

PRODUCT SPECIFICATION

MODEL NO: SEL0144SQAB3

< ◇ > PRELIMINARY SPECIFICATION

< ◆ > APPROVAL SPECIFICATION

CUSTOMER
APPROVED BY
DATE:

DESIGNED	CHECKED	APPROVED

REVISION STATUS

V1.0	2013.05.30	-	First Issue	--
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1. GENERAL DESCRIPTION

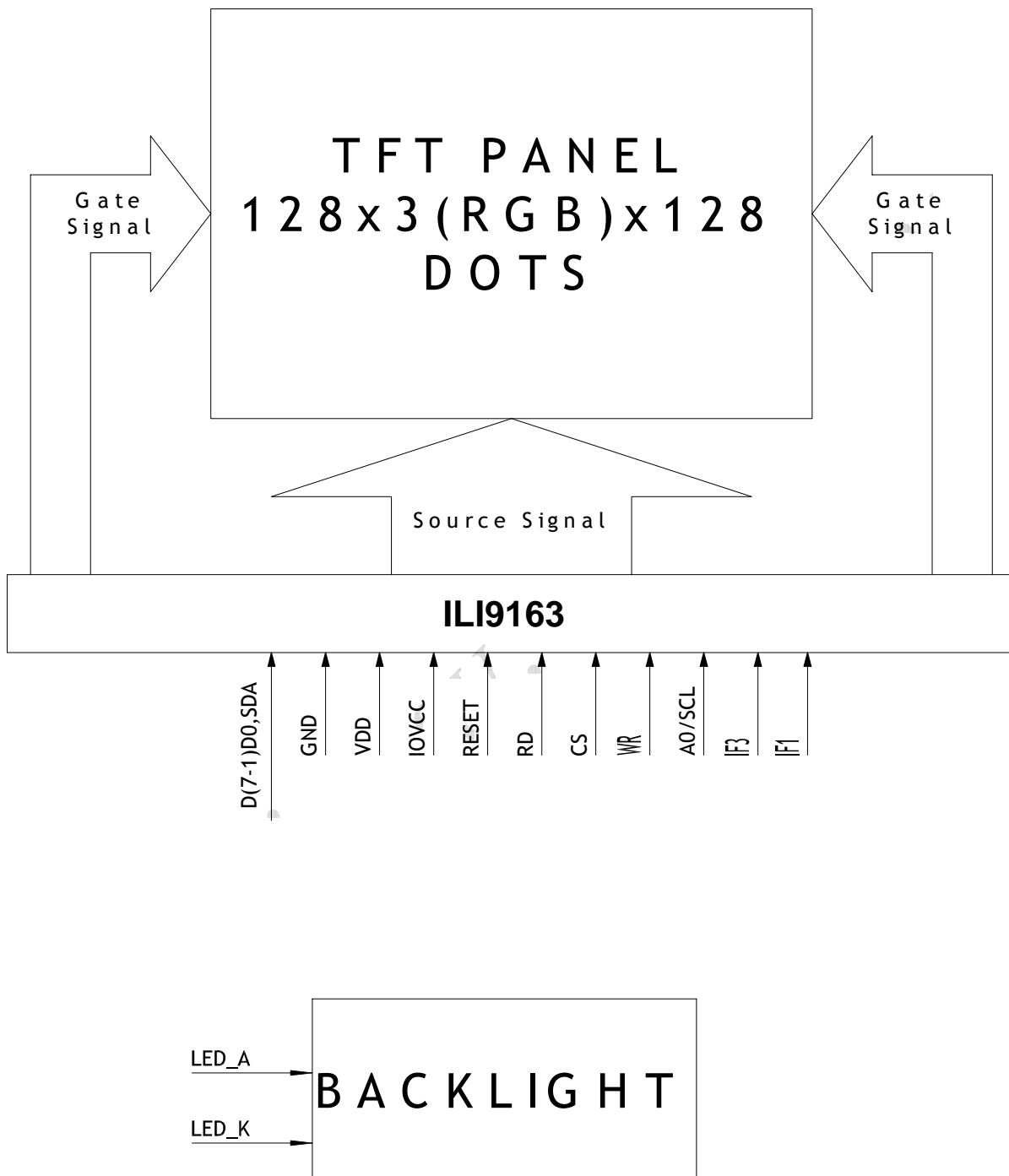
1.1 DESCRIPTION

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 SEL0144SQAB3.

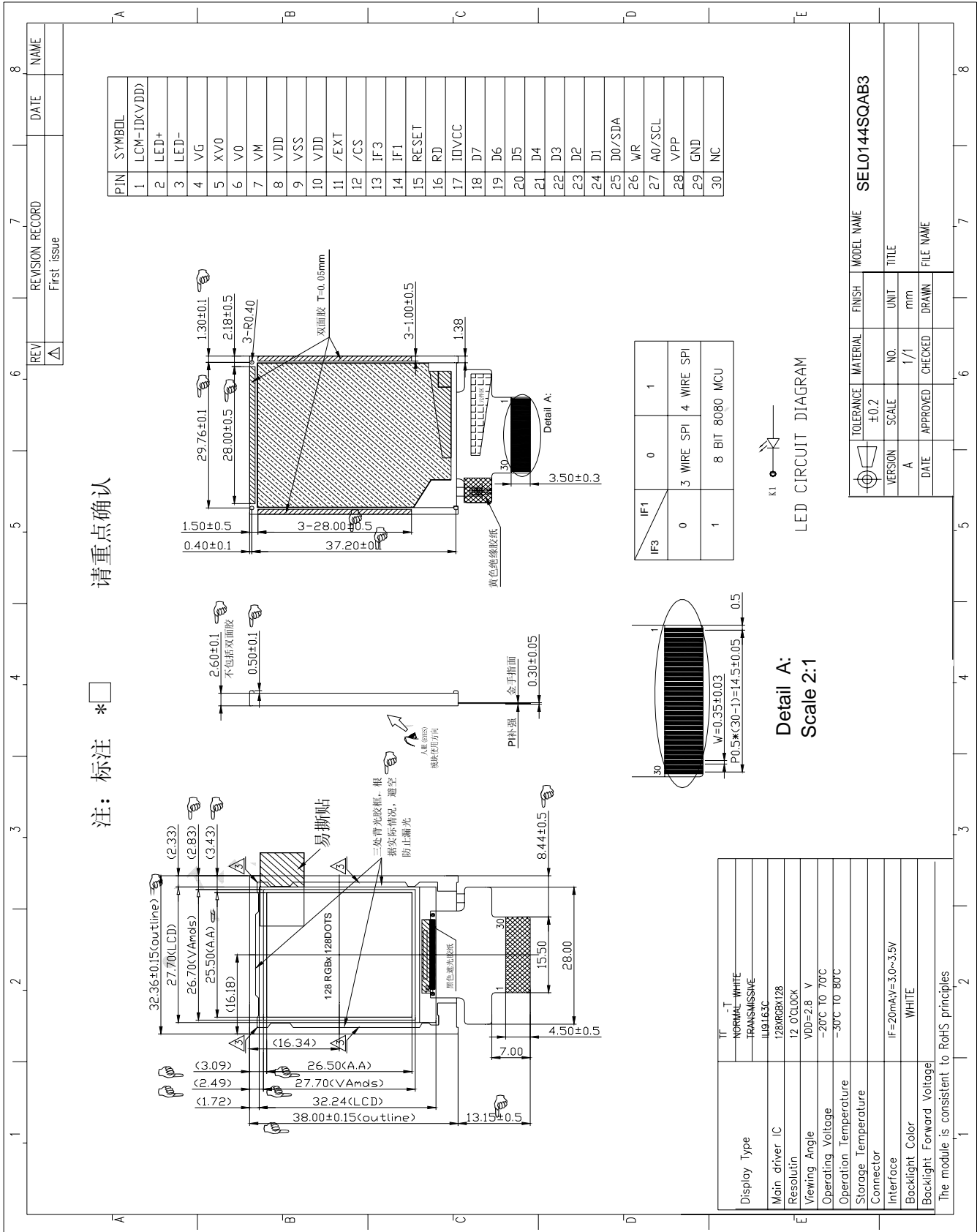
1.2 FEATURES:

No.	Item	Specification	Unit
1	Panel Size	1.44"	inch
2	Number of Pixels	128(W) × RGB × 128(H)	pixels
3	Active Area	25.5(W)×26.5(H)	mm
4	Pixel Pitch	0.199 (W)×0.207(H)	mm
5	Outline Dimension	32.36 (W) 38.0 (H) ×2.6(T) mm	mm
6	Number of Colors	65K/262K color	-
7	Display Mode	TFT LCD module/ Transmissive	-
8	Viewing Direction	6 o'clock	-
9	Display Format	RGB Strip	-
10	Interface	8-bit 80 system parallel interface or 3wire 4wire serial interface	-
11	Driver IC	ILI9163C	-
12	Backlight	White LED 1-LED	-
13	Operation Temperature	-20-70	°C
14	Storage Temperature	-30-80	°C
15	Weight	TBD	g
16	Polarizer Mode	Transmissive/Positive	-

2. FUNCTIONAL BLOCK DIAGRAM



3. MECHANICAL SPECIFICATION



4. PIN DESCRIPTION

Pin No.	Symbol	I/O	Function
1	LCM-ID (VDD)	PG	Power supply voltage.
2	LED+	PG	POWER SUPPLY FOR LED+
3	LED-	PG	POWER SUPPLY FOR LED-
4	VG	NC	NO CONNECTION
5	XV0	NC	NO CONNECTION
6	V0	NC	NO CONNECTION
7	VM	NC	NO CONNECTION
8	VDD	PG	Power supply voltage.
9	VSS	PG	Ground
10	VDD	PG	Power supply voltage.
11	/EXT	NC	NO CONNECTION
12	/CS	I	Chip select :low active
13	IF3	I	Parallel/Serial interface select Pin. (IM2) IF3=1:8080 8bit ,IF3=0: Serial Interface.
14	IF1	I	SPI interface selection pin. (SPI4W) IF1=0: 3-wire SPI (default) ,IF1=1:4-wire SPI.
15	RESET	I	Reset pin: low active
16	RD	I	Read enable clock input pin
17	I0VCC	PG	Logic Power supply(1.8V/2.8V)
18	D7	I/O	8 bit data bus. D0 is also the serial input/ output signal in SPI interface mode. In serial interface, D[7:1] are not used and should be connected to ground.
19	D6	I/O	
20	D5	I/O	
21	D4	I/O	
22	D3	I/O	
23	D2	I/O	
24	D1	I/O	
25	D0/SDA	I/O	
26	WR	I	Write enable input pin in Parallel interface. D/CX: for 4-wire SPI
27	A0/SCL	I	Data/Instruction select input SCL pin in SPI interface.
28	VPP	NC	NO CONNECTION
29	GND	PG	Ground
30	NC	NC	NO CONNECTION

Note1: Please refer to ILITEK's [ILI9163C](#) data sheet for more details.

Note2: I/O definition: I---Input O---Output PG---Power/ Ground NC--- Not Connected

5. ELECTRICAL CHARACTERISTICS

5.1 ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Values		Unit	Remark
		Min	Max.		
Power Supply	IOV _{CC}	1.65	3.3	V	
Power Supply	V _{DD}	2.5 to 3.3		V	
Operating Temperature	Top	-20	+70	°C	75%MAX
Storage Temperature	Tst	-30	+80	°C	75%MAX

5.2 DC ELECTRICAL CHARACTERISTICS

Typical Operating Conditions (Ta=25°C)

	Symbol	Condition	Values			Unit	Remark
			Min	Typ	Max.		
Power Supply	V _{DD}	-	2.5	2.8	3.3	V	
Input Voltage	V _{IH}	-	0.77IOV _{CC}	-	IOV _{CC}	V	
	V _{IL}	-	0	-	0.3V _{CC}	V	
Supply current	I _{DD}	Without LED	-	1.0	2.0	mA	-
Sleeping in mode current	I _{sleep}	Without LED	-	10	-	uA	

5.3 BACKLIGHT UNIT (GND=0V)

Item	Symbol	Min	Typ	Max.	Unit
LED Current	If	-	20	-	mA
Number of LED ★ 1	-	1			pcs
Connection modet	p	p			-
LCM Surface Luminance★ 2 (If =20 mA)	L	200	250	-	Cd/m ²
LCM Surface brightness uniform★ 3	LD	80			%

★1 BACKLIGHT Block diagram

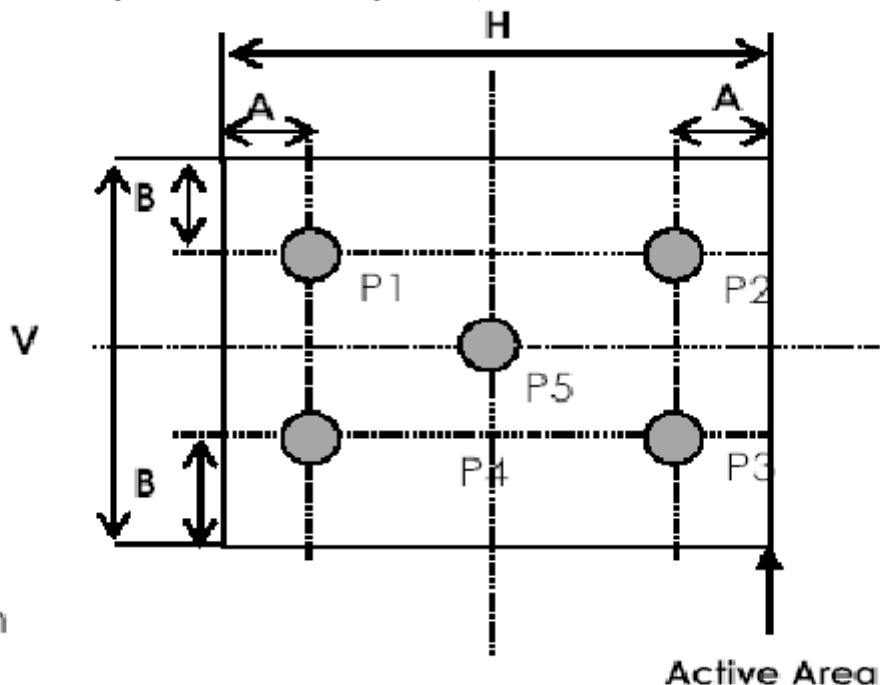


★2 Definition of Luminance:

From the LCD surface 50cm vertical suvery the center point ,use BM-7 at field 1° when all pixels displaying white.

★3 Uniform measure condition

- (1) Measure 5 point. Measure location is show below
- (2) Uniform = (Min. brightness / Max. brightness) × 100%



A : 5 mm

B : 5 mm

Light source spot size $\varnothing=2\text{mm}$

H,V : Active Area

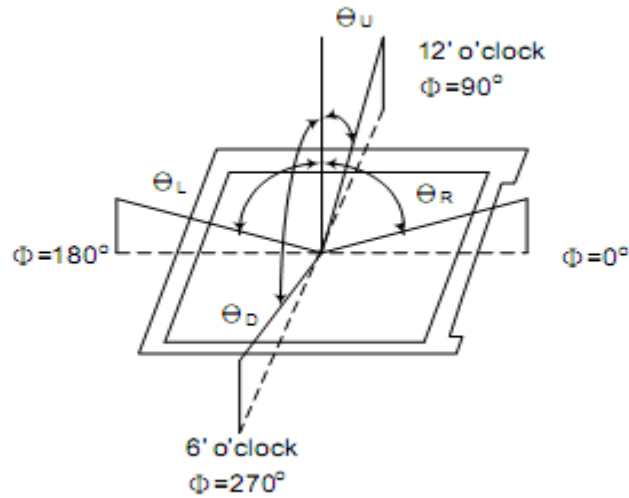
measurement device is TOPCON luminance meter BM-7

6. OPTICAL CHARACTERISTICS

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

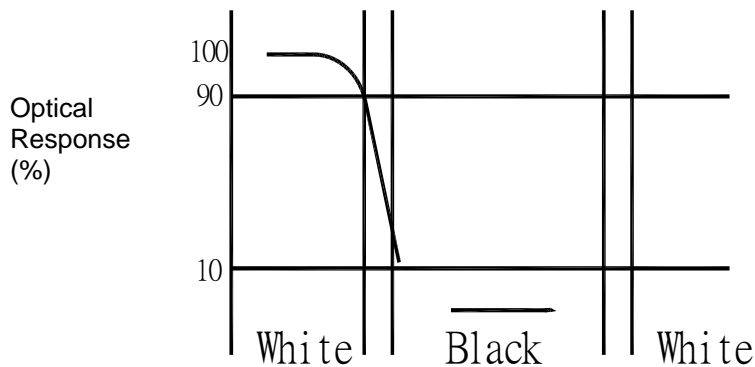
Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Transmittance (without Polarizer)	T(%)	—	—	17.5	—	—	
Contrast Ratio	CR	$\Theta=0$ Normal viewing angle	400	500	—	—	(1)(2) Measuring with EWV Polarizer · Reference Only
Response time	Rising	T_R	—	4	8	msec	(1)(3)
	Falling	T_F	—	12	24		
Color gamut	S(%)			53		%	
Color chromaticity (CIE1931)	White	W_x		0.273	0.293	0.313	(1)(4) CF glass
		W_y		0.305	0.325	0.345	
	Red	R_x		0.616	0.636	0.656	
		R_y		0.308	0.328	0.348	
	Green	G_x		0.263	0.283	0.303	
		G_y		0.511	0.531	0.551	
Blue	B_x		0.115	0.135	0.155		
	B_y		0.114	0.134	0.154		
Viewing angle	Hor.	Θ_L	CR>10	60	70	—	Measuring with EWV Polarizer · Reference Only
		Θ_R		60	70	—	
	Ver.	Θ_U		60	70	—	
		Θ_D		50	60	—	
View Direction	12 O'clock						(5)

Note.1 After stabilizing and leaving the panel alone at a given temperature for 30 minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7(fast) with a viewing angle of 1° at a distance of 50cm and normal direction.



Note.4: Definition of Response Time: TR and TF

The figure below is the output signal of the photo detector.



Note.5: Definition of Contrast Ratio (CR)

Ratio of gray max (G max)& gray min(G min)

Contrast ratio (CR) =(G max) / (G min)

(G max)=luminance with all pixel white

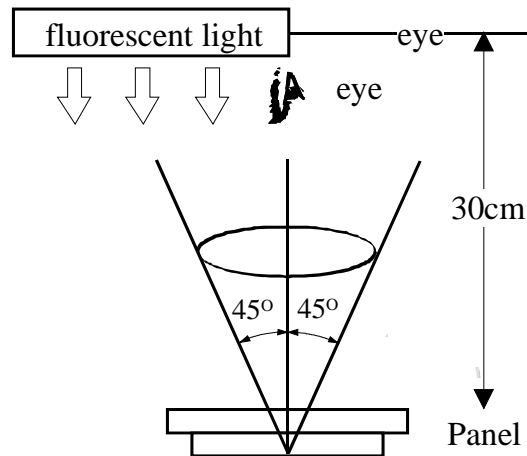
(G min)=luminance with all pixel black

Note.6: Measured at the center area of the panel when all the input terminals of LCD are electrically opened.

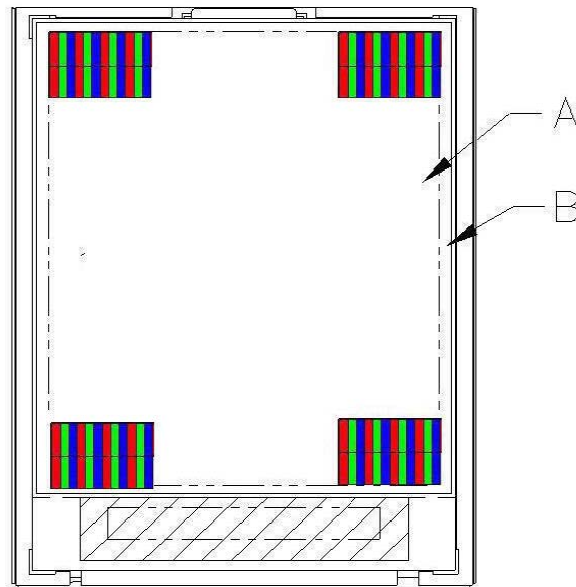
7. QUALITY SPECIFICATIONS

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.

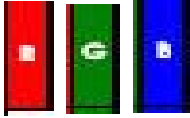
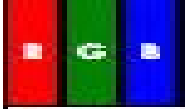



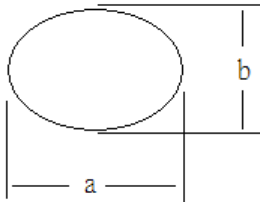
7.2 DEFINITION OF AREA



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"> <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> 	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		
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<p>3-2 Blemish: dot shapes of defect.</p> <table border="1"> <thead> <tr> <th>Dimension</th> <th>Acceptable</th> <th>Mini. Space</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.10$</td> <td>Ignore</td> <td>---</td> </tr> <tr> <td>$0.10 < \Phi \leq 0.2$</td> <td>2</td> <td rowspan="2">5 m m</td> </tr> <tr> <td>$0.2 < \Phi \leq 0.25$</td> <td>1</td> </tr> <tr> <td>$\Phi > 0.25$</td> <td>0</td> <td>---</td> </tr> </tbody> </table>	Dimension	Acceptable	Mini. Space	$\Phi \leq 0.10$	Ignore	---	$0.10 < \Phi \leq 0.2$	2	5 m m	$0.2 < \Phi \leq 0.25$	1	$\Phi > 0.25$	0	---							
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<p>3-3 Polarizer Bubble</p> <table border="1"> <thead> <tr> <th>Size</th> <th colspan="2">Acceptable Q'TY</th> </tr> <tr> <th>Area</th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>$\Psi < 0.2$</td> <td colspan="2">Accept no dense</td> </tr> <tr> <td>$0.2 < \Psi < 0.5$</td> <td>3</td> <td rowspan="3">Accept No Dense</td> </tr> <tr> <td>$0.5 < \Psi < 1.0$</td> <td>2</td> </tr> <tr> <td>$1.0 < \Psi$</td> <td>0</td> </tr> <tr> <td>Total acceptable Q'TY</td> <td>3</td> <td></td> </tr> </tbody> </table>	Size	Acceptable Q'TY		Area	A	B	$\Psi < 0.2$	Accept no dense		$0.2 < \Psi < 0.5$	3	Accept No Dense	$0.5 < \Psi < 1.0$	2	$1.0 < \Psi$	0	Total acceptable Q'TY	3			
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<p>Foreign Substances</p>  <p style="text-align: right;">$\Phi = (a+b)/2$</p>																					

NO	Item	Acceptable specification	Judgment Criterion																					
3	Cosmetic Inspection	<p>3-4 Scratch</p> <ul style="list-style-type: none"> ● Sensate scratch not allowed. ● Impassive scratch as below. <p style="text-align: right; color: red;">Unit:mm</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">Length</th> <th style="width: 25%;">Width</th> <th style="width: 25%;">Acceptable number</th> <th style="width: 25%;">Mini. space</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">-----</td> <td style="text-align: center;">$W \leq 0.03$</td> <td style="text-align: center;">Ignore</td> <td rowspan="3" style="text-align: center; vertical-align: middle;">5 m m</td> </tr> <tr> <td style="text-align: center;">$L \leq 2.5$</td> <td style="text-align: center;">$0.03 < W \leq 0.05$</td> <td style="text-align: center;">3</td> </tr> <tr> <td style="text-align: center;">$L \leq 2.5$</td> <td style="text-align: center;">$0.05 < W \leq 0.1$</td> <td style="text-align: center;">2</td> </tr> <tr> <td style="text-align: center;">----</td> <td style="text-align: center;">$0.1 < W$</td> <td style="text-align: center;">Not allowed</td> <td rowspan="2" style="text-align: center; vertical-align: middle;">---</td> </tr> <tr> <td style="text-align: center;">$L > 2.5$</td> <td style="text-align: center;">----</td> <td style="text-align: center;">Not allowed</td> </tr> </tbody> </table>	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	
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4	Package	<p>4-1 Mixed product types</p> <p>4-2 Shipping q'ty should be the same as "shipping notice form" q'ty.</p> <p>4-3 Outer box can't broken.</p>	N=0																					

8. RELIABILITY

1.MTTF .

The LCD module shall be designed to meet a minimum MTTF value of 50,000 hours with normal condition. (25°C in the room without sunlight; not include life time of backlight)

2. TESTS.

Test Item	Test Condition	CRITERION
High Temperature Operation	70°C for 240 hours	1.No defect of operational functions in room temperature are allowable. 2.IDD of LCM should be below specification.
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	50°C , 90%RH for 96 hours	
Thermal Shock	-30°C (30min) ~+25°C (30min) for 10 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)	Air discharge:±8KV Contact discharge:±4KV	

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 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 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.