

PRODUCT SPECIFICATION

MODEL NO: SEL020QCFC1

< ◇ > PRELIMINARY SPECIFICATION

< ◆ > APPROVAL SPECIFICATION

CUSTOMER
APPROVED BY
DATE:

DESIGNED	CHECKED	APPROVED

REVISION STATUS

Version	Revise Date	Page	Content	Modified by
V1.0	2011.05.11		First Issued	Iris

TABLE OF CONTENTS

No.	CONTENTS	PAGE
	REVISION STATUS.....	2
	TABLE OF CONTENTS.....	3
1.	GENERAL DESCRIPTION.....	4
2.	FUNCTIONAL BLOCK DIAGRAM.....	5
3.	MECHANICAL SPECIFICATION	6
4.	PIN DESCRIPTION.....	7
5.	ELECTRICAL CHARACTERISTICS	8
6.	OPTICAL CHARACTERISTICS.....	10
7.	QUALITY SPECIFICATIONS.....	12
8.	RELIABILITY.....	16
9.	HANDLING PRECAUTION	17

1. GENERAL DESCRIPTION

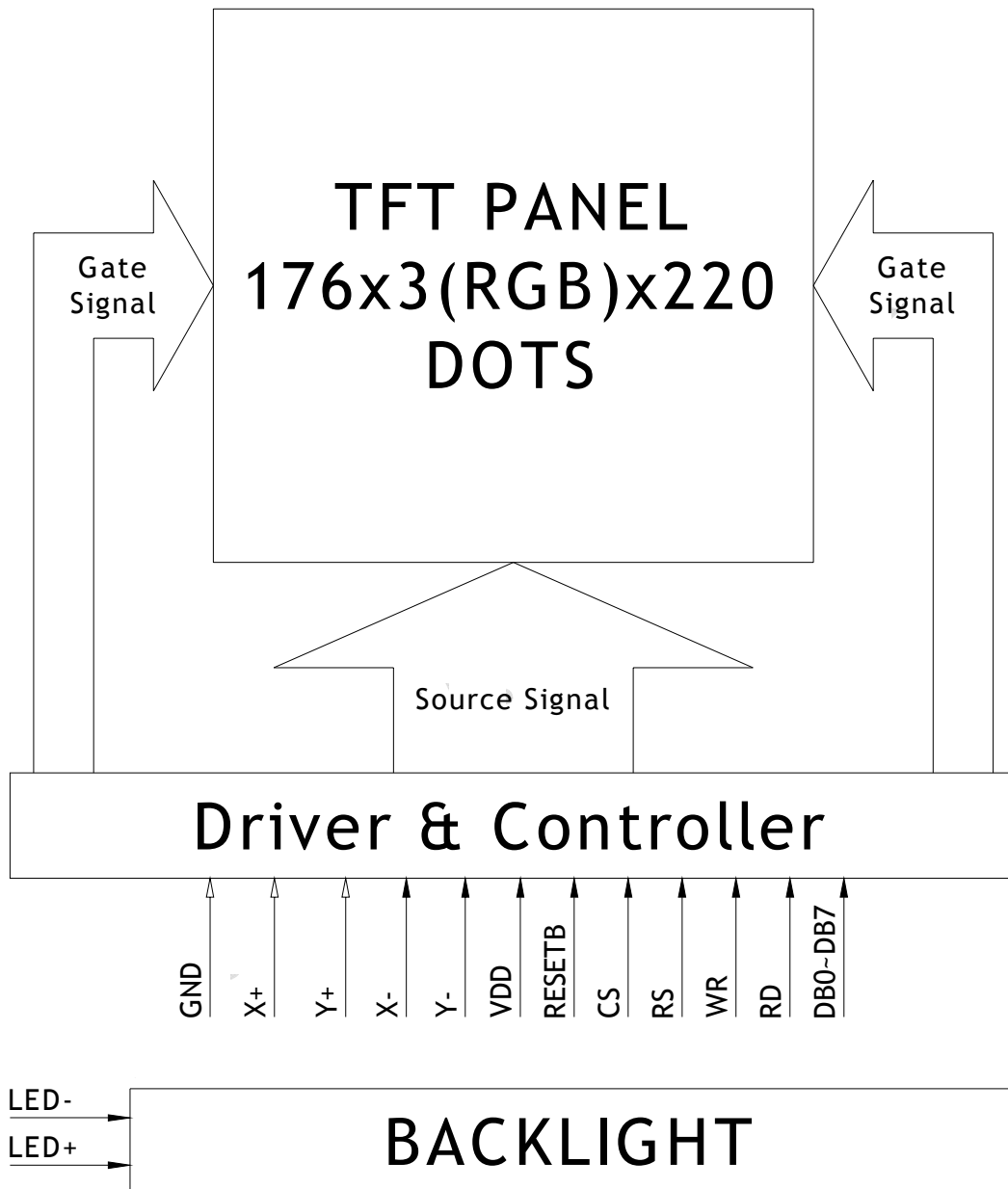
1.1 DESCRIPTION

The specifications is a transmissive type color active matrix liquid crystal display (LCD) which uses amorphous thin film transistor (TFT) as switching devices. This product is composed of a TFT LCD panel, driver ICs and a backlight unit. The following table described the features of SEL020QCFC1.

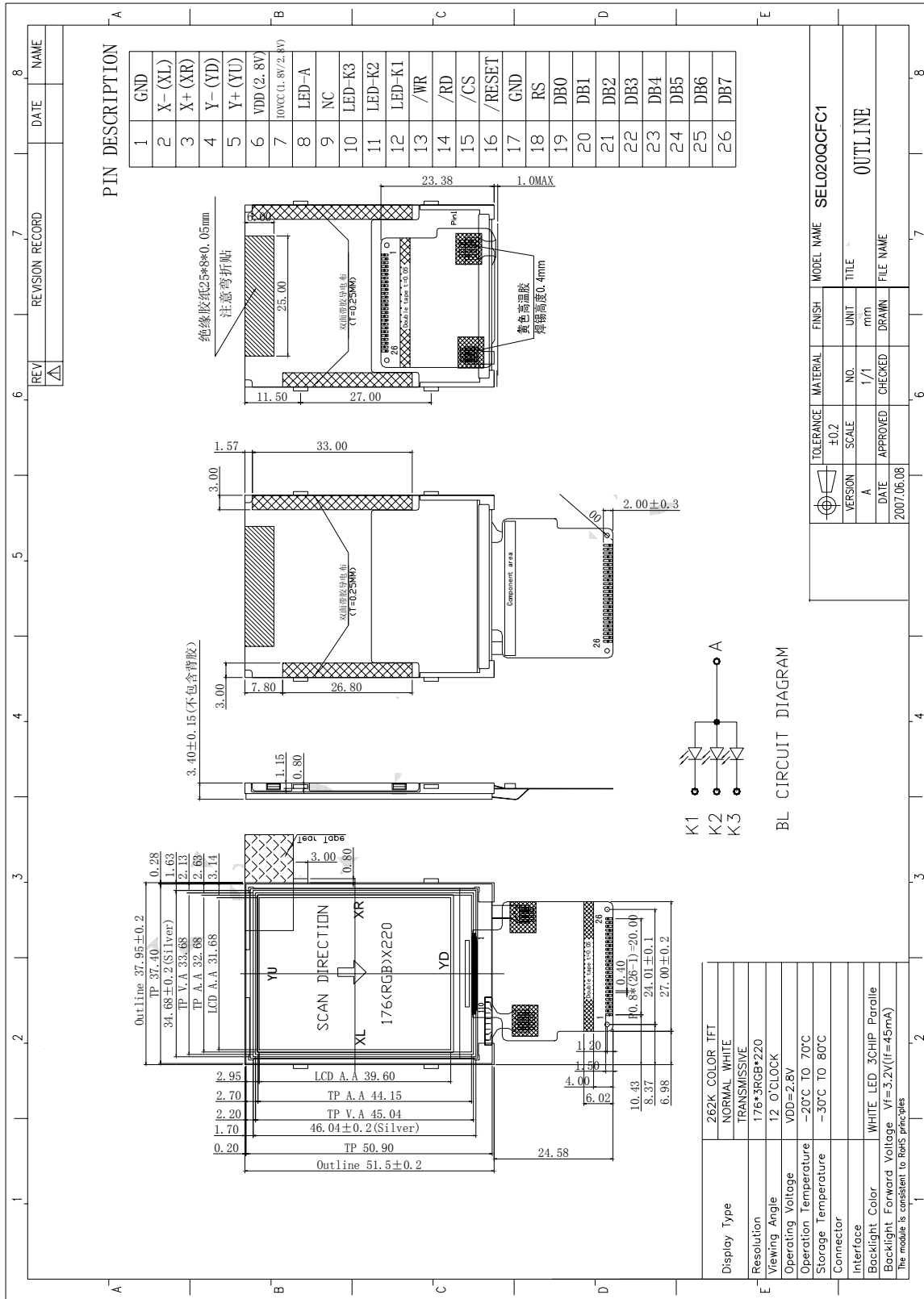
1.2 FEATURES:

No.	Item	Specification	Unit
1	Panel Size	2.0"	inch
2	Number of Pixels	176(W) × RGB × 220(H)	pixels
3	Active Area	31.68(W) × 39.6(H)	mm
4	Pixel Pitch	0.18(W) × 0.18(H)	mm
5	Outline Dimension	38.5(W) × 51.4(H) × 2.9(T)	mm
6	Number of Colors	262K Color / 65K Color	-
7	Display Mode	TN / Normally White / Transmissive	-
8	Viewing Direction	12 o'clock	-
9	Display Format	RGB Strip type	-
10	Interface	8 bits 8080-series parallel data	-
11	Backlight	White LED	-
12	Operation Temperature	-20~70	°C
13	Storage Temperature	-30~80	°C
14	Weight	-	g

2. FUNCTIONAL BLOCK DIAGRAM



3. MECHANICAL SPECIFICATION



4. PIN DESCRIPTION

Pin No.	Symbol	Description
1	GND	Ground
2	XL	The signal pins of touch panel
3	XR	
4	YD	
5	YU	
6	VDD	
7	IOVCC	Power supply for the I/O ports.(1.8/2.8V)
8	LED_A	Power supply for LED-A
9	NC	Dummy
10	LED_K3	Power supply for LED-K
11	LED_K2	
12	LED_K1	
13	/WR	Write signal and write data when it is low
14	/RD	Read signal and read data out when it is low
15	/CS	Chip select pin
16	RESET	Chip reset signal
17	GND	Ground
18	RS	Register select signal. 0:index register; 1: data register
19-26	DB0-7	Data bus DB0-7

5. ELECTRICAL CHARACTERISTICS

5.1 ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min.	Max.	Unit	Note
Power supply voltage (VDDT)	VCC	-0.3	+3.6	V	1
Power supply voltage (IOVCC)	IOVCC	-0.3	+3.6	V	1

Note:

1. IOVCC, VCC, GND must be maintained.
2. The modules may be destroyed if they are used beyond the absolute maximum ratings.

5.2 Environmental Condition

Item	Operating temperature (Topr)		Storage temperature (TSgt) (Note 1)		Remark
	Min.	Max.	Min.	Max.	
Ambient temperature	-20°C	+70°C	-30°C	+80°C	Dry
Humidity (Note 1)	80% max. RH for Ta ≤ 40°C < 50% RH for 40°C < Ta ≤ Maximum operating temperature				No condensation

Note 1: Product cannot sustain at extreme storage conditions for long time.

5.3 DC ELECTRICAL CHARACTERISTICS

5.3.1 OPERATING CONDITIONS

Typical Operating Conditions (Ta=25°C)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply voltage (analog)	VCC-GND		2.6	2.8	3.3	V
Supply voltage (logic)	IOVCC-GND		1.65	1.8/2.8	3.3	V
Supply current (Logic & LCD)	ICC	VCC=2.8V	-	-	10	mA
Supply voltage of white LED backlight	VLED = V(BL+) - V(BL-)	Forward current = 45 mA	3.0	3.2	3.4	V
Luminance (on the module surface)		Number of LED dies = 3	-	150	-	cd/m ²

5.4 TIMING CHARACTERISTICS

80-system Bus Interface Timing Characteristics of IC

Table 8: Normal Write Mode (VCC = 2.4~3.3V ,IOVCC=1.65~3.3V)

Item	Symbol	Unit	Min.	Max.	Test Condition
Bus cycle time	Write	t_{CYCW}	ns	70	-
	Read	t_{CYCR}	ns	300	-
Write low-level pulse width	PW_{LW}	ns	15	500	-
Write high-level pulse width	PW_{HW}	ns	15	-	-
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	-	15	
Setup time	Write (RS to nCS, E/nWR)	t_{AS}	ns	10	-
	Read (RS to nCS, RW/nRD)			5	-
Address hold time	t_{AH}	ns	5	-	
Write data set up time	t_{DSW}	ns	10	-	
Write data hold time	t_H	ns	15	-	
Read data delay time	t_{DDR}	ns	-	100	
Read data hold time	t_{DHR}	ns	5	-	

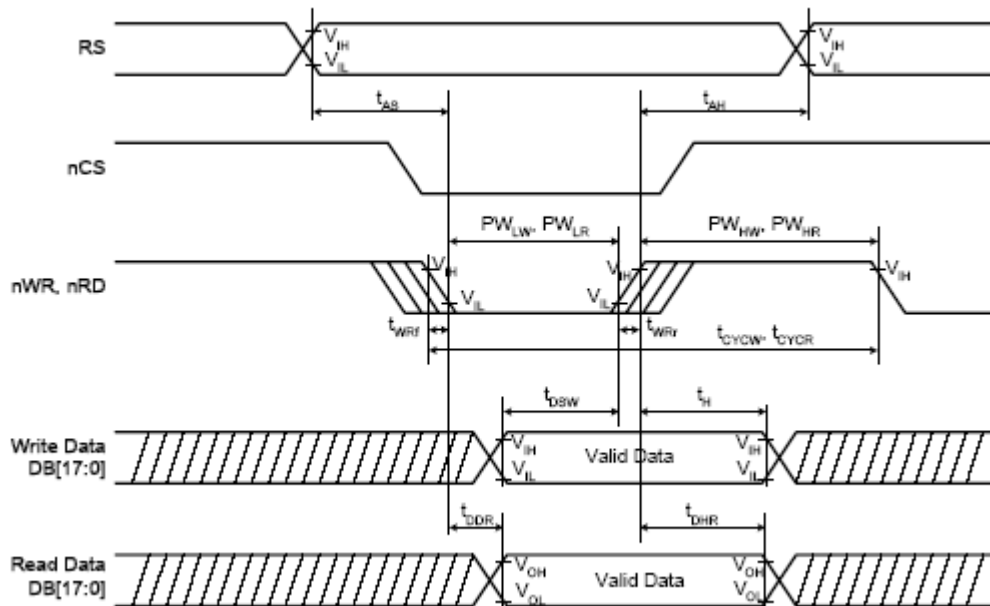


Table 9: Reset Timing Characteristics (VCC = 2.4~3.3V , IOVCC=1.65~3.3V)

Item	Symbol	Unit	Min.	Typ.	Max.
Reset front high-level width	t_{RES_FH}	ms	1	-	-
Reset low-level width	t_{RES_L}	ms	10	-	-
Reset back high-level width	t_{RES_BH}	ms	50	-	-
Reset rise time	t_{RES}	μ s	-	-	10

6. OPTICAL CHARACTERISTICS

6.1 SPECIFICATION

The following items are measured under stable conditions. The optical characteristics should be measured in a dark room or equivalent state with the methods shown in Note.1.

Items	Symbol	Condition	Specifications			Unit	Note
			Min.	Typ.	Max.		
Contrast Ratio	CR		400	500	-	-	
Response Time	T _R		-	10	20	ms	
	T _F		-	15	20	ms	
Chromaticity	Red	X _R	0.606	0.626	0.646	-	
		Y _R	0.314	0.334	0.354	-	
	Green	X _G	0.257	0.277	0.297	-	
		Y _G	0.529	0.549	0.569	-	
	Blue	X _B	0.122	0.142	0.162	-	
		Y _B	0.102	0.122	0.142	-	
	White	X _W	0.283	0.303	0.323	-	
		Y _W	0.305	0.325	0.345	-	
Viewing angle	Hor.	φ1(3 o'clock)	35	45	-	deg.	
		φ2(9 o'clock)	35	45	-		
	Ver.	θ2(12 o'clock)	35	45	-		
		θ1(6 o'clock)	10	20	-		
NTSC ratio				61.5		%	

Note 1: Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

$$\text{Contrast Ratio (CR)} = L63 / L0$$

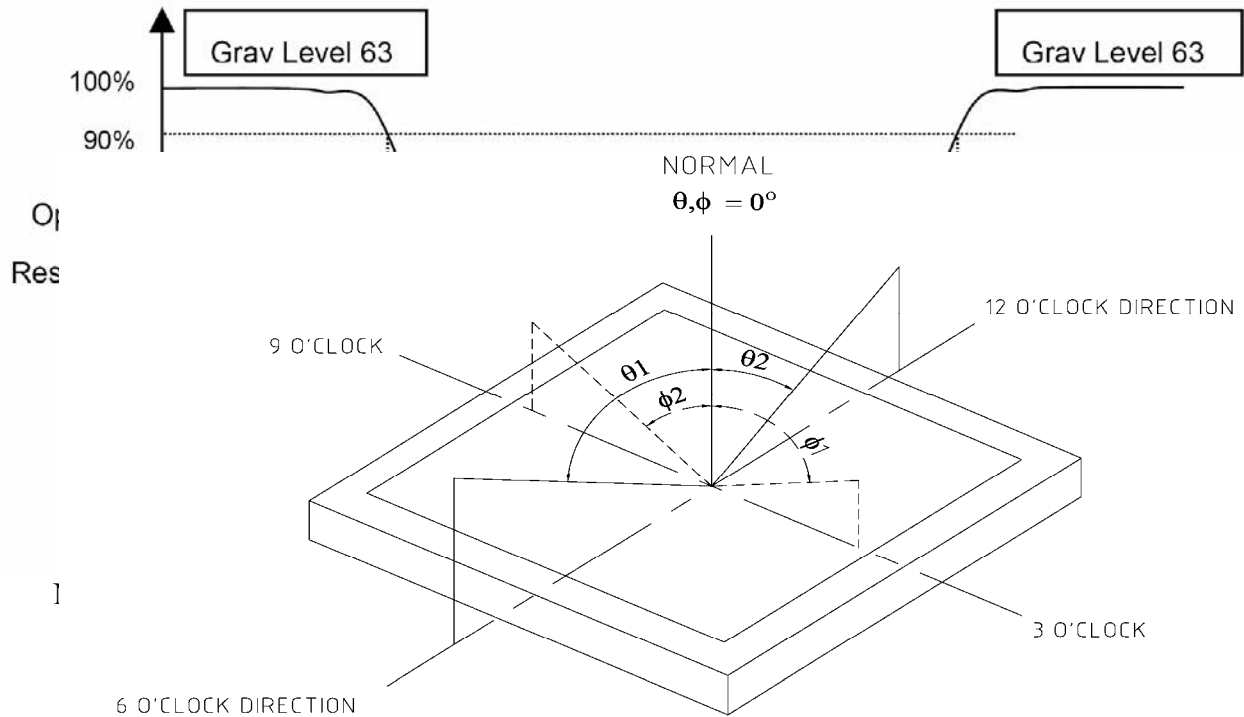
L63: Luminance of gray level 63

L0: Luminance of gray level 0

$$\text{CR} = \text{CR} (10)$$

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note 5.

Note 2: Definition of Response Time (TR, TF):



The above “Viewing Angle” is the measuring position with Largest Contrast Ratio; not for good image quality. View Direction for good image quality is 6 O’clock. Module maker can increase the “Viewing Angle” by applying Wide View Film.

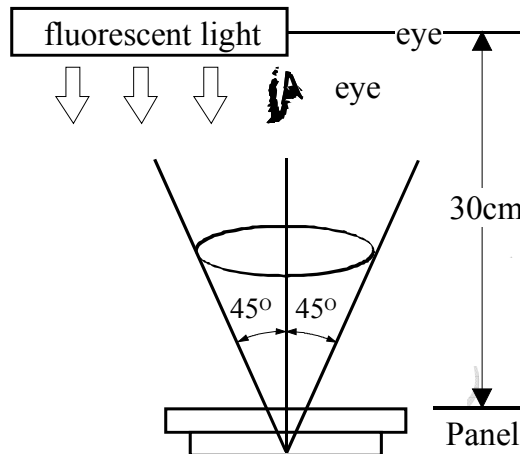
Note 4: Measurement Set-Up:

The LCD module should be stabilized at a given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.

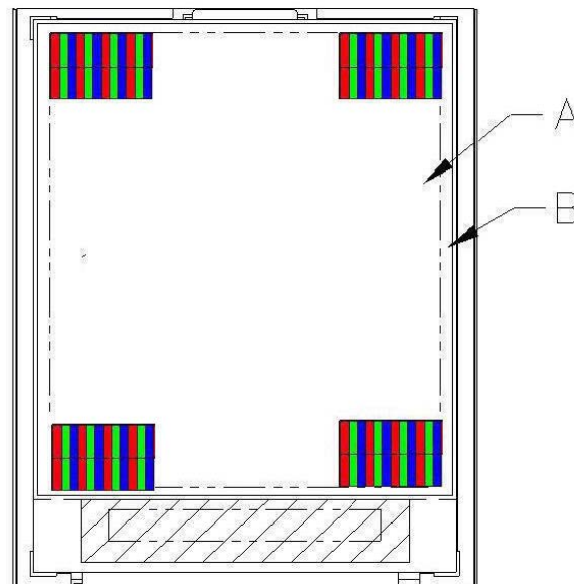
7. QUALITY SPECIFICATIONS

7.1 INSPECTION CONDITION

- (1) Inspect under 300~500Lux fluorescent light, leaving 30~35cm between panels and eyes, and between panels and lights.
- (2) Inspection condition is $23\pm 5^{\circ}\text{C}$, $50\pm 20\%\text{RH}$ maximum.



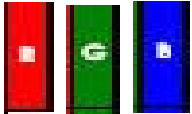
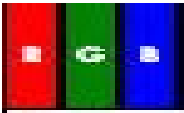
7.2 DEFINITION OF AREA


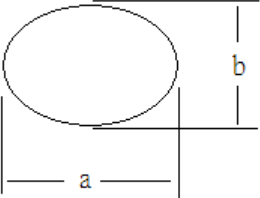


A Area : Viewing area.

B Area : Out of viewing.(outside viewing area)

7.3 INSPECTION SPECIFICATION

NO	Item	Acceptable specification	Judgment Criterion
1	Electrical Testing	<p>1-1 sub pixel classification</p> <ul style="list-style-type: none"> ● Sub Pixel: Number of sub pixel doesn't exceed one dot. <div style="text-align: center;">  <p>Sub Pixel (Dot)</p> </div> <p>a> Dark dot ----one Allowed b> Bright dot ---- one Allowed</p> <ul style="list-style-type: none"> ● Pixel : Three dots link together doesn't exceed ones <div style="text-align: center;">  <p>Pixel</p> </div> <p>1-2 Leakage to light</p> <ul style="list-style-type: none"> ● Leakage to light be not allowed. <p>1-3 Picture to shake</p> <ul style="list-style-type: none"> ● Picture had shake, twinkle and noise etc. instable of defect that be not allowed. <p>1-4 Function</p> <ul style="list-style-type: none"> ● No display or No function. ● Source Line, Gate Line. ● Contrast Ratio ● Current consumption exceeds product specifications. ● Display malfunction. 	<p>$N \leq 1$</p> <p>$N \leq 0$</p> <p>$N=0$</p> <p>$N=0$</p> <p>$N=0$</p>
2	Mechanical Dimension	<p>2-1 Mechanical Dimension exceeds product specifications.</p> <p>2-2 Out of frame and boss of plastic changed shape that be not allowed</p>	<p>$N=0$</p>

NO	Item	Acceptable specification	Judgment Criterion																																												
3	Cosmetic Inspection	<p>3-1 Blemish: Line shapes of defect</p> <table border="1" data-bbox="363 465 1313 824"> <thead> <tr> <th>Length</th> <th>Width</th> <th>Acceptable number</th> <th>Mini. space</th> </tr> </thead> <tbody> <tr> <td>---</td> <td>$W \leq 0.03$</td> <td>Ignore</td> <td rowspan="3">5 m m</td> </tr> <tr> <td>$L \leq 2.5$</td> <td>$0.03 < W \leq 0.05$</td> <td>3</td> </tr> <tr> <td>$L \leq 2.5$</td> <td>$0.05 < W \leq 0.1$</td> <td>2</td> </tr> <tr> <td>--</td> <td>$W > 0.1$</td> <td>Not allowed</td> <td></td> </tr> </tbody> </table> <p>L: length(mm) W: width(mm)</p>  <p>3-2 Blemish: dot shapes of defect</p> <table border="1" data-bbox="435 1104 1281 1339"> <thead> <tr> <th>Dimension</th> <th>Acceptable number</th> <th>Mini. Space</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.10$</td> <td>Ignore</td> <td>---</td> </tr> <tr> <td>$0.10 < \Phi \leq 0.15$</td> <td>2</td> <td rowspan="2">5 m m</td> </tr> <tr> <td>$0.15 < \Phi \leq 0.25$</td> <td>1</td> </tr> <tr> <td>$\Phi > 0.25$</td> <td>0</td> <td>---</td> </tr> </tbody> </table> <p>3-3 Polarizer Bubble</p> <table border="1" data-bbox="435 1417 1281 1585"> <thead> <tr> <th>Dimension</th> <th>Acceptable number</th> <th>Mini. Space</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.20$</td> <td>Ignore</td> <td>---</td> </tr> <tr> <td>$0.20 < \Phi \leq 0.30$</td> <td>2</td> <td>15 m m</td> </tr> <tr> <td>$\Phi > 0.30$</td> <td>0</td> <td>---</td> </tr> </tbody> </table> <p>Foreign Substances</p>  <p>$\Phi = (a+b)/2$</p>	Length	Width	Acceptable number	Mini. space	---	$W \leq 0.03$	Ignore	5 m m	$L \leq 2.5$	$0.03 < W \leq 0.05$	3	$L \leq 2.5$	$0.05 < W \leq 0.1$	2	--	$W > 0.1$	Not allowed		Dimension	Acceptable number	Mini. Space	$\Phi \leq 0.10$	Ignore	---	$0.10 < \Phi \leq 0.15$	2	5 m m	$0.15 < \Phi \leq 0.25$	1	$\Phi > 0.25$	0	---	Dimension	Acceptable number	Mini. Space	$\Phi \leq 0.20$	Ignore	---	$0.20 < \Phi \leq 0.30$	2	15 m m	$\Phi > 0.30$	0	---	
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NO	Item	Acceptable specification	Judgment Criterion			
3	Cosmetic Inspection	3-4 Scratch <ul style="list-style-type: none"> ● Sensate scratch not allowed. ● Impassive scratch as below. <p style="text-align: right; color: red;">Unit:mm</p>				
		Length		Width	Acceptable number	Mini. space
		-----		$W \leq 0.03$	Ignore	5 m m
		$L \leq 2.5$		$0.03 < W \leq 0.05$	3	
		$L \leq 2.5$		$0.05 < W \leq 0.1$	2	---
		----		$0.1 < W$	Not allowed	
		$L > 2.5$		----	Not allowed	
		4		Package	4-1 Mixed product types 4-2 Shipping q'ty should be the same as "shipping notice form" q'ty. 4-3 Outer box can't broken.	N=0

8. RELIABILITY

Test Item	Test Condition
High Temperature Operation	70°C for 240 hours
Low Temperature Operation	-20°C for 240 hours
High Temperature Storage	80°C for 240 hours
Low Temperature Storage	-30°C for 240 hours
High Temperature Operation Humidity Operation	60°C, 90%RH for 240 hours
Thermal Shock	-30°C (30min) ~+25°C (5min)~ +80°C (30min) for 100 cycles
Vibration Test (No Operation)	Frequency: 10~55Hz Amplitude:1.0mm Sweep Time: 11min Test Period: 6 Cycles for each direction of X, Y, Z
Electrostatic Discharge Test (No Operation)	150pF, 330Ω Air: ±2KV; Contact: ±2KV 10 times/point; 4 points/panel face

9. HANDLING PRECAUTION

9.1 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.

9.2 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 $50\pm 20\% \text{RH}$.
- (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.

9.3 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 it 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 ketonics 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 frame from the module.

9.4 WARRANTY

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