ORIENT DISPLAY
Your Total LCD Solution Provider
http://www.orientdisplay.com

SPECIFICATION
FOR
LCD MODULE

MODULE NO: AFK240400A0-3.2N6NTM
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
2015-9-26		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 resolution: Dots 240*RGBx400.

As to basic specification of the driver IC, refer to the IC (ST7793) data sheet.

1.2 Structure:

Structure: TFT Panel+Polarizer+IC+FPC+BL;

Full 262K Color 3.2 inch TFT Panel;

One bare chip with gold bump (COG) TECH;

White LED back light;

1.3 TFT features:

Transmissive Type LCD, normally white;

240 dot-source and 400 dot-gate outputs;

Optimum viewing direction:6 o'clock;

Support MCU and RGB interface mode;

1.4 Applications:

Mobile phone

PSP

PDA

GPS

Etc…

2. General specification

ITEM	Standard value	UNIT
Display Mode	Transmissive,Normally white	---
Driver Mothod	TFT Active matrix	
Number of Dots	240(RGB)*400	Dots
Pixel Arrangement	RGB Vertical Stripe	
Active Area	41.76*69.60	mm
Optimum Viewing Direction	6	o'clock
Gray Scale Inversion Direction	12	o'clock
Driver IC	ST7793	
Module Size(W*H*T)	48.40*81.50*2.77	mm
Approx. Weight	TBD	g
Back Light	White LED	
System interface	MCU & RGB	

3. Mechanical drawing

PIN DESCRIPTION

PIN NO	SYMBOL
1	FLM
2	GND
3	ENABLE
4	DOTCLK
5	VSYNC
6	GND
7	HSYNC
8	BS0
9	BS1
10	BS2
11	IOVCC
12	VCC
13	SDI
14	SDO
15	D17
16	D16
17	D15
18	D14
19	D13
20	D12
21	D11
22	D10
23	D9
24	D8
25	D7
26	D6
27	D5
28	D4
29	D3
30	D2
31	D1
32	D0
33	RESET
34	RD
35	WR/SCL
36	RS
37	CS
38	LEDK6
39	LEDK5
40	LEDK4
41	LEDK3
42	LEDK2
43	LEDK1
44	LEDA
45	LCM_ID

Display Type	TFT,NORMAL WHITE TRANSMISSIVE
Optimum Viewing Direction	6 O'CLOCK
LCD Driver IC	ST7793
Operating Voltage	IOVCC=1.8V; VCC=2.8V
Operating Temperature	-20°C TO 70°C
Storage Temperature	-30°C TO 80°C
Interface	18-BIT RGB/MCU
Backlight	6-CHIP WHITE LED
Surface luminance	400 cd/m² (TYP.)
White X/Y	

(Serial number, e.g. 1501001 means this product is from the 1st production lot during the year and produced in week01 of year 2015)

Height=0.4 MAX

Code printing

CON:FH26-45S-0.3SHW

LED CIRCUIT DIAGRAM
3.2V@120mA

LEDK1 LEDK2 LEDK3 LEDK4 LEDK5 LEDK6
LEDA

PULL TAPE
WHITE LINE
3.2"TFT
240RGB*400

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.

VER.	SYMBOL	AMENDMENT	SIGN	DATE		
V05		Update the label		2015.4.7A	DRAWN	
V04		Update the label		2015.4.3A	ME.CHECKED	
V03		Add the label		2015.3.30A	EE.CHECKED	
V02		Update the drawing		2015.3.2A	APPROVED	
V01		Improve the brightness		2015.3.2A	CUSTOMER'S APPROVAL	
V00		First issue		2015.2.6A		

TITLE: MODULE SPEC.

DRAWING NO. AFK240400A0-3.2N6NTM
UNIT mm   3rd Angle   SCALE FIT   SHEET 1 OF 1

ORIENT DISPLAY

4. BLOCK DIAGRAM

Connection with Host		Timing Controller with Memory		3.2″ TFT LCD Panel

VCC
IOVCC
GND
HSYNC
VSYNC
DOTCLK
ENABLE
D[0:17]
RS
CS
RD
WR/SCL
SDI
SDO
FLM
RESET
BS2
BS1
BS0

LED A
LED K1~K6

Timing Controller
with Memory

Driver IC

ST7793

S1

S720

G400

G1

3.2″
TFT LCD Panel
240(RGB)*400

BL Circuit(6-Die LED)

5. Interface Pin Function

Pin No.	Symbol	Description
1	FLM	Output a frame head pulse signal is used as synchronies MCU to frame rate. If not used, leave this pin open.
2	GND	Power ground.
3	ENABLE	Data enable signal for RGB interface operation. If not used, please fix this pin at VDDI or DGND level.
4	DOTCLK	Dot clock signal for RGB interface operation. If not used, please fix this pin at VDDI or DGND level.
5	VSYNC	Vertical (Frame) synchronizing input signal for RGB interface operation. Fix to the GND level when not in use.
6	GND	Power ground.
7	HSYNC	Horizontal (Line) synchronizing input signal for RGB interface operation. Fix to the VDDI or GND level when not in use.
8	BS0	
9	BS1	Interface mode select.
10	BS2	
11	IOVCC	Digital I/O Pad power supply.
12	VCC	Analog power supply.
13	SDI	SPI interface input pin. The data is latched on the rising edge of the SCL signal. If not used, please fix this pin at IOVCC or GND level.
14	SDO	SPI interface output pin. The data is outputted on the falling edge of the SCL signal. If not used, please fix this pin at floating.
15~32	D17~D0	Data bus.
33	RESET	This signal will reset the device and it must be applied to properly initialize the chip. Signal is active low.
34	RD	Read enable in 8080 MCU parallel interface. Low-active. If not used, please fix this pin at IOVCC or GND level.
35	WR/SCL	Write enable in MCU parallel interface. In SPI mode, this pin is used as SCL. If not used, please fix this pin at IOVCC level.
36	RS	Display data/command selection (RS) pin in MCU interface. RS=1: display data or parameter. RS=0: register index / command.

		If not used, please fix this pin at IOVCC or GND level.
37	CS	Chip selection pin. Low-active. If not used, please fix this pin at IOVCC level.
38	LEDK6	Cathode of LED backlight.
39	LEDK5	Cathode of LED backlight.
40	LEDK4	Cathode of LED backlight.
41	LEDK3	Cathode of LED backlight.
42	LEDK2	Cathode of LED backlight.
43	LEDK1	Cathode of LED backlight.
44	LEDA	Anode of LED backlight.
45	LCM_ID	Customer define PIN(default connect to IOVCC).

Note: Interface mode select:

BS2	BS1	BS0	Interface Mode	Data Pin
0	0	0	8080 18-bit interface	D[17:0]
0	0	1	8080 9-bit interface	D[17:9]
0	1	0	8080 16-bit interface	D[17:10],D[8:1]
0	1	1	8080 8-bit interface	D[17:10]
1	0	ID	SPI	SDI,SDO

When the SPI interface is selected, BS0 pin is used for the ID setting.

6. ABSOLUTE MAXIMUM RATINGS

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

7. ELECTRICAL CHARACTERISTICS

For IC

Item	Symbol	Min	Typ	Max	Unit	Applicable terminal
Supply voltage for logic	IOVCC	1.65	1.8	VCC	V	
Supply voltage for analog	VCC	2.5	2.75	3.3	V	
Input voltage	VIL	GND	–	0.2IOVCC	V	
	VIH	0.8IOVCC	–	IOVCC		
Input leakage current	I_{LKG}	-0.1		0.1	μA	

For backlight

Item	Symbol	Min	Typ	Max	Unit	Condition
Supply Current	I		120		mA	
Forward Voltage	V_{LED}	3.0	3.2	3.4	V	I=120mA
Power Consumption	P		384		mW	
Life Time		20000			Hours	Note

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

8. OPTICAL CHARACTERISTICS

ITEM		SYMBOL	CONDITIONS	SPECIFICATIONS			UNIT	NOTE
				MIN.	TYP.	MAX		
Brightness		B	Viewing normal angle	–	400	–	Cd/m^2	
Contrast Ratio		CR			350	––	––	
Response Time		Tr+Tf		––	20	30	ms	
CIE Color coordinate	Red	X_R		––				
		Y_R						
	Green	X_G		––				
		Y_G						
	Blue	X_B		––				
		Y_B						
	White	X_W		––				
		Y_W						
Viewing Angle	Hor.	θ_{X+}	Center CR>=10		70	––	Deg.	
		θ_{X-}			70	––		
	Ver.	θ_{Y+}			70	––		
		θ_{Y-}			60			
Uniformity		Un		80			%	

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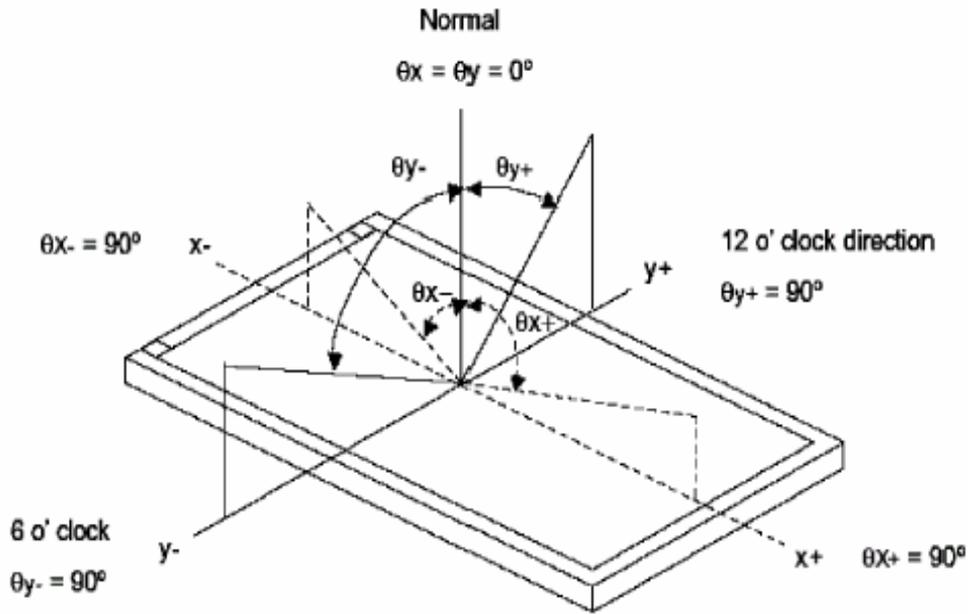
Note 2: Definition of contrast ratio CR:

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

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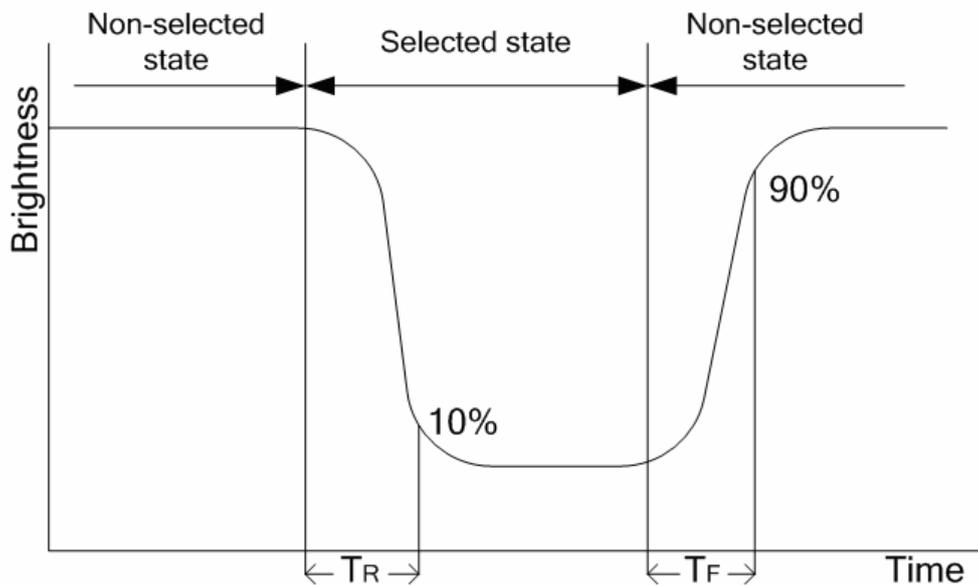
: The brightness test equipment setup
20mA   Field=2° (As measuring "black" image, field=2° is the best testing condition)

BM-7

Field = 2°

50 cm

TFT-LCD Panel

The center of the screen

Note 4 :

H/6

H/3

Active area

H/3

H

H/6

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

L

Active area

Unit: mm
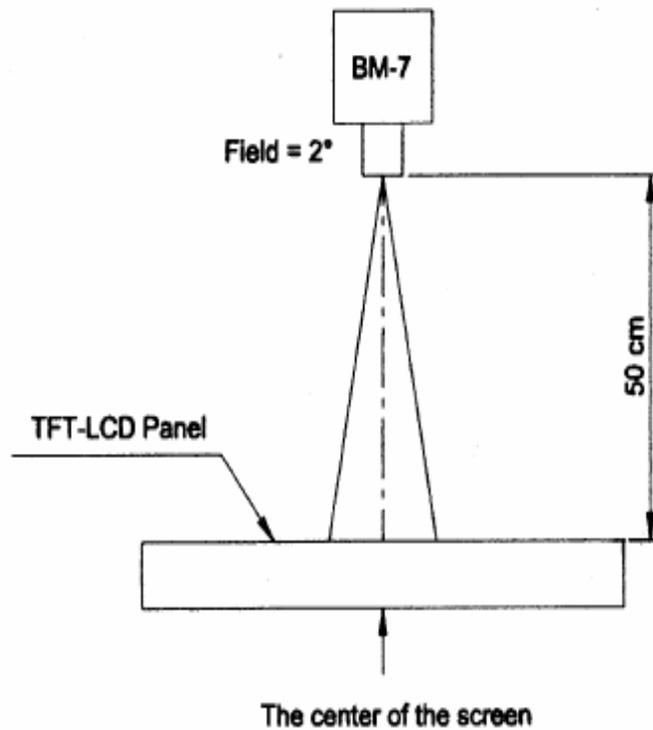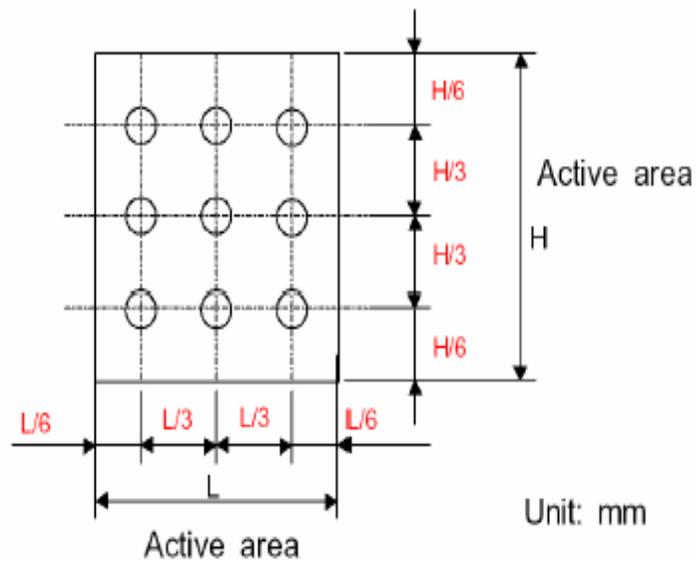
9. Timing characteristics
9.1 8080 series MCU parallel interface Characteristics:18/16/9/8-bit bus
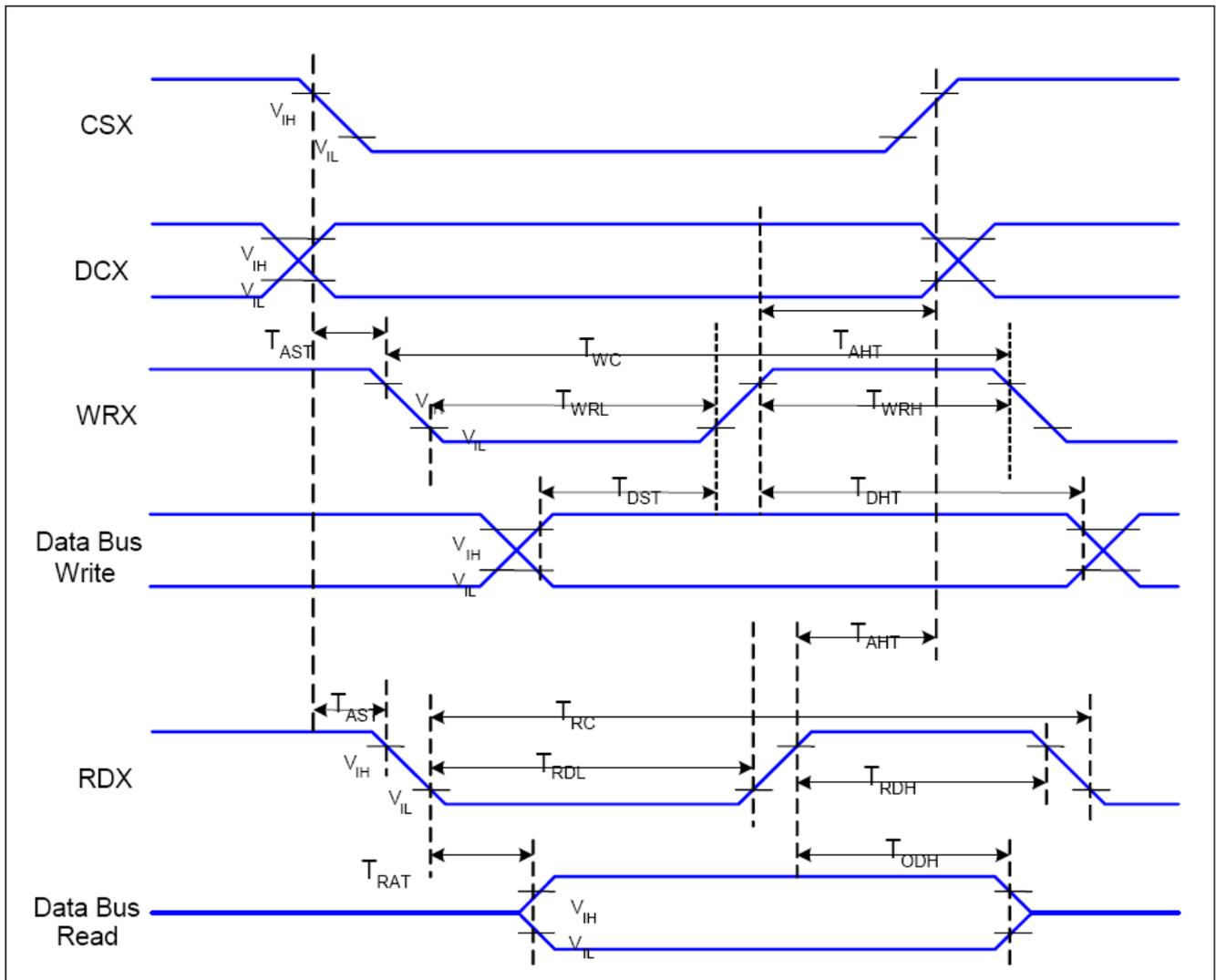
Figure 1. Parallel interface timing characteristics (8080-Series MCU)

IOVCC=1.65 to VCC,VCC=2.5 to 3.3V, AGND=DGND=0V,Ta=23℃

Signal	Symbol	Parameter	Min	Max	Unit	Description
DCX	TAST	Address Setup Time	0	--	ns	
	TAHT	Address Hold Time (Write/Read)	2	--	ns	
WRX	TWC	Write Cycle	75	--	ns	
	TWRH	Control Pulse "H" Duration	25	--	ns	
	TWRL	Control Pulse "L" Duration	30	--	ns	
RDX	TRC	Read Cycle (ID)	450	--	ns	When Read ID Data
	TRDH	Control Pulse "H" Duration (ID)	250	--	ns	
	TRDL	Control Pulse "L" Duration (ID)	170	--	ns	

Signal	Symbol	Parameter	Min	Max	Unit	Description
DB[17:0]	TDST	Data Setup Time	20	--	ns	TRAT, TRATFM: 3K ohm Pull up or Down and 30pF Parallel Cap. To GND. TODH: 3K ohm Pull up or Down.
	TDHT	Data Hold Time	10	--	ns	
	TRAT	Read Access Time (ID)	--	150	ns	
	TODH	Output Disable Time	10	--	ns	

Figure 2. 8080 parallel interface characteristics
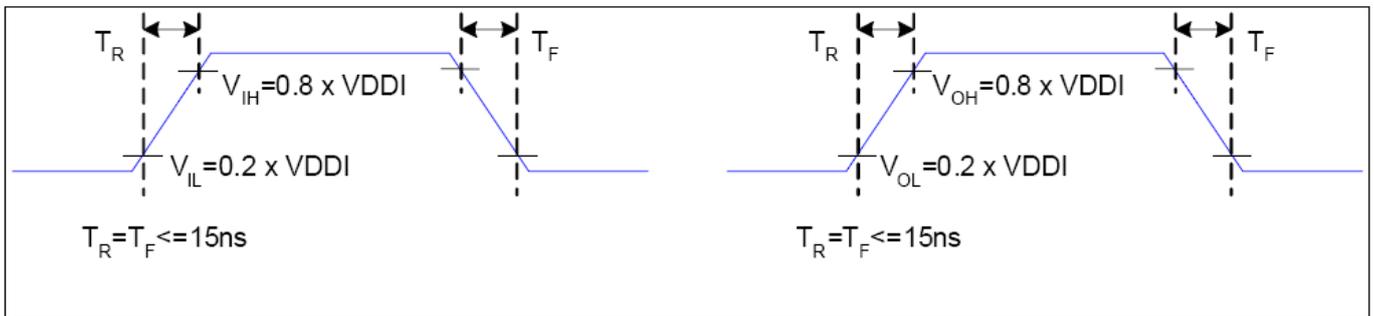
Figure 3. Rising and falling timing for I/O signal

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 20% and 80% of IOVCC for Input signals.

## 9.2 Serial Interface Characteristics
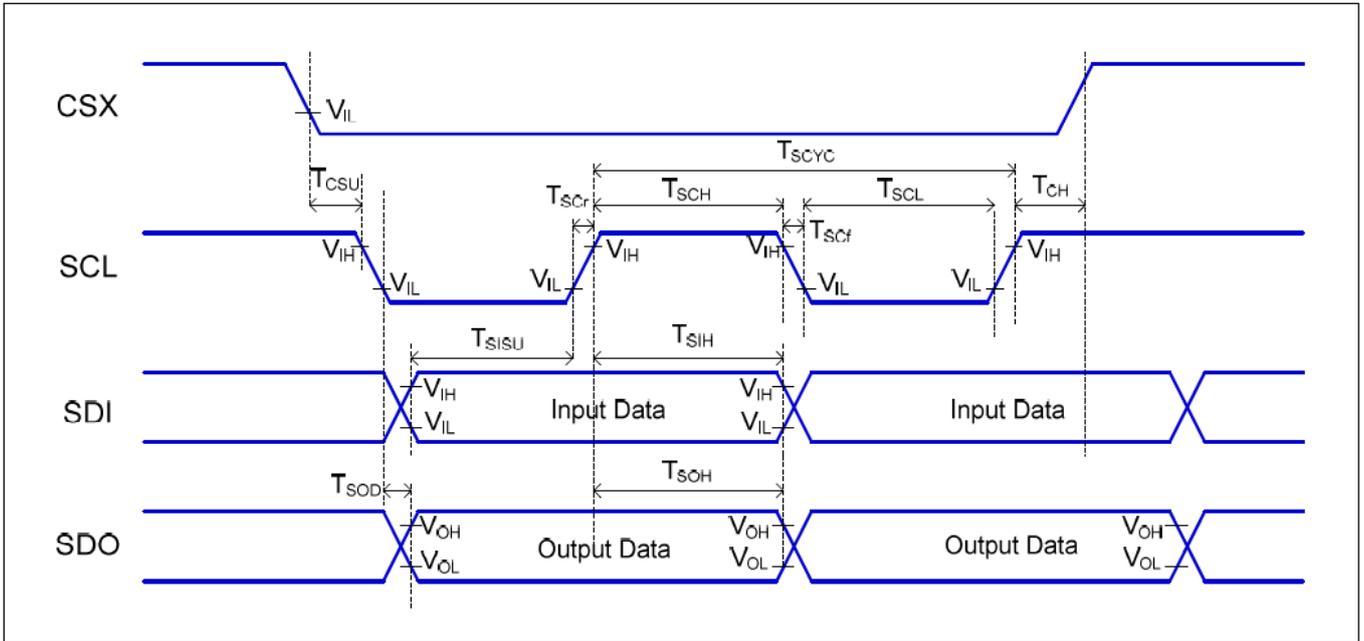
Figure 4. SPI interface timing Characteristics

IOVCC=1.65 to VCC, VCC=2.5 to 3.3V, AGND=DGND=0V, Ta=23℃

Signal	Symbol	Parameter	Min	Max	Unit	Description
CSX	TCSU	Chip Select Setup Time	20		ns	-
	TCH	Chip Select Hold Time	60		ns	
SCL	TSCH	SCL "H" pulse width (Write)	40		ns	
	TSCH	SCL "H" pulse width (Read)	150		ns	
	TSCYC	Serial clock cycle (Write)	100		ns	
	TSCYC	Serial clock cycle (Read)	350		ns	
	TSCL	SCL "L" pulse width (Write)	40		ns	
	TSCL	SCL "L" pulse width (Read)	150		ns	
SDI	TSISU	Serial Input Data Setup Time	30		ns	
	TSIH	Serial Input Data Hold Time	30		ns	
SDO	TSOD	Serial Output Data Setup Time	--	130	ns	
	TSOH	Serial Output Data Hold Time	10	--	ns	

**Figure 5. SPI interface Characteristics**

9.3 RGB Interface Characteristics
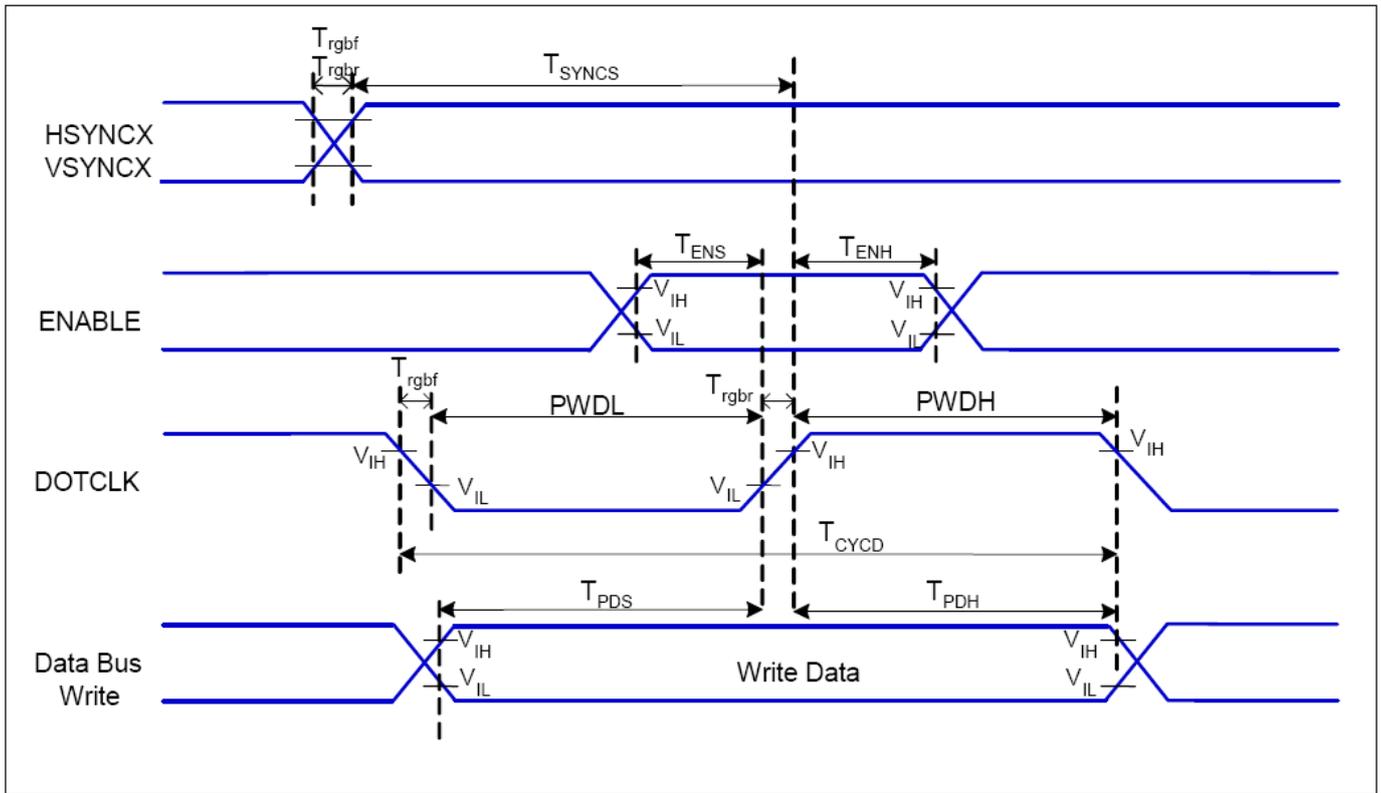
Figure 6. RGB Interface timing Characteristics

IOVCC=1.65 to VCC,VCC=2.5 to 3.3V, AGND=DGND=0V,Ta=23℃

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
HSYNCX VSYNCX	TSYNCS	VSYNC, HSYNC Setup Time	30	-	ns	
ENABLE	TENS	Enable Setup Time	30	-	ns	
	TENH	Enable Hold Time	30	-	ns	
DOTCLK	PWDH	DOTCLK High-level Pulse Width	40	-	ns	
	PWDL	DOTCLK Low-level Pulse Width	40	-	ns	
	TCYCD	DOTCLK Cycle Time	100	-	ns	
DB	TPDS	PD Data Setup Time	40	-	ns	
	TPDH	PD Data Hold Time	40	-	ns	

Figure 7. RGB Interface Characteristics

9.4 Reset input Timing
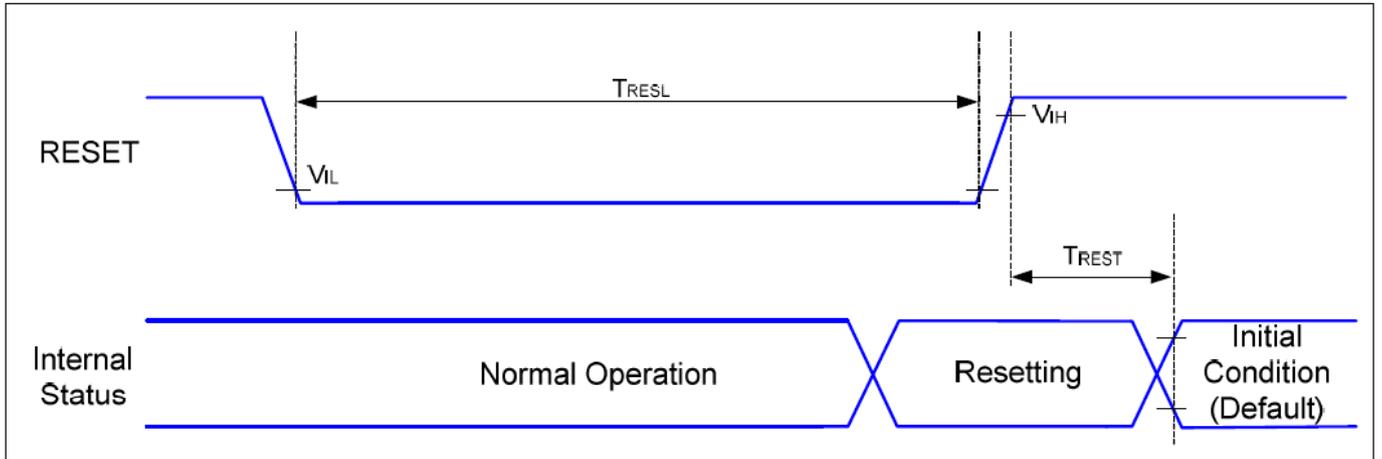
Figure 8. Reset Timing Characteristics

IOVCC=1.65 to VCC,VCC=2.5 to 3.3V, AGND=DGND=0V,Ta=23℃

Signal	Symbol	Parameter	Min	Max	Unit	Description
RESET	TRESL	Reset Low Level Width	1	-	ms	-
	TREST	Reset Complete Time	1		ms	

Figure 9. Reset Characteristics

10. Standard Specification for Reliability :

10‑1. 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 ISTA 1A 2001.
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

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 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.

10- 3. MTBF

MTBF	Functions, performance, appearance, etc. shall be free from remarkable deterioration within10,000 hours under ordinary operating and storage conditions room temperature $(25 \pm 5°C)$, normal humidity $(50 \pm 10\%$ RH$)$, and in area not exposed to direct sun light.

11. Specification of Quality Assurance:

11-1. Purpose

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

11-2. 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 (MASS PRODUCTION FAILURE RATE: 5000~7000PPM)

11-3. 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.

11-4. 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.

11-5. 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
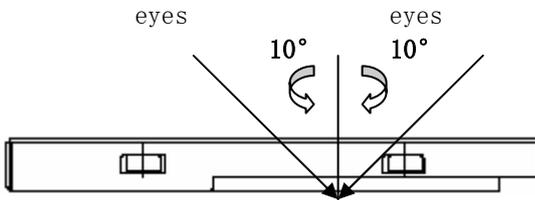
      (iv) Definition of area:
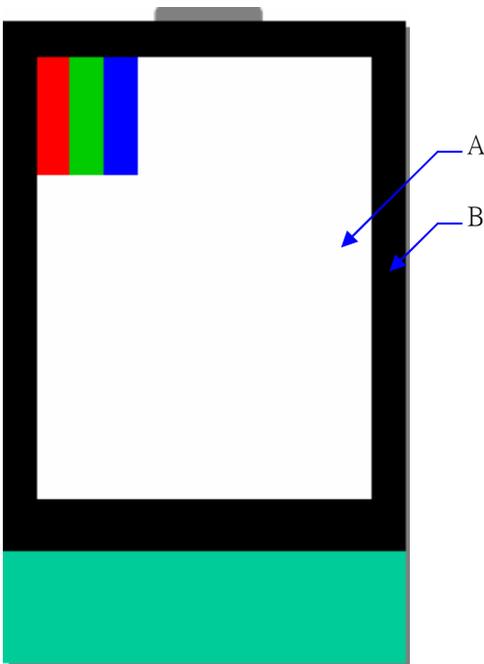
A. Area: Viewing area.
B. Area: Out of viewing area.
        (Outside viewing area)
 b. Basic principle:
  (i) It will accord to the AQL when the standard can not be described.
 (ii) The sample of the lowest acceptable quality level must be discussed by both supplier and
      customer when any dispute happened.
 (iii) Must add new item on time when it is necessary.

 c. Standard of inspection: (Unit: mm)

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 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 $\Phi = (X+Y) / 2$	2.5

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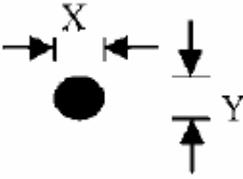
Size(mm)	Acceptable Q'ty
$\Phi \leqq 0.10$	Accept no dense
$0.10 < \Phi \leqq 0.20$	2
$0.20 < \Phi \leqq 0.25$	2
$0.25 < \Phi \leqq 0.30$	1
$0.30 < \Phi$	0

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

3.2 Line type: (As following drawing)
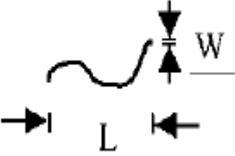
Length(mm)	Width(mm)	Acceptable Q'ty
---	$W \leqq 0.02$	Accept no dense
$L \leqq 3.0$	$0.02 < W \leqq 0.05$	2
$L \leqq 2.5$	$0.03 < W \leqq 0.08$	2
---	$0.08 < W$	Rejection

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

(AQL for 3.2: 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

For item 04, the criterion also includes a table:

Size Φ (mm)	Acceptable Q'ty
$\Phi \leq 0.20$	Accept no dense
$0.20 < \Phi \leq 0.50$	3
$0.50 < \Phi \leq 1.00$	2
$1.00 < \Phi$	0
Total Q'ty	3

NO	Item	Criterion	AQL
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:	2.5
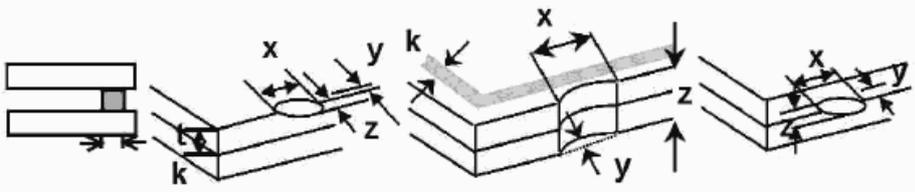
z: Chip thickness	y: Chip width	x: Chip length
$Z \leq 1/2t$	Not over viewing area	$x \leq 1/8a$
$1/2t < z \leq 2t$	Not exceed $1/3k$	$x \leq 1/8a$

⊙ 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
$Z \leq 1/2t$	Not over viewing area	$x \leq 1/8a$
$1/2t < z \leq 2t$	Not exceed $1/3k$	$x \leq 1/8a$

⊙ 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
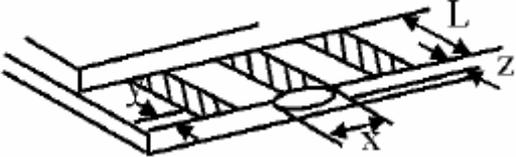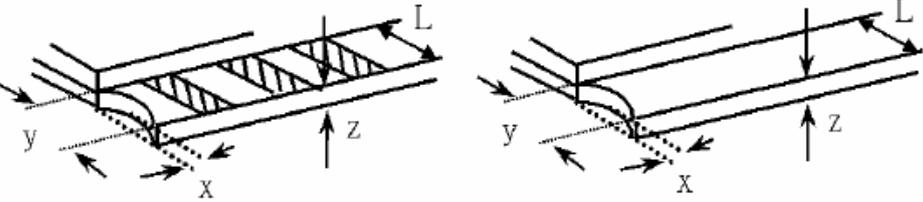
NO	Item	Criterion	AQL
08	Cracked glass	The LCD with extensive crack is not acceptable.	2.5
09	Backlight elements	9.1 Illumination source flickers when lit. 9.2 Spots or scratches that appear when lit must be judged. Using LCD spot, lines and contamination standards. 9.3 Backlight doesn't light or color 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: ⊙ Unit: mm ⊙ If there are 2 or more chips, x is the total length of each chip 14.1.2 Corner crack: 	2.5

14.1.1 table:

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

14.1.2 table:
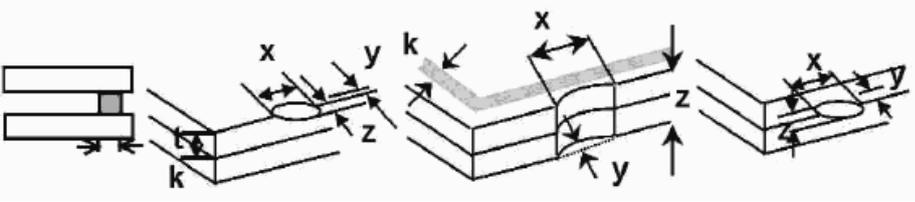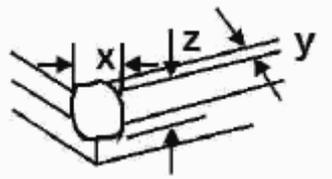
z: Chip thickness	y: Chip width	x: Chip length
z≦t	≦1/2 k and not over viewing area	x≦1/8a

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

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

12. Handling Precaution:

12-1 Handling of LCM

- Don't give external shock.
- Don't apply excessive force on the surface.
- Liquid in LCD is hazardous substance. Must not lick and swallow.
  when the liquid is attach to your hand, skin, cloth etc.
  Wash it out thoroughly and immediately.
- Don't operate it above the absolute maximum rating.
- Don't disassemble the LCM.
- The operators should be grounded 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 care when
    peeling off this protective film since static electricity may be generated.

12-2 Storage

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

11-3 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