



深圳市勋瑞光电科技有限公司

Xunrui photoelectric technology (shenzhen) CO.,LTD.



CERT. No. QAC0946535 (ISO9001) CERT. No. HKG002005 (ISO14001)

Product Specification

Customer: _____

Model Name: _____ **H028WH005T10** _____

Date: _____

Version: _____

Preliminary Specification

Final Specification

For Customer's Acceptance

Approved by	Comment

Approved by	Reviewed by	Prepared by



1. General Description

*H028EH005T10 is a 240RGB*400 dots matrix TFT LCD module. It has a TFT panel composed of 720 sources and 400gates. The LCM can be easily accessed by micro-controller.*

2. Features

Display Mode	Transmissive
	a-TFT
Display Format	Graphic 240RGB*400 Dot-matrix
Input Data	18/16/8 bits parallel interface by 8080 MPU
Viewing Direction	6 o'clock
Drive	OTM4001A

3. Mechanical Specification

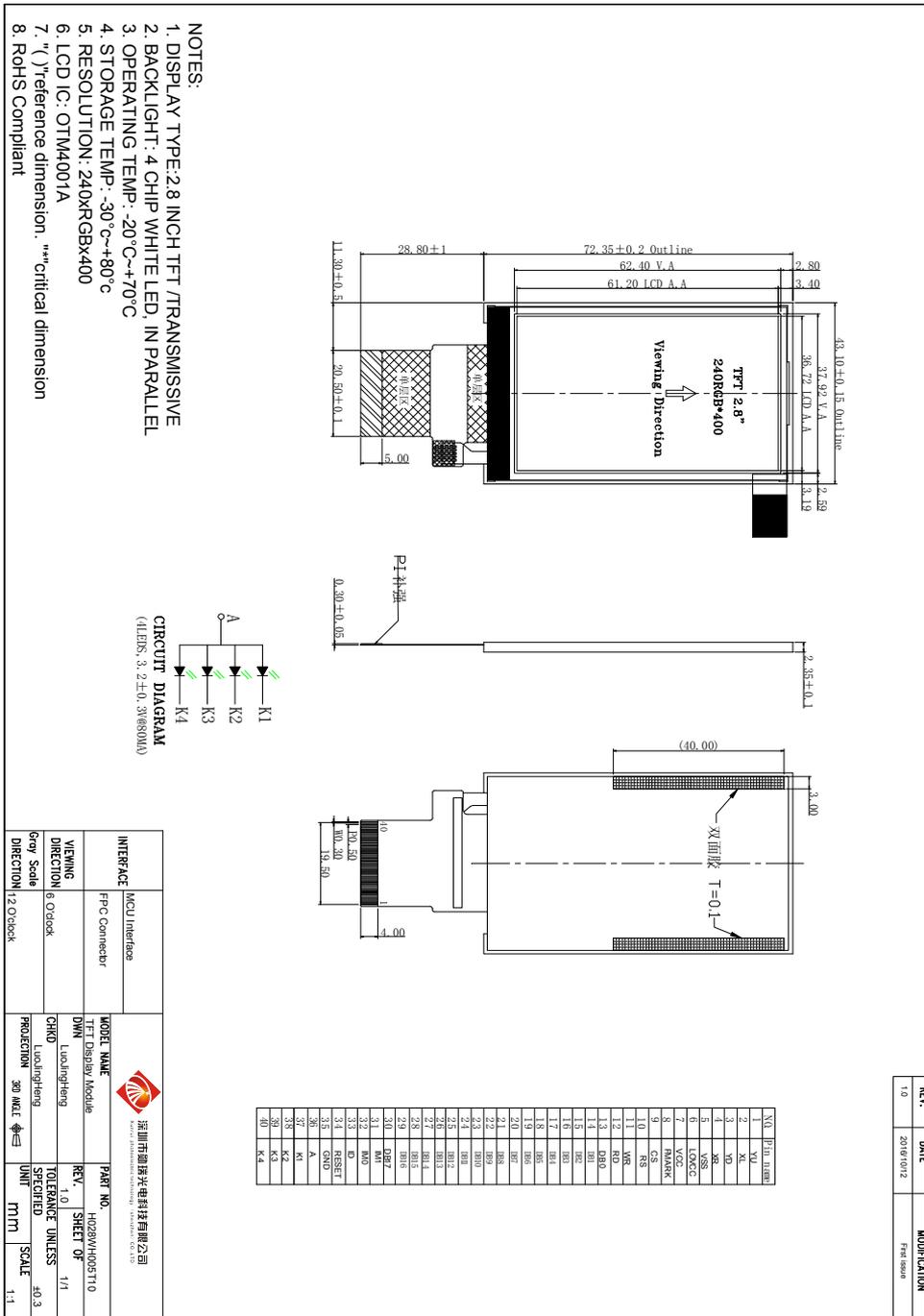
Item	Specifications	Unit
Dimensional outline	43.1(W)*72.35(H)*2.35(T) (FPC not include)	mm
Resolution	240RGB*400	dots
LCD Active area	36.72(W)*61.2(H)	mm
Pixel size	0.153(W)*0.153(H)	mm
Backlight	4 chip white LED in Parallel	



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4. Mechanical Dimension





5. Maximum Ratings

Item	Symbol	Min	Max	Unit	Note
Supply voltage	V	-0.3	4.6	V	
Operating temperature	T	-0.3	V _{CC} +0.3	V	
Storage temperature	OPR	-10	60	°C	
Storage temperature	STR	-20	70	°C	

6. Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply voltage	V _{CC}		2.7	2.8	3.3	V
Input Voltage	H level	I _H	0.8*IOVCC		IOVCC	V
	L level	I _L	-0.3		0.2* IOVCC	
Storage temperature	I _{DD}	With internal voltage generation V _{CC} =2.8V; T _{emp} =25°C			TBD	mA

7. Backlight Characteristic

Item	Symbol	Min	Typical	Max	Unit
LED module Forward voltage	V _{LED}	3.0	3.2	3.4	V
LED module current	I _{LED}		80		mA
L/G Surface Luminance ★1	L _S	3200	3400		Cd/m ³
LCM Surface brightness uniform ★2	L _D	80			%

★1 Test condition is:

(a) Center point on active area. (b) Best

Contrast.

★2 Uniform measure condition:

(1) Measure 9 point. Measure location show below;

(2) Uniform=(Min. brightness /Max. brightness)*100% (3) Best

Contrast.



8. Module Function Description

Pin No.	Symbol	Functional	Notes
1	YU	Touch panel YU pin	
2	XL	Touch panel XL pin	
3	YD	Touch panel YD pin	
4	XR	Touch panel XR pin	
5	VSS	Power Ground	
6	IOVCC	Power supply	
7	VCC	System power supply terminal	
8	FMARK	Output a frame head pulse signal	
9	CS	Chip select signal input terminal	
10	RS	Display data/Command select signal input terminal	
11	WR	Write control signal input, active at 'L'.	
12	RD	Read control signal input, active at 'L'.	
13	DB0	Data bus	
14	DB1	Data bus	
15	DB2	Data bus	
16	DB3	Data bus	
17	DB4	Data bus	
18	DB5	Data bus	
19	DB6	Data bus	
20	DB7	Data bus	
21	DB8	Data bus	
22	DB9	Data bus	
23	DB10	Data bus	
24	DB11	Data bus	
25	DB12	Data bus	
26	DB13	Data bus	
27	DB14	Data bus	
28	DB15	Data bus	
29	DB16	Data bus	
30	DB17	Data bus	
31	IM1	Interface select pin	
32	IM0	Interface select pin	
33	ID	NC	
34	RESET	Reset signal input terminal. Active at 'L'.	
35	GND	Ground	
36	A	Power supply for backlight anode input terminal.	
37	K1	Power supply for backlight cathode input terminal.	
38	K2		
39	K3		
40	K4		



8.2 Timing characteristics.

I80-System Interface Timing Characteristics

Normal Write Mode (IOVCC=1.65~3.3V, VCC=2.4~3.3V)

Item		Symbol	Unit	Min.	Typ.	Max.	Test Condition
Bus cycle time	Write	t_{CYCW}	ns	100			
	Read	t_{CYCR}	ns	300			
Write low-level pulse width		PW_{LM}	ns	50		500	
Write high-level pulse width		PW_{HW}	ns	50			
Read low-level pulse width		PW_{LR}	ns	150			
Read high -level pulse width		PW_{HR}	ns	150			
Write/ Read rise/fall time		t_{WRr} / t_{WRf}	ns			25	
Setup time	Write (RS to nCS,E/nWR)	ns	ns	10			
	Read (RS to nCS,E/nWR)	ns	ns	5			
Address hold time		T_{AH}	ns	5			
Write data set up time		t_{osw}	ns	10			
Write data hold time		t_H	ns	15			
Read data set up time		t_{DDR}	ns			100	
Read data hold time		t_{OHR}	ns	5			

Read Timing Characteristics

Reset Timing Characteristics (VCC=1.8~3.3V, IOVCC=1.65~3.3V)

Item	Symbol	Unit	Min.	Typ..	Max
Reset low-level width	t_{RES}	ms	1		
Reset rise time	t_{RES}	μs			10

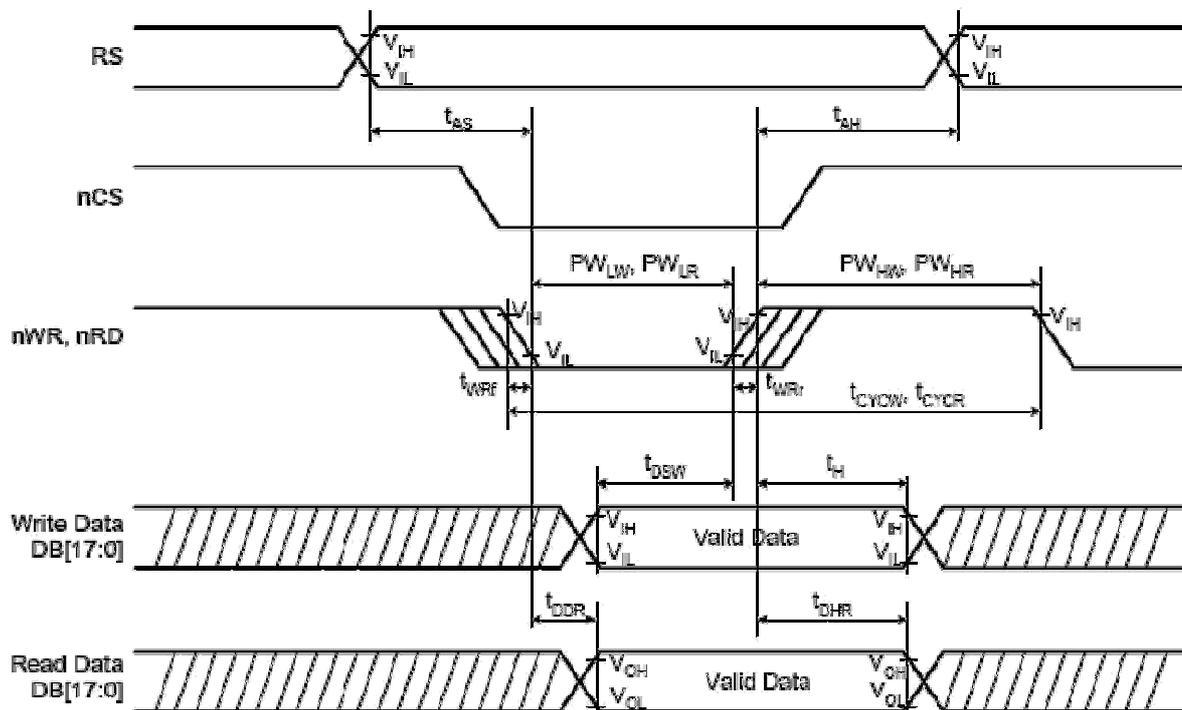


Figure 51 180-System Bus Timing



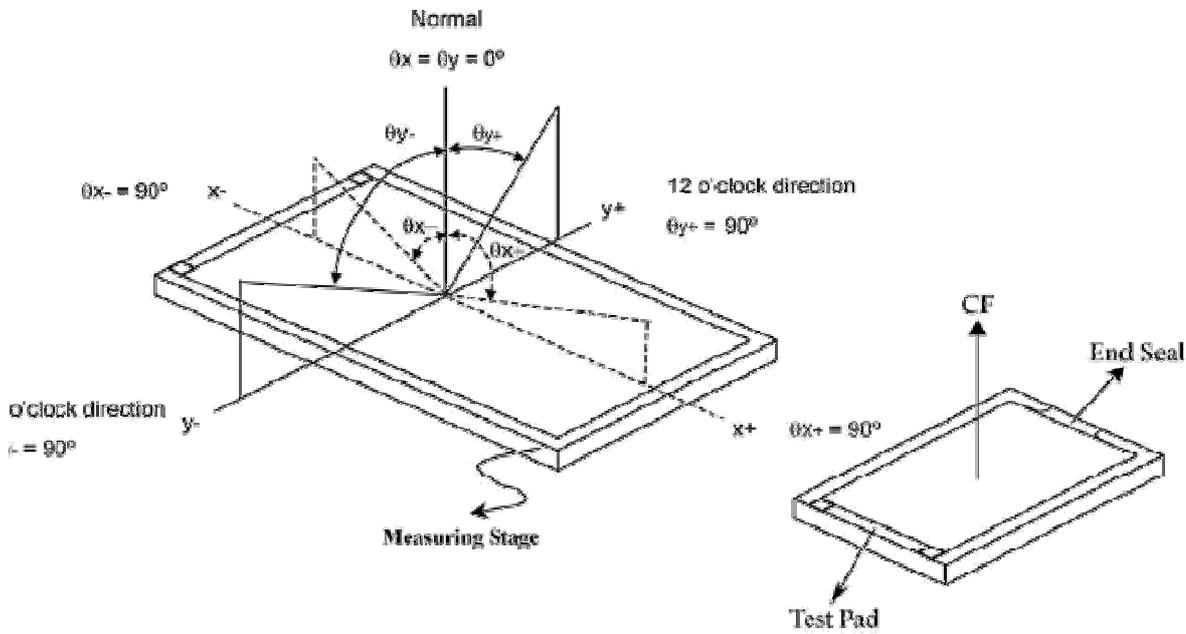
Reset Timing

9. Electro-optical Characteristics

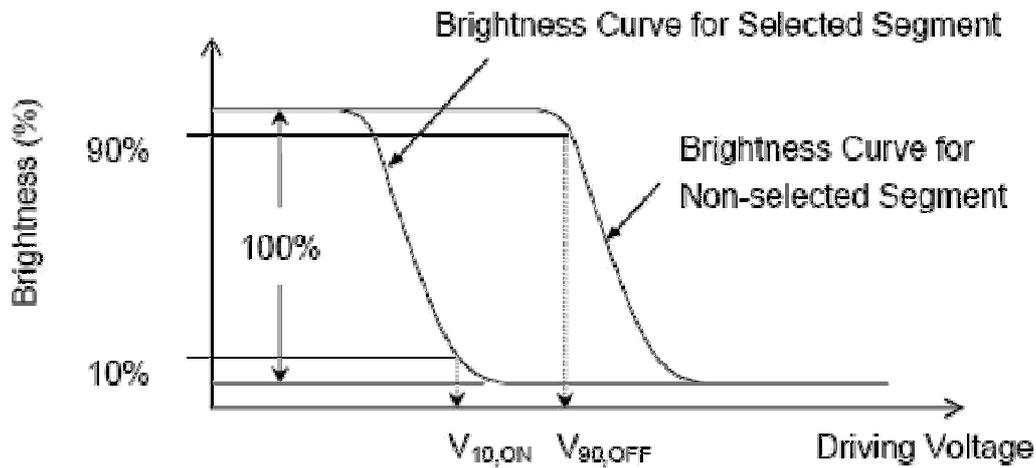
Item	Symbol	Conditions	Temp	Min.	Typ.	Max.	Unit	Note
Response Time	T_R	$\theta = \varphi = 0$	25 °C		TBD	TBD	msec	NOTE2
	T_F				TBD	TBD		
Viewing Angle Range	$\varphi = 0^\circ (6'')$	$\varphi = 90^\circ (3'')$	$\varphi = 180^\circ (12'')$			$\varphi = 270^\circ (9'')$		NOTE3
$\theta (25\text{ }^\circ\text{C}) CR \geq 10$	TBD	TBD	TBD			TBD		NOTE3

The above "viewing angle" is the measuring position with the largest contrast ratio. Not for good image quality. Viewing direction for good image quality is 12 O'clock.

- For panel only
- Electro-Optical Characteristics Test Method

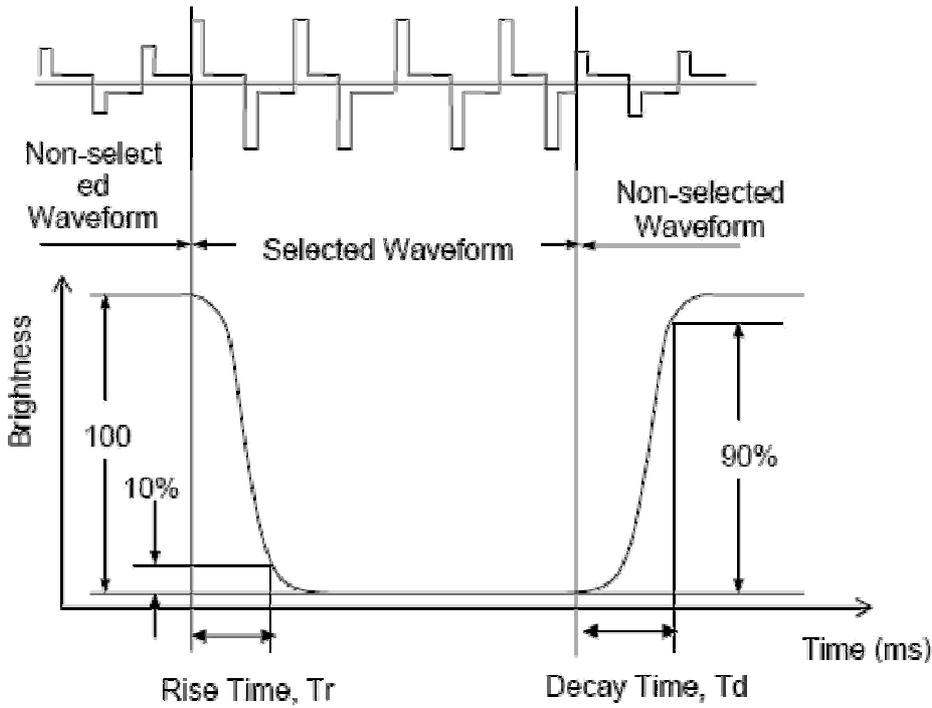


$$V_{op} = (V_{10, ON} + V_{90, OFF}) / 2$$

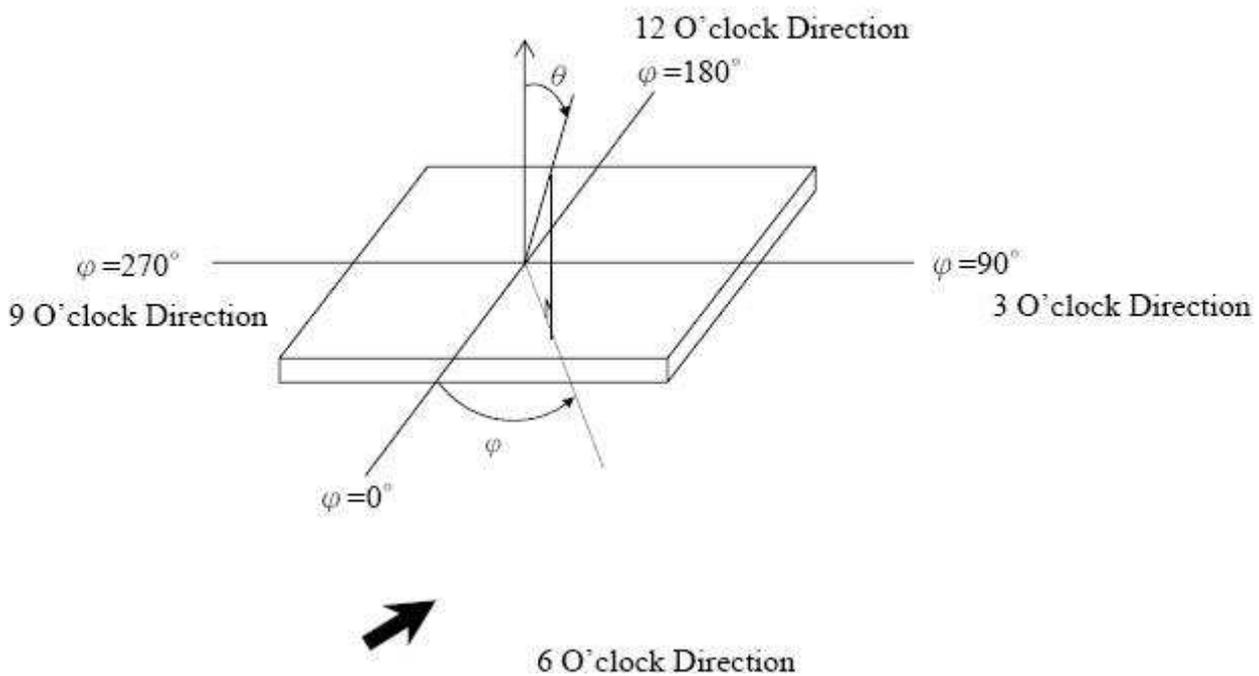




.Note2.Definition of Optical Response Time:



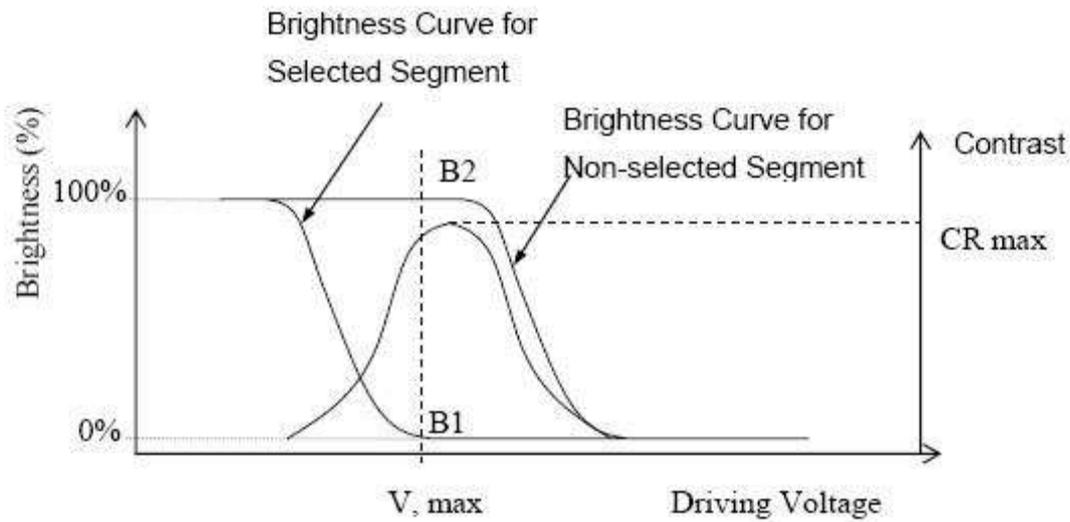
.Note3.Definition of Viewing Angle θ and φ :





Note4.Definition of Contrast ratio (CR):

$$CR = \frac{\text{Brightness of Non-selected Segment (B2)}}{\text{Brightness of Selected Segment (B1)}}$$



10. Reliability

10.1Mtbf

The LCD module shall be designed to meet a minimum MTBF value of 50000 hours with normal

10.2Test condition

TBD



11. Inspection standards

1. AQL(Acceptable Quality Level)

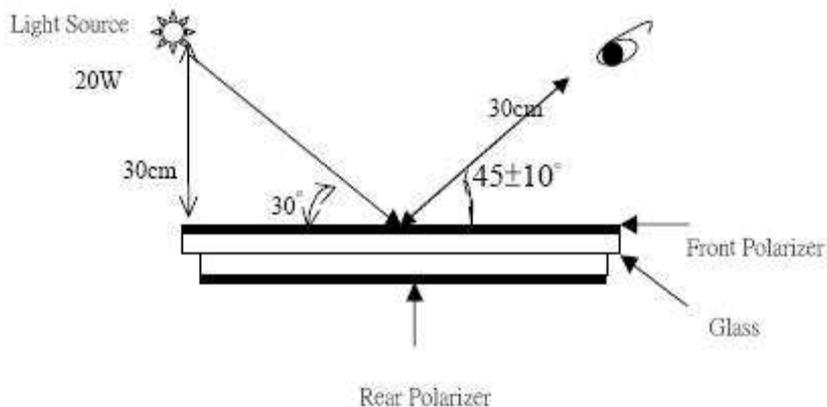
AQL of major and minor defect.

	MAJOR DEFECT	MINOR DEFECT
AQL	0.65	1.5

2. Basic conditions for inspection

The LCM face to us, in normal environment, the lux is 1000 ± 200 . (Darkroom's lux: 100 ± 50), About an angle of incidence 30° , a distance of 30 cm with an angle of $45 \pm 10^\circ$ to check the products without uncovering the film!

(As shown below)



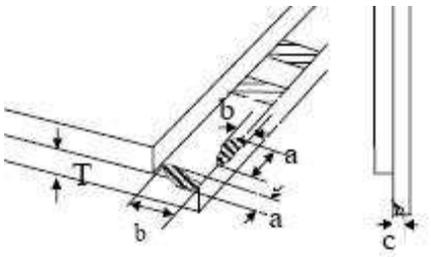
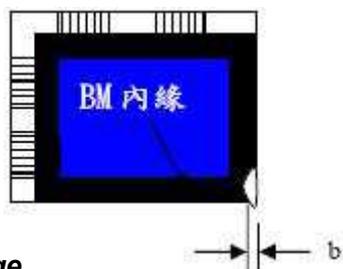
3. Inspection item and criteria

3.1 Visual inspection criterion in immobility

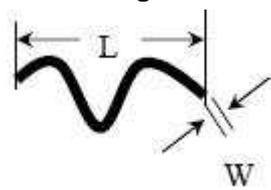
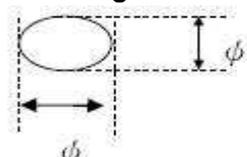
3.1.1 Glass defect

NO	Defect item	Criteria	Remark
1	Dimension Unconformity (Major defect)	By Engineering Drawing	
2	Cracks (Major defect)	1. Linear cracks panel 【Reject】 2. Nonlinear crack contrast by limited sample	
3	Glass extrude the conductive area (minor defect)	a: disregards and no influence assemblage. 1) $b \leq 1/3$ Pin width (non bonding area) 【Accept】 2) bonding area ≤ 0.5 mm 【Accept】	A: Length, b: Width
4	Pin-side ,conductive area damaged (minor defect)	(a c: disregards) $b \leq 1/3$ of effective length for bonding electrode 【Accept】	a: length, b: Width, c: Thickness



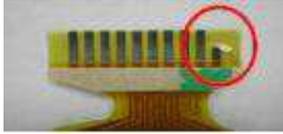
5	<p>Pin-side, non-conductive area damaged (minor defect)</p>	<p>1) Damage area don't touch the ITO (Including contraposition mark, except scribing mark) 【Accept】</p> <p>2) $C < T$ $b \leq BM1/3$ of width 【Accept】</p> <p>3) $c = T$ b not touch the seal glue 【Accept】</p> <p>4) a disregards</p>	<p>a: Length, b: Width c: Thickness</p> 
6	<p>Non-pin-side damage (minor defect)</p>	<p>$c < T$</p> <p>1) b exceeds $1/3BM$ 【Reject】</p> <p>$c = T$ b not touch the seal glue 【Reject】</p>	<p>c: Thickness b: width of</p>  <p>damage</p>

3.1.2 LCD appearance defect (View area)

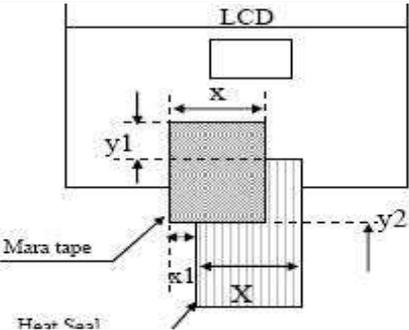
NO	Defect item	Criteria		Remark	
1	<p>Fiber, glass cratch, polarizer scratch/folded (minor defect)</p>	Specification	Allowable	<p>note1: L: Length, W: Width note2: disregard if out of AA</p> 	
		$W \leq 0.03mm$	disregard		
		$0.03mm < W \leq 0.05mm;$ $L \leq 3.0mm$	2		
		$0.05mm < W \leq 0.1mm;$ $L \leq 3.0mm$	1		
		$W > 0.1mm; L > 3.0mm$	0		
2	<p>Polarizer bubble, concave and convex (minor defect)</p>	$\phi \leq 0.2mm$	disregard	<p>note1: $\phi = (L+W)/2$, L: Length, W: Width note2: disregard if out of AA</p>	
		$0.2mm < \phi \leq 0.3mm$	2		
		$0.3mm < \phi \leq 0.5mm$	1		
		$0.5mm < \phi$	0		
3	<p>Black dots, dirty dots, impurities, eye winker (minor defect)</p>	$\phi \leq 0.15mm$	disregard	<p>note2: disregard if out of AA</p> 	
		$0.15mm < \phi \leq 0.25mm$	2		
		$0.25mm < \phi \leq 0.3mm$	1		
		$0.3mm < \phi$	0		
4	<p>Polarizer prick (minor defect)</p>	$\phi \leq 0.1mm$	disregard	<p>note1: $\phi = (L+W)/2$, L=Length, W=Width note2: the distance between two dots > 5mm</p>	
		$0.1mm < \phi \leq 0.25mm$	3		
		$\phi > 0.25mm$	0		



3.1.3 FPC

NO	Defect item	Criteria	Remark	
1	Copper screen peel (minor defect)	Copper screen peel 【Reject】		
2	No release tape or peel	No release tape or peel 【Reject】		
3	Dirty dot and impurity of FPC for customer using side (minor defect)	Specification	Allowable	Note1: Cannot have stride ITO impurities
		$\varphi \leq 0.25\text{mm}$	2	
		$\varphi > 0.25$	0	

3.1.4 Black tape & Mara tape

NO	Defect item	Criteria	Remark
1	FPC or H/S black tape (minor defect)	1. shift spec: 1) glue to the polarize 【Reject】 2) IC bare 【Reject】 2. left-and-right spec: 1) exceed of FPC edge or H-S edge 【Reject】 2) IC bare 【Reject】	
2	No black tape (major defect)	No black tape 【Reject】	
3	Tape position mistake (minor defect)	Not by engineering drawing	
4	Mara tape defect (minor defect)	Peel before pulling the protecting film 【Reject】	

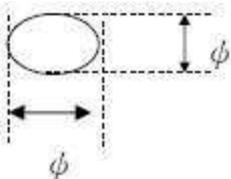
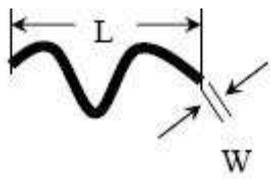
3.1.5 Silicon and Taffy glue

NO	Defect item	Criteria	Remark
1	Quantity of silicon (major defect)	Uncover the ITO and circuit area 【Reject】	note: compared by engineering
2	Taffy glue (major defect)	1. Uncover the reveal copper area 【Reject】 2. Cover layer 0.3mm(Min)~3.0mm(Max) 【Reject】	note: if customer has special requirement, refer to the technical document

3	Depth of glue covering (major defect)	Depth of glue covering overtop front Polarizer 【Reject】	Except of the special requirement
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3.2 Electrical criteria

NO	Defect item	Criteria	Remark	
1	No display (major defect)	No display 【Reject】		
2	Missing line (major defect)	Missing line 【Reject】		
3	Seg-com light and dark (major defect)	Seg-com light and dark 【Reject】	ND filter 2% test	
4	No display in immobility (major defect)	No display in immobility 【Reject】		
5	Flicker of Pattern (major defect)	Flicker of Pattern 【Reject】		
6	Mura (major defect)	ND filter 2% test		
7	Over current (major defect)	Over current 【Reject】		
8	Voltage out of specification (major defect)	Voltage out of specification 【Reject】		
9	Pattern blur, error code (major defect)	Pattern blur, error code 【Reject】		
10	Dark light, Flicker (major defect)	Dark light, Flicker 【Reject】		
11	Black/white dots 、 Dirty dots 、 eye winker (major defect)	Specification	Allowable	Note1: disregard if out of AA 
		$\phi \leq 0.15mm$	disregard	
		$0.15mm < \phi \leq 0.25mm$	2	
		$0.25mm < \phi \leq 0.3mm$	1	
		$0.3mm < \phi$	0	
12	Fiber、 glass crutch、 Polarizer scratch/folded (major defect)	$W \leq 0.03mm$	disregard	Note1: L: Length, W: Width Note2: disregard if out of AA 
		$0.03mm < W \leq 0.05mm$ $L \leq 3.0mm$	2	
		$0.05mm < W \leq 0.1mm$ $L \leq 3.0mm$	1	
		$W > 0.1mm; L > 3.0mm$	0	



12. Precautions for using LCD modules.

12.1 Safety

- (1) Do not swallow any liquid crystal, even if there is no proof that liquid crystal is poisonous.*
- (2) If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.*
- (3) If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.*

12.2 Storage Conditions

- (4) Store the panel or module in a dark place where the temperature is $23\pm 5^{\circ}\text{C}$ and the humidity is below $45\pm 20\% \text{RH}$.*
- (5) Store in anti-static electricity container.*
- (6) Store in clean environment, free from dust, active gas, and solvent.*
- (7) Do not place the module near organics solvents or corrosive gases.*
- (8) Do not crush, shake, or jolt the module.*

12.3 Handling Precautions

- (9) Avoid static electricity, which can damage the CMOS LSI.*
- (10) The polarizing plate of the display is very fragile, please handle it very carefully. (11) Do not give external shock.*
- (12) Do not apply excessive force on the surface.*
- (13) Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of the plate. (14) Do not use ketonic solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent. (15) Do not operate it above the absolute maximum rating.*
- (16) Do not remove the panel or frame from the module.*

12.4 Warranty

The period is within twelve months since the date of shipping out under normal using and storage conditions.