



Your Total LCD Solution Provider

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SPECIFICATION FOR LCD MODULE

**MODULE NO: AFK480800A0-4.3INTM
REVISION NO: V02**

Customer's Approval:

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

Records of Revision

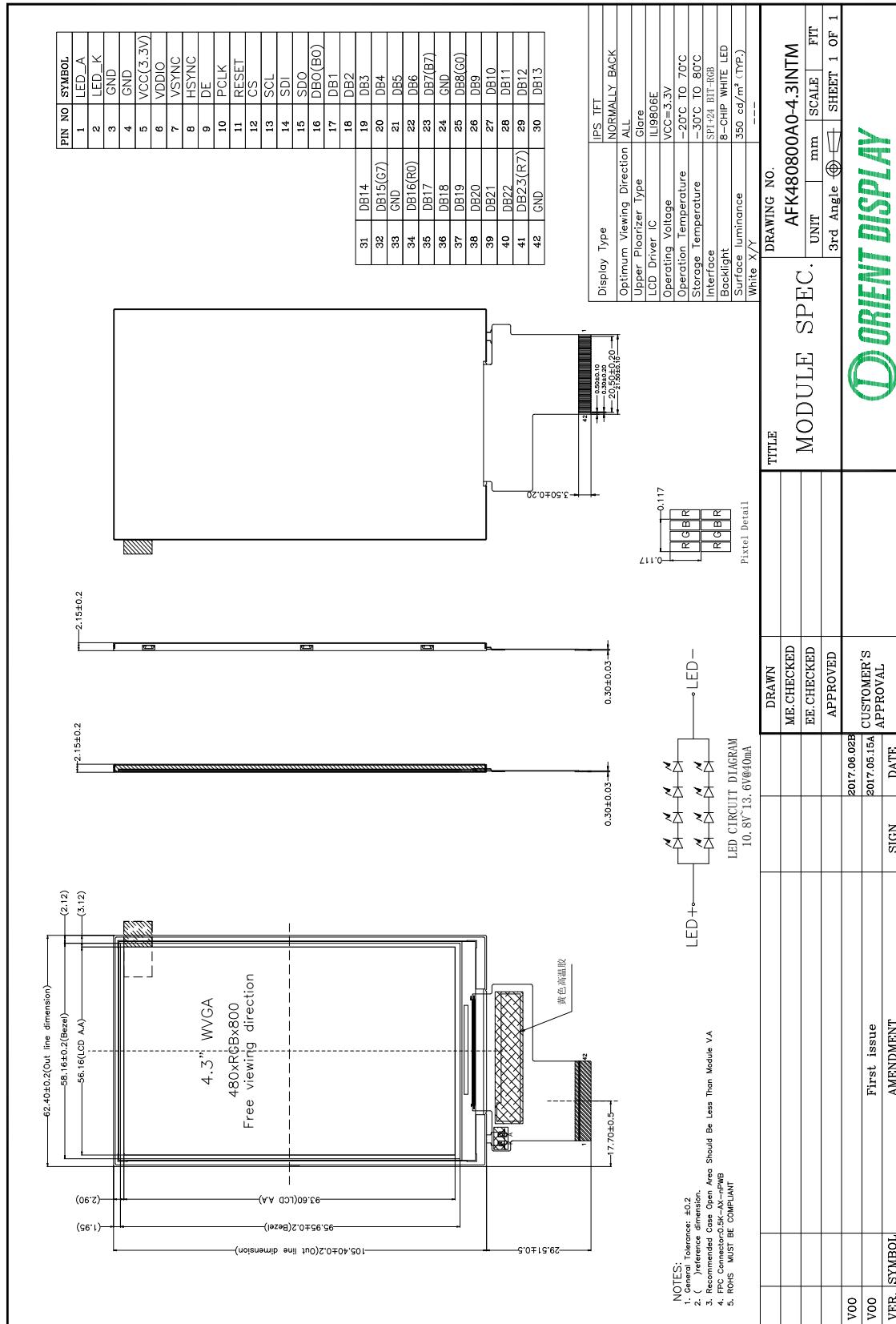
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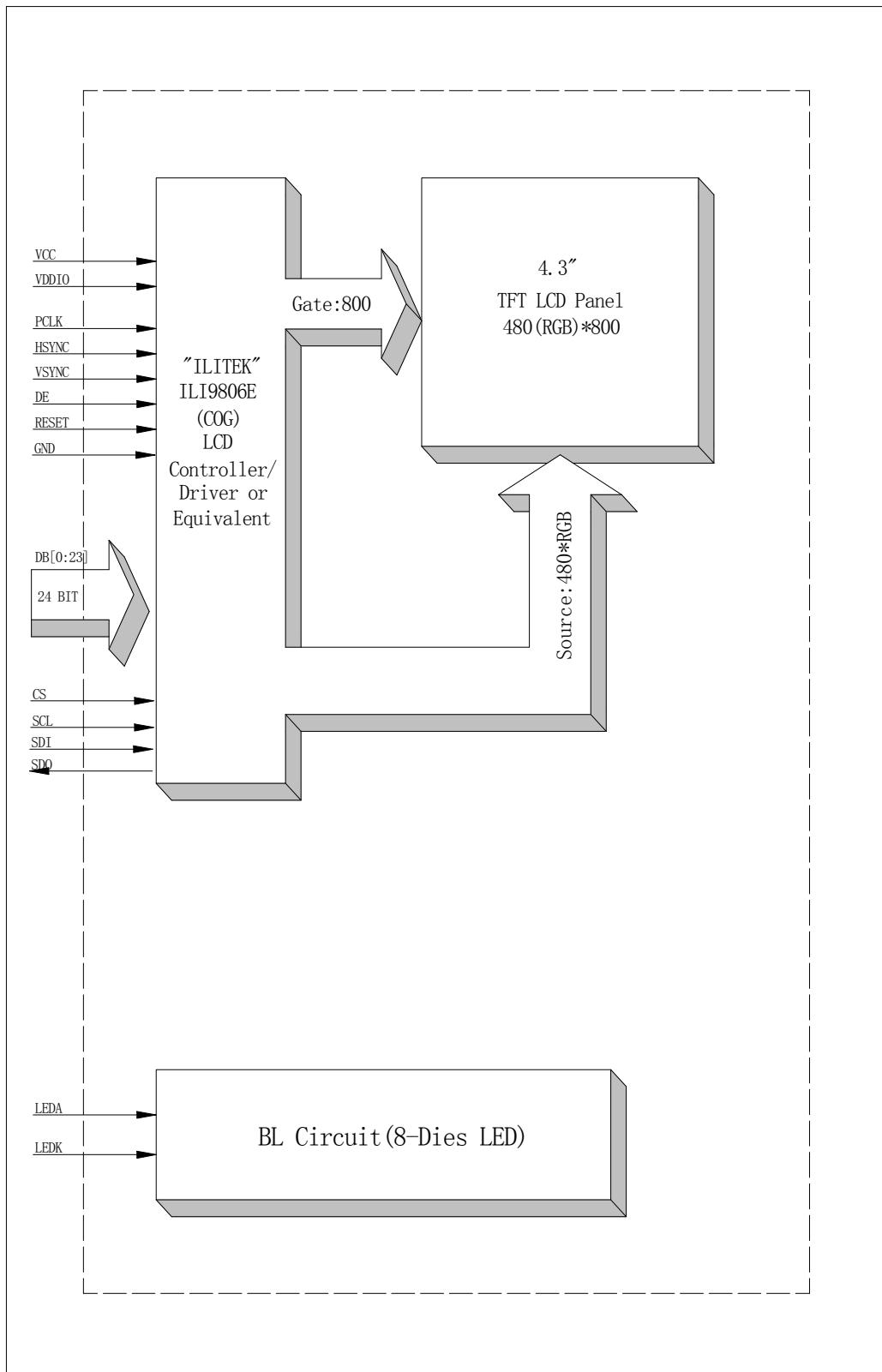
1. General Specification

Item	Contents	Unit
LCD TYPE	TFT/TRANSMISSIVE	
MODULE SIZE (W*H*T)	62.40*105.40*2.15	MM
ACTIVE SIZE (W*H)	56.16*93.60	MM
PIXEL PITCH (W*H)	0.117*0.117	MM
NUMBER OF DOTS	480*800	
DIVER IC	ILI9806E	
INTERFACE TYPE	SPI+24 BIT RGB	
TOP POLARIZER TYPE	GLARE	
RECOMMEND VIEWING DIRECTION	ALL	O'CLOCK
GRAY SCALE INVERSION DIRECTION	-	O'CLOCK
BACKLIGHT TYPE	8-LED WHITE	
TOUCH PANEL TYPE	WITHOUT	

2. Mechanical Drawing



3. Block Diagram



4. Interface Pin Function

Pin No.	Symbol	Description
1	LEDA	Anode of LED back light
2	LEDK	Cathode of LED back light
3	GND	Power ground
4	GND	Power voltage
5	VCC(3.3V)	Power supply
6	VDDIO	Power supply
7	VSYNC	Vertical sync signal
8	HSYNC	Horizontal sync signal
9	DE	Data enable
10	PCLK	Pixel clock
11	RESET	Reset pin
12	CS	Chip select signal input terminal, active at "L"
13	SCL	Serial clock
14	SDI	Serial data input pin
15	SDO	Serial data output pin
16	DB0(B0)	Blue data(LSB)
17	DB1	Blue data
18	DB2	Blue data
19	DB3	Blue data
20	DB4	Blue data
21	DB5	Blue data
22	DB6	Blue data
23	DB7(B7)	Blue data(MSB)
24	GND	Power ground
25	DB8(G0)	Green data (LSB)
26	DB9	Green data
27	DB10	Green data
28	DB11	Green data
29	DB12	Green data
30	DB13	Green data
31	DB14	Green data
32	DB15(G7)	Green data(MSB)
33	GND	Power ground
34	DB16(R0)	Red data(LSB)
35	DB17	Red data
36	DB18	Red data
37	DB19	Red data
38	DB20	Red data
39	DB21	Red data
40	DB22	Red data

41	DB23(R7)	Red data(MSB)
42	GND	Power ground

5. Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply voltage for analog	VCC	-0.3	6.0	V
Supply voltage for logic	VDDIO	-0.3	4.5	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	2.5	3.8	3.6	V	
Supply Voltage for Logic	VDDIO	1.65	1.8	3.6	V	
Input Voltage	V _{IL}	-0.3	-	0.3VDDI _O	V	
	V _{IH}	0.7 VDDIO	-	VDDIO		
Input leakage Current	I _{LKG}	-1		1	µA	

6.2 Backlight Driving Conditions

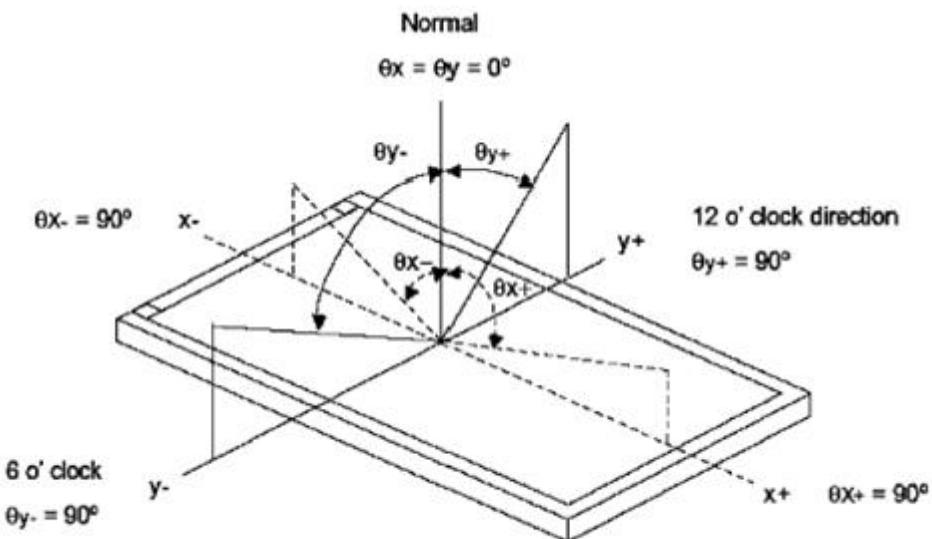
Item	Symbol	Value			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED Backlight	V _F	11.2	12.8	13.6	V	I _L =40mA
Current for LED Backlight	I _L		40		mA	
Power Consumption	P		0.512		W	
LED Life Time		30,000	50,000		Hr	Note

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

7. Optical Characteristics

ITEM	SYMBOL	CONDITIONS	SPECIFICATIONS			UNIT	NOTE
			MIN	TYP.	MAX		
Luminance	L	$I_L = 40\text{mA}$	310	350	390	cd/m^2	
Contrast Ratio	CR	$\theta = 0^\circ$	650	800			
Response Time	T_{ON}	25°C		35	40	ms	
	T_{OFF}						
CIE Color Coordinate	Red	X_R	Viewing normal angle	0.601	0.621	0.641	
		Y_R		0.324	0.344	0.364	
	Green	X_G		0.311	0.331	0.351	
		Y_G		0.593	0.613	0.633	
	Blue	X_B		0.120	0.140	0.160	
		Y_B		0.053	0.073	0.093	
	White	X_w		0.277	0.297	0.317	
		Y_w		0.319	0.339	0.359	
Viewing Angle	Hor.	θ_{X+}	CR ≥ 10	70	80		Degree
		θ_{X-}		70	80		
	Ver.	θ_{Y+}		70	80		
		θ_{Y-}		70	80		
Uniformity	Un			80			%

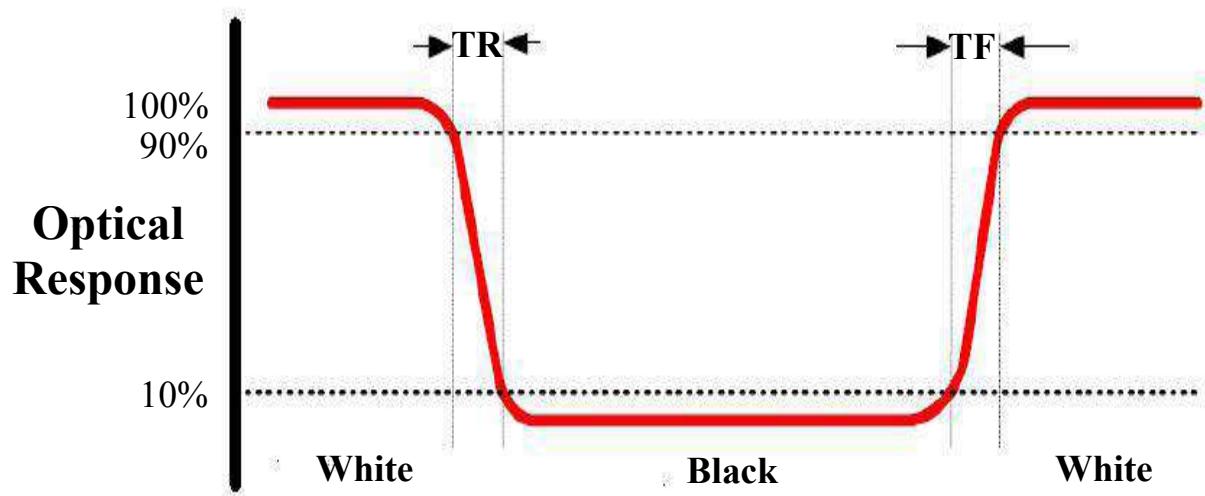
Note 1: Definition of Viewing Angle θ_x and θ_y :



Note 2: Definition of contrast ratio CR:

$$CR = \frac{\text{Luminance of white state}}{\text{Luminance of black state}}$$

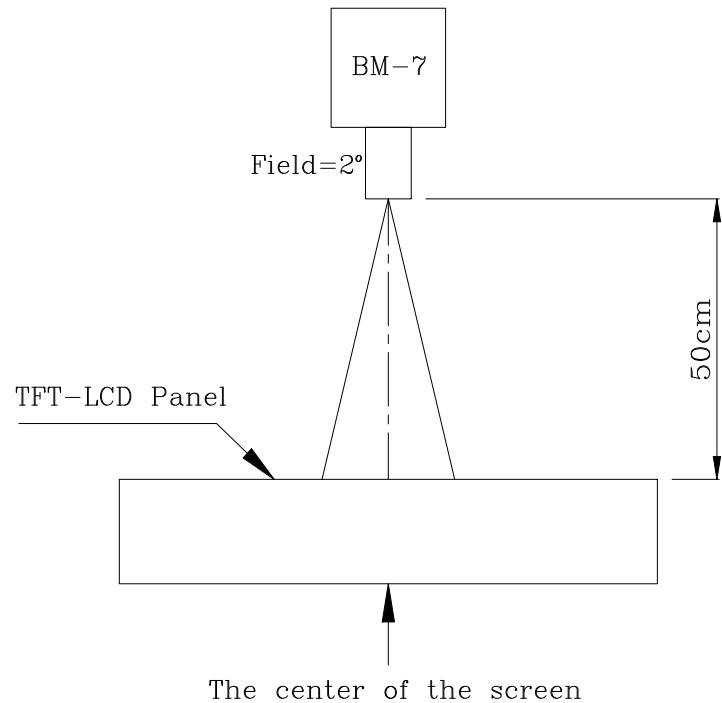
Note 3: Definition of Response Time(Tr,Tf)



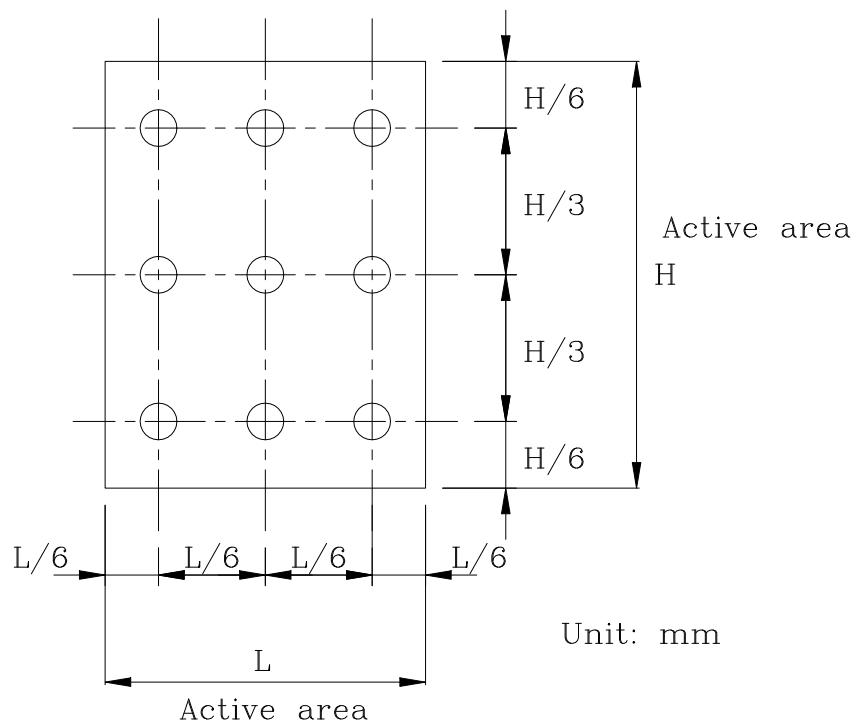
Note 4: Definition of Luminance

① The Brightness Test Equipment Setup

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

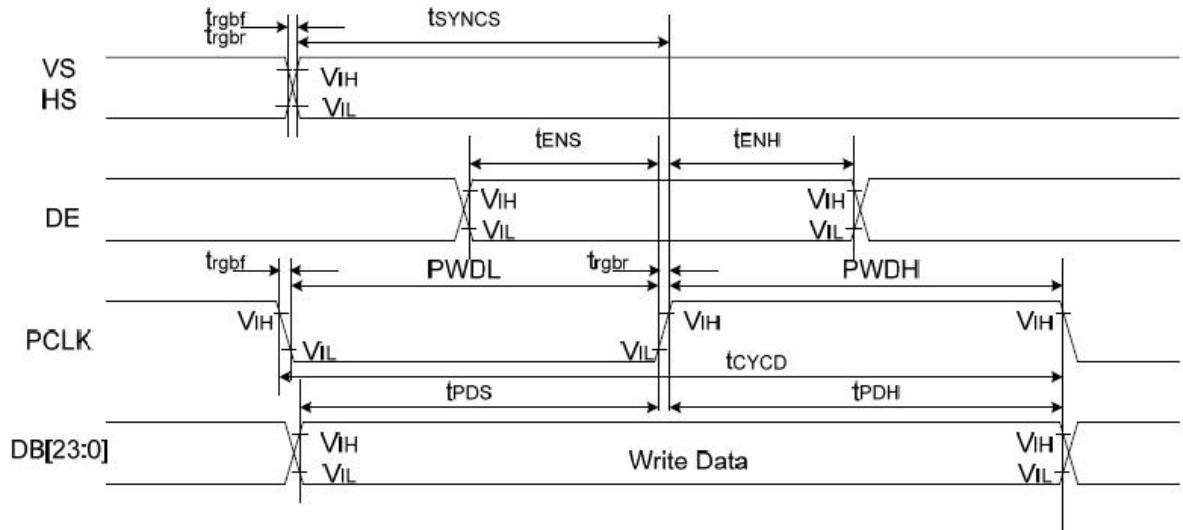


② The Brightness Test Point Setup



8. Timing Characteristics

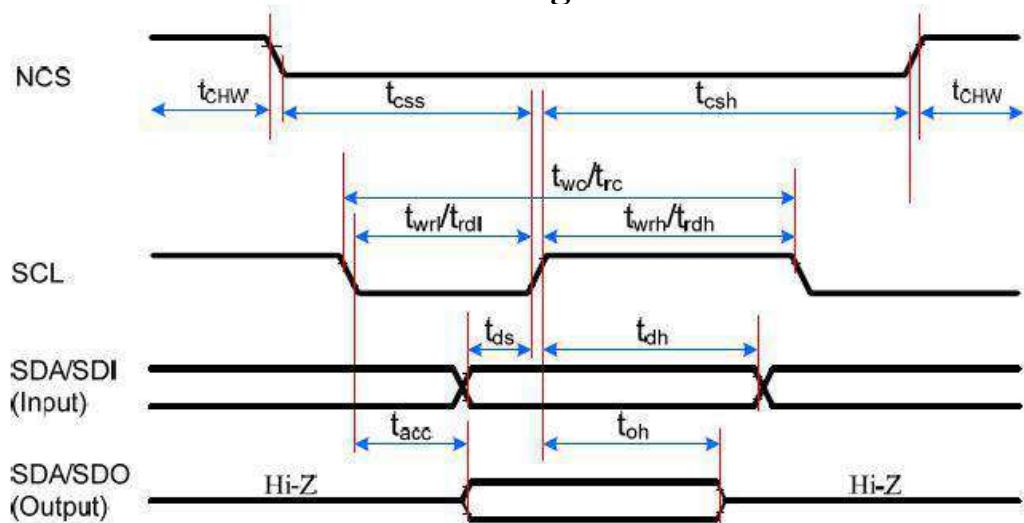
8.1 Parallel RGB Mode Characteristics



Signal	Symbol	Parameter	min	max	Unit	Description
VS/ HS	t_{SYNCS}	VS/HS setup time	5	-	ns	24/18/16-bit bus RGB interface mode
	t_{SYNCH}	VS/HS hold time	5	-	ns	
DE	t_{ENS}	DE setup time	5	-	ns	24/18/16-bit bus RGB interface mode
	t_{ENH}	DE hold time	5	-	ns	
DB[23:0]	t_{PDS}	Data setup time	5	-	ns	24/18/16-bit bus RGB interface mode
	t_{PDH}	Data hold time	5	-	ns	
PCLK	t_{PWDH}	PCLK high-level period	13	-	ns	24/18/16-bit bus RGB interface mode
	t_{PWDL}	PCLK low-level period	13	-	ns	
	t_{CYCD}	PCLK cycle time	28	-	ns	
	t_{RGBR}, t_{RGBF}	PCLK,HS,VS rise/fall time	-	15	ns	

Note: $T_a = -30$ to 70 °C, $IOVCC=1.65V$ to $3.6V$, $VCI=2.5V$ to $3.6V$, $DGND=0V$

8.2 3-Line SPI Serial interface Timing Characteristics



Signal	Symbol	Parameter	min	max	Unit	Description
CSX	tcss	Chip select time (Write)	15	-	ns	
	tcsh	Chip select hold time (Read)	15	-	ns	
	tc _{HW}	CS "H" pulse width	40	-	ns	
SCL	t _{WC}	Serial clock cycle (Write)	30	-	ns	
	t _{WRH}	SCL "H" pulse width (Write)	10	-	ns	
	t _{WRl}	SCL "L" pulse width (Write)	10	-	ns	
	t _{RC}	Serial clock cycle (Read)	150	-	ns	
	t _{RDH}	SCL "H" pulse width (Read)	60	-	ns	
	t _{RDl}	SCL "L" pulse width (Read)	60	-	ns	
SDA/SDO (Output)	t _{acc}	Access time (Read)	10	100	ns	For maximum CL=30pF For minimum CL=8pF
	t _{oh}	Output disable time (Read)	15	100	ns	
SDA/SDI (Input)	t _{ds}	Data setup time (Write)	10	-	ns	
	t _{dh}	Data hold time (Write)	10	-	ns	

9. Standard Specification for Reliability

9.1 Standard Specification for Reliability of LCD Module

No.	Item	Description	Remarks
01	High temperature operation	The sample should be allowed to stand at 70°C 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°C 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°C 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°C 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°C,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°C for 30 minutes → normal temperature for 5 minutes → +80°C 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: $\pm 4\text{KV}$ 150pF/330Ω 5 times	IEC61000-4-2 GB/T17626.2-1998
		Contact: $\pm 2\text{KV}$ 150pF/330Ω 5 time	

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.

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 ($25\pm5^{\circ}\text{C}$), normal humidity ($50\pm10\%$ RH), and in area not exposed to direct sun light.
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10. Specification of Quality Assurance

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

10.1 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.

10.2 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

10.3 Non-conforming Analysis & Deal With Manners

10.3.1 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.

10.3.2 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.

10.4 Agreement items

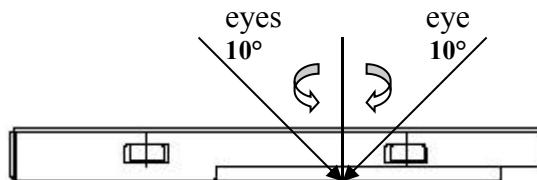
Both parties should negotiate together when the following problems happen.

- 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.

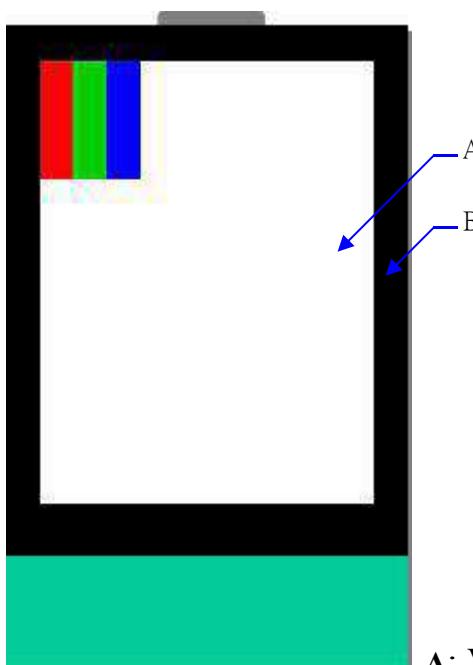
10.5 Standard of The Product Appearance Test

10.5.1 Manner of appearance test

- The test must be under $20W \times 2$ or $40W$ fluorescent light, and the distance of view must be at $30\pm 5\text{cm}$.
- When test the model of transmissive product must add the reflective plate.
- The test direction is base on around 10° of vertical line.
- Temperature: $25\pm 5^\circ\text{C}$ Humidity: $60\pm 10\%\text{RH}$



- Definition of area:

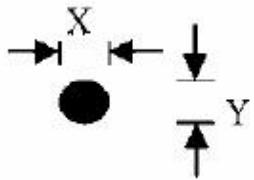
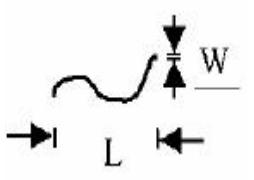


A: Viewing area B: Outside viewing area

10.5.2 Basic principle

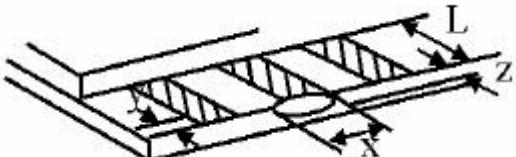
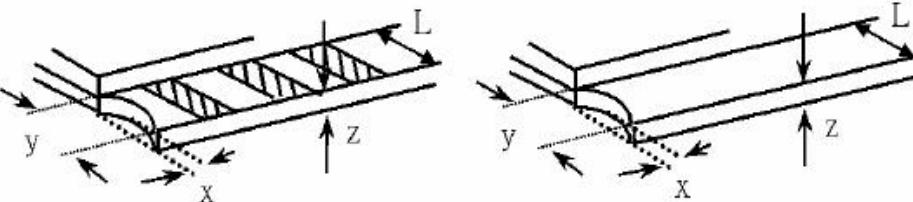
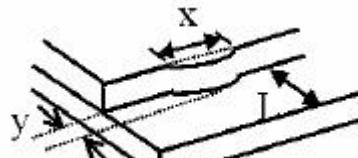
- When the standard can not be described, AQL will be applied.
- The sample of the lowest acceptable quality level must be negotiated by both supplier and customer when any dispute happened.
- New item must be added on time when it is necessary.

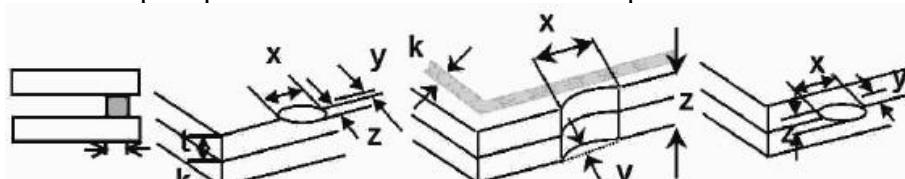
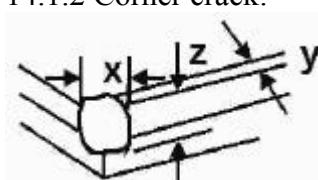
10.6 Inspection Specification

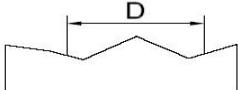
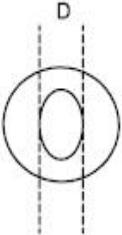
NO.	Item	Criterion	AQL																										
01	Electrical Testing	<p>1.1 Missing vertical, horizontal segment, segment contrast defect.</p> <p>1.2 Missing character, dot or icon.</p> <p>1.3 Display malfunction.</p> <p>1.4 No function or no display.</p> <p>1.5 Current consumption exceeds product specifications.</p> <p>1.6 LCD viewing angle defect.</p> <p>1.7 Mixed product types.</p> <p>1.8 Flicker</p>	0.65																										
02	Black or White spots or Bright spots or Color spots on LCD (Display only)	<p>2.1 White and black or color spots on display $\leq 0.25\text{mm}$, no more than Five spots.</p> <p>2.2 Densely spaced: No more than three spots within 3mm.</p>	2.5																										
03	LCD and Touch Panel black spots, white spots, contamination (non – display)	<p>3.1 Round type: As following drawing $\Phi = (X+Y) / 2$</p>  <table border="1"> <thead> <tr> <th>Size(mm)</th> <th>Acceptable Q'ty</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.10$</td> <td>Accept no dense</td> </tr> <tr> <td>$0.10 < \Phi \leq 0.20$</td> <td>2</td> </tr> <tr> <td>$0.20 < \Phi \leq 0.25$</td> <td>2</td> </tr> <tr> <td>$0.25 < \Phi \leq 0.30$</td> <td>1</td> </tr> <tr> <td>$0.30 < \Phi$</td> <td>0</td> </tr> </tbody> </table> <p>* Densely spaced: No more than two spots within 3mm.</p> <p>3.2 Line type: (As following drawing)</p>  <table border="1"> <thead> <tr> <th>Length(mm)</th> <th>Width(mm)</th> <th>Acceptable Q'ty</th> </tr> </thead> <tbody> <tr> <td>---</td> <td>$W \leq 0.02$</td> <td>Accept no dense</td> </tr> <tr> <td>$L \leq 3.0$</td> <td>$0.02 < W \leq 0.05$</td> <td rowspan="2">2</td> </tr> <tr> <td>$L \leq 2.5$</td> <td>$0.03 < W \leq 0.08$</td> </tr> <tr> <td>---</td> <td>$0.08 < W$</td> <td>Rejection</td> </tr> </tbody> </table> <p>* Densely spaced: No more than two lines within 3mm.</p>	Size(mm)	Acceptable Q'ty	$\Phi \leq 0.10$	Accept no dense	$0.10 < \Phi \leq 0.20$	2	$0.20 < \Phi \leq 0.25$	2	$0.25 < \Phi \leq 0.30$	1	$0.30 < \Phi$	0	Length(mm)	Width(mm)	Acceptable Q'ty	---	$W \leq 0.02$	Accept no dense	$L \leq 3.0$	$0.02 < W \leq 0.05$	2	$L \leq 2.5$	$0.03 < W \leq 0.08$	---	$0.08 < W$	Rejection	2.5
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---	$0.08 < W$	Rejection																											

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																	
			$\Phi \leq 0.20$	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																	
05	Scratches	Follow NO.3 -2 Line Type.																			
06	Chipped glass	<p>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:</p> <table border="1"> <tr> <td>z: Chip thickness</td> <td>y: Chip width</td> <td>x: Chip length</td> </tr> <tr> <td>$Z \leq 1/2t$</td> <td>Not over viewing area</td> <td>$x \leq 1/8a$</td> </tr> <tr> <td>$1/2t < z \leq 2t$</td> <td>Not exceed $1/3k$</td> <td>$x \leq 1/8a$</td> </tr> </table> <p>Unit: mm If there are 2 or more chips, x is the total length of each chip</p> <p>6.1.2 Corner crack:</p> <table border="1"> <tr> <td>z: Chip thickness</td> <td>y: Chip width</td> <td>x: Chip length</td> </tr> <tr> <td>$Z \leq 1/2t$</td> <td>Not over viewing area</td> <td>$x \leq 1/8a$</td> </tr> <tr> <td>$1/2t < z \leq 2t$</td> <td>Not exceed $1/3k$</td> <td>$x \leq 1/8a$</td> </tr> </table> <p>Unit: mm If there are 2 or more chips, x is the total length of each chip</p>	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 $1/3k$	$x \leq 1/8a$	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 $1/3k$	$x \leq 1/8a$	2.5
z: Chip thickness	y: Chip width	x: Chip length																			
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$1/2t < z \leq 2t$	Not exceed $1/3k$	$x \leq 1/8a$																			

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 \leq 1/2 FPC terminal width and can not affect the function , we judge accept. 12.2 FPC alignment hole damage \leq 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																
07	Glass crack	<p>Symbols: x: Chip length y: Chip width z: Chip thickness k: Seal width t: Glass thickness a: LCD side length L: Electrode pad length</p> <p>7.2 Protrusion over terminal: 7.2.1 Chip on electrode pad:</p>  <table border="1"> <tr> <td>y: Chip width</td> <td>x: Chip length</td> <td>z: Chip thickness</td> </tr> <tr> <td>$y \leq 0.5\text{mm}$</td> <td>$x \leq 1/8a$</td> <td>$0 < z \leq t$</td> </tr> </table> <p>7.2.2 Non-conductive portion:</p>  <table border="1"> <tr> <td>y: Chip width</td> <td>x: Chip length</td> <td>z: Chip thickness</td> </tr> <tr> <td>$y \leq L$</td> <td>$x \leq 1/8a$</td> <td>$0 < z \leq t$</td> </tr> </table> <p>④ If there chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications. ④ If the product will be heat sealed by the customer, the alignment mark must not be damaged.</p> <p>7.2.3 Substrate protuberance and internal crack</p>  <table border="1"> <tr> <td>y: width</td> <td>x: length</td> </tr> <tr> <td>$y \leq 1/3L$</td> <td>$X \leq a$</td> </tr> </table>	y: Chip width	x: Chip length	z: Chip thickness	$y \leq 0.5\text{mm}$	$x \leq 1/8a$	$0 < z \leq t$	y: Chip width	x: Chip length	z: Chip thickness	$y \leq L$	$x \leq 1/8a$	$0 < z \leq t$	y: width	x: length	$y \leq 1/3L$	$X \leq a$	2.5
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$y \leq 1/3L$	$X \leq a$																		

NO.	Item	Criterion	AQL												
14	Touch Panel Chipped glass	<p>Symbols:</p> <p>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</p> <p>14.1 General glass chip:</p> <p>14.1.1 Chip on panel surface and crack between panels:</p>  <table border="1" data-bbox="444 763 1254 965"> <tr> <td>z: Chip thickness</td> <td>y: Chip width</td> <td>x: Chip length</td> </tr> <tr> <td>$z \leq t$</td> <td>$\leq 1/2 k$ and not over viewing area</td> <td>$x \leq 1/8a$</td> </tr> </table> <p>④ Unit: mm ④ If there are 2 or more chips, x is the total length of each chip</p> <p>14.1.2 Corner crack:</p>  <table border="1" data-bbox="444 1347 1254 1572"> <tr> <td>z: Chip thickness</td> <td>y: Chip width</td> <td>x: Chip length</td> </tr> <tr> <td>$z \leq t$</td> <td>$\leq 1/2 k$ and not over viewing area</td> <td>$x \leq 1/8a$</td> </tr> </table> <p>④ Unit: mm ④ If there are 2 or more chips, x is the total length of each chip</p>	z: Chip thickness	y: Chip width	x: Chip length	$z \leq t$	$\leq 1/2 k$ and not over viewing area	$x \leq 1/8a$	z: Chip thickness	y: Chip width	x: Chip length	$z \leq t$	$\leq 1/2 k$ and not over viewing area	$x \leq 1/8a$	2.5
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z: Chip thickness	y: Chip width	x: Chip length													
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NO.	Item	Criterion	AQL										
15	Touch Panel(Fish eye、dent and bubble on film)	<table border="1"> <thead> <tr> <th>SIZE(mm)</th><th>Acceptable Q'ty</th></tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.2$</td><td>Accept no dense</td></tr> <tr> <td>$0.2 < D \leq 0.4$</td><td>5</td></tr> <tr> <td>$0.4 < D \leq 0.5$</td><td>2</td></tr> <tr> <td>$0.5 < D$</td><td>0</td></tr> </tbody> </table>  	SIZE(mm)	Acceptable Q'ty	$\Phi \leq 0.2$	Accept no dense	$0.2 < D \leq 0.4$	5	$0.4 < D \leq 0.5$	2	$0.5 < D$	0	2.5
SIZE(mm)	Acceptable Q'ty												
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$0.2 < D \leq 0.4$	5												
$0.4 < D \leq 0.5$	2												
$0.5 < D$	0												
16	Touch Panel Newton ring	Newton ring dimension $\leq 1/2$ touch panel area and not affect font and line distortion($\leq 2.5\%$) , 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. Handling Precaution

11.1 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.

11.2 Storage

- Store it in an ambient temperature of $25\pm10^{\circ}\text{C}$, and in a relative humidity of $50\pm10\%\text{RH}$. 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.

11.3 Soldering

- Use only soldering irons with proper grounding and no leakage.
- Iron: no higher than $280\pm10^{\circ}\text{C}$ and less than 3 sec during hand soldering.
- Rewiring: no more than 2 times.

12. Packing Method

----TBD