



PHOENIX DISPLAY INTERNATIONAL, INC.

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SPECIFICATION FOR LCD MODULE

CUSTOMER	
PART NUMBER	PDI030VGGP-02
DESCRIPTION	3.0" 480 x 640 TRANSMISSIVE
VERSION	V1.0
ISSUE DATE	13-Sep-18

COMPANY ADDRESS:

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TABLE OF CONTENT

1. GENERAL DESCRIPTION.....	3
2. FEATURES.....	3
3. MECHANICAL SPECIFICATION.....	3
4. MECHANICAL DIMENSION.....	4
5. MAXIMUM RATINGS.....	4
NOTE1: $T_A \leq 40^\circ\text{C}$ WITHOUT DEWING.....	5
6. ELECTRICAL CHARACTERISTICS.....	5
7. MODULE FUNCTION DESCRIPTION.....	7
7.1 PIN DESCRIPTION.....	7
7.2 APPLICATION CIRCUIT.....	8
8. ELECTRO-OPTICAL CHARACT ERISTICS.....	8
9.RELIABILITY.....	11
9.1 TESTS.....	11
10. INSPECTION CRITERIA.....	12
11. ILLUSTRATION OF LCD DATE CODE.....	17
12. PRECAUTIONS FOR USE.....	17
12.1 SAFETY.....	17
12.2 STORAGE CONDITIONS.....	17
12.3 HANDLING PRECAUTIONS.....	17
12.4 WARRANTY.....	17
13. MARK AND PACKAGING.....	18
14. FACTORY.....	19
15. REVISION HISTORY.....	19

1. GENERAL DESCRIPTION

PDI030VGGP-02 is a 480XRGBX640 dot-matrix TFT module. This module has a 3.0inch diagonally .Each pixel is divided into Red, Green and Blue sub-pixels and dots that are arranged in vertical stripes. LCD color is determined with Dithering 16.7M Color signal for each pixel. It is intended to support applications where thin thickness, wide viewing angle, low power are critical factors and graphic displays are important.

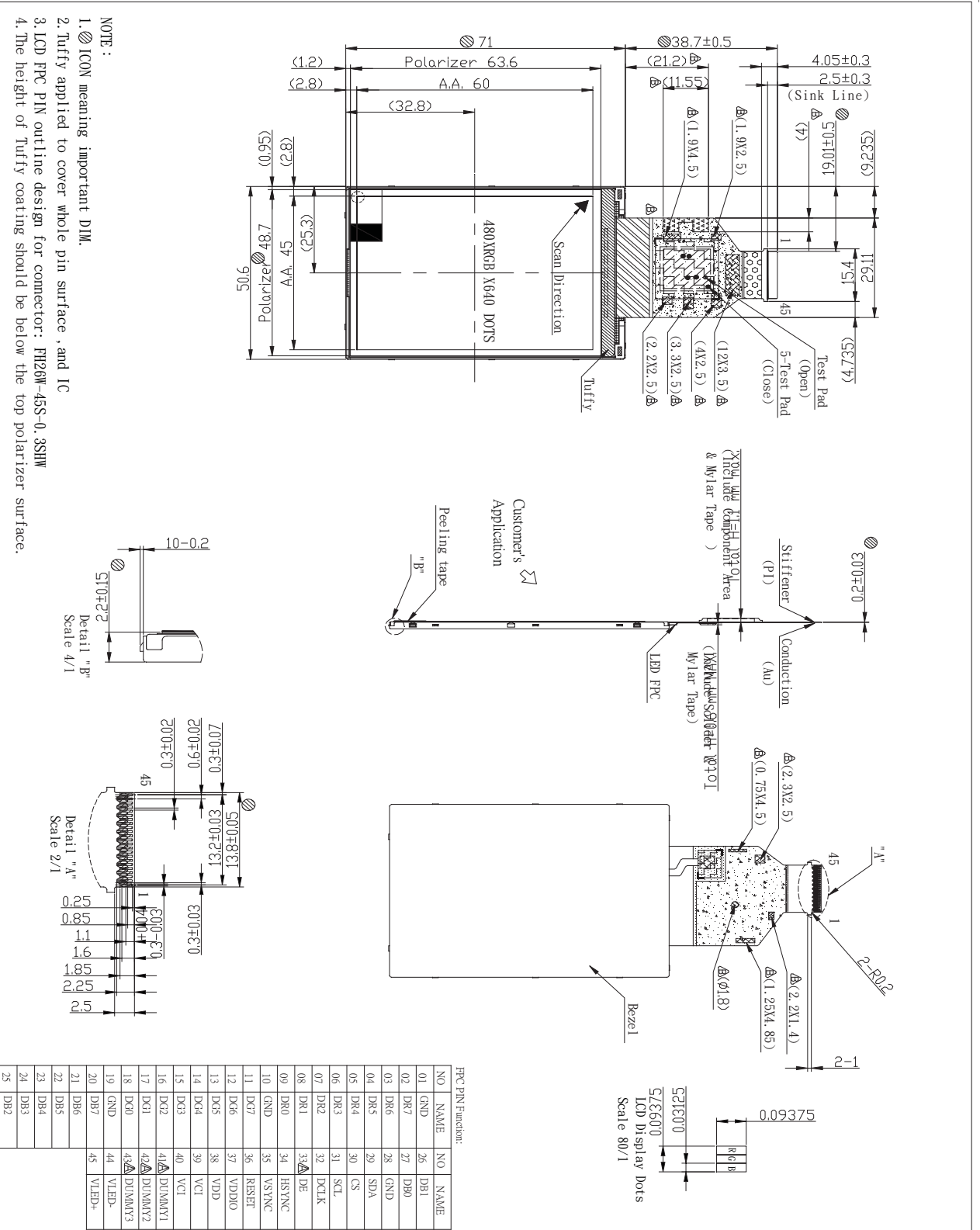
2. FEATURES

Display Mode	Transmissive and Normally Black type
Display Format	RGB Stripe
Color	16.7M
Input Data	RGB data bus, 24-bit parallel data ,DE MODE
Viewing Direction	Wide View

3. MECHANICAL SPECIFICATION

Item	Specifications	Unit
Dimensional outline	50.6(W)×71(L)×2.2(D) (Exclude FPC)	mm
Number of DOT	480(W)×640(H)	Pixel
LCD A.A	45(W)×60 (L)	mm
Pixel Pitch	0.09375 (W)× 0.09375(L)	mm

4.MECHANICAL DIMENSION



5. MAXIMUM RATINGS

Item	Symbol	Min.	Max.	Unit	Note
Power Supply	VDD	-0.3	6.0	V	
Operating temperature	T _{OP}	-20	70	°C	
Storage temperature	T _{ST}	-30	80	°C	
Humidity	-	-	90%	RH%	Note1

Note1: T_A ≤ 40°C Without dewing.

6. ELECTRICAL CHARACTERISTICS

Item		Symbol	Min.	Typ.	Max.	Unit
Supply voltage		V _{CI}	2.6	2.8	3.3	V
		VDDIO	1.65	1.8	3.3	
Input Voltage	High level	V _{IH}	0.7VDDIO	---	VDDIO	V
	Low level	V _{IL}	VSS	---	0.3VDDIO	V
Output Voltage	High level	V _{OH}	0.8VDDIO	---	VDDIO	V
	Low level	V _{OL}	VSS	---	0.2VDDIO	V

7. MODULE FUNCTION DESCRIPTION

7.1 PIN DESCRIPTION

NO.	Symbol	Description
1	GND	Power ground.
2	DR7	8-bit Red digital data input
3	DR6	
4	DR5	
5	DR4	
6	DR3	
7	DR2	
8	DR1	
9	DR0	
10	GND	Power ground.
11	DG7	8-bit Green digital data input
12	DG6	
13	DG5	
14	DG4	
15	DG3	
16	DG2	
17	DG1	
18	DG0	
19	GND	Power ground.
20	DB7	8-bit Blue digital data input
21	DB6	
22	DB5	
23	DB4	
24	DB3	
25	DB2	
26	DB1	
27	DB0	

28	GND	Power ground
29	SDA	Serial communication data input/output
30	CS	Chip select signal
31	SCL	Serial communication clock input
32	DCLK	Clock signal pin
33	DE	Data input Enable pin
34	HSYNC	Horizontal sync signal
35	VSYNC	Vertical sync signal
36	RESET	Global reset pin
37	VDDIO	I/O power supply
38	VDD	Core power
39	VCI	Analog power supply
40	VCI	
41	DUMMY1	Not use
42	DUMMY2	Not use
43	DUMMY3	Not use
44	VLED-	Cathode for LED power supply
45	VLED+	Anode for LED power supply

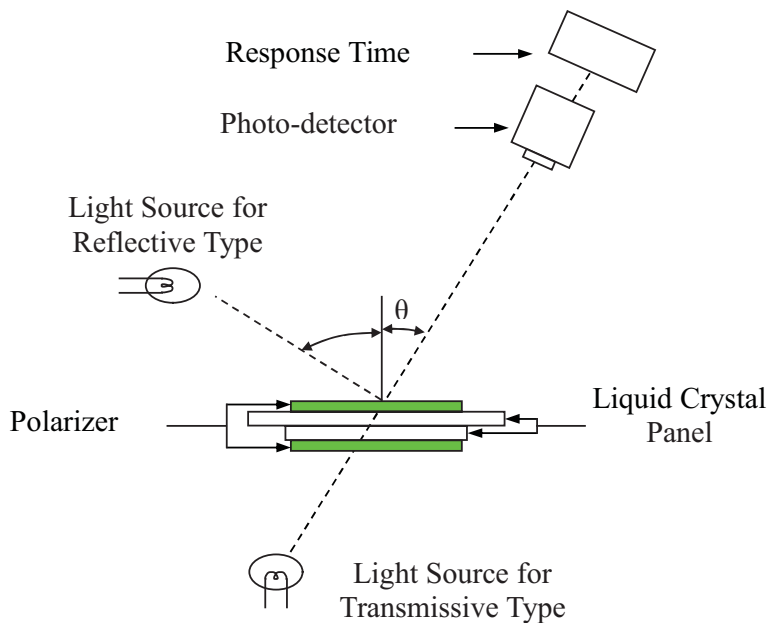
8.ELECTRO-OPTICAL CHARACT ERISTICS

Electro-Optical Characteristics								
Item	Symbol	Condition	Temp.	Min.	Typ.	Max.	Units	Note
Viewing Angle Range	θ	$\psi = 0^\circ$ $\psi = 90^\circ$ $\psi = 180^\circ$ $\psi = 270^\circ$ ($CR \geq 10$)	25°C	---	85	---	degree	Note 2
				---	85	---		
				---	85	---		
				---	85	---		
Response Time	(Tr)	$\theta = \psi = 0^\circ$	25°C	---	---	40	msec	Note 1,4
	(Tf)	$\theta_0 = 25^\circ$						
Module Contrast Ratio	CR	$\theta = \psi = 0^\circ$	25°C	---	800	---	---	Note3, 5
Luminance of white	Lwh	$\theta = \psi = 0^\circ$	25°C	---	500	---	cd/m ²	
Uniformity	---	---	25°C	80	---	---	%	---

1. Ambient temperature = 25°C ± 2°C.

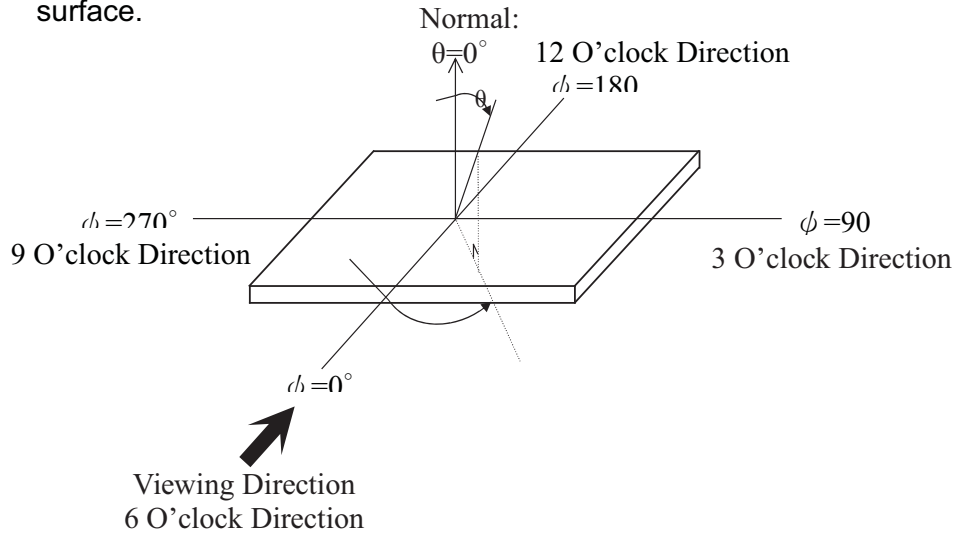
2. To be measured in the dark room.

Note 1: Electro-Optical Characteristics Test Method.



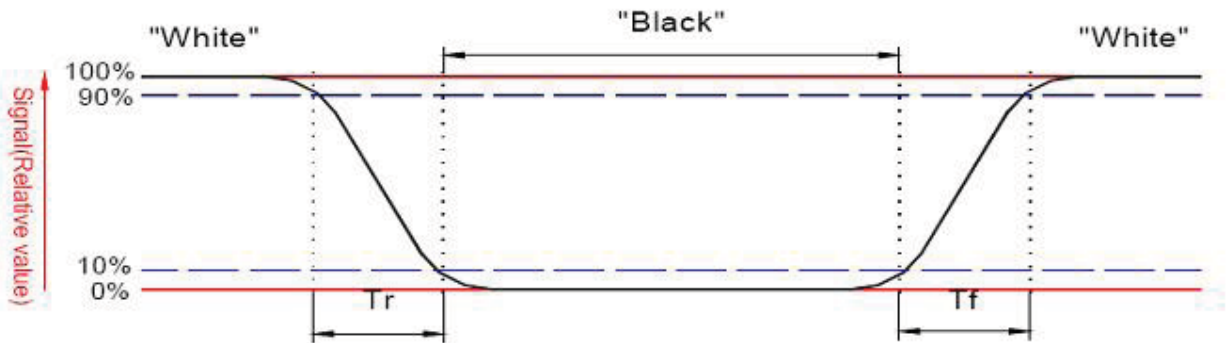
Note 2: Definition of Viewing Angle.

Viewing angle is the angle at which the contrast ratio is greater than 2, for TFT module the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface.



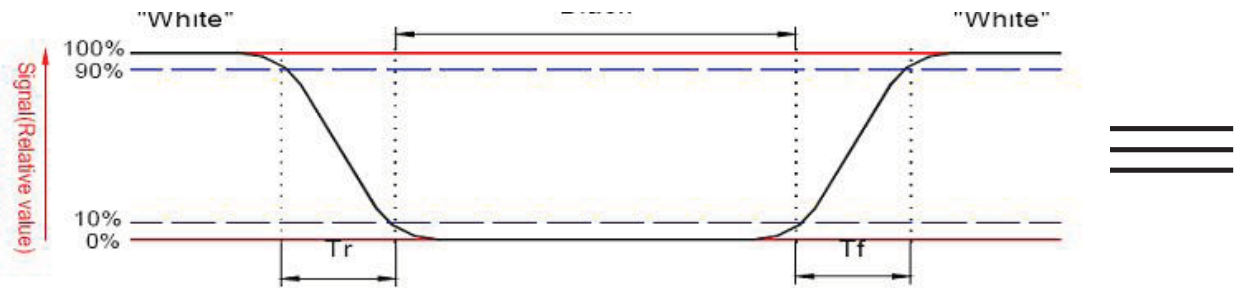
Note 3: Definition of Optical Response Time

The output signals of photo detector are measured when the input signals are changed from "black" to "white" (falling time) and from "white" to "black" (rising time), respectively. The response time is defined as the time interval between the 10% and 90% of amplitudes. Refer to figure as below:



Note 4: Definition of Optical Response Time

The output signals of photo detector are measured when the input signals are changed from "black" to "white" (falling time) and from "white" to "black" (rising time), respectively. The response time is defined as the time interval between the 10% and 90% of amplitudes. Refer to figure as below:



Note 5: Definition of Contrast Ratio (CR).

Contrast ratio is calculated with the following formula.

$$\text{Contrast ratio (CR)} = \frac{\text{Photo detector output when LCD is at "White" state}}{\text{Photo detector output when LCD is at "Black" state}}$$

9.RELIAB/LITY

9.1 TESTS

NO.	ITEM	CONDITION	CRITERION
1	High Temperature Non-Operating Test	80°C * 240Hrs	<ul style="list-style-type: none"> ◦ No defect of operational functions in room temperature are allowable. ◦ IDD of LCM should be below specification.
2	Low Temperature Non-Operating Test	-30°C * 240Hrs	
3	High Temperature/Humidity Operating Test	60°C * 90±5%RH * 96Hrs	
4	High Temperature Operating Test	70°C * 240Hrs	
5	Low Temperature Operating Test	-20°C * 24 0Hrs	
6	Thermal Shock Test	-30°C(30Min)↔ 80(30Min)* 10 Cycles	
7	ESD Test	Air discharge:±6KV Contact discharge:±4KV	

Notes:

1. Judgments should be made after exposure in room temperature for two hours.
2. The pure water is used for the high temperature / humidity test.
3. The sample above is individually for every reliability tests condition.
4. The color fading of polarizing filter should not

10. INSPECTION CRITERIA

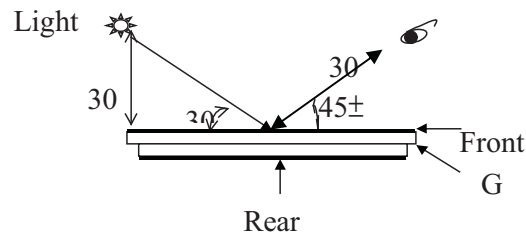
1. AQL(Acceptable Quality Level)
AQL of major and minor defect

	MAJOR DEFECT	MINOR DEFECT
APPEARANCE	0.65%	1.0%
ELECTRIC-OPTICAL	0.4%	0.65%

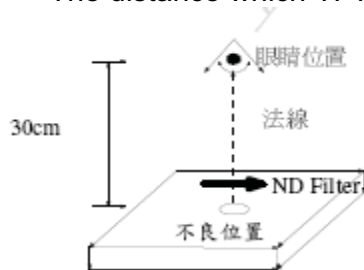
2. Basic conditions for inspection

The LCM face to us, According to the criteria of luminance measurement instruction, About an angle of incidence 30,a distance of 30 cm with normal eye.with an angle of 45 degree to check the products without uncovering the film!

(As shown below)



The distance which TFT ND Filter between the defect place is about 25~30mm.

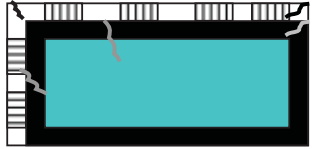


3. Inspection item and criteria

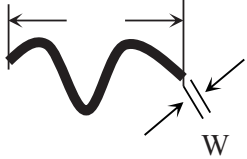
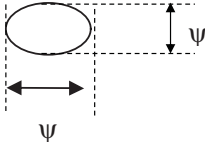
- 3.1 Visual inspection criterion in immobility

- 3.1.1 Glass defect

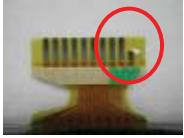
No	Defect item	Criteria	Remark
1	Dimension Unconformity (Major defect)	By Engineering Drawing	

No	Defect item	Criteria	Remark
2	Cracks (Major defect)	1. No-extended crack according to limited sample 2. Extended crack when $C \leq T$ and the Crack touch $\leq 1/3$ sealant width is OK	

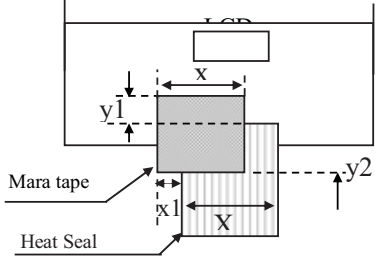
3.1.2 LCD appearance defect (View area)

No	Defect item	Criteria	Remark	
1	Fiber 、glass cratch 、polarizer scratch/folded (minor defect)	Specification	Allowable	note1: L : Length , W : Width note2: disregard if out of AA 
		$W \leq 0.03\text{mm}$	disregard	
		$0.03\text{mm} < W \leq 0.05\text{mm}$; $L \leq 3.0\text{mm}$	2	
		$0.05\text{mm} < W \leq 0.1\text{mm}$; $L \leq 3.0\text{mm}$	1	
		$W > 0.05\text{mm}$; $L > 3.0\text{mm}$	0	
2	Polarizer bubble 、concave and convex (minor defect)	$\psi \leq 0.2\text{mm}$	disregard	note 1: $\psi = (L+W)/2$; L : Length , W Width note2: disregard if out of AA
		$0.2\text{mm} < \psi \leq 0.3\text{mm}$	2	
		$0.3\text{mm} < \psi \leq 0.5\text{mm}$	1	
		$0.5\text{mm} < \psi$	0	
3	Black dots 、dirty dots 、impurities 、eyewinker (Major defect)	$\phi \leq 0.1\text{mm}$	disregard	note 1: disregard if out of AA note2: Inspection by RGB pattern 
		$0.1\text{mm} < \phi \leq 0.2\text{mm}$	3	
		$0.2\text{mm} < \phi$	0	
4	Polarizer prick (Major defect)	$\psi \leq 0.1\text{mm}$	disregard	note1: $\psi = (L+W)/2$; L= Length , W=Width note2: the distance between two dots $> 5\text{mm}$
		$0.1\text{mm} < \psi \leq 0.25\text{mm}$	3	
		$\psi > 0.25\text{mm}$	0	

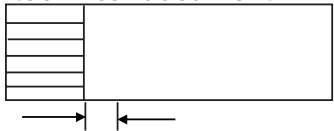
3.1.3 .FPC

No	Defect item	Criteria	Remark
1	Copper screen peel (Major defect)	Copper screen peel 【Reject】	
2	No release tape or peel (Major defect)	No release tape or peel 【Reject】	

3.1.4 Black tape & Mara tape

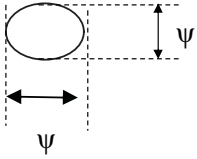
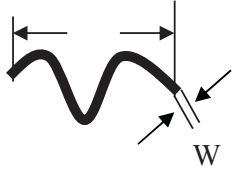
No	Defect item	Criteria	Remark
1	FPC or H/S black tape shift (minor defect)	1.shift spec: 1)glue to the polarize 【Reject】 2) IC bare 【Reject】 2. left-and-right spec: 1) exceed of FPC edge or H-S edge 【Reject】 2)IC bare 【Reject】	

3.1.5 Silicon and Tuffy glue

No	Defect item	Criteria	Remark
1	Quantity of silicon (minor defect)	Uncover the ITO and circuit area. 【Reject】	note: compared by engineering drawing.
2	Tuffy glue (minor defect)	1. Uncover the reveal copper area 【Reject】 2. Cover layer 0.3mm(Min) ~ 3.0mm(Max) 【accept】	note:if customer has special requirement , refer to the technical document.  3.0mm(Max)
3	Depth of glue covering (minor defect)	Depth of glue covering overtop front Polarizer 【Reject】	Except of the special requirement °

3.2 Electrical criteria

No	Defect item	Criteria	Remark
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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】		
4	No display in immobility (Major defect)	No display in immobility 【Reject】		
5	Flicker of Pattern (Major defect)	Flicker of Pattern 【Reject】		
6	Over current (Major defect)	Over current 【Reject】		
7	Voltage out of specification (Major defect)	Voltage out of specification 【Reject】		
8	Pattern blur ,error code (Major defect)	Pattern blur ,error code 【Reject】		
9	Dark light, Flicker (Major defect)	Dark light, Flicker 【Reject】		
10	Black/White dots 、 Dirty dots 、 eyewinker 、 Bright (Minor defect)	Specification	Allowable	Note1: disregard if out of AA 
		$\psi \leq 0.1\text{mm}$	disregard	
		$0.1\text{mm} < \psi \leq 0.2\text{mm}$	3	
		$0.2\text{mm} < \psi$	0	
11	Fiber 、 glass cratch 、 polarizer scratch/folded (Minor defect)	$W \leq 0.03\text{mm}$	disregard	note1: L : Length , W : Width note2: disregard if out of AA 
		$0.03\text{mm} < W \leq 0.05\text{mm} ;$ $L \leq 3.0\text{mm}$	2	
		$0.05\text{mm} < W \leq 0.1\text{mm} ;$ $L \leq 3.0\text{mm}$	1	
		$W > 0.05\text{mm} ; L > 3.0\text{mm}$	0	

11. ILLUSTRATION OF LCD DATE CODE

TBD

12. PRECAUTIONS FOR USE

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

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

12.3 HANDLING PRECAUTIONS

- (1) Avoid static electricity, which can damage the CMOS LSI.
 - (2) The polarizing plate of the display is very fragile. so, please handle if very carefully.
 - (3) Do not give external shock.
 - (4) Do not apply excessive force on the surface.
 - (5) Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.
 - (6) Do not use ketonic solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.
 - (7) Do not operate it above the absolute maximum rating.
 - (8) Do not remove the panel or
-

13.Mark AND PACKAGING

T.B.D

15. REVISION HISTORY

Rev NO.	Revise record	Rev Date
0.1	Original revision	2018/5/28

