PRODUCT SPECIFICATION

MODEL: WST018QQAA1

< ◇ > PRELIMINARY SPECIFICATION

< ◆ > APPROVAL SPECIFICATION

CUSTOMER
APPROVED BY
DATE:

DESIGNED	CHECKED	APPROVED
W-Display 2007.12.20 秦林		W Display 2007.12.20 李会斌

PREPARED BY:

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REVISION STATUS

Version	Revise Date	Page	Content	Modified by
V1.0	2007.12.20		First Issued	Iris

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1. GENERAL DESCRIPTION

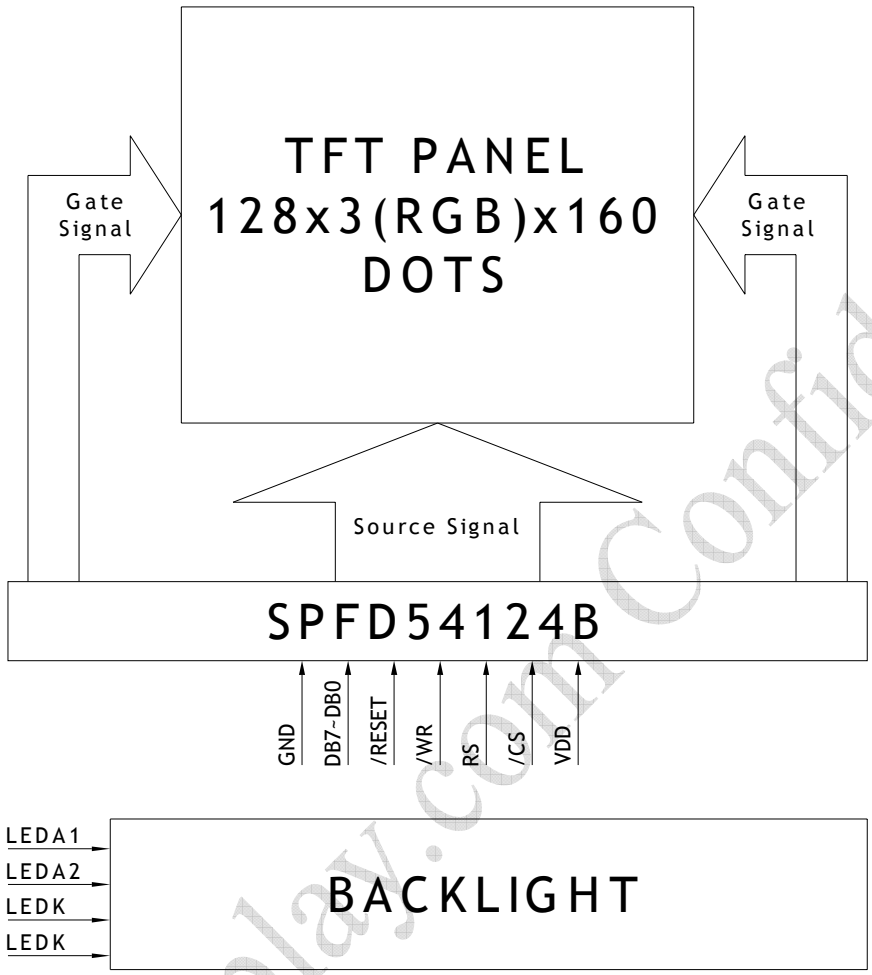
1.1 DESCRIPTION

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 WST018QQAA1.

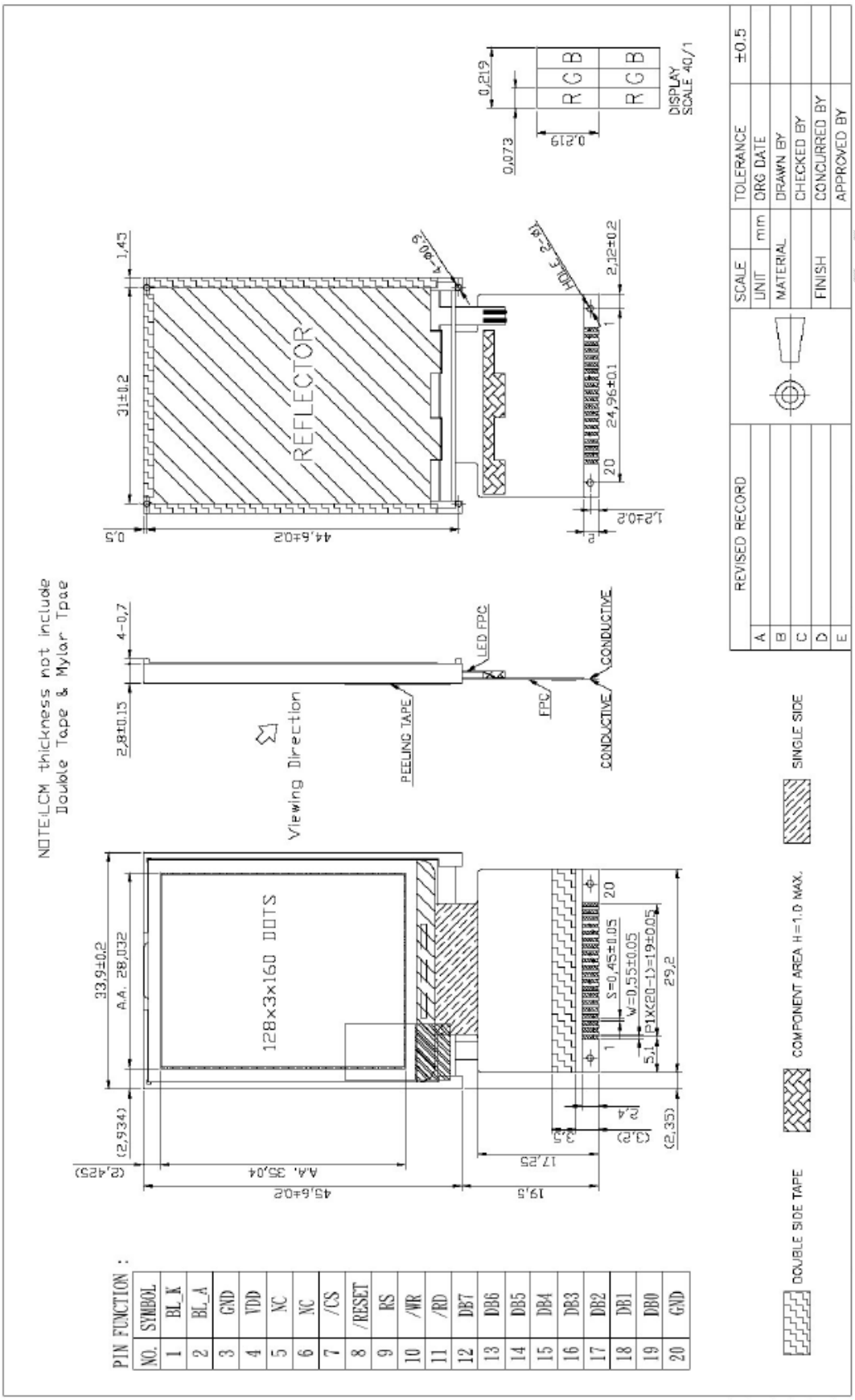
1.2 FEATURES:

No.	Item	Specification	Unit
1	Panel Size	1.8”	inch
2	Number of Pixels	128(W) × RGB × 160(H)	pixels
3	Active Area	28.032(W) × 35.04(H)	mm
4	Pixel Pitch	0.219(W) × 0.219(H)	mm
5	Outline Dimension	34(W) × 45.8(H) × 2.4(T)	mm
6	Number of Colors	262K Color / 65K Color	-
7	Display Mode	TN / Normally White / Transmissive	-
8	Viewing Direction	12 o’colock	-
9	Display Format	RGB Strip type	-
10	Interface	8 bits parallel data	-
11	Driver IC	SPFD54124B	-
12	Backlight	White LED	-
13	Operation Temperature	-20~70	℃
14	Storage Temperature	-30~80	℃
15	Weight	-	g

2. FUNCTIONAL BLOCK DIAGRAM



3. MECHANICAL SPECIFICATION



PIN FUNCTION :

NO.	SYMBOL
1	BL_K
2	BL_A
3	GND
4	VDD
5	NC
6	NC
7	/CS
8	/RESET
9	RS
10	/WR
11	/RD
12	DB7
13	DB6
14	DB5
15	DB4
16	DB3
17	DB2
18	DB1
19	DB0
20	GND

4. PIN DESCRIPTION

No.	Symbol	I/O	Function	Remark
1	GND	P	Ground.	
2	GND	P	Ground.	
3	DB7	I/O	Bi-directional data bus.	
4	DB6			
5	DB5			
6	DB4			
7	DB3			
8	DB2			
9	DB1			
10	DB0			
11	/RESET	I	When / Reset="L", all control registers are re-initialized by their default states.	
12	/WR	I	For and 80-system bus interface, serves as a write strobe signal and writes data at the low level.	
13	RS	I	Register select signal. Low: Index / Status High: Control register	
14	/CS	I	Chip select, force low to active display.	
15	VDD	P	Power Supply.	
16	GND	P	Ground.	
17	LEDA1	I	Anode for LED.	
18	LEDA2	I	Anode for LED.	
19	LEDK	I	Cathode for LED.	
20	LEDK	I	Cathode for LED.	

5. ELECTRICAL CHARACTERISTICS

5.1 ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Values		Unit	Remark
		Min	Max.		
Supply Voltage for Source Driver	V_{DD}	-0.3	4.6	V	
	V_{GH} -V_{GL}	-0.3	33	V	
Logic Input voltage range	V_{IN}	-0.3	V_{DD} +0.3	V	
Logic Output voltage range	V_O	-0.3	V_{DD} +0.3	V	

5.2 DC ELECTRICAL CHARACTERISTICS

5.2.1 OPERATING CONDITIONS

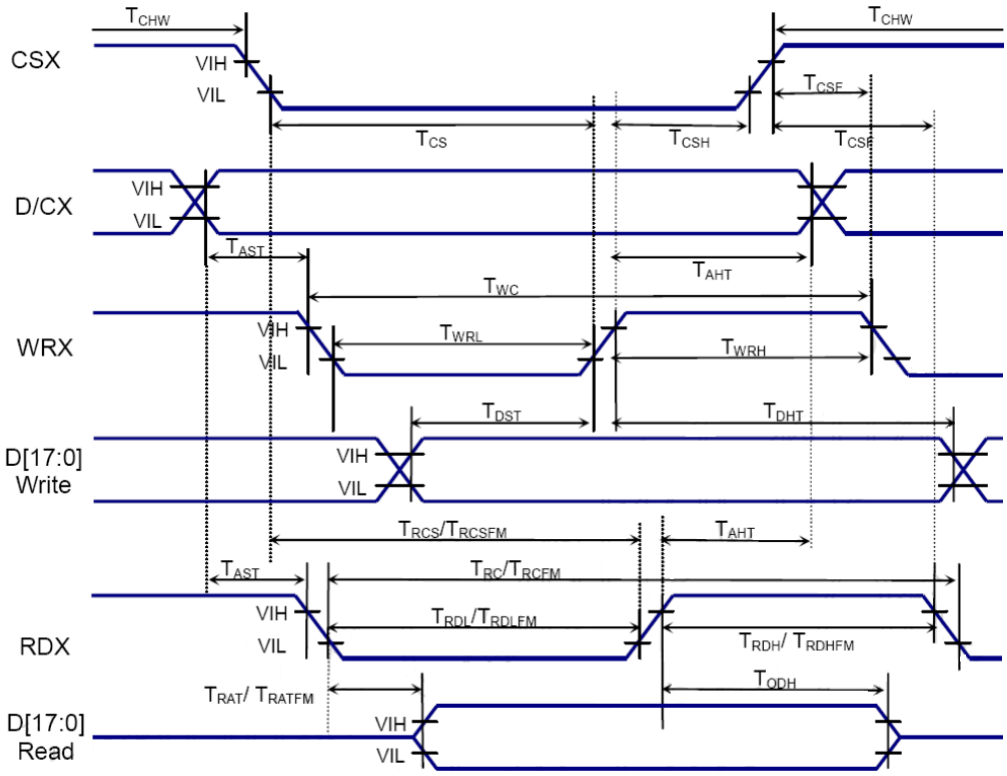
Typical Operating Conditions (Ta=25℃)

Item		Symbol	Values			Unit	Remark
			Min	Typ	Max.		
Power Supply		V_{DD}	2.6	2.85	3.6	V	
Supply Current for LCM		I_{DD}	-	1.62	3.24	mA	V_{DD}=2.85V
Input Signal Voltage	"H" Level	V_{IH}	0.7 V_{DD}	-	V_{DD}	V	
	"L" Level	V_{IL}	0	-	0.3 V_{DD}	V	
Output Signal Voltage	"H" Level	V_{OH}	V_{DD}-0.4	-	V_{DD}	V	
	"L" Level	V_{OL}	0	-	0.2 V_{DD}	V	

5.2.2 BACKLIGHT UNIT (GND=0V)

Item	Symbol	Values			Unit	Remark
		Min	Typ	Max.		
LED Voltage	V_L	-	3.3	3.4	V	
LED Current	I_L	-	-	40	mA	
Power Consumption	P_{LED}	-	66	-	mW	

5.3 TIMING CHARACTERISTICS



Signal	Symbol	Parameter	MIN	MAX	Unit	Description
D/CX	T_{AST}	Address setup time	10		ns	-
	T_{AHT}	Address hold time (Write/Read)	10		ns	
CSX	T_{CHW}	Chip select "H" pulse width	0		ns	-(3-transfer for one pixel)
	T_{CS}	Chip select setup time (Write)	35		ns	
	T_{RCS}	Chip select setup time (Read ID)	45		ns	
	T_{RCSFM}	Chip select setup time (Read FM)	355		ns	
	T_{CSF}	Chip select wait time (Write/Read)	10		ns	
	T_{CSH}	Chip select hold time	10		ns	
WRX	T_{WC}	Write cycle	100		ns	
	T_{WRH}	Control pulse "H" duration	35		ns	
	T_{WRL}	Control pulse "L" duration	35		ns	
RDX (ID)	T_{RC}	Read cycle (ID)	160		ns	When read ID data
	T_{RDH}	Control pulse "H" duration (ID)	90		ns	
	T_{RDL}	Control pulse "L" duration (ID)	45		ns	
RDX (FM)	T_{RCFM}	Read cycle (FM)	450		ns	When read from frame memory
	T_{RDHFM}	Control pulse "H" duration (FM)	90		ns	
	T_{RDLFM}	Control pulse "L" duration (FM)	355		ns	
D[17:0]	T_{DST}	Data setup time	10		ns	For maximum C_L=30pF For minimum C_L=8pF
	T_{DHT}	Data hold time	10		ns	
	T_{RAT}	Read access time (ID)		100	ns	
	T_{RATFM}	Read access time (FM)		340	ns	
	T_{ODH}	Output disable time	20	80	ns	

5.4 INITIALIZATION TABLE

	Instruction	D/CX	Code	Description
1	SLPOUT	0	0x11	Sleep out & booster on
2	INVOFF	0	0x20	Display inversion off (normal)
3	IDMOFF	0	0x38	Idle mode off
4	NORON	0	0x13	Partial off (Normal)
5	COLMOD	0	0x3A	Interface pixel format
		1	0x05	Interface format
6	CASET	0	0x2A	Column address set
		1	0x00	X address start: 0 ≤ XS ≤ EFh,MV='0' X address end: XS ≤ XE ≤ EFh,MV='0'
		1	0x00	
		1	0x00	
		1	0x7F	
7	RASET	0	0x2B	Row address set
		1	0x00	Y address start: 0 ≤ YS ≤ 13Fh,MV='0' Y address end: YS ≤ YE ≤ 13Fh,MV='0'
		1	0x00	
		1	0x00	
		1	0x9F	
8	INVCTR	0	0xB4	Display inversion controll
		1	0x00	NLA, NLB, NLC: set inversion
9	Delay			500ms
10	VMCTR1	0	0xC5	VCOM control 1
		1	0xC8	nVM: VCOM input select
11	PWCTR1	0	0xC0	Power control setting
		1	0x03	VRH: Set the GVDD voltage
12	VMCTR2	0	0xC6	VCOM control 2
		1	0x1F	VMA: VCOMAC voltage control
13	CPT Panel	0	0xFE	For CPT Panel
		1	0x00	
		1	0x04	
14	GAMSET	0	0x26	Gamma curve select
		1	0x01	Gamma curve（G2.2）
15	GAMCTRP1	0	0xE0	Set Gamma correction
		0	0x00	Gamma adjustment (+ polarity)
		1	0x10	
		1	0x52	
		1	0x53	
		1	0x55	
		1	0x55	
		1	0x37	
16	GAMCTRN1	0	0xE1	Set Gamma correction
		1	0x00	Gamma adjustment (- polarity)
		1	0x10	
		1	0x52	
		1	0x53	
		1	0x55	
		1	0x55	
		1	0x37	
17	Delay			500ms
18	DISPON	0	0x29	Display on

6. OPTICAL CHARACTERISTICS

6.1 SPECIFICATION

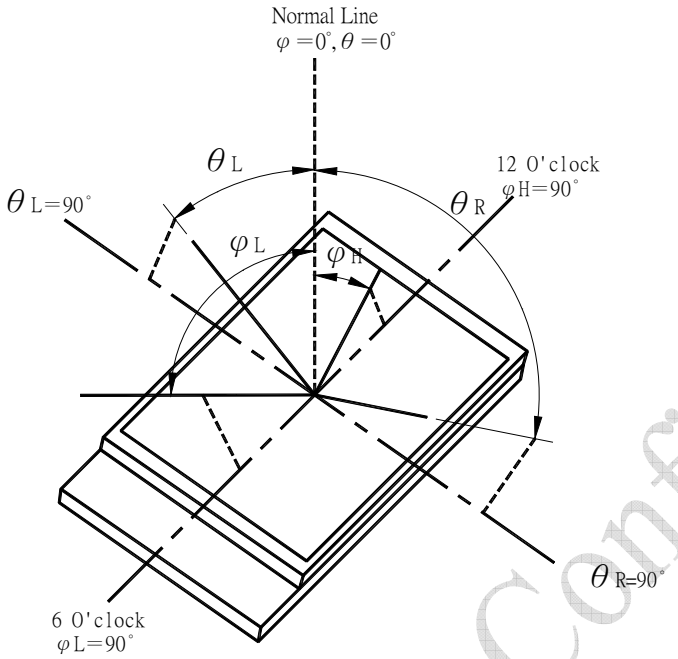
The following items are measured under stable conditions. The optical characteristics should be measured in a dark room or equivalent state with the methods shown in Note.1.

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle	Horizontal	-	CR≧10	-	140	-	degree	Note.3
	Vertical	-		-	115	-		
Response Time(Tr+Tf)			Θ=0	-	30	-	ms	Note.4
Brightness			Center	180	-		cd/m^2	Note.6
Contrast Ratio		CR	At optimized viewing angle	210	420	-	-	Note.5
Color Gamut(NTSC)		S		-	51	-	%	Note.5
Color Chromaticity	White	X_W	Viewing normal angle Φ,Θ=0	0.27	0.31	0.35	-	Note.6
		Y_W		0.30	0.34	0.38		
	Red	X_R		0.58	0.62	0.66		
		Y_R		0.32	0.36	0.40		
	Green	X_G		0.29	0.33	0.37		
		Y_G		0.54	0.58	0.62		
	Blue	X_B		0.10	0.14	0.18		
		Y_B		0.09	0.11	0.15		

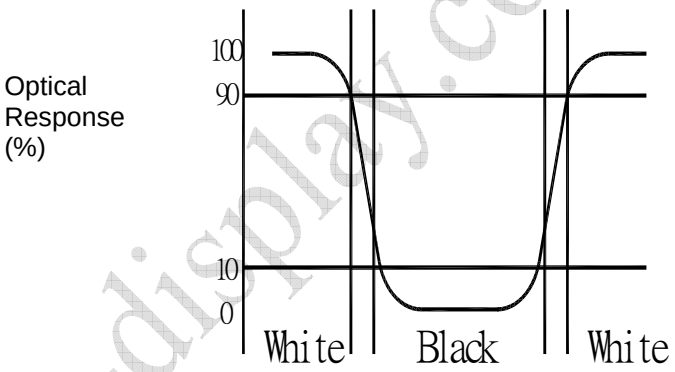
Note.1: After stabilizing and leaving the panel alone at a given temperature for 30 minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7(fast) with a viewing angle of 1° at a distance of 50cm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

Note.2: ΔB=B(min)/B(max)

Note.3: Definition of Viewing Angle: Refer to figure as below:



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)

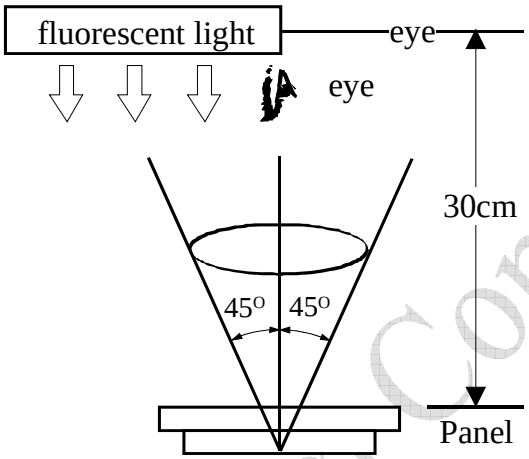
Ratio of gray max (G max)& gray min(G min)
Contrast ratio (CR) =(G max) / (G min)
(G max)=luminance with all pixel white
(G min)=luminance with all pixel black

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

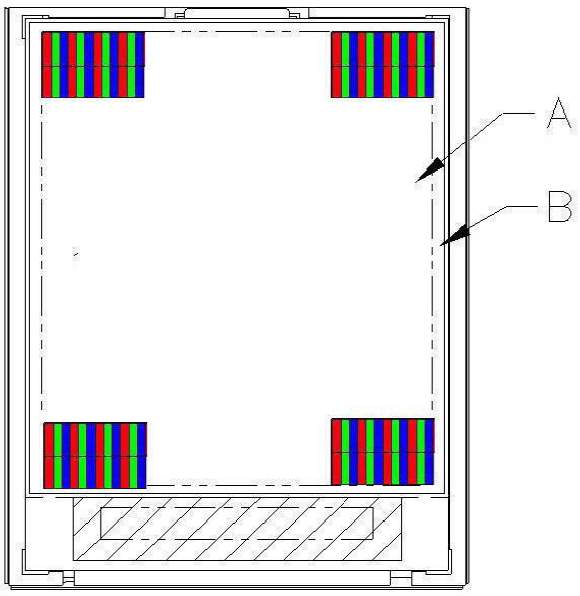
7. QUALITY SPECIFICATIONS

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±5°C, 50±20%RH maximum.

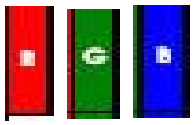


7.2 DEFINITION OF AREA



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	**1-1 sub pixel classification** ● Sub Pixel: Number of sub pixel doesn't exceed one dot.  **Sub Pixel (Dot)** **a> Dark dot ----one Allowed** **b> Bright dot ---- one Allowed**	N≦1
		● Pixel : Three dots link together doesn't exceed ones  **Pixel**	N≦0
		1-2 Leakage to light ● Leakage to light be not allowed.	N=0
		1-3 Picture to shake ● Picture had shake, twinkle and noise etc. instable of defect that be not allowed.	N=0
		1-4 Function ● No display or No function. ● Source Line, Gate Line. ● Contrast Ratio ● Current consumption exceeds product specifications. ● Display malfunction.	N=0
2	Mechanical Dimension	2-1 Mechanical Dimension exceeds product specifications. 2-2 Out of frame and boss of plastic changed shape that be not allowed	N=0

<table>
<tr><th>NO</th><th>Item</th><th>Acceptable specification</th><th>Judgment Criterion</th></tr>
<tr><td>3</td><td>Cosmetic Inspection</td><td>

3-1 Blemish: Line shapes of defect

<table>
<tr><th>Length</th><th>Width</th><th>Acceptable number</th><th>Mini. space</th></tr>
<tr><td>---</td><td>W≦0.03</td><td>Ignore</td><td rowspan="3">5 m m</td></tr>
<tr><td>L≦2.5</td><td>0.03<W≦0.05</td><td>3</td></tr>
<tr><td>L≦2.5</td><td>0.05<W≦0.1</td><td>2</td></tr>
<tr><td>--</td><td>W＞0.1</td><td>Not allowed</td><td>---</td></tr>
</table>

L: length(mm)
W: width(mm)

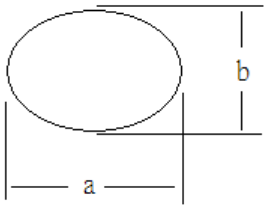
3-2 Blemish: dot shapes of defect.

<table>
<tr><th>Dimension</th><th>Acceptable number</th><th>Mini. Space</th></tr>
<tr><td>Φ≦0.10</td><td>Ignore</td><td>---</td></tr>
<tr><td>0.10＜Φ≦0.15</td><td>2</td><td rowspan="2">5 m m</td></tr>
<tr><td>0.15＜Φ≦0.25</td><td>1</td></tr>
<tr><td>Φ＞0.25</td><td>0</td><td>---</td></tr>
</table>

3-3 Polarizer Bubble

<table>
<tr><th>Dimension</th><th>Acceptable number</th><th>Mini. Space</th></tr>
<tr><td>Φ≦0.20</td><td>Ignore</td><td>---</td></tr>
<tr><td>0.20＜Φ≦0.30</td><td>2</td><td>15 m m</td></tr>
<tr><td>Φ＞0.30</td><td>0</td><td>---</td></tr>
</table>

Foreign Substances



Φ=(a+b)/2

</td><td></td></tr>
</table>

<table>
<tr><th>NO</th><th>Item</th><th>Acceptable specification</th><th>Judgment Criterion</th></tr>
<tr><td>3</td><td>Cosmetic Inspection</td><td>
3-4 Scratch
● Sensate scratch not allowed.
● Impassive scratch as below.
Unit:mm
<table>
<tr><th>Length</th><th>Width</th><th>Acceptable number</th><th>Mini. space</th></tr>
<tr><td>-----</td><td>W≦0.03</td><td>Ignore</td><td rowspan="3">5 m m</td></tr>
<tr><td>L≦2.5</td><td>0.03<W≦0.05</td><td>3</td></tr>
<tr><td>L≦2.5</td><td>0.05<W≦0.1</td><td>2</td></tr>
<tr><td>----</td><td>0.1＜W</td><td>Not allowed</td><td rowspan="2">---</td></tr>
<tr><td>L>2.5</td><td>----</td><td>Not allowed</td></tr>
</table>
</td><td></td></tr>
<tr><td>4</td><td>Package</td><td>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.</td><td>N=0</td></tr>
</table>

8. RELIABILITY

Test Item	Test Condition
High Temperature Operation	70℃ for 240 hours
Low Temperature Operation	-20℃ for 240 hours
High Temperature Storage	80℃ for 240 hours
Low Temperature Storage	-30℃ for 240 hours
High Temperature Operation Humidity Operation	60℃, 90%RH for 240 hours
Thermal Shock	-30℃(30min) ~+25℃(5min)~ +80℃(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 stal 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±5℃ and thehumidity is below 50±20%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 acleaning 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.