.5 Product packaging shall be by trays sized to protect TFT and FPC cable. 19.6 Cable shall not be bent during transportation. 19.7 Top tray must be empty.	0.65 0.65 0.65 0.65

12. Handling Precaution

12.1 Handling of LCM

- Avoid external shock.
- Don't apply excessive force on the surface.
- Liquid in LCD is hazardous substance, do not lick or swallow. When the liquid is attaching to your hand, skin, cloth, etc., wash it thoroughly and immediately.
- Don't operate it above the absolute maximum rating.
- Don't disassemble the LCM.
- The operators should wear protections whenever he/she comes into contact with the module. Never touch any of the conductive parts such as the LSI pads, the copper leads on the PCB and the interface terminals with any parts of the human body.
- The modules should be kept in antistatic bags or other containers resistant to static for storage.
- The module is coated with a film to protect the display surface, be careful when peeling off this protective film since static electricity may be generated.

12.2 Storage

- Store it in an ambient temperature of 25±10℃, and in a relative humidity of 50±10%RH. Don't expose to sunlight or fluorescent light.
- Store it in a clean environment, free from dust, active gas, and solvent.
- Store it in anti-static electricity container.
- Store it without any physical load.

12.3 Soldering

- Use only soldering irons with proper grounding and no leakage.
- Iron: no higher than 280±10℃ and less than 3 sec during hand soldering.
- Rewiring: no more than 2 times.

13. Packing Method

----TBD