SPECIFICATION
FOR
LCD MODULE

MODULE NO: AFK640480A0-5.7N6NTH
REVISION NO: V01

Customer's Approval:

	SIGNATURE	DATE
PREPARED BY (RD ENGINEER)		
CHECKED BY		
APPROVED BY		

Records of Revision

DATE	REF.PAGE PARAGRAPH DRAWING No.	REVISED No.	SUMMARY	REMARK
2015-2-9		01	First issue	

Contents

1. Introduction

1.1 Scope of application
   This specification applies to the positive type TFT transmissive dot matrix LCD module ,LCD specification: Dots 640xRGBx480.
As to basic specification of the driver IC, refer to the IC (HX8250A+HX8678B) specification and datasheet.

1.2 Structure:
Module display structure:
TFT Module + FPC +BL
FULL 262K Color 5.7inch TFT LCD size for main LCD;
One bare chip with gold bump (COG) TECH;
18 BIT RGB interface;

1.3 TFT features:
Structure: TFT PANNEL+IC+FPC+BL;
Transmissive Type LCD
640 dot-source and 480 dot-gate outputs;
White LED back light;
18 BIT RGB interface;

1.4 Applications:
Mobile phone
   PSP
   PDA
   GPS
   Etc…

2. General specification

ITEM	Standard value	UNIT
LCD Type	TFT Transmissive	---
Driver element	a-Si TFT Active matrix	
Number of Dots	640*(RGB)*480	Dots
Pixel Arrangement	RGB Vertical Stripe	
Active Area	115.20 *86.40	mm
Viewing Direction	6 O' clock(without image inversion)	
Driver IC	HX8250A(*2)+HX8678B(*1)	
Module Size(W*H*T)	127x98.43x7.0(Max)	mm
Approx. Weight	TBD	g
Back Light	White LED	
Surface treatment	Anti-glare	
System interface	18 Bit RGB interface	
Backlight power consumption	TBD	

3. Mechanical drawing

PIN DESCRIPTION

PIN NO	SYMBOL
1	U/D
2	NC
3	HSYNC
4	VLED
5	VLED
6	VLED
7	VCC
8	VSYNC
9	DE
10	NCX(R2)
11	NCX(Y1)
12	ADJ
13	B5
14	B4
15	B3
16	B2
17	B1
18	B0
19	G5
20	G4
21	G3
22	G2
23	G3
24	VSS
25	G2
26	G1
27	G0
28	VSS
29	R5
30	R4
31	R3
32	VSS
33	R2
34	R1
35	R0
36	NCX(X1)
37	NCX(Y2)
38	DCLK
39	VSS
40	L/R

Display Type	TFT
Viewing Angle	TRANSMISSIVE,POSITIVE 6:00 CLOCK
LCD Driver IC	HIMAX
Operating Voltage	VDD=3.3V
Operation Temperature	-20°C TO 70°C
Storage Temperature	-30°C TO 80°C
Interface	18-BIT RGB
Backlight	21-CHIP WHITE LED
Surface luminance	700 cd/m² TYPE)
White X/Y	

MODULE SPEC.

TITLE

DRAWING NO.
AFK640480A0-5.7N6NTH

UNIT	mm	SCALE	FIT
3rd Angle		SHEET 1 OF 1	

ORIENT DISPLAY

LED CIRCUIT DIAGRAM
9.6V@140mA

LEDK7
LEDK6
LEDK5
LEDK4
LEDK3
LEDK2
LEDK1
LEDA

TFT 5.7"
640XRGBX480

7.00 MAX
5.80

127.00±0.2
118.16±0.2(BZ OPEN)
115.20(LCD AA)

98.43±0.2
89.22±0.2(BZ OPENING)
86.40(LCD AA)
(3.85)
(2.55)

(5.89)
(7.56)

63.92±0.8
43.29±0.8

MOLEX 54548-071
JAE FA5B040HP1

NOTES:
1. General Tolerance: ±0.2
2. ( )reference dimension.
3. Recommended Case Open Area Should Be Less Than Module V.A
4. recommended cushion adherent area:TP V.A+1.6mm
5. ROHS MUST BE COMPLIANT

		DRAWN		
		ME.CHECKED		
		EE.CHECKED		
		APPROVED		
		CUSTOMER'S APPROVAL		
V00	First issue	2014.11.20A	DATE	
VER.	SYMBOL	AMENDMENT	SIGN	DATE

4. ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit
Supply voltage for logic	Vcc	-0.5	5.0	V
Input voltage for logic	V_{IN}	-0.5	5.0	V
Supply current (One LED)	I_{LED}		40	mA
Operating temperature	T_{OP}	-20	+70	°C
Storage temperature	T_{ST}	-30	+80	°C

5. ELECTRICAL CHARACTERISTICS

5.1 Typical Operation Conditions

Item	Symbol	Min	Typ	Max	Unit	Applicable terminal
Supply voltage	Vcc	3.0	3.3	3.6	V	V_{DD}
Input voltage	V_{IL}	-0.3	-	$0.2\ V_{dd}$	V	
	V_{IH}	$0.8\ V_{dd}$	-	V_{dd}	V	
Input leakage current	I_{LKG}	-	-	-	μA	

5.2 Backlight Driving Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED backlight	V_L	-	9.6	-	V	Note 1
Current for LED backlight	I_L	-	140	-	mA	
LED life time	-	30,000	50,000	-	Hr	Note 2
Power supply for LED	VLED	4.5	5	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	

5.3. Timing Characteristics

5.3.1. Timing conditions

Parallel DE mode input timing table

Signal	Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Remarks
DCLK	Period	t_{CLK}	33	40	43	ns	
	Frequency	f_{CLK}	23	25	30	MHz	
	Low Level Width	t_{WCL}	6	-	-	ns	
	High Level Width	t_{WCH}	6	-	-	ns	
	Rise, Fall Time	t_{CLKr}, t_{CLKf}	-	-	3	ns	
	Duty$^{(1)}$	-	0.45	0.50	0.55	-	
DE (Data Enable)	Setup Time	t_{DES}	5	-	-	ns	
	Hold Time	t_{DEH}	10	-	-	ns	
	Rise, Fall Time	t_{DEr}, t_{DEf}	-	-	16	ns	
	Horizontal Period	t_{HP}	750	800	900	t_{CLK}	
	Horizontal Valid	t_{HV}	640	640	640	t_{CLK}	
	Horizontal Blank	t_{HBK}	110	160	260	t_{CLK}	
	Vertical Period	t_{VP}	515	525	560	t_{HP}	
	Vertical Valid	t_{W}	480	480	480	t_{HP}	
	Vertical Blank	t_{VBK}	35	45	80	t_{HP}	
	Vertical Frequency	f_{v}	55	60	65	Hz	
Data R,G,B	Setup Time	t_{DS}	5	-	-	ns	
	Hold Time	t_{DH}	10	-	-	ns	
	Rise, Fall Time	t_{Dr}, t_{Df}	-	-	3	ns	

Note: (1) t_{CLKL} / t_{CLK}.

Timing diagram
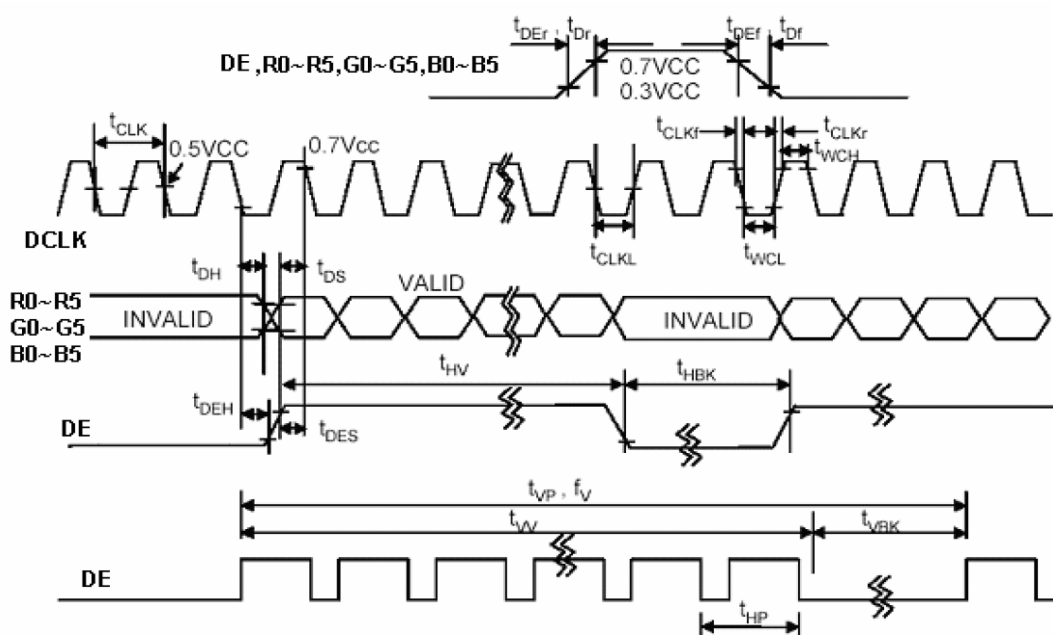
5.3.3.SYNC mode input timing table

| Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Remarks
Clock Period	t_{CLK}	33	40	43	ns	
Clock Frequency	f_{CLK}	23	25	30	MHz	
Clock Low Level Width	t_{WCL}	6	-	-	ns	
Clock High Level Width	t_{WCH}	6	-	-	ns	
Clock Rise, Fall Time	t_{CLKr}, t_{CLKf}	-	-	3	ns	
HSYNC Period	t_{HP}	750	800	900	t_{CLK}	
HSYNC Pulse Width	t_{HW}	5	30	-	t_{CLK}	
HSYNC Front Porch	t_{HFP}	1	16	116	t_{CLK}	
HSYNC Back Porch	t_{HBP}	1	114	139	t_{CLK}	
HSYNC Width + Back Porch	$t_{HW}+ t_{HBP}$	144	144	144	t_{CLK}	
Horizontal Blank	t_{HBK}	1	160	260	t_{CLK}	
Horizontal Valid	t_{HV}	640	640	640	t_{CLK}	
VSYNC Period	t_{VP}	515	525	560	t_{HP}	
VSYNC Pulse Width	t_{VW}	1	3	5	t_{HP}	
VSYNC Front Porch	t_{VFP}	1	10	45	t_{HP}	
VSYNC Back Porch	t_{VBP}	30	32	34	t_{HP}	
VSYNC Width + Back Porch	$t_{VW}+ t_{VBP}$	35	35	35	t_{CLK}	
Vertical Blank	t_{VBK}	35	45	80	t_{HP}	
Vaild data Width	t_{W}	480	480	480	t_{HP}	
Data Setup Time	t_{DS}	5	-	-	ns	
Data Hold Time	t_{DH}	10	-	-	ns	

Note: (1) tHBK = tHFP + tHW + tHBP

Timing diagram
Input vertical timing
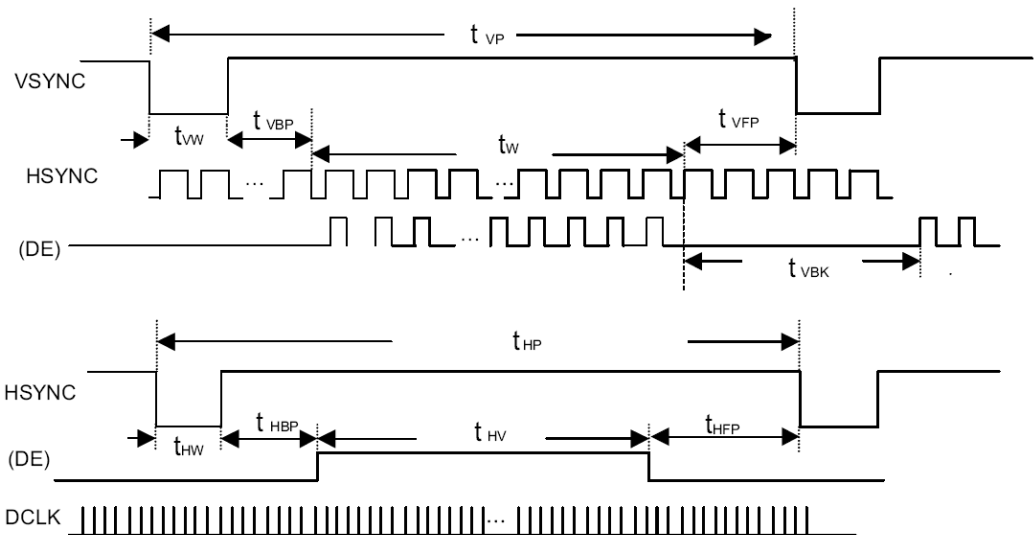
Remark : If SYNC mode is used, please fix DE signal to low, DE timing waveform is for reference only.

Input horizon timing
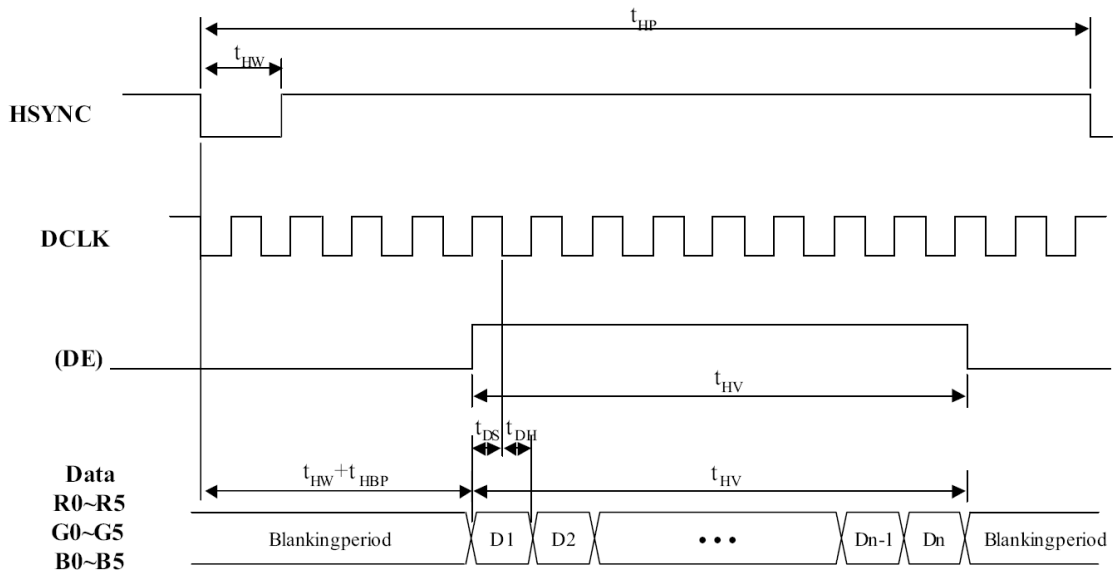
Remark : If SYNC mode is used, please fix DE signal to low, DE timing waveform is for reference only.

6. OPTICAL CHARACTERISTICS

ITEM		SYMBOL	CONDITIONS	SPECIFICATIONS			UNIT	NOTE
				MIN.	TYP.	MAX		
Brightness		B		--	700	--	Cd/m^2	
Contrast Ratio		CR		150	250	--	--	
Response Time		Tr+Tf		--	45	--	ms	
CIE Color coordinate	Red	X_R	Viewing normal angle		0.605			All left side data are based on INNOLUX's product reference only
		Y_R			0.362			
	Green	X_G			0.342			
		Y_G			0.537			
	Blue	X_B			0.148			
		Y_B			0.113			
	White	X_W			0.304			
		Y_W			0.339			
Viewing Angle	Hor.	θ_{X+}	Center CR>=10	-	70	--	Deg.	
		θ_{X-}		-	70	--		
	Ver.	θ_{Y+}		-	60	--		
		θ_{Y-}		-	40			
Uniformity		Un		75	80		%	

Note 1 : Definition of Viewing Angle θ_X and θ_Y :
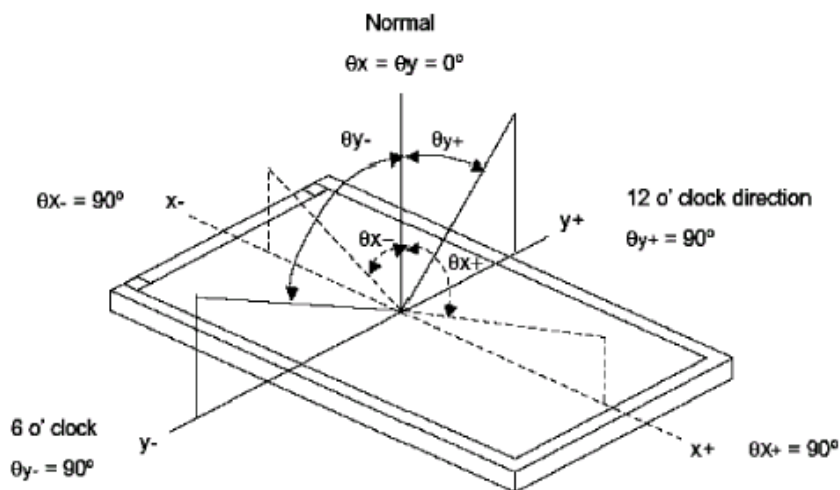
Note 2: Definition of contrast ratio CR:

$$CR = \frac{\text{Brightness of non-selected dots (white)}}{\text{Brightness of selected dots (black)}}$$

Note 3: Definition of response time (T_R, T_F)
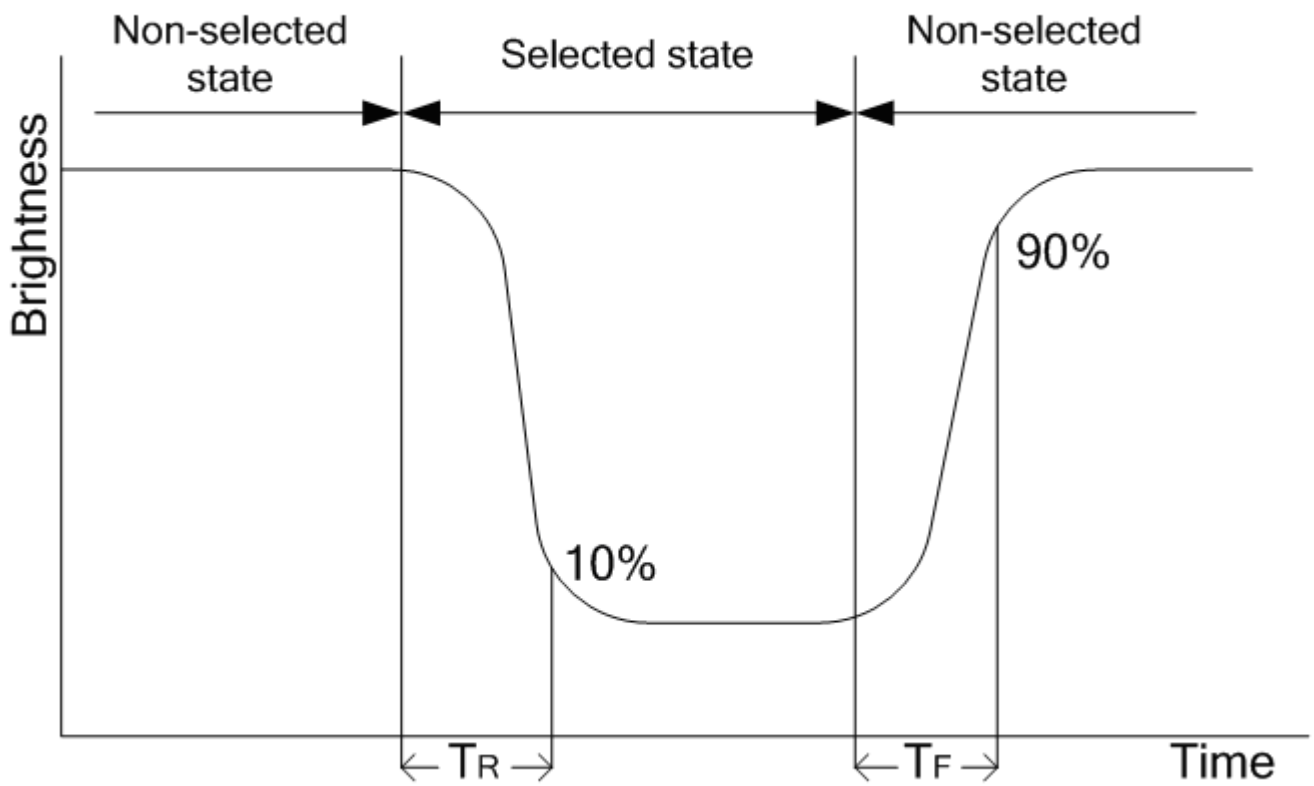
: The brightness test equipment setup
20mA Field=2° (As measuring "black" image, field=2° is the best testing condition)


BM-7

Field = 2°

50 cm

TFT-LCD Panel

The center of the screen

Note 4 :

H/6

H/3

H/3

H/6

Active area

H

L/6 L/3 L/3 L/6

L

Active area

Unit: mm
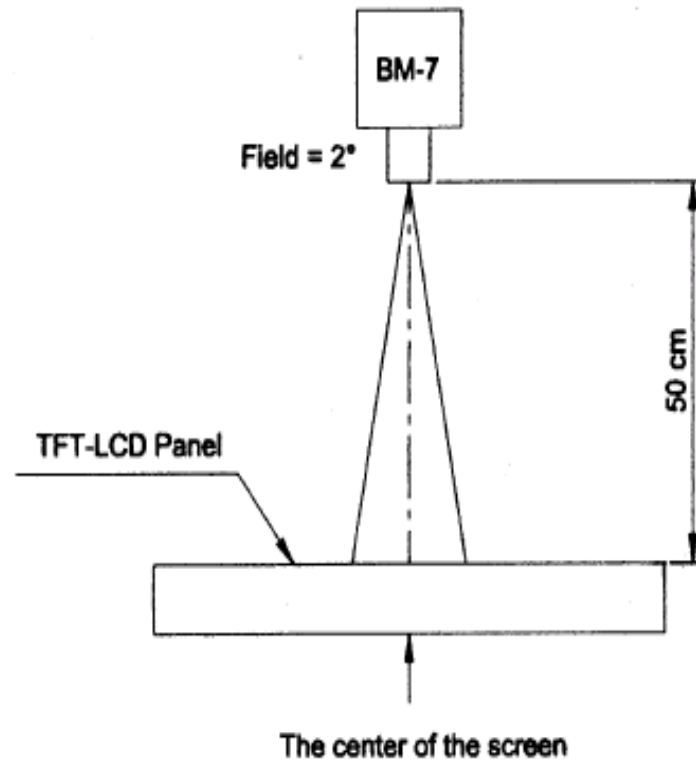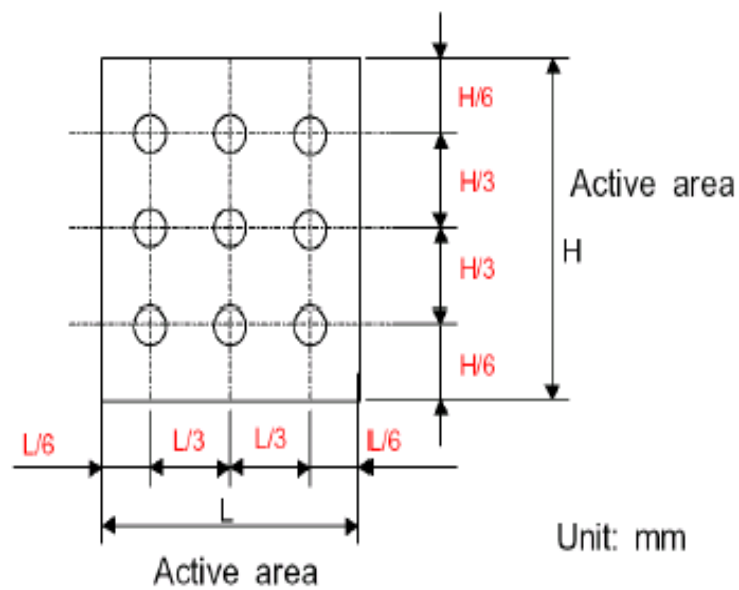
7. Interface Pin Function

Pin No	Symbol	Function
1	U/D	Up or Down Display Control
2	NC	No Connection
3	Hsync	Horizontal SYNC.
4	VLED	Power Supply for LED Driver circuit
5	VLED	Power Supply for LED Driver circuit
6	VLED	Power Supply for LED Driver circuit
7	VCC	Power Supply for LCD
8	Vsync	Vertical SYNC.
9	DE	Data Enable
10	NC	No Connection
11	NC	No Connection
12	ADJ	Brightness control for LED B/L
13	B5	Blue Data 5 (MSB)
14	B4	Blue Data 4
15	B3	Blue Data 3
16	VSS	Power Ground
17	B2	Blue Data 2
18	B1	Blue Data 1
19	B0	Blue Data 0 (LSB)
20	VSS	Power Ground
21	G5	Green Data 5 (MSB)
22	G4	Green Data 4
23	G3	Green Data 3
24	VSS	Power Ground
25	G2	Green Data 2
26	G1	Green Data 1
27	G0	Green Data 0 (LSB)
28	VSS	Power Ground
29	R5	Red Data 5 (MSB)
30	R4	Red Data 4
31	R3	Red Data 3
32	VSS	Power Ground
33	R2	Red Data 2
34	R1	Red Data 1

35	R0	Red Data 0
36	NC	No Connection
37	NC	No Connection
38	DCLK	Clock Signals ; Latch Data at the rising Edge and can not be changed
39	VSS	Power Ground
40	L/R	Left or Right Display Control

NOTE:1,For digital RGB input data format, both SYNC mode and DE+SYNC mode are supported. If EN signal is fixed low. SYNC mode is used. Otherwise, DEN+SYNC is used.

8. BLOCK DIAGRAM

Driver IC:HX8250A+HX8678B or Compatible

Connection with Host

/RESET → Timing Controller with Memory

R[0:6]
G[0:6]
B[0:6]
DCLK
VSYNC
HSYNC
DE
VCC
VSS

Gate Driver

Source Driver

Gate Driver

G640

Y1

Y480

G1

5.7"
TFT LCD Panel

LEDA
LEDK

BL Circuit (3*7LED)
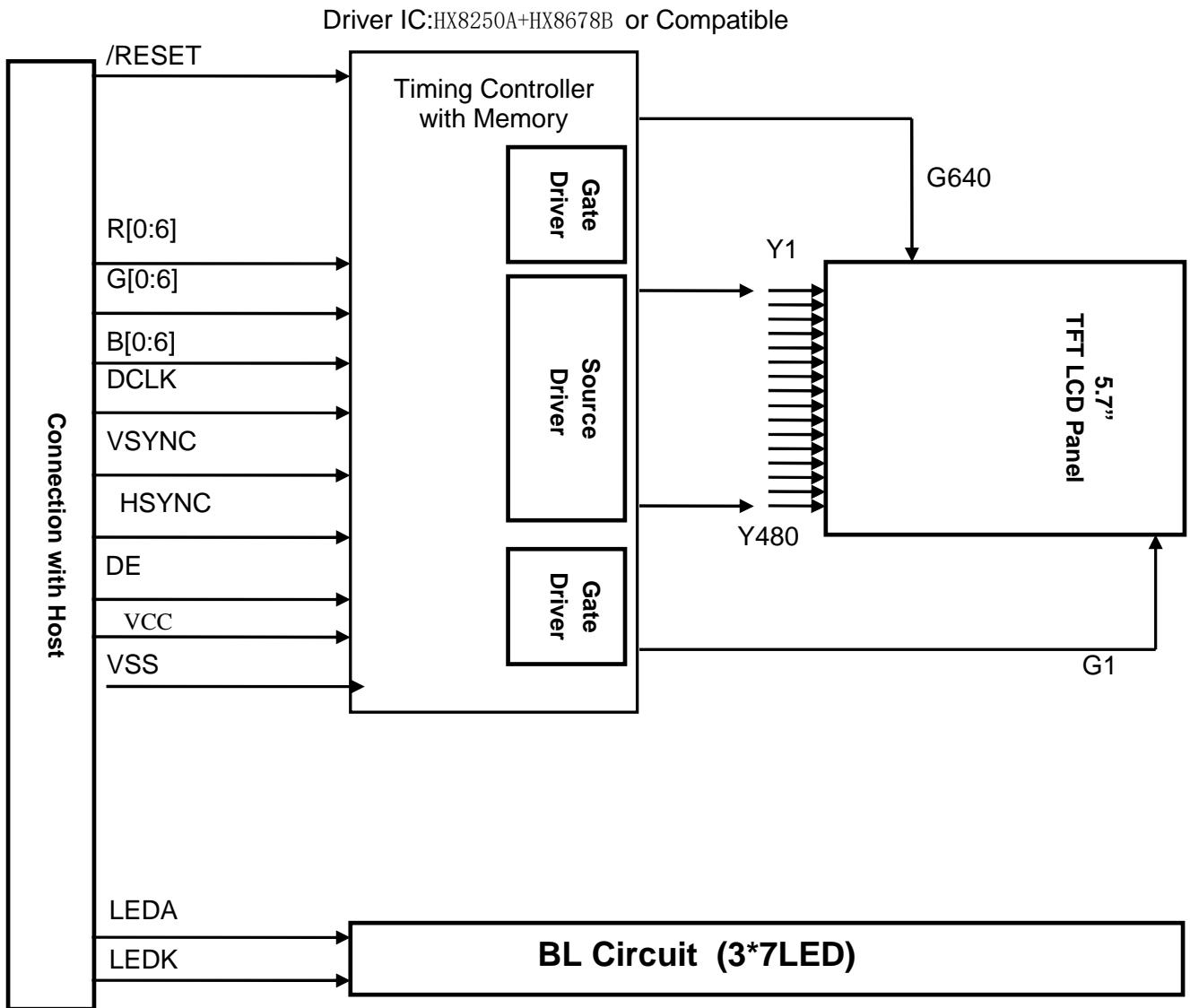
9. Standard Specification for Reliability

9–1. Standard Specifications for Reliability of LCD Module

No	Item	Description
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.
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.
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.
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.
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.
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.
07	Packing vibration	Frequency range : 10Hz ~ 55Hz Amplitude of vibration : 1.5mm Sweep time: 12 min X,Y,Z 2 hours for each direction.
08	Packing drop test	According to ASTM-D-5327.
09	Electrical Static Discharge	Air: ±4KV 150pF/330Ω 5 times
		Contact: ±2KV 150pF/330Ω 5 time

*Sample size for each test item is 3~5pcs

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 12.2, Standard specifications for Reliability have been 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. Specification of Quality Assurance:

10-1. Purpose

This standard for Quality Assurance should affirm the quality of LCD module products to supply to purchaser by Orient Display (Supplier).

10-2. Standard for Quality Test

  a. Inspection:

Before delivering, the supplier should take the following tests, and affirm the quality of product.

  b. Electro-Optical Characteristics:

According to the individual specification to test the product.

  c. Test of Appearance Characteristics:

According to the individual specification to test the product.

  d. Test of Reliability Characteristics:

  According to the definition of reliability on the specification for testing products.

  e. Delivery Test:

Before delivering, the supplier should take the delivery test.

  (i) Test method: According to MIL-STD105E.General Inspection Level Ⅱ take a single time.

  (ii) The defects classify of AQL as following:

  Major defect: AQL = 0.65

  Minor defect: AQL = 2.5

  Total defects: AQL = 2.5

10-3. Non- conforming Analysis & Deal With Manners

a. Non- conforming Analysis:

(i) Purchaser should supply the detail data of non- conforming sample and the non- conforming.

(ii) After accepting the detail data from purchaser, the analysis of non- conforming should be finished in two weeks.

  (iii) If supplier can not finish analysis on time, must announce purchaser before 3 days.

  b. Disposition of non- conforming:

  (i) If find any product defect of supplier during assembly time, supplier must change the good product for every defect after recognition.

  (ii) Both supplier and customer should analyze the reason and discuss the disposition of non- conforming when the reason of nonconforming is not sure.

10-4. Agreement items

  Both sides should discuss together when the following problems happen.

  a. There is any problem of standard of quality assurance, and both sides should think that must be modified.

  b. There is any argument item which does not record in the standard of quality assurance.

  c. Any other special problem.

10-5. Standard of The Product Appearance Test

    a. Manner of appearance test:

    (i) The test must be under 20W ×2 or 40W fluorescent light, and the distance of view must be at 30±5cm.

    (ii) When test the model of transmissive product must add the reflective plate.

    (iii)The test direction is base on around 10°of vertical line.

    (iiii)Temperature: 25±5℃   Humidity: 60±10%RH
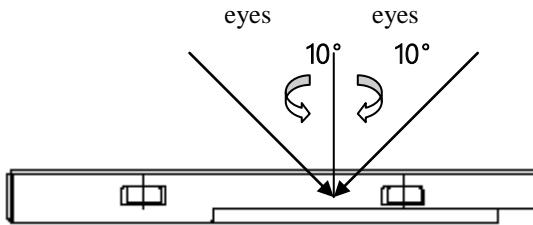
    (iv) Definition of area:
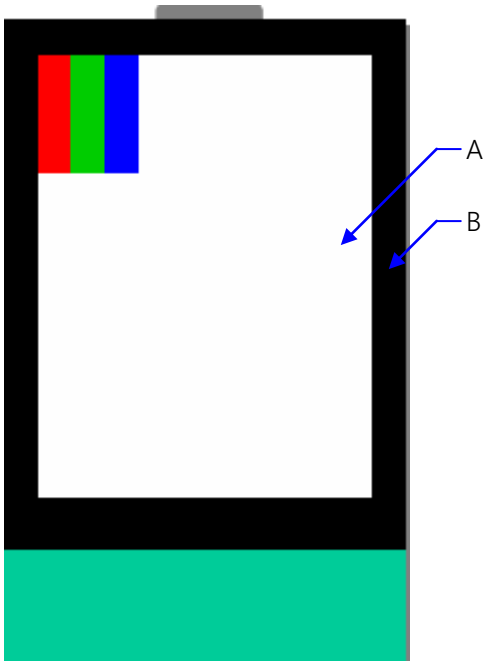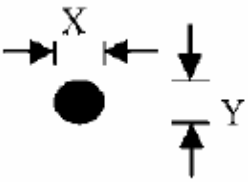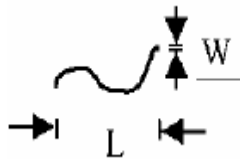
A.   Area: Viewing area.

B.   Area: Out of viewing area.

    (Outside viewing area)
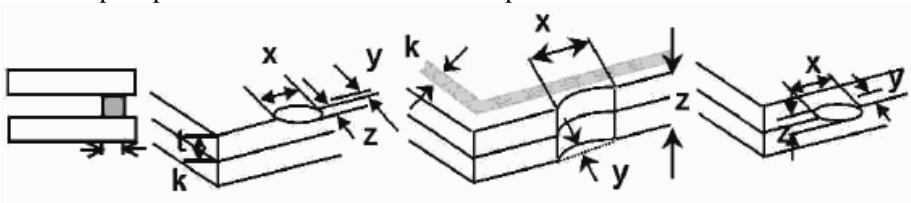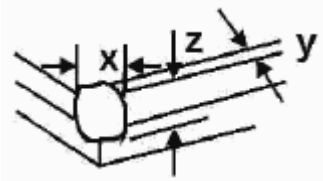
b. Basic principle:
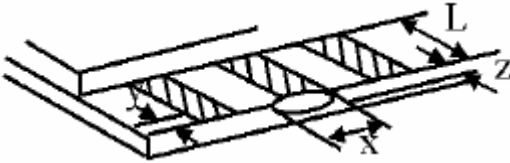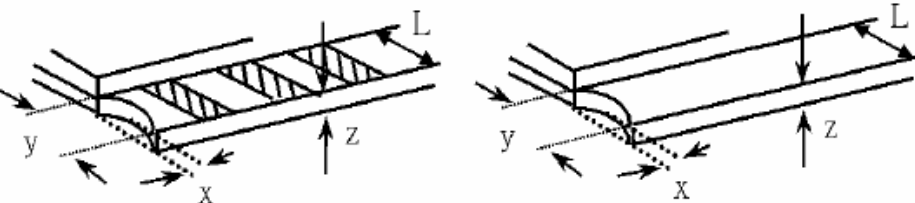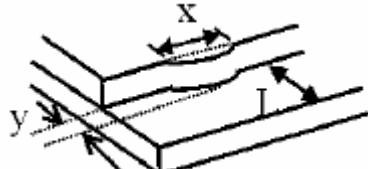
(i) It will accord to the AQL when the standard can not be described.

(ii) The sample of the lowest acceptable quality level must be discussed by both supplier and customer when any dispute happened.

(iii) Must add new item on time when it is necessary.

c. Standard of inspection: (Unit: mm)

10-6. Inspection specification
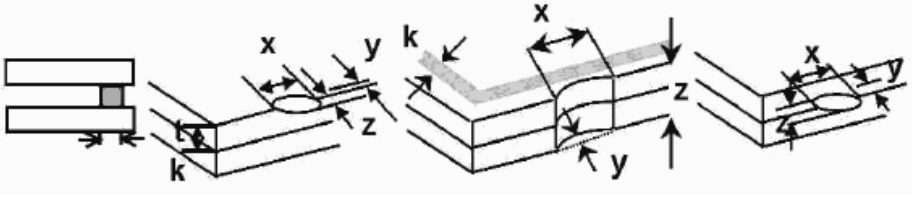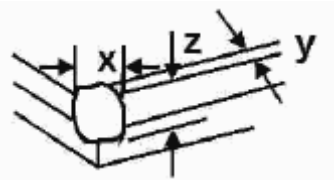
NO	Item	Criterion	AQL
01	Electrical Testing	1.1 Missing vertical, horizontal segment, segment contrast defect. 1.2 Missing character, dot or icon. 1.3 Display malfunction. 1.4 No function or no display. 1.5 Current consumption exceeds product specifications. 1.6 LCD viewing angle defect. 1.7 Mixed product 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 $\leqq0.25$mm, no more than Five 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 $\Phi = (X+Y) / 2$ <table><tr><td>Size(mm)</td><td>Acceptable Q'ty</td></tr><tr><td>$\Phi \leqq 0.10$</td><td>Accept no dense</td></tr><tr><td>$0.10< \Phi \leqq 0.20$</td><td>2</td></tr><tr><td>$0.20< \Phi \leqq 0.25$</td><td>2</td></tr><tr><td>$0.25< \Phi \leqq 0.30$</td><td>1</td></tr><tr><td>$0.30< \Phi$</td><td>0</td></tr></table>* Densely spaced: No more than two spots within 3mm. 3.2 Line type: (As following drawing) <table><tr><td>Length(mm)</td><td>Width(mm)</td><td>Acceptable Q'ty</td></tr><tr><td>---</td><td>$W \leqq 0.02$</td><td>Accept no dense</td></tr><tr><td>$L \leqq 3.0$</td><td>$0.02<W \leqq 0.05$</td><td rowspan="2">2</td></tr><tr><td>$L \leqq 2.5$</td><td>$0.03<W \leqq 0.08$</td></tr><tr><td>---</td><td>$0.08<W$</td><td>Rejection</td></tr></table>* Densely spaced: No more than two lines within 3mm.	**2.5** **2.5**
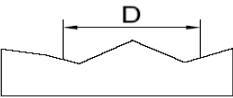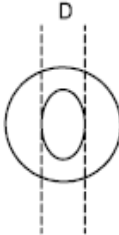
NO	Item	Criterion			AQL
04	Polarizer bubbles	If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction			2.5

Size Φ(mm)	Acceptable Q'ty
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

NO	Item	Criterion	AQL
05	Scratches	Follow NO.3 -2 Line Type.	
06	Chipped glass		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: <table><tr><td>y: Chip width</td><td>x: Chip length</td><td>z: Chip thickness</td></tr><tr><td>$y \leqq 0.5mm$</td><td>$x \leqq 1/8a$</td><td>$0 < z \leqq t$</td></tr></table> 7.2.2 Non-conductive portion: <table><tr><td>y: Chip width</td><td>x: Chip length</td><td>z: Chip thickness</td></tr><tr><td>$y \leqq L$</td><td>$x \leqq 1/8a$</td><td>$0 < z \leqq t$</td></tr></table> ⊙ 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 <table><tr><td>y: width</td><td>x: length</td></tr><tr><td>$y \leqq 1/3L$</td><td>$X \leqq a$</td></tr></table>	2.5

NO	Item	Criterion	AQL
08	Cracked glass	The LCD with extensive crack is not acceptable.	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	Bezel must comply with product specifications.	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	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.	2.5 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.	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: _(see table below)_ there are 2 or more chips, x is the total length of each chip 14.1.2 Corner crack: _(see table below)_ there are 2 or more chips, x is the total length of each chip	2.5

14.1.1

z: Chip thickness	y: Chip width	x: Chip length	
Z≦t	≦1/2 k and not over viewing area	x≦1/8a	⊙ Unit: mm ⊙ If

14.1.2

z: Chip thickness	y: Chip width	x: Chip length	
z≦t	≦1/2 k and not over viewing area	x≦1/8a	⊙ Unit: mm ⊙ If

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.	0.65 0.65 0.65 0.65

11. Packing method

--TBD