



**SPECIFICATION
FOR
LCD Module
KD035C-3A-TP**

MODULE:	KD035C-3A-TP
CUSTOMER:	

REV	DESCRIPTION	DATE
1.0	FIRST ISSUE	2011.02.06

STARTEK	INITIAL	DATE
PREPARED BY		
CHECKED BY		
APPROVED BY		

CUSTOMER	INITIAL	DATE
APPROVED BY		

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General Description

* Description

This is a color active matrix TFT (Thin Film Transistor) LCD (liquid crystal display) that uses amorphous silicon TFT as a switching device. This model is composed of a Transmissive type TFT-LCD Panel, driver circuit, back-light unit. The resolution of a 3.5TFT-LCD contains 320x240 pixels, and can display up to 65K/262K colors.

* Features

-Low Input Voltage: 3.3V(TYP)

-Display Colors of TFT LCD: 65K/262K colors

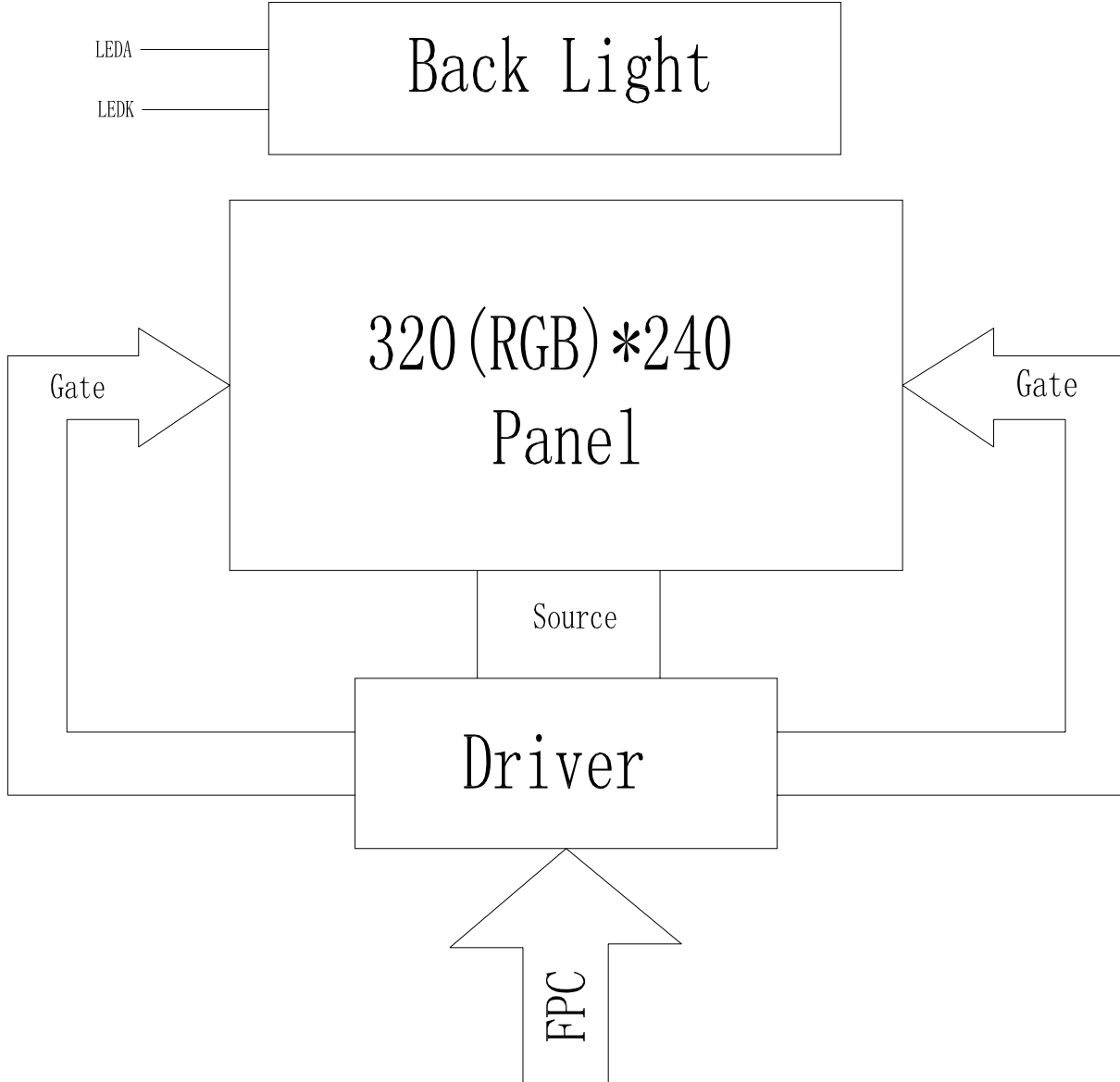
-RGB Interface: 8BIT/9BIT/16BIT/18BIT MCU, 3SPI/4SPI+16BIT/18BIT RGB

eral Information Items	Specification	Unit	Note
	Main Panel		
Display area(AA)	70.08(H)*52.56(V) (3.5inch)	mm	-
Driver element	TFT active matrix	-	-
Display colors	65K/262K	colors	-
Number of pixels	320(RGB)*240	dots	-
Pixel arrangement	RGB vertical stripe	-	-
Pixel pitch	0.219(H)*0.219(V)	mm	-
Viewing angle	12:00	o'clock	-
Controller IC	SSD2119M	-	-
Display mode	Transmissive/ Normally White	-	-
Operating temperature	-20~+70	°C	-
Storage temperature	-30~+80	°C	-

* Mechanical Information

Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal(H)		78.02		mm	-
	Vertical(V)		64.85		mm	-
	Depth(D)		4.4		mm	-
Weight			TBD		g	-

1. Block Diagram



3. Input terminal Pin Assignment

NO.	SYMBOL	DISCRIPTION	I/O
1	GND	Ground.	P
2	XL	Touch panel LIFT Glass Terminal	
3	YD	Touch panel Bottom Film Terminal	
4	XR	Touch panel Right Glass Terminal	
5	YU	Touch panel Top Film Terminal	
6	GND	Ground.	P
7	RD	Serves as a read signal and MCU read data at the rising edge. fix this pin at VCI or GND when not in use	I
8	SDO	SPI interface output pin. -The data is output on the falling edge of the SCL signal. -If not used, let this pin open.	O
9	RESET	This signal will reset the device and must be applied to properly initialize the chip.	I
10	CS	Chip select input pin ("Low" enable). fix this pin at VCI or GND when not in use.	I
11	SCL	This pin is used serial interface clock in 3-wire 9-bit 4-wire 8-bit serial data interface. fix this pin at VCI or GND when not in use.	I
12	SDA	Serial input signal. The data is applied on the rising edge of the SCL signal. If not used, fix this pin at VCI or GND.	I
13	RS	Display data/ command selection pin	I
14	RW	Write strobe signal in DBI type B operation	I
15	PS3	MPU Parallel interface bus and serial interface select If use RGB Interface must select serial interface. Fix this pin at VCI and GND.	I
16	PS2		I
17	PS1		I
18	PS0		I



19-36	DB17-DB0	18-bit parallel bi-directional data bus for M CU system and RGB interface mode . Fix to GND level when not in use	I/O
37	DEN	Data enable signal for RGB interface operation. fix this pin at VCI or GND when not in use.	I
38	HSYNC	Line synchronizing signal for RGB interface operation. fix this pin at VCI or GND when not in use.	I
39	VSYNC	Frame synchronizing signal for RGB interface operation. fix this pin at VCI or GND when not in use.	I
40	DCLK	Dot clock signal for RGB interface operation.	I
41	NC	NC	
42	GND	Ground.	P
43	GND	Ground.	P
44	VCC	Supply voltage(3.3V).	P
45	VCC	Supply voltage(3.3V).	P
46	NC	NC	
47	K2	Cathode pin OF backlight	P
48	A2	Anode pin of backlight	P
49	A1	Anode pin of backlight	P
50	K1	Cathode pin OF backlight	P

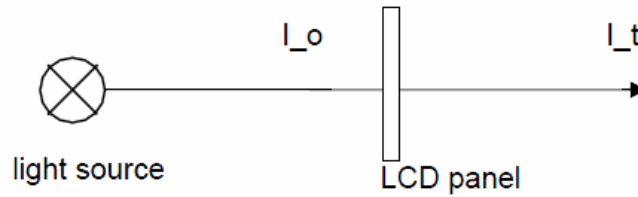
4. LCD Optical Characteristics

4.1 Optical specification

Item	Symbol	Specifications			Unit	Note
		Min.	Typ.	Max.		
Transmittance (Without Polarizer)	T%	-	14	-	%	[1]Here the transmittance and response time are design value. [2]Chromaticity measuring machine: CFT-01. Reference Only
Contrast ratio	Cr ($\Theta=0^\circ$)	150	300	-		
Response time (25°C)	T _r + T _f	-	35	50	ms	
Viewing angle (Cr≥ 10)	Θ21	15	25	-	deg	
	Θ22	35	45	-		
	Θ12	35	45	-		
	Θ11	35	45	-		
Chromaticity of CF	Red	x	0.604	0.624	0.644	
		y	0.302	0.322	0.342	
		Y	15.6	20.6	25.6	
	Green	x	0.268	0.288	0.308	
		y	0.54	0.56	0.58	
		Y	53.6	58.6	63.6	
	Blue	x	0.127	0.147	0.167	
		y	0.097	0.117	0.137	
		Y	8.3	13.3	18.3	
	White	x		0.307		
		y		0.328		
		Y		30.8		
Color gamut of CF (NTSC%)	S		58		%	

[1] Transmittance (T%)

The transmittance of the panel including polarizers is measured without electrical driving.



The Transmittance is defined as:

$$Tr = \frac{I_t}{I_o} \times 100\%$$

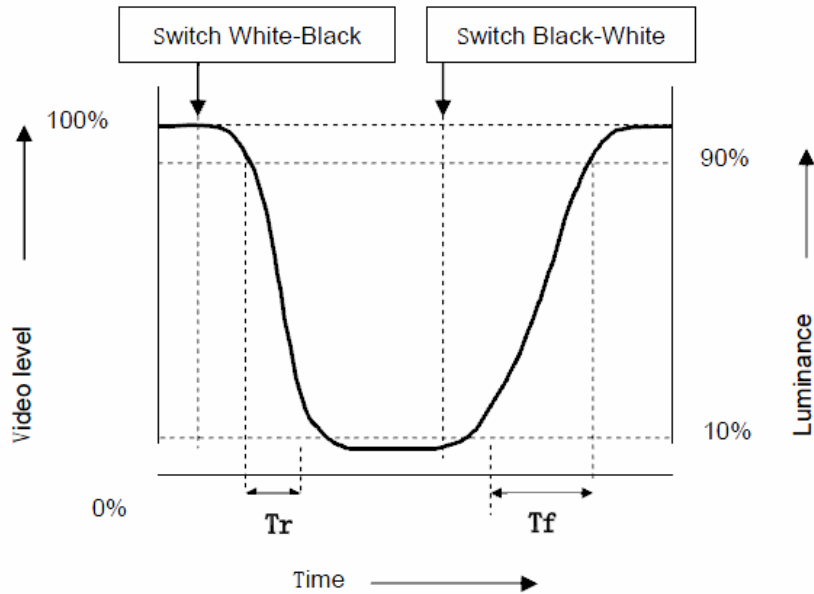
here,

I_o : the brightness of the light source.

I_t : the brightness after panel transmission.

[2] Response Time(Tr、Tf)

The rise time 'Tr' is defined as the time for luminance to change from 90% to 10% as a result of a change of the electrical condition. The fall time 'Tf' is defined as the time for luminance to change from 10% to 90% as a result of a change of the electrical condition.

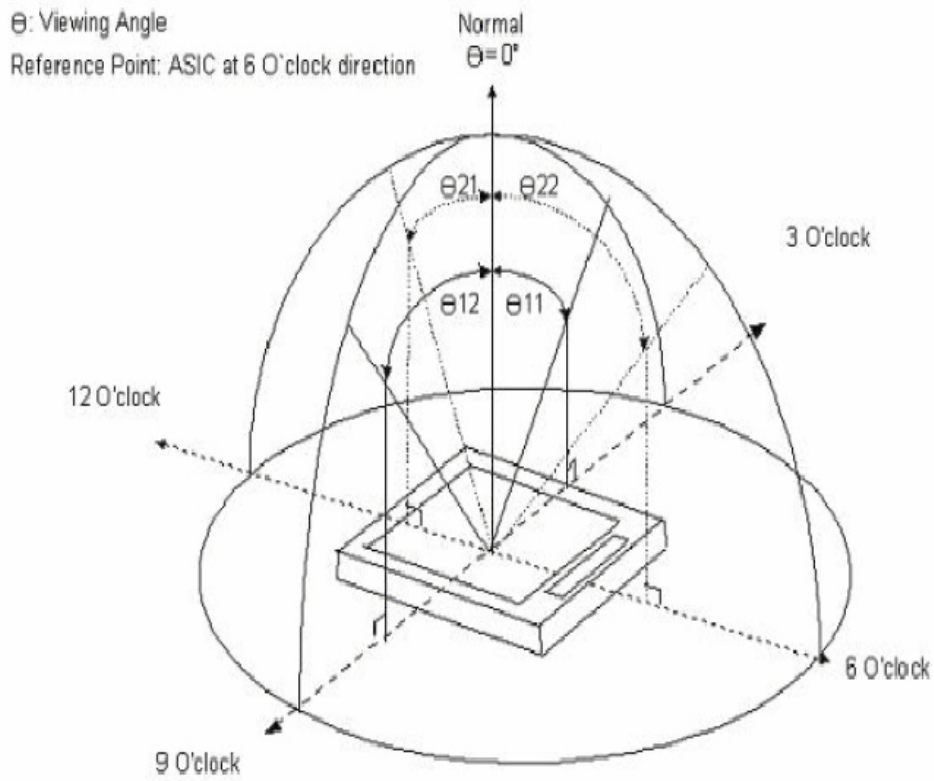


[3] Contrast ratio (Cr)

The contrast ratio (Cr), measured on a module, is the ratio between the luminance (L_w) in a full white area ($R=G=B=1$) and the luminance (L_d) in a dark area ($R=G=B=0$):

$$Cr = \frac{L_w}{L_d}$$

[4] Viewing angle diagram



[5] Definition of color gamut

Measuring machine: CFT-01. NTSC'S Primaries: R(x,y,Y)、G(x,y,Y)、 B(x,y,Y).

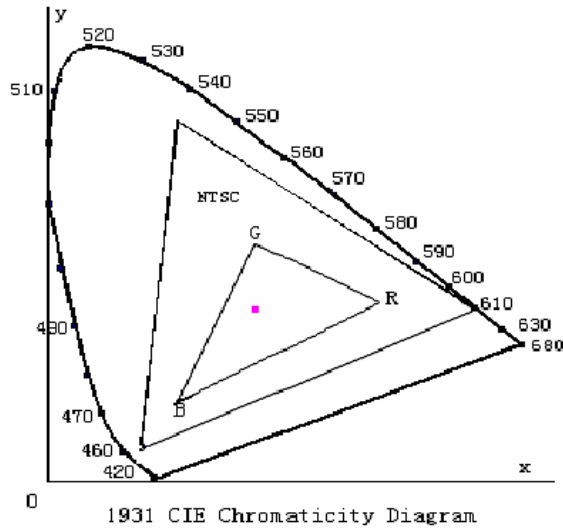


Fig. 1931 CIE chromaticity diagram

Color gamut:
$$S = \frac{\text{Area of RGB triangle}}{\text{Area of NTSC triangle}} \times 100\%$$

5. Electrical Characteristics

5.1 Absolute Maximum Rating (Ta=25 VSS=0V)

Characteristics	Symbol	Min.	Max.	Unit
Digital Supply Voltage	VDD	-0.3	4.6	V
Digital interface supply Voltage	VDDIO	-0.3	4.6	V
Operating temperature	T _{OP}	-20	+70	°C
Storage temperature	T _{ST}	-30	+80	°C

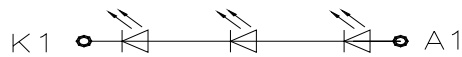
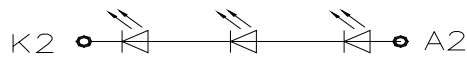
5.2 DC Electrical Characteristics

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Note
Digital Supply Voltage	VDD	2.4	3.3	4.2	V	
Digital interface supply Voltage	VDDIO	1.65	3.3	4.2	V	
Normal mode Current consumption	IDD	--	8	--	mA	
Level input voltage	V _{IH}	0.7V _{DDIO}		V _{DDIO}	V	
	V _{IL}	GND		0.3V _{DDIO}	V	
Level output voltage	V _{OH}	0.8V _{DDIO}		V _{DDIO}	V	
	V _{OL}	GND		0.2V _{DDIO}	V	

5.3 LED Backlight Characteristics

The back-light system is edge-lighting type with 4chips White LED

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Forward Current	I_F	35	40	--	mA	
Forward Voltage	V_F	--	9.6	--	V	
LCM Luminance	L_V	250	--	--	cd/m ²	$I_F = 40\text{mA}$
Uniformity	AV_g	80	--	--	%	

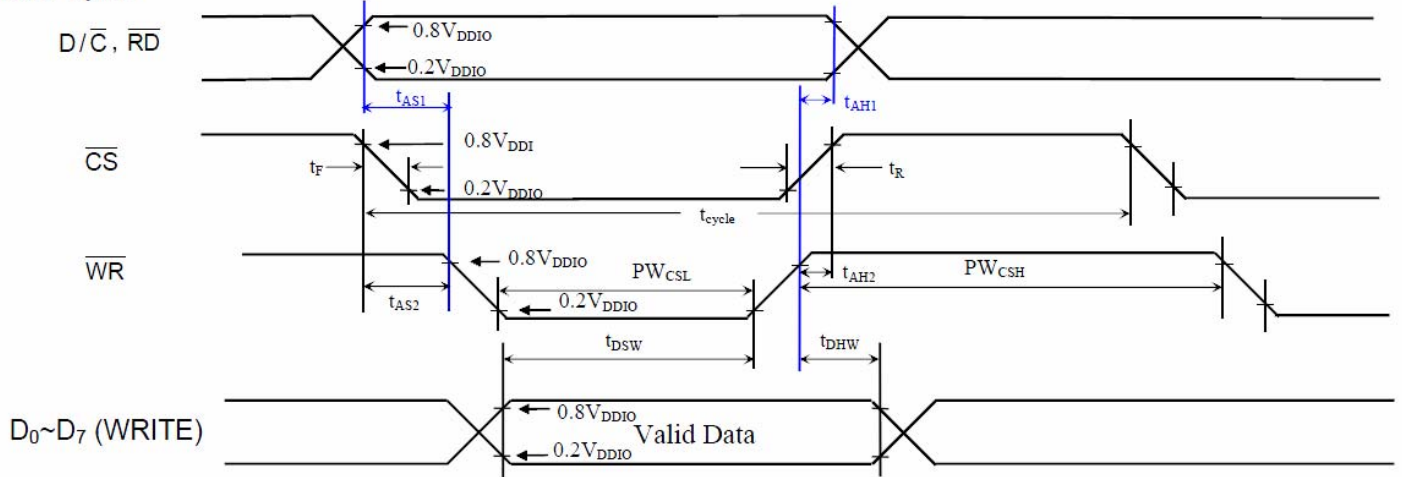


BLU CIRCUIT DIAGRAM

6. AC Characteristic

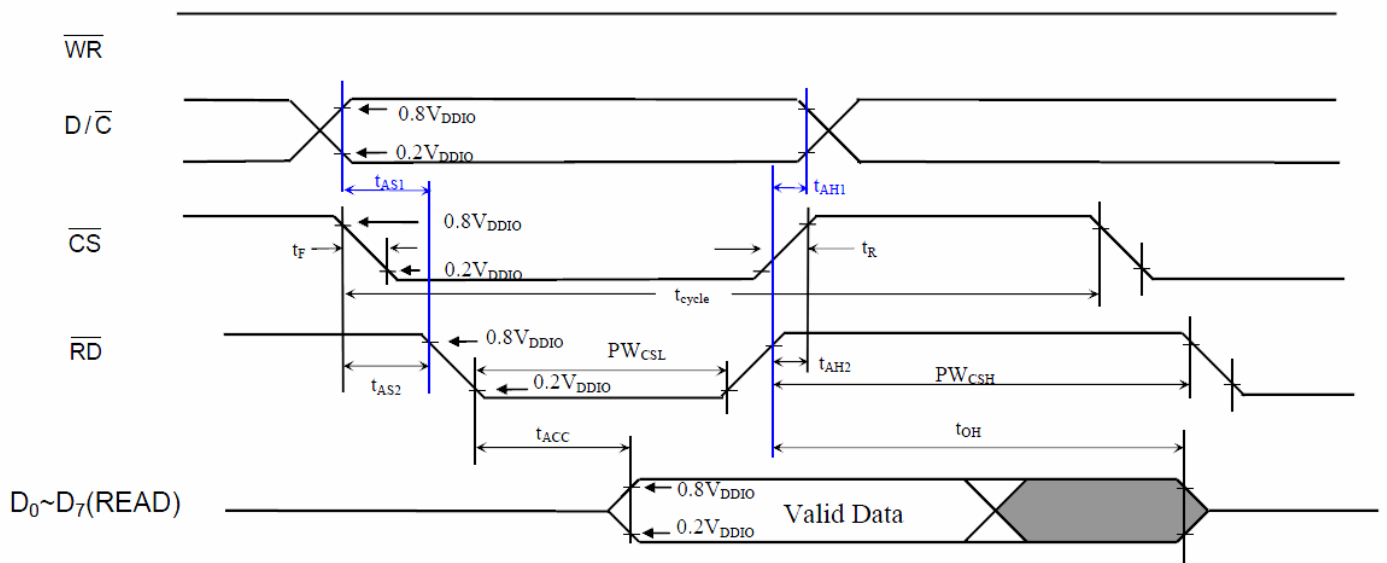
6.1. Display Parallel 18/16/9/8-bit Interface Timing Characteristics (8080-I system)

Write Cycle



Remark: It's highly recommended that \bar{RD} remains high for the whole write cycle

Read Cycle



($T_A = -40$ to 85°C , $V_{DDIO} = 1.4\text{V}$ to 3.6V)

Symbol	Parameter	Min	Typ	Max	Unit																														
t_{cycle}	Clock Cycle Time	77	-	-	ns																														
f_{CLK}	Serial Clock Cycle Time SPI Clock tolerance = +/- 2 ppm	-	-	15	MHz																														
t_{AS}	Register select Setup Time	4	-	-	ns																														
t_{AH}	Register select Hold Time	5	-	-	ns																														
t_{CSS}	Chip Select Setup Time	2	-	-	ns																														
t_{CSH}	Chip Select Hold Time	10	-	-	ns																														
t_{DSW}	Write Data Setup Time	5	-	-	ns </tr <tr> <td>t_{OHW}</td> <td>Write Data Hold Time</td> <td>10</td> <td>-</td> <td>-</td> <td>ns</td> </tr> <tr> <td>t_{CLKL}</td> <td>Clock Low Time</td> <td>38</td> <td>-</td> <td>-</td> <td>ns</td> </tr> <tr> <td>t_{CLKH}</td> <td>Clock High Time</td> <td>38</td> <td>-</td> <td>-</td> <td>ns</td> </tr> <tr> <td>t_{R}</td> <td>Rise time</td> <td>-</td> <td>-</td> <td>4</td> <td>ns</td> </tr> <tr> <td>t_{F}</td> <td>Fall time</td> <td>-</td> <td>-</td> <td>4</td> <td>ns</td> </tr>	t_{OHW}	Write Data Hold Time	10	-	-	ns	t_{CLKL}	Clock Low Time	38	-	-	ns	t_{CLKH}	Clock High Time	38	-	-	ns	t_{R}	Rise time	-	-	4	ns	t_{F}	Fall time	-	-	4	ns
t_{OHW}	Write Data Hold Time	10	-	-	ns																														
t_{CLKL}	Clock Low Time	38	-	-	ns																														
t_{CLKH}	Clock High Time	38	-	-	ns																														
t_{R}	Rise time	-	-	4	ns																														
t_{F}	Fall time	-	-	4	ns																														

6.2 Display Serial Interface Timing Characteristics (4-line SPI system)

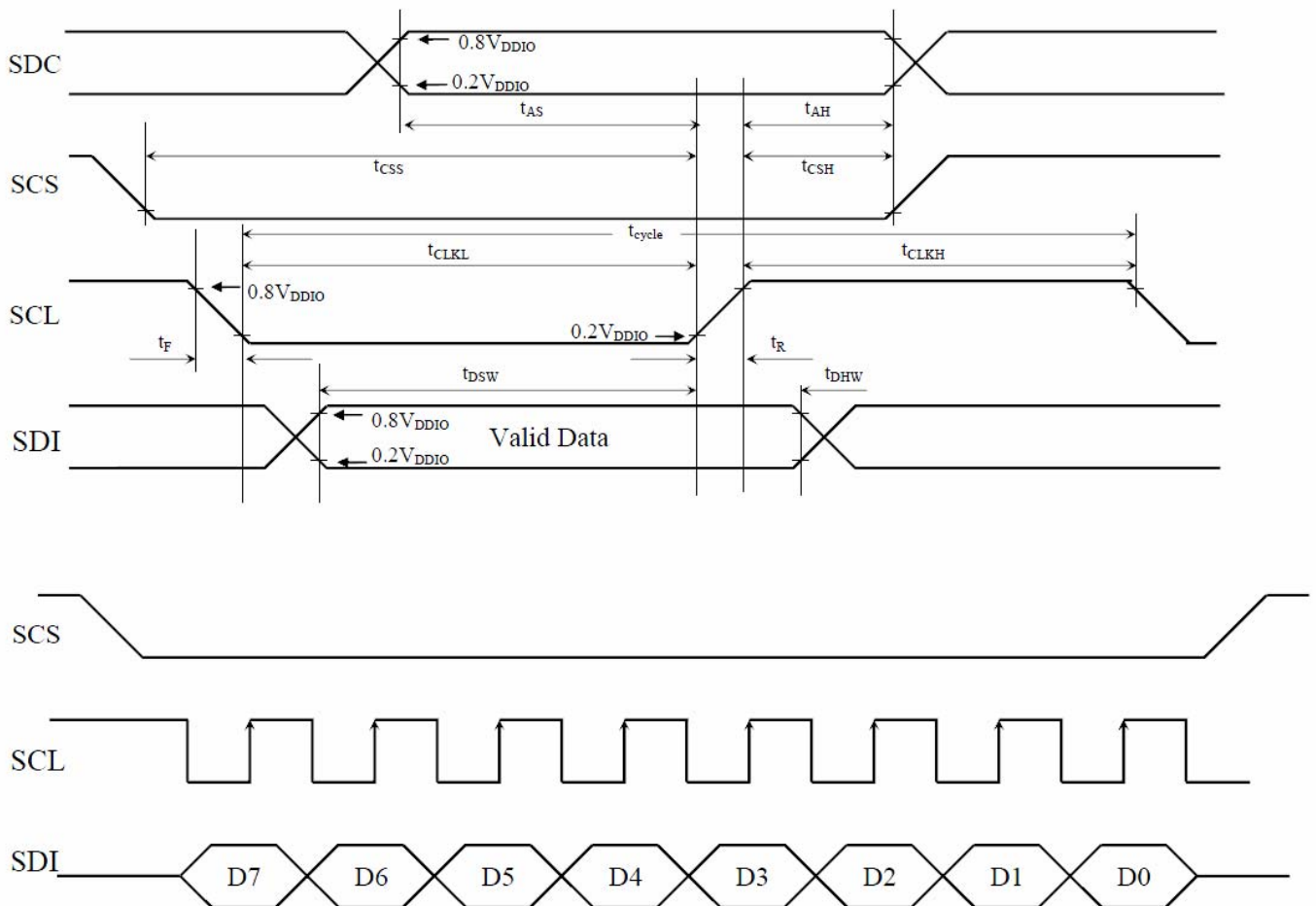


Table 13-4: RGB Timing Characteristics

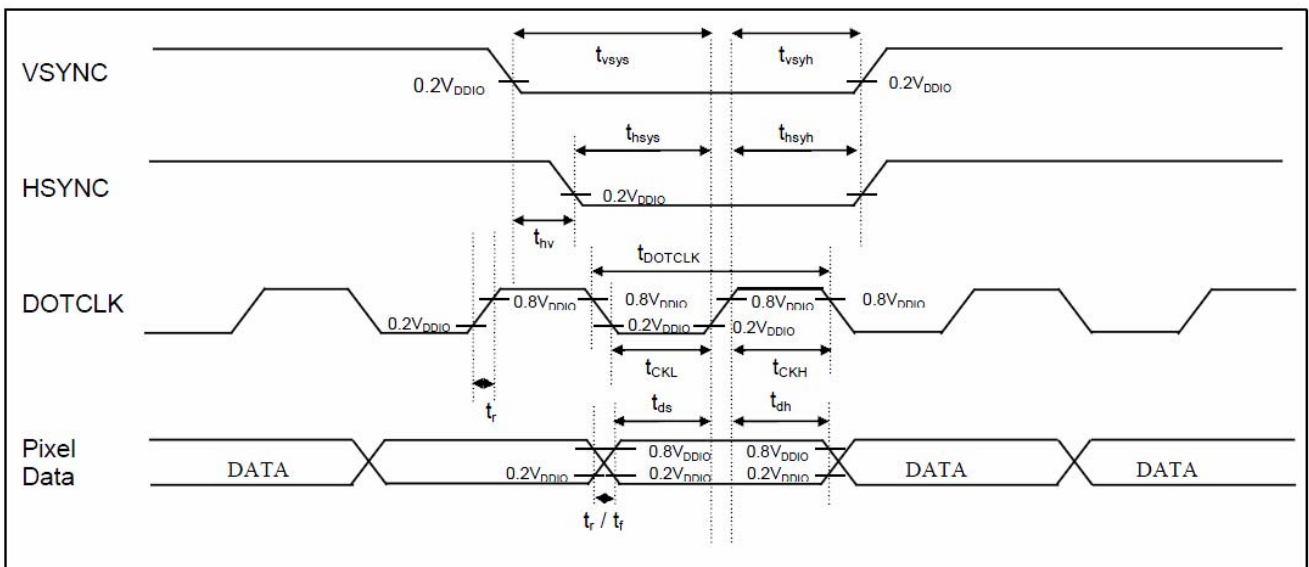
($T_A = -40$ to 85°C , $V_{DDIO} = 1.4\text{V}$ to 3.6V)

Symbol	Parameter	Min	Typ	Max	Unit
f_{DOTCLK}	DOTCLK Frequency (70Hz frame rate)	1	5.5	8.2	MHz
t_{DOTCLK}	DOTCLK Period	122	182	1000	us
t_{vSYS}	Vertical Sync Setup Time	20	-	-	ns
t_{vSYH}	Vertical Sync Hold Time	20	-	-	ns
t_{hSYS}	Horizontal Sync Setup Time	20	-	-	ns
t_{hSYH}	Horizontal Sync Hold Time	20	-	-	ns
t_{HV}	Phase difference of Sync Signal Falling Edge	0	-	320	t_{DOTCLK}
t_{CLK}	DOTCLK Low Period	61	-	-	ns
t_{CKH}	DOTCLK High Period	61	-	-	ns
t_{DS}	Data Setup Time	25	-	-	ns
t_{DH}	Data hold Time	25	-	-	ns
t_{RES}	Reset pulse width	8	-	-	ns

Note: External clock source must be provided to DOTCLK pin of SSD2119. The driver will not operate in absence of the clocking signal.

6.3 Parallel RGB Interface Timing Characteristics

Figure 13-4: RGB Timing Characteristics



7. LCD Module Out-Going Quality Level

7.1 VISUAL & FUNCTION INSPECTION STANDARD

7.1.1 Inspection conditions

Inspection performed under the following conditions is recommended.

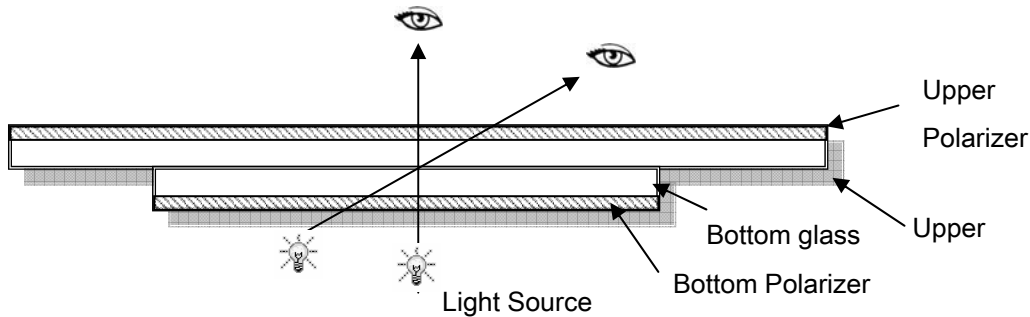
Temperature : $25 \pm 5^{\circ}\text{C}$

Humidity : $65\% \pm 10\% \text{RH}$

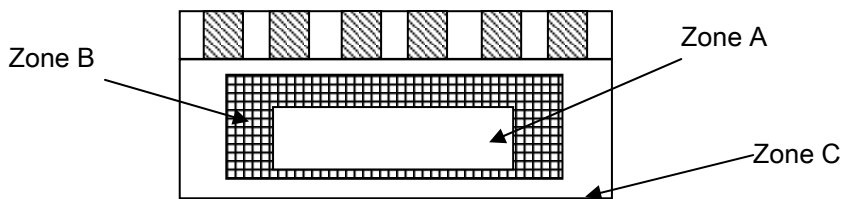
Viewing Angle : Normal viewing Angle.

Illumination: Single fluorescent lamp (300 to 700Lux)

Viewing distance: 30–50cm



7.1.2 Definition



Zone A : Effective Viewing Area(Character or Digit can be seen)

Zone B : Viewing Area except Zone A

Zone C : Outside (Zone A+Zone B) which can not be seen after assembly by customer .)

Note:

As a general rule ,visual defects in Zone C can be ignored when it doesn't effect product function or appearance after assembly by customer.

7.1.3 Sampling Plan

According to GB/T 2828-2003 ; , normal inspection, Class II

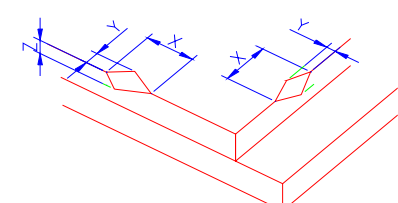
AQL:

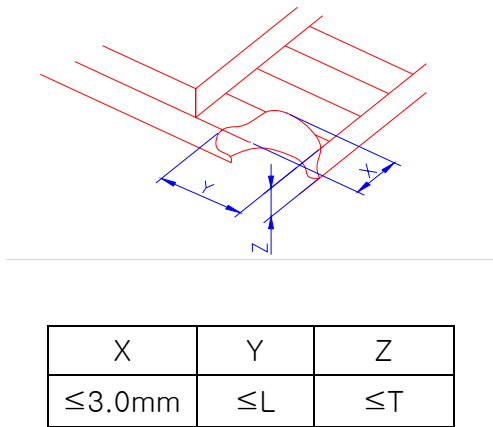
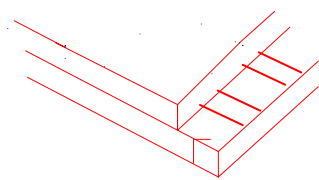
Major defect	Minor defect
0.65	1.5

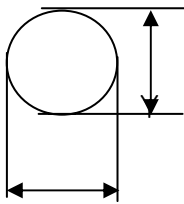
LCD: Liquid Crystal Display , TP: Touch Panel , LCM: Liquid Crystal Module

No	Items to be inspected	Criteria	Classification of defects
1	Functional defects	1) No display, Open or miss line 2) Display abnormally, Short 3) Backlight no lighting, abnormal lighting. 4) TP no function	Major
2	Missing	Missing component	
3	Outline dimension	Overall outline dimension beyond the drawing is not allowed	
4	Color tone	Color unevenness, refer to limited sample	Minor
5	Soldering appearance	Good soldering , Peeling off is not allowed.	
6	LCD/Polarizer/TP	Black/White spot/line, scratch, crack, etc.	

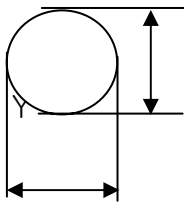
7.1.4 Criteria (Visual)

Number	Items	Criteria(mm)						
1.0 LCD Crack/Broken	(1) The edge of LCD broken	 <table border="1" data-bbox="861 1747 1388 1904"> <tr> <td>X</td> <td>Y</td> <td>Z</td> </tr> <tr> <td>≤3.0mm</td> <td><Inner border line of the seal</td> <td>≤T</td> </tr> </table>	X	Y	Z	≤3.0mm	<Inner border line of the seal	≤T
X	Y	Z						
≤3.0mm	<Inner border line of the seal	≤T						
NOTE: X: Length Y: Width								

<p>Z: Height L: Length of ITO, T: Height of LCD</p>	<p>(2)LCD corner broken</p>	 <table border="1" data-bbox="922 548 1332 649"> <tr> <td>X</td> <td>Y</td> <td>Z</td> </tr> <tr> <td>≤3.0mm</td> <td>≤L</td> <td>≤T</td> </tr> </table>	X	Y	Z	≤3.0mm	≤L	≤T
	X	Y	Z					
≤3.0mm	≤L	≤T						
<p>(3) LCD crack</p>	 <p>Crack Not allowed</p>							

Number	Items	Criteria (mm)																									
2.0	Spot defect  $\Phi = (X+Y)/2$	① light dot (LCD/TP/Polarizer black/white spot , light dot, pinhole, dent, stain) <table border="1" data-bbox="406 347 1348 705"> <thead> <tr> <th rowspan="2">Zone Size (mm)</th> <th colspan="3">Acceptable Qty</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.10$</td> <td colspan="3">Ignore</td> </tr> <tr> <td>$0.10 < \Phi \leq 0.15$</td> <td colspan="3">3(distance $\geq 10\text{mm}$)</td> </tr> <tr> <td>$0.15 < \Phi \leq 0.2$</td> <td colspan="3">1</td> </tr> <tr> <td>$0.2 < \Phi$</td> <td colspan="3">0</td> </tr> </tbody> </table>	Zone Size (mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.10$	Ignore			$0.10 < \Phi \leq 0.15$	3(distance $\geq 10\text{mm}$)			$0.15 < \Phi \leq 0.2$	1			$0.2 < \Phi$	0				
		Zone Size (mm)		Acceptable Qty																							
			A	B	C																						
		$\Phi \leq 0.10$	Ignore																								
		$0.10 < \Phi \leq 0.15$	3(distance $\geq 10\text{mm}$)																								
		$0.15 < \Phi \leq 0.2$	1																								
		$0.2 < \Phi$	0																								
		② Dim spot (LCD/TP/Polarizer dim dot, light leakage、 dark spot) <table border="1" data-bbox="406 795 1372 1164"> <thead> <tr> <th rowspan="2">Zone Size (mm)</th> <th colspan="3">Acceptable Qty</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.1$</td> <td colspan="3">Ignore</td> </tr> <tr> <td>$0.1 < \Phi \leq 0.2$</td> <td colspan="3">2(distance $\geq 10\text{mm}$)</td> </tr> <tr> <td>$0.2 < \Phi \leq 0.3$</td> <td colspan="3">1</td> </tr> <tr> <td>$\Phi > 0.3$</td> <td colspan="3">0</td> </tr> </tbody> </table>	Zone Size (mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.1$	Ignore			$0.1 < \Phi \leq 0.2$	2(distance $\geq 10\text{mm}$)			$0.2 < \Phi \leq 0.3$	1			$\Phi > 0.3$	0				
		Zone Size (mm)		Acceptable Qty																							
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$\Phi > 0.3$	0																										
③ Polarizer accidented spot <table border="1" data-bbox="406 1254 1372 1545"> <thead> <tr> <th rowspan="2">Zone Size (mm)</th> <th colspan="3">Acceptable Qty</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.2$</td> <td colspan="3">Ignore</td> </tr> <tr> <td>$0.2 < \Phi \leq 0.5$</td> <td colspan="3">2(distance $\geq 10\text{mm}$)</td> </tr> <tr> <td>$\Phi > 0.5$</td> <td colspan="3">0</td> </tr> </tbody> </table>	Zone Size (mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.2$	Ignore			$0.2 < \Phi \leq 0.5$	2(distance $\geq 10\text{mm}$)			$\Phi > 0.5$	0										
Zone Size (mm)		Acceptable Qty																									
	A	B	C																								
$\Phi \leq 0.2$	Ignore																										
$0.2 < \Phi \leq 0.5$	2(distance $\geq 10\text{mm}$)																										
$\Phi > 0.5$	0																										
Line defect (LCD/TP /Polarizer black/white line, scratch, stain)	<table border="1" data-bbox="406 1590 1364 1960"> <thead> <tr> <th rowspan="2">Width(mm)</th> <th rowspan="2">Length(mm)</th> <th colspan="3">Acceptable Qty</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.03$</td> <td>Ignore</td> <td colspan="2">Ignore</td> <td rowspan="3">Ignore</td> </tr> <tr> <td>$0.03 < W \leq 0.05$</td> <td>$L \leq 3.0$</td> <td colspan="2">$N \leq 2$</td> </tr> <tr> <td>$0.05 < W \leq 0.08$</td> <td>$L \leq 2.0$</td> <td colspan="2">$N \leq 2$</td> </tr> <tr> <td>$0.08 < W$</td> <td colspan="4">Define as spot defect</td> </tr> </tbody> </table>	Width(mm)	Length(mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.03$	Ignore	Ignore		Ignore	$0.03 < W \leq 0.05$	$L \leq 3.0$	$N \leq 2$		$0.05 < W \leq 0.08$	$L \leq 2.0$	$N \leq 2$		$0.08 < W$	Define as spot defect			
Width(mm)	Length(mm)			Acceptable Qty																							
		A	B	C																							
$\Phi \leq 0.03$	Ignore	Ignore		Ignore																							
$0.03 < W \leq 0.05$	$L \leq 3.0$	$N \leq 2$																									
$0.05 < W \leq 0.08$	$L \leq 2.0$	$N \leq 2$																									
$0.08 < W$	Define as spot defect																										



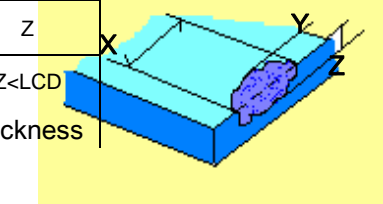
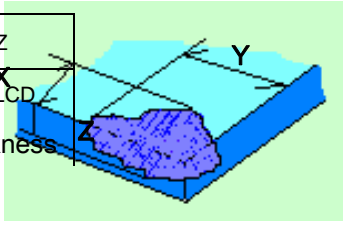
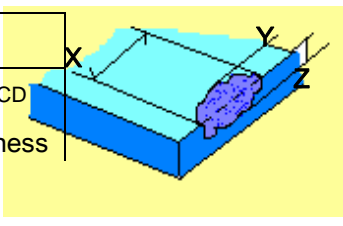


Items	Criteria (mm)																																																									
Spot defect  $\Phi = (X+Y)/2$	<p>① light dot (LCD/TP/Polarizer black/white spot , light dot, pinhole, dent, stain)</p> <table border="1" data-bbox="411 743 1342 1093"> <thead> <tr> <th rowspan="2">Zone Size (mm)</th> <th colspan="3">Acceptable Qty</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.10$</td> <td colspan="2">Ignore</td> <td rowspan="4">Ignore</td> </tr> <tr> <td>$0.10 < \Phi \leq 0.15$</td> <td colspan="2">3(distance $\geq 10\text{mm}$)</td> </tr> <tr> <td>$0.15 < \Phi \leq 0.2$</td> <td colspan="2">1</td> </tr> <tr> <td>$0.2 < \Phi$</td> <td colspan="2">0</td> </tr> </tbody> </table> <p>② Dim spot (LCD/TP/Polarizer dim dot, light leakage, dark spot)</p> <table border="1" data-bbox="411 1189 1369 1541"> <thead> <tr> <th rowspan="2">Zone Size (mm)</th> <th colspan="3">Acceptable Qty</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.1$</td> <td colspan="2">Ignore</td> <td rowspan="4">Ignore</td> </tr> <tr> <td>$0.1 < \Phi \leq 0.2$</td> <td colspan="2">2(distance $\geq 10\text{mm}$)</td> </tr> <tr> <td>$0.2 < \Phi \leq 0.3$</td> <td colspan="2">1</td> </tr> <tr> <td>$\Phi > 0.3$</td> <td colspan="2">0</td> </tr> </tbody> </table> <p>③ Polarizer accidented spot</p> <table border="1" data-bbox="411 1637 1230 1942"> <thead> <tr> <th rowspan="2">Zone Size (mm)</th> <th colspan="3">Acceptable Qty</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.2$</td> <td colspan="2">Ignore</td> <td rowspan="3">Ignore</td> </tr> <tr> <td>$0.2 < \Phi \leq 0.5$</td> <td colspan="2">2(distance $\geq 10\text{mm}$)</td> </tr> <tr> <td>$\Phi > 0.5$</td> <td colspan="2">0</td> </tr> </tbody> </table>	Zone Size (mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.10$	Ignore		Ignore	$0.10 < \Phi \leq 0.15$	3(distance $\geq 10\text{mm}$)		$0.15 < \Phi \leq 0.2$	1		$0.2 < \Phi$	0		Zone Size (mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.1$	Ignore		Ignore	$0.1 < \Phi \leq 0.2$	2(distance $\geq 10\text{mm}$)		$0.2 < \Phi \leq 0.3$	1		$\Phi > 0.3$	0		Zone Size (mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.2$	Ignore		Ignore	$0.2 < \Phi \leq 0.5$	2(distance $\geq 10\text{mm}$)		$\Phi > 0.5$	0	
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Line defect (LCD/TP /Polarizer black/white line, scratch, stain)	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2">Width(mm)</th> <th rowspan="2">Length(mm)</th> <th colspan="3">Acceptable Qty</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.03$</td> <td>Ignore</td> <td colspan="2">Ignore</td> <td rowspan="3">Ignore</td> </tr> <tr> <td>$0.03 < W \leq 0.05$</td> <td>$L \leq 3.0$</td> <td colspan="2">$N \leq 2$</td> </tr> <tr> <td>$0.05 < W \leq 0.08$</td> <td>$L \leq 2.0$</td> <td colspan="2">$N \leq 2$</td> </tr> <tr> <td>$0.08 < W$</td> <td colspan="3">Define as spot defect</td> <td></td> </tr> </tbody> </table>	Width(mm)	Length(mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.03$	Ignore	Ignore		Ignore	$0.03 < W \leq 0.05$	$L \leq 3.0$	$N \leq 2$		$0.05 < W \leq 0.08$	$L \leq 2.0$	$N \leq 2$		$0.08 < W$	Define as spot defect			
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		TP bubble/ accidented spot	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2">Size Φ(mm)</th> <th colspan="3">Acceptable Qty</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.1$</td> <td colspan="2">Ignore</td> <td rowspan="4">Ignore</td> </tr> <tr> <td>$0.1 < \Phi \leq 0.2$</td> <td colspan="2">2</td> </tr> <tr> <td>$0.2 < \Phi \leq 0.3$</td> <td colspan="2">1</td> </tr> <tr> <td>$0.3 < \Phi$</td> <td colspan="2">0</td> </tr> </tbody> </table>	Size Φ (mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.1$	Ignore		Ignore	$0.1 < \Phi \leq 0.2$	2		$0.2 < \Phi \leq 0.3$	1		$0.3 < \Phi$	0	
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		Assembly deflection	beyond the edge of backlight $\leq 0.15\text{mm}$																				

5.0	TP Related	Newton Ring	Newton area > 1/3 TP NG	Ring area	 <p>1 规律性</p>						
			Newton area ≤ 1/3 TP OK	Ring area	 <p>2 非规律性</p>						
					 <p>似牛顿环</p>						
		TP corner broken X : length Y : width Z : height	<table border="1"> <tr> <td>X</td> <td>Y</td> <td>Z</td> </tr> <tr> <td>X ≤ 3.0mm</td> <td>Y ≤ 3.0mm</td> <td>Z < LCD thickness</td> </tr> </table>	X	Y	Z	X ≤ 3.0mm	Y ≤ 3.0mm	Z < LCD thickness		<p>* Circuitry broken is not allowed.</p>
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		TP edge broken X : length Y : width Z : height	<table border="1"> <tr> <td>X</td> <td>Y</td> <td>Z</td> </tr> <tr> <td>X ≤ 6.0mm</td> <td>Y ≤ 2.0mm</td> <td>Z < LCD thickness</td> </tr> </table>	X	Y	Z	X ≤ 6.0mm	Y ≤ 2.0mm	Z < LCD thickness		<p>* Circuitry broken is not allowed.</p>
X	Y	Z									
X ≤ 6.0mm	Y ≤ 2.0mm	Z < LCD thickness									

Criteria (functional items)

Number	Items	Criteria (mm)
1	No display	Not allowed
2	Missing segment	Not allowed
3	Short	Not allowed
4	Backlight no lighting	Not allowed
5	TP no function	Not allowed

8. Reliability Test Result

8.1 Condition

Item	Condition	Sample Size	Test Result	Note
Low Temperature Operating Life test	-20℃, 96HR	3ea	pass	-
Thermal Humidity Operating Life test	70℃90%RH, 96HR	3ea	pass	-
Temperature Cycle ON/OFF test	-20℃ ↔ 70℃, ON/OFF, 20CYC	3ea	pass	(1)
High Temperature Storage test	80℃, 96HR	3ea	pass	-
Low Temperature Storage test	- 30℃, 96HR	3ea	pass	-
Thermal Shock Resistance	The sample should be allowed to stand the following 5 cycles of operation: TSTL for 30 minutes -> normal temperature for 5 minutes -> TSTH for 30 minutes -> normal temperature for 5 minutes, as one cycle, then taking it out and drying it at normal temperature, and allowing it stand for 24 hours	3ea	pass	
Box Drop Test	1 Corner 3 Edges 6 faces, 66cm(MEDIUM BOX)	1box	pass	-

Note (1) ON Time over 10 seconds, OFF Time under 10 seconds

9. Cautions and Handling Precautions

9.1 Handling and Operating the Module

- (1) When the module is assembled, it should be attached to the system firmly.
Do not warp or twist the module during assembly work.
- (2) Protect the module from physical shock or any force. In addition to damage, this may cause improper operation or damage to the module and back-light unit.
- (3) Note that polarizer is very fragile and could be easily damaged. Do not press or scratch the surface.
- (4) Do not allow drops of water or chemicals to remain on the display surface.
If you have the droplets for a long time, staining and discoloration may occur.
- (5) If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.
- (6) The desirable cleaners are water, IPA (Isopropyl Alcohol) or Hexane.
Do not use ketene type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.
- (7) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs, or clothes, it must be washed away thoroughly with soap.
- (8) Protect the module from static; it may cause damage to the CMOS ICs.
- (9) Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.
- (10) Do not disassemble the module.
- (11) Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.
- (12) Pins of I/F connector shall not be touched directly with bare hands.
- (13) Do not connect, disconnect the module in the "Power ON" condition.
- (14) Power supply should always be turned on/off by the item 6.1 Power On Sequence & 6.2 Power Off Sequence

9.2 Storage and Transportation.

- (1) Do not leave the panel in high temperature, and high humidity for a long time.
It is highly recommended to store the module with temperature from 0 to 35 °C and relative humidity of less than 70%
- (2) Do not store the TFT-LCD module in direct sunlight.
- (3) The module shall be stored in a dark place. When storing the modules for a long time, be sure to adopt effective measures for protecting the modules from strong ultraviolet radiation, sunlight, or fluorescent light.
- (4) It is recommended that the modules should be stored under a condition where no condensation is allowed. Formation of dewdrops may cause an abnormal operation or a failure of the module.
In particular, the greatest possible care should be taken to prevent any module from being operated where condensation has occurred inside.
- (5) This panel has its circuitry FPC on the bottom side and should be handled carefully in order not to be stressed.

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10.Packing

---TBD-----

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