SPECIFICATION

PV05705T0140F

■ Preliminary Specification

☐ Final Specification

KINGTECH:

CUSTOMER:

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

Approved By:
Date:
Note:

Records of Revision

DATE	REF.PAGE PARAGRAPH DRAWING No.	REVISED No.	SUMMARY	REMARK
2018-10-29		V01	First Issue	

Contents

1. General Specification

Item	Contents	Unit
LCD TYPE	TFT/TRANSMISSIVE	
MODULE SIZE (W*H*T)	127*98.43*5.8	MM
ACTIVE SIZE (W*H)	115.2*86.4	MM
PIXEL PITCH (W*H)	0.18*0.18	MM
NUMBER OF DOTS	640*480	
DRIVER IC	HX8250-A01*2+HX8678A	
INTERFACE TYPE	18 BIT RGB	
TOP POLARIZER TYPE	GLARE	
RECOMMEND VIEWING DIRECTION	6	O'CLOCK
GRAY SCALE INVERSION DIRECTION	12	O'CLOCK
BACKLIGHT TYPE	21-DIES WHITE LED	
TOUCH PANEL TYPE	WITHOUT	
Led supplier	Spec-01.JA.ZA3014W65P01-EN-A3	JUFEI

2. Mechanical Drawing

3. Block Diagram

4. Interface Pin Function

Pin No.	Symbol	Description
1	U/D	Up/down scan setting When u/d=h reverse scan When u/d=l normal scan
2	NC	No connection
3	HSYNC	Horizontal sync input in digital rgb and ccir601 mode (short to gnd in not used)
4-6	VLED	Power supply for blu ldo circuit
7	VCC	Power supply
8	VSYNC	Vertical sunc input in digital rgb and ccir601 mode (short to gnd if not used)
9	DE	Input data enable control.when de mode ,active high to enable data input Default pull low.
10	NC(X2)	No connection
11	NC(Y1)	No connection
12	ADJ	Chip enable
13-15	B5-B3	Blue data input
16	VSS	Power ground
17-19	B2-B0	Blue data input
20	VSS	Power ground
21-23	G5-G3	Green data input
24	VSS	Power ground
25-27	G2-G0	Green data input
28	VSS	Power ground
29-31	R5-R3	Red data input
32	VSS	Power ground
33-35	R2-R0	Red data input
36	NC(X1)	No connection
37	NC(Y2)	No connection
38	DCLK	Clock signal.latching data at the rising edge
39	VSS	Power ground
40	L/R	The shift direction of device internal shift register is controlled by this pin as hown below L/r=h:sth->s01->...->s0960->sth0 L/r=l:sth->s0960->...->s01->sth0

5. Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply voltage for analog	VCC	-0.3	5.0	V
Supply voltage for logic	VDDIO	-0.3	5.0	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	VCC	2.7	3.3	3.6	V	
Supply Voltage for Logic	VCC	2.7	3.3	3.6	V	
Input Voltage	V_{IL}	-0.3	-	0.2VCC	V	
	V_{IH}	0.8VCC	-	VCC		
Input leakage Current	I_{LKG}	-1		1	μA	

6.2 Backlight Driving Conditions

ltem	Symbol	Value			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED Backlight	V_F	8.4	9.6	10.2	V	I_L =140mA
Current for LED Backlight	I_L		140	-	mA	
Power Consumption	P		1.344		W	
LED Life Time		30,000	50,000		Hr	Note
Power supply for led	VLED	4.5	5.0	5.5	V	
Adj frequency		19K	20K	21K	HZ	
Adj input voltage	VIH	3.0		3.3	V	
Adj input voltage	VIL	0		0.3	V	
Module current	IVCC	103		123	MA	
Power comsumption	P(VCC)	0.3296		0.3936	W	

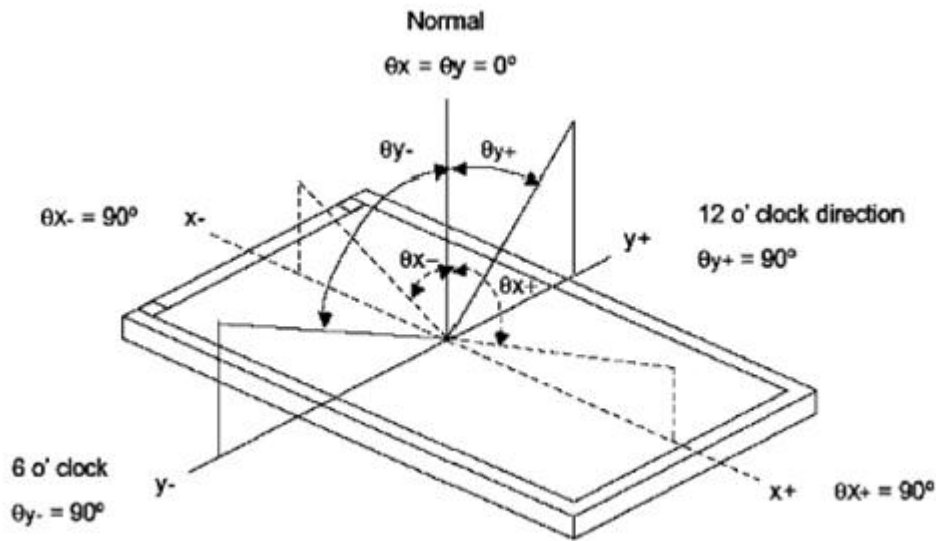Note: Brightness to be decreased to 50% of the initial value at ambient temperature TA=25℃

7. Optical Characteristics

ITEM		SYMBOL	CONDITIONS	SPECIFICATIONS			UNIT	NOTE
				MIN	TYP.	MAX		
Luminance		L	I_L =140mA	560	700	840	Cd/m^2	
Contrast Ratio		CR	θ=0°		TBD			
Response Time		T_{ON}	25℃		TBD		ms	
		T_{OFF}						
CIE Color Coordinate	Red	X_R	Viewing normal angle					
		Y_R						
	Green	X_G						
		Y_G						
	Blue	X_B						
		Y_B						
	White	X_W		0.248	0.288	0.328		
		Y_W		0.281	0.321	0.361		
Viewing Angle	Hor.	θ_{X+}	CR≥10		70		Degree	
		θ_{X-}			70			
	Ver.	θ_{Y+}			60			
		θ_{Y-}			40			
Uniformity		Un		80			%	

Note 1: Definition of Viewing Angle θx and θy:

Note 2: Definition of contrast ratio CR:

$$CR= \frac{Luminance\ of\ white\ state}{Luminance\ of\ black\ state}$$
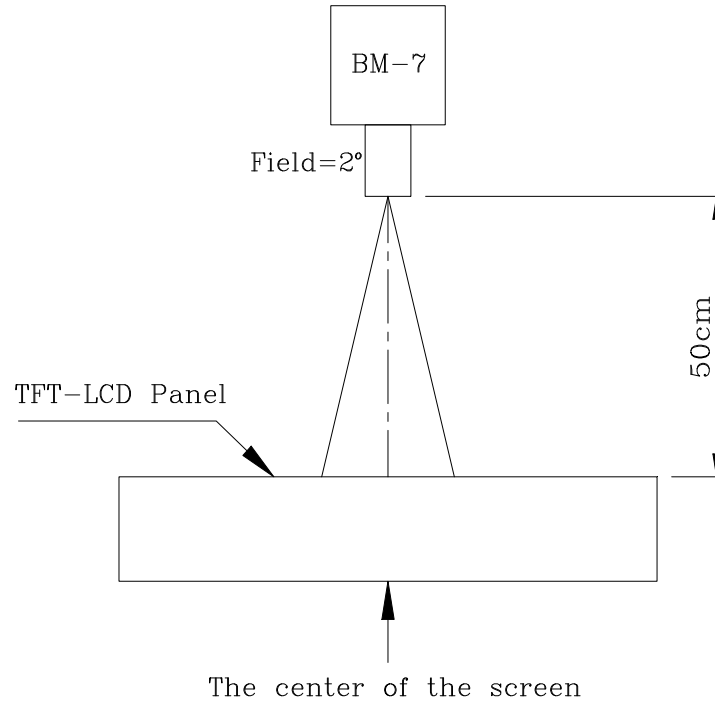
Note 3: Definition of Response Time(Tr,Tf)
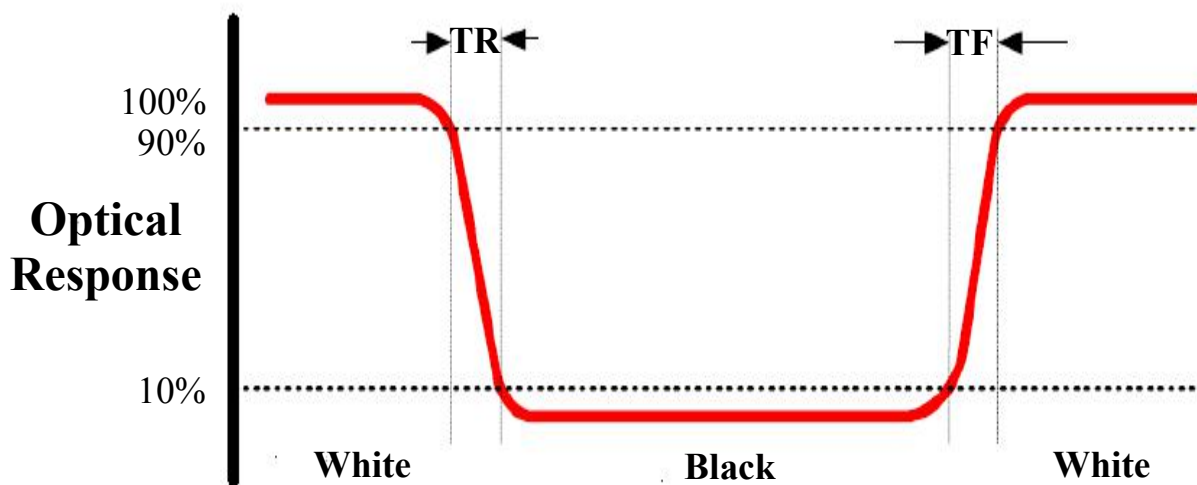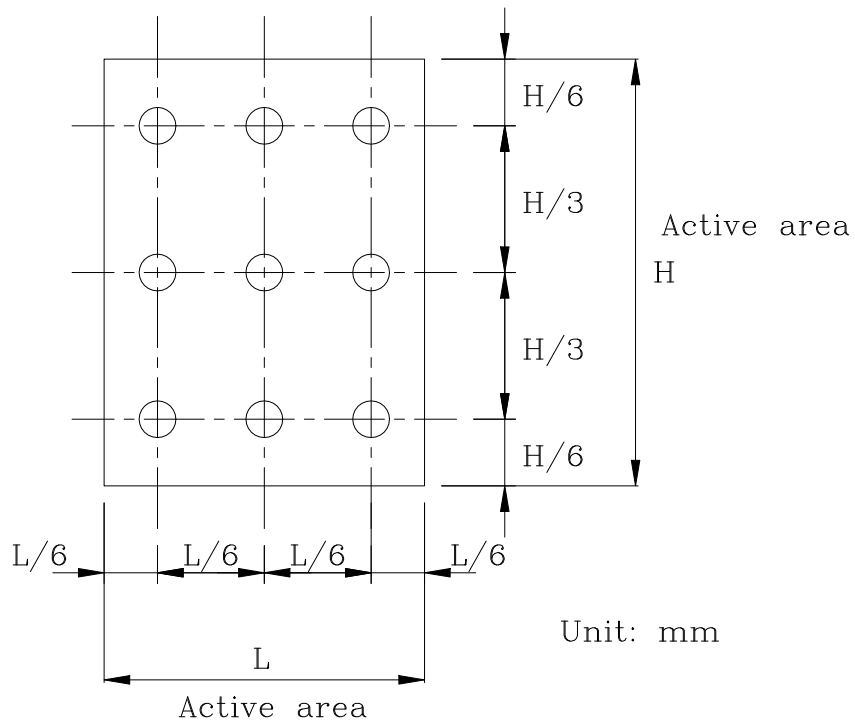
Note 4: Definition of Luminance
  ①**The Brightness Test Equipment Setup**
    Field=2° (As measuring "black" image, field=2° is the best testing condition)

②The Brightness Test Point Setup

8. Timing Characteristics

8.1 AC Electrical Characteristics

PARAMETER	Symbol	Min.	Typ.	Max.	Unit
HS setup time	T_{hst}	10	-	-	ns
HS hold time	T_{hhd}	10	-	-	ns
VS setup time	T_{vst}	10	-	-	ns
VS hold time	T_{vhd}	10	-	-	ns
Data setup time	T_{dsu}	10	-	-	ns
Data hold time	T_{dhd}	10	-	-	ns
DEN setup time	T_{esu}	10	-	-	ns
VS falling to HS falling time on odd field @ RGB mode	T_{HV_O}	-4	0	+4	T_{CPH}
VS falling to HS falling time on even field @ RGB mode	T_{HV_E}	0.4	0.5	0.6	T_H
Source output settling time	T_{ST}	-	12	20	µs
Source output loading R	R_{SL}	-	2	-	K ohm
Source output loading C	C_{SL}	-	60	-	pF
POL output delay time	T_{DP}	-	-	40	ns

8.2 Digital Parallel RGB interface

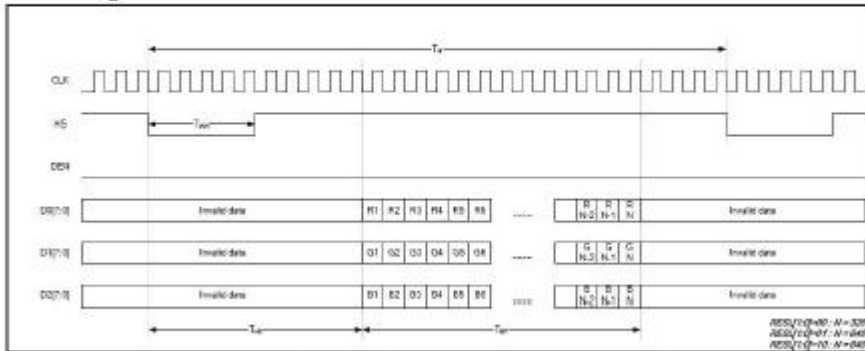| PARAMETER	Symbol	Min.	Typ.	Max.	Unit
CLK frequency	F_{CPH}	-	25.175	-	MHz
CLK period	T_{CPH}	-	39.7	-	ns
CLK pulse duty	T_{CWH}	40	50	60	%
HS period	T_H	-	800	-	T_{CPH}
HS pulse width	T_{WH}	5	30	-	T_{CPH}
HS-first horizontal data time	T_{HS}	112	144	175	T_{CPH}
DEN pulse width	T_{EP}	-	640	-	T_{CPH}
VS pulse width	T_{WV}	1	3	5	T_H
VS-DEN time	T_{STV}	-	35	-	T_H
VS period	T_V	-	525	-	T_H

Note: When SYNC mode is used, 1st data start from 144th CLK after HS falling (when STHD[5:0]=00000)

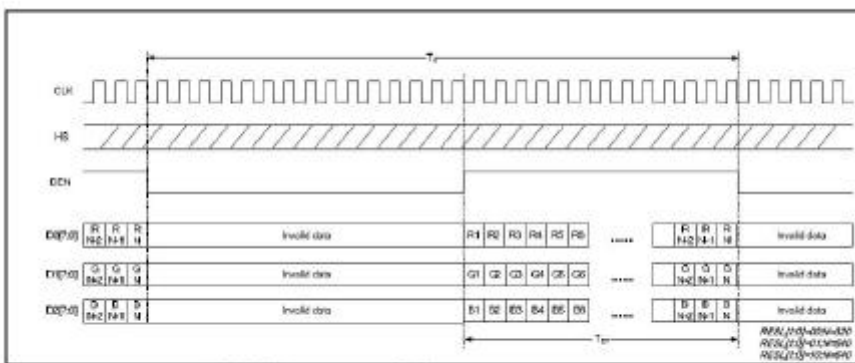| PARAMETER	Symbol	Min.	Typ.	Max.	Unit
OEV pulse width	T_{OEV}	-	100	-	T_{CPH}
CKV pulse width	T_{CKV}	-	96	-	T_{CPH}
HS-CKV time	T_1	-	52	-	T_{CPH}
HS-OEV time	T_2	-	8	-	T_{CPH}
HS-POL time	T_3	-	72	-	T_{CPH}
STV setup time	T_{SUV}	-	46	-	T_{CPH}
STV pulse width	T_{WSTV}	-	1	-	T_H

8.3 Clock and Data input waveforms
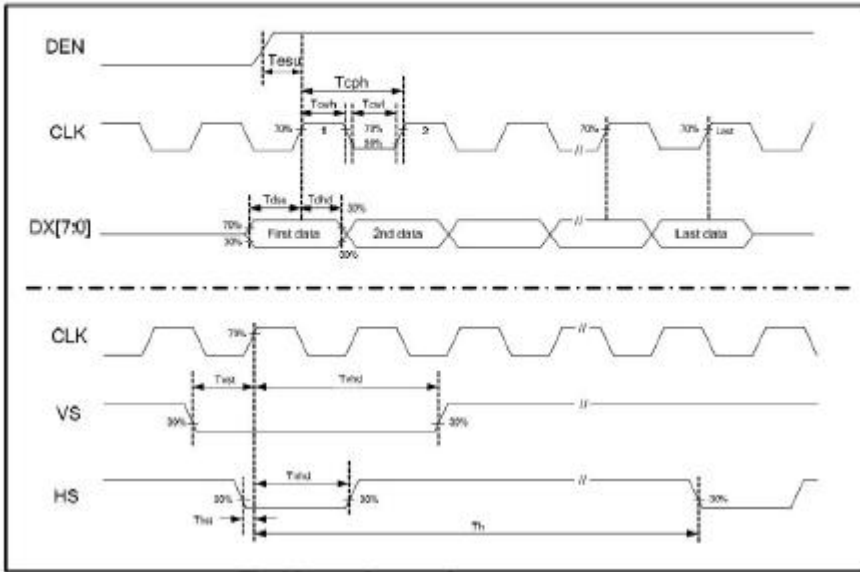
8.4 Data input format for RGB mode
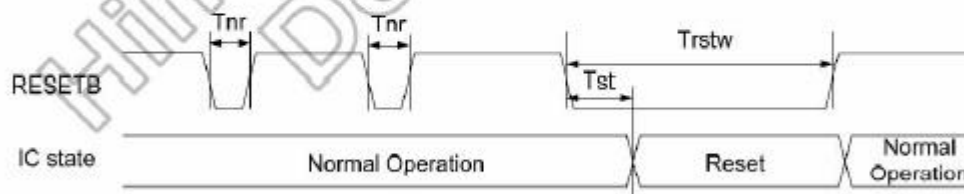

Parallel RGB SYNC Mode Horizontal Data Format

Parallel RGB DE Mode Horizontal Data Format

8.5 Hardware reset timing

PARAMETER	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
RESETB low pulse width	T_{rstw}	10	-	-	µs
Negative noise pulse width	T_{nr}		-	2	µs
Reset start time	T_{st}	2	-		µs

9.Standard Specification for Reliability
9.1Standard Specification for Reliability of LCD Module

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts = +85℃, 240 hours	IEC60068-21:2007 GB2423.2-2008
2	Low Temperature Operation	Ta = -30℃, 240 hours	IEC60068-2-1:2007 GB/2423.1-2008
3	High Temperature Storage	Ta = +85℃, 240 hours	IEC60068-21:2007 GB/2423.2-2008
4	Low Temperature Storage	Ta = -40℃, 240 hours	IEC60068-21:2007 GB/2423.1-2008
5	Storage at High Temperature and Humidity	Ta = +60℃, 90% RH max,240hours	IEC60068-2-78 :2001 GB/T2423.3—2006
6	Thermal Shock (non-operation)	-30℃ 30 min~+80℃ 30 min, Change time:5min, 20 Cycle	Start with cold temperature, End with high temperature, IEC60068-214:1984, GB/2423.22-2002
7	ESD	C=150pF,R=330Ω,5point/panel Air:±8Kv,5times; Contact:±4Kv,5times (Environment:15℃~35℃, 30%~60%.86Kpa~106Kpa)	IEC61000-42:2001 GB/T17626.2-2006
8	Vibration Test	Frequency range:10~55Hz Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z (6 hours for total)	IEC60068-2-6:1982 GB/T2423.101995
9	Mechanical Shock (Non Op)	Half Sine Wave60G 6ms, ±X,±Y,±Z 3times for each direction	IEC60068-2-27:1987 GB/T2423.5—1995
10	Package Drop Test	Height:80cm, 1corner,3 edges,6 surfaces	IEC60068-2-32:1990 GB/T2423.8—1995

Note1: Ts is the temperature of panel's surface.
Note2: Ta is the ambient temperature of sample.

9.2 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.

9.3 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.

10.General Precautions

10.1. Safety
- Liquid crystal is poisonous. Do not put it in your mouth. If liquid crystal touches your skin or clothes, wash it off immediately by using soap and water.

10.2. Handling
- The LCD panel is plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.
- The polarizer attached to the display is easily damaged. Please handle it carefully to avoid scratch or other damages.
- To avoid contamination on the display surface, do not touch the module surface with bare hands.
- Keep a space so that the LCD panels do not touch other components.
- Put cover board such as acrylic board on the surface of LCD panel to protect panel from damages.
- Transparent electrodes may be disconnected if you use the LCD panel under environmental conditions where the condensation of dew occurs.
- Do not leave module in direct sunlight to avoid malfunction of the ICs.

10.3. Static Electricity
- Be sure to ground module before turning on power or operating module.
- Do not apply voltage which exceeds the absolute maximum rating value.

10.4. Storage
- Store the module in a dark room where must keep at 25±10℃ and 65%RH or less.
- Do not store the module in surroundings containing organic solvent or corrosive gas.
- Store the module in an anti-electrostatic container or bag.

10.5. Cleaning
- Do not wipe the polarizer with dry cloth. It might cause scratch.
- Only use a soft sloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.

11.Specification of Quality Assurance

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

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 = 1.5
   Total defects: AQL = 1.5

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
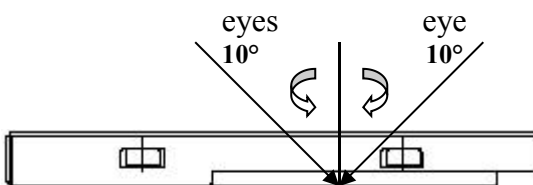
- Definition of area:
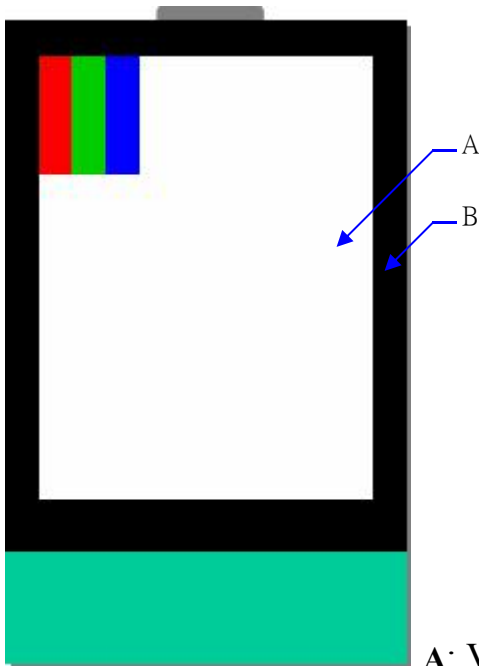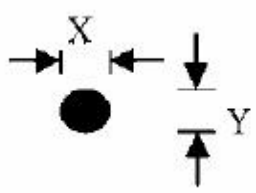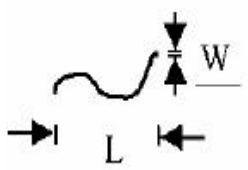
A: Viewing area B: Outside viewing area

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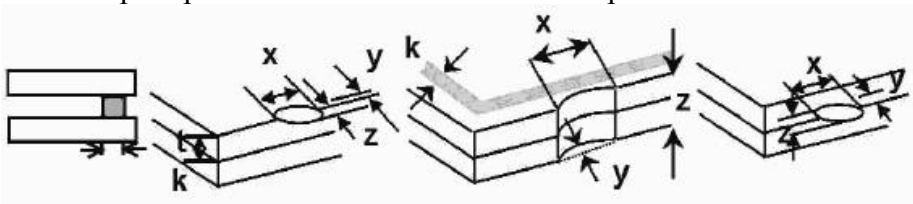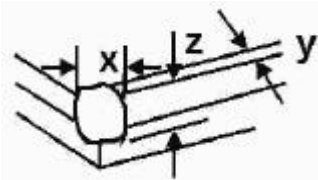
- When the standard can not be described, AQL will be applied.
- The sample of the lowest acceptable quality level must be negotiated by both supplier and customer when any dispute happened.
- New item must be added on time when it is necessary.

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 $\leqq$ 0.25mm, no more than Five spots. 2.2 Densely spaced: No more than three spots within 3mm.	**1.5**

03 — LCD and Touch Panel black spots, white spots, contamination (non – display)

3.1 Round type: As following drawing
$\Phi = (X+Y) / 2$

Size(mm)	Acceptable Q'ty
$\Phi \leqq 0.10$	Accept no dense
$0.10 < \Phi \leqq 0.20$	2
$0.20 < \Phi \leqq 0.25$	2
$0.25 < \Phi \leqq 0.30$	1
$0.30 < \Phi$	0

* Densely spaced: No more than two spots within 3mm.

AQL: **1.5**

3.2 Line type: (As following drawing)

Length(mm)	Width(mm)	Acceptable Q'ty
---	$W \leqq 0.02$	Accept no dense
$L \leqq 3.0$	$0.02 < W \leqq 0.05$	2
$L \leqq 2.5$	$0.03 < W \leqq 0.08$	
---	$0.08 < W$	Rejection

* Densely spaced: No more than two lines within 3mm.

AQL: **1.5**
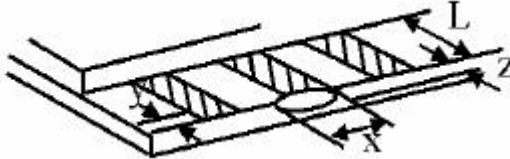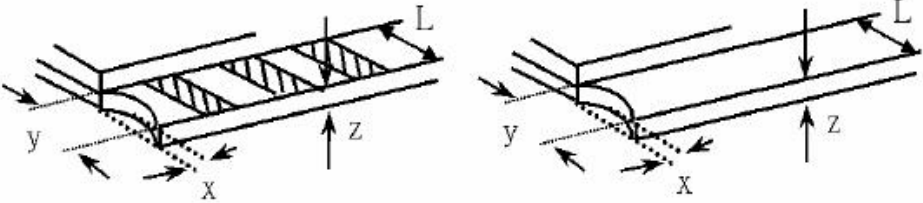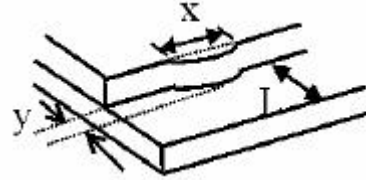
NO.	Item	Criterion			AQL
04	Polarizer bubbles	If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction	Size Φ(mm)	Acceptable Q'ty	1.5
			Φ≦0.20	Accept no dense	
			0.20< Φ≦0.50	3	
			0.50< Φ≦1.00	2	
			1.00< Φ	0	
			Total Q'ty	3	
05	Scratches	Follow NO.3 -2 Line Type.			
06	Chipped glass	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: 			1.5

Table for 6.1.1:

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
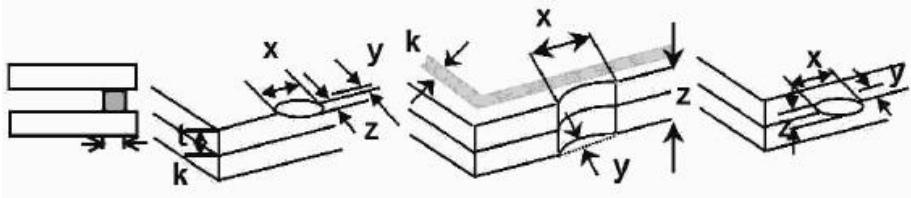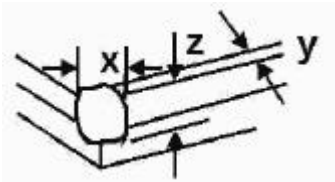
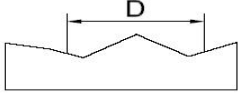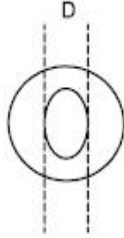| NO.	Item	Criterion	AQL
08	Cracked glass	The LCD with extensive crack is not acceptable.	1.5
09	Backlight elements	9.1 Illumination source flickers when lit. 9.2 Spots or scratches that appear when lit must be judged. Using LCD spot, lines and contamination standards. 9.3 Backlight doesn't light or color is wrong.	1.5 1.5 0.65
10	Bezel	Bezel must comply with product specifications.	1.5
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.	1.5 1.5 1.5 1.5 0.65 0.65
12	FPC	12.1 FPC terminal damage ≦ 1/2 FPC terminal width and can not affect the function , we judge accept. 12.2 FPC alignment hole damage ≦ 1/2 alignment area and can not affect the function , we judge accept.	1.5 1.5
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.	1.5 0.65

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: *see table below* 7.2.2 Non-conductive portion: *see table below* ⊙ 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 	1.5

7.2.1 Chip on electrode pad:

y: Chip width	x: Chip length	z: Chip thickness
$y \leqq 0.5mm$	$x \leqq 1/8a$	$0 < z \leqq t$

7.2.2 Non-conductive portion:

y: Chip width	x: Chip length	z: Chip thickness
$y \leqq L$	$x \leqq 1/8a$	$0 < z \leqq t$

7.2.3 Substrate protuberance and internal crack

y: width	x: length
$y \leqq 1/3L$	$X \leqq a$

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	1.5

Table within 14.1.1:

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

Table within 14.1.2:

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>	1.5
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.	1.5
17	Touch Panel Linearity	Less than 1.5% is acceptable.	1.5
18	LCD Ripple	Touch the touch panel , can not see the LCD ripple. Pen: R 1.0mm silicon rubber. Operation Force: 80g	1.5
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.	0.65 0.65 0.65 0.65

12.Packing Method

No.	Item	Dimensions(mm)	Quantity	Remark
1	LCM Module	127*98.43*5.8	30PCS	
2	PALLET	344*285*175 (include 30pcs products/one pallet)	1PCS	
3	LARGE CARTON	385*355*227 (include 30pcs products/one carton)	1PCS	