SPECIFICATION

Product Model: K D035C-3

Designed by	R&D Checked by	Quality Department by	Approved by

Approval by Customer

OK

NG，Problem survey:

Approved By _____

Revision Record

REV NO.	REV DATE	CONTENTS	Note
A	2011-11-05	NEW ISSUE	

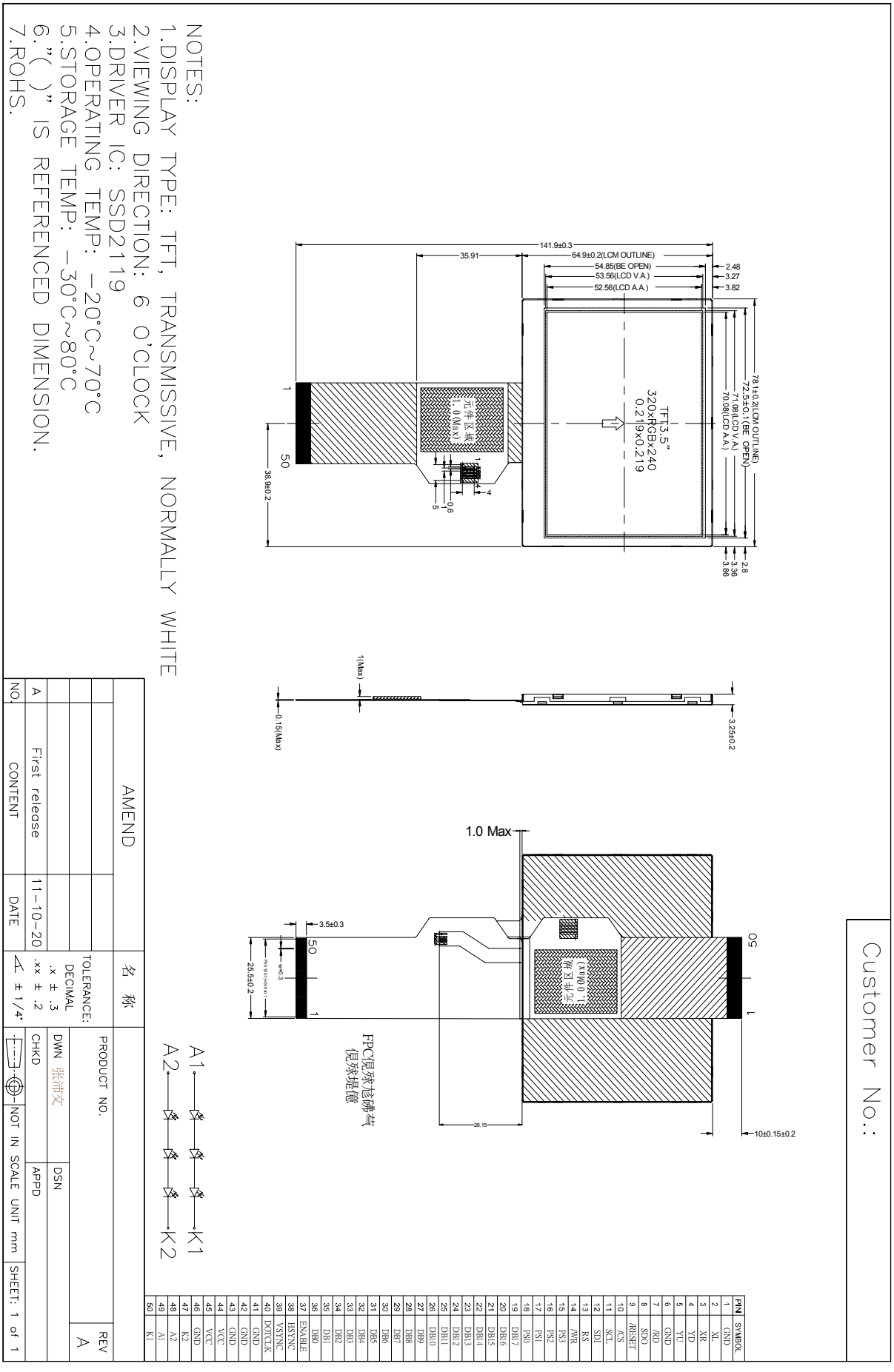
Table Of Contents

1. Numbering System

2. General Information

ITEM	STANDARD VALUES	UNITS
LCD type	3.5”TFT	--
Dot arrangement	320(RGB)×240	dots
Color filter array	RGB vertical stripe	--
Display mode	TN / Transmissive / Normally White	--
Viewing Direction	6 o’clock	--
Driver IC	SSD2119	--
Module size	78.10(W)×64.90(H)×3.25(T)	mm
Active area	70.08(W)×52.56(H)	mm
Dot pitch	0.219(W)×0.219(H)	mm
Interface	4-lines_8bit / 3-lines_9bit SPI 8-/ 9-/16-/18-bit 6800/8080-series system interface 6-/9-/16-/18-bit RGB interface	--
Operating temperature	-20 ~ +70	℃
Storage temperature	-30 ~ +80	℃
Back Light	6 White LED	--
Weight	TBD	g

3. External Dimensions



NO.	CONTENT	DATE	AMEND	名 称
A	First release	11-10-20		

TOLERANCE: DECIMAL .x ± .3 .xx ± .2 ∠ ± 1/4°

PRODUCT NO. REV A

DWN 张沛文 CHKD DSN APPD

NOT IN SCALE UNIT mm SHEET: 1 of 1

PIN	SYMBOL
1	GND
2	XL
3	XR
4	YD
5	YU
6	GND
7	/RD
8	SDO
9	/RESET
10	/CS
11	SCL
12	SDI
13	RS
14	/WR
15	PS3
16	PS2
17	PS1
18	PS0
19	DB17
20	DB16
21	DB15
22	DB14
23	DB13
24	DB12
25	DB11
26	DB10
27	DB9
28	DB8
29	DB7
30	DB6
31	DB5
32	DB4
33	DB3
34	DB2
35	DB1
36	DB0
37	ENABLE
38	HSYNC
39	VSYNC
40	DOTCLK
41	GND
42	GND
43	GND
44	VCC
45	VCC
46	GND
47	K2
48	A2
49	A1
50	K1

4. Interface Description

<table>
<tr><th>PIN NO.</th><th>PIN NAME</th><th>DESCRIPTION</th></tr>
<tr><td>1</td><td>GND</td><td>Power ground</td></tr>
<tr><td>2</td><td>XL</td><td>TOUCH PIN(XL)</td></tr>
<tr><td>3</td><td>XR</td><td>TOUCH PIN(XR)</td></tr>
<tr><td>4</td><td>YD</td><td>TOUCH PIN(YD)</td></tr>
<tr><td>5</td><td>YU</td><td>TOUCH PIN(YU)</td></tr>
<tr><td>6</td><td>GND</td><td>Power ground</td></tr>
<tr><td>7</td><td>/RD</td><td>Read signal input terminal, Active at ‘L’.</td></tr>
<tr><td>8</td><td>SDO</td><td>SPI interface output pin.</td></tr>
<tr><td>9</td><td>/RESET</td><td>Reset signal input terminal, active at ‘L’</td></tr>
<tr><td>10</td><td>/CS</td><td>Chip select signal input terminal, Active at ‘L’</td></tr>
<tr><td>11</td><td>SCL</td><td>Write signal input terminal, Active at ‘L‘.
Synchronizing clock signal in SPI mode.</td></tr>
<tr><td>12</td><td>SDI</td><td>SPI interface input pin.</td></tr>
<tr><td>13</td><td>RS</td><td>Register select signal input terminal:
RS=’H’: control register; RS=’L’: index or status register.</td></tr>
<tr><td>14</td><td>/WR</td><td>Write signal input terminal, Active at ‘L‘.
Synchronizing clock signal in SPI mode.</td></tr>
<tr><td>15</td><td>PS3</td><td rowspan="9">Select the MPU system interface mode
<table>
<tr><th>PS3</th><th>PS2</th><th>PS1</th><th>PS0</th><th>interface mode</th><th>DB Pin</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>6800 16-bit interface</td><td>DB[17:10],DB[8:1]</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>1</td><td>6800 8-bit interface</td><td>DB[17:10]</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>0</td><td>8080 16-bit interface</td><td>DB[17:10],DB[8:1]</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>1</td><td>8080 8-bit interface</td><td>DB[17:10]</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>0</td><td>9bit RGB+3wire SPI</td><td>DB[17:9]</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>1</td><td>16bit RGB+3wire SPI</td><td>DB[17:10],DB[8:1]</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>0</td><td>18bit RGB+3wire SPI</td><td>DB[17: 0]</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>1</td><td>6bit RGB+3wire SPI</td><td>DB[17:12]</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>0</td><td>6800 18-bit interface</td><td>DB[17:0]</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>1</td><td>6800 9-bit interface</td><td>DB[17:9]</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>0</td><td>8080 18-bit interface</td><td>DB[17:0]</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>1</td><td>8080 9-bit interface</td><td>DB[17:9]</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>0</td><td>3-wire_9-bit SPI</td><td>/CS,SDI,SCL</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td><td>4-wire_8-bit SPI</td><td>/CS,RS,SDI,SCL</td></tr>
</table></td></tr>
<tr><td>16</td><td>PS2</td></tr>
<tr><td>17</td><td>PS1</td></tr>
<tr><td>18</td><td>PS0</td></tr>
<tr><td>19</td><td>DB17</td><td rowspan="10">An 18-bit parallel bi-directional data bus for MPU system interface Mode:
8-bit I/F: DB[17:10] is used.
9-bit I/F: DB[17:9] is used.
16-bit I/F: DB[17:10] and DB[8:1] is used.
18-bit I/F: DB[17:0] is used.

18-bit parallel bi-directional data bus for RGB interface operation
6-bit RGB I/F: DB[17:12] are used.
9-bit RGB I/F: DB[17:9] are used.
16-bit RGB I/F: DB[17:10] and DB[8:1] are used.
18-bit RGB I/F: DB[17:0] are used.</td></tr>
<tr><td>20</td><td>DB16</td></tr>
<tr><td>21</td><td>DB15</td></tr>
<tr><td>22</td><td>DB14</td></tr>
<tr><td>23</td><td>DB13</td></tr>
<tr><td>24</td><td>DB12</td></tr>
<tr><td>25</td><td>DB11</td></tr>
<tr><td>26</td><td>DB10</td></tr>
<tr><td>27</td><td>DB9</td></tr>
<tr><td>28</td><td>DB8</td></tr>
</table>

29	DB7	Unused pins must be fixed to GND level.
30	DB6	
31	DB5	
32	DB4	
33	DB3	
34	DB2	
35	DB1	
36	DB0	
37	ENABLE	Data ENEABLE signal for RGB interface operation.
38	HSYNC	Line synchronizing signal for RGB interface operation.
39	VSYNC	Frame synchronizing signal for RGB interface operation.
40	DOTCLK	Dot clock signal for RGB interface operation.
41	GND	Power ground
42	GND	Power ground
43	GND	Power ground
44	VCC	System power supply.
45	VCC	System power supply.
46	GND	Power ground
4	K2	LED backlight cathode 2
48	A2	LED backlight anode 2
49	A1	LED backlight anode 1
50	K1	LED backlight cathode 1

5. Absolute Maximum Ratings

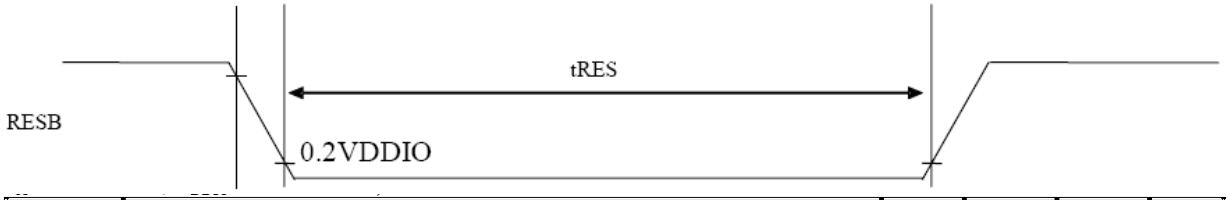
Item	Symbol	Min.	Max.	Unit
Analog Supply Voltage	VCC	-0.3	4.0	V
Input Voltage	Vin	GND-0.3	5.0	V
Operating Temperature	TOP	-20	70	°C
Storage Temperature	TST	-30	80	°C
Storage Humidity	HD	-	90	%RH

6. DC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Analog Supply Voltage	VCC	2.5	2.8	3.6	V	-
Input High Voltage	V_{IH}	0.8VCC	-	VCC	V	Digital input pins
Input Low Voltage	V_{IL}	0	-	0.2VCC	V	Digital input pins
Output High Voltage	V_{OH}	0.9VCC	-	VCC	V	Digital output pins
Output Low Voltage	V_{OL}	0	-	0.1VCC	V	Digital output pins
Logic Input Current	I_{IL}/I_{IH}	-1	-	1	uA	-

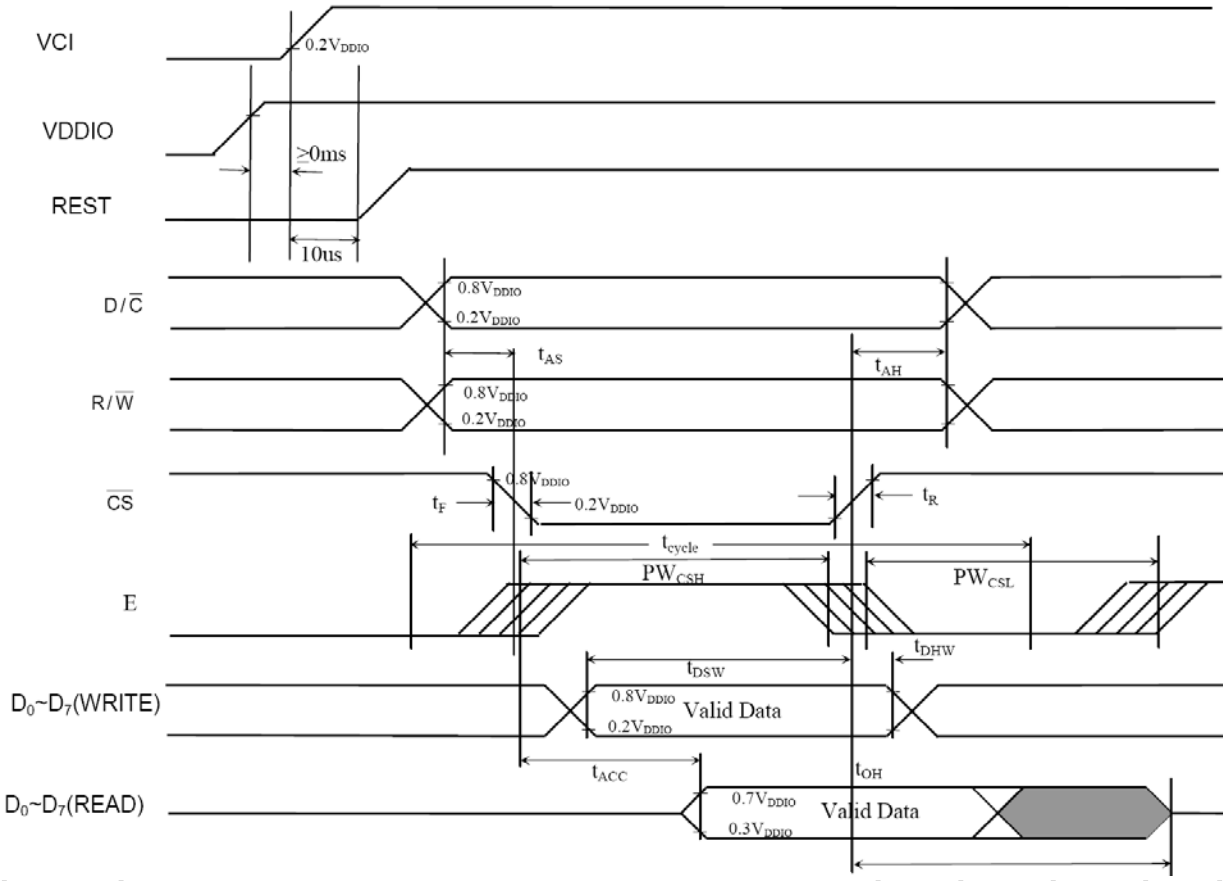
7. Timing Characteristics

7.1 Reset Timing Characteristics



Symbol	Parameter	Min	Typ	Max	Unit
t_{RES}	Reset pulse duration	15	-	-	us

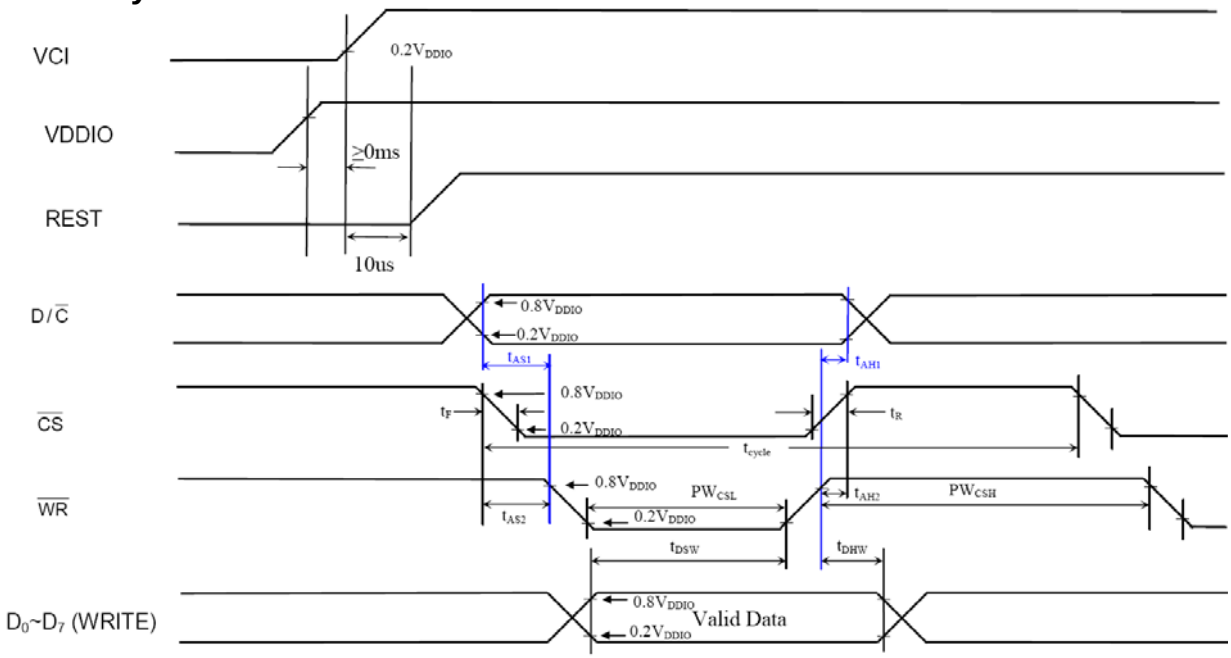
7.2 Parallel 6800 Interface Timing Characteristics



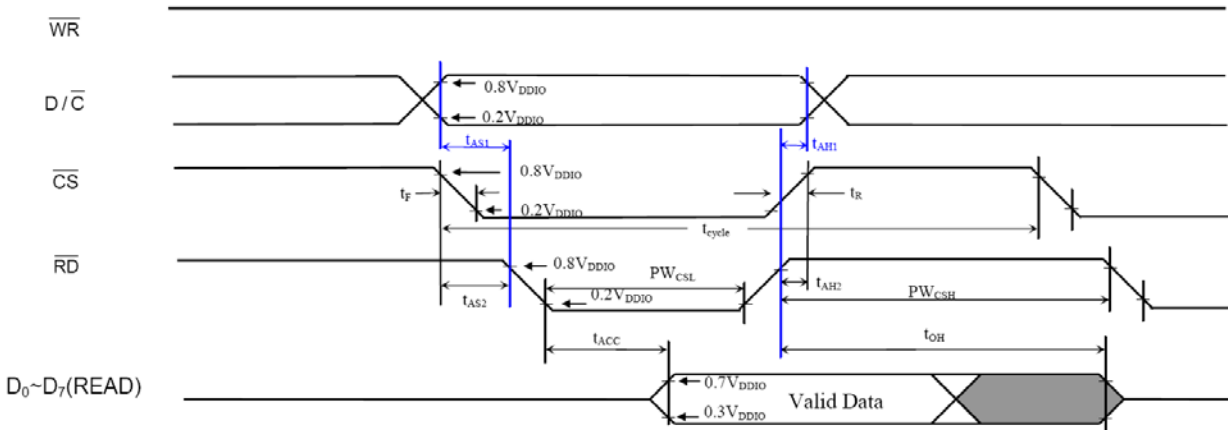
Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time (write cycle)	75	-	-	ns
t_{cycle}	Clock Cycle Time (read cycle) (Based on VOL/VOH = 0.3*VDDIO/0.7*VDDIO)	450	-	-	ns
t_{AS}	Address Setup Time (R/$\overline{W}$)	0	-	-	ns
t_{AH}	Address Hold Time (R/$\overline{W}$)	0	-	-	ns
t_{DSW}	Data Setup Time (D0~D7, WRITE)	5	-	-	ns
t_{DHW}	Data Hold Time (D0~D7, WRITE))	5	-	-	ns
t_{ACC}	Data Access Time (D0~D7, READ)	250	-	-	ns
t_{OH}	Output Hold time (D0~D7, READ)	100	-	-	ns
PW_{CSL}	Pulse width /CS low (write cycle)	40	-	-	ns
PW_{CSH}	Pulse width /CS high (write cycle)	25	-	-	ns
PW_{CSL}	Pulse width /CS low (read cycle)	500	-	-	ns
PW_{CSH}	Pulse width /CS high (read cycle)	500	-	-	ns
t_R	Rise time	-	-	4	ns
t_F	Fall time	-	-	4	ns

7.3 Parallel 8080 Interface Timing Characteristics

Write Cycle



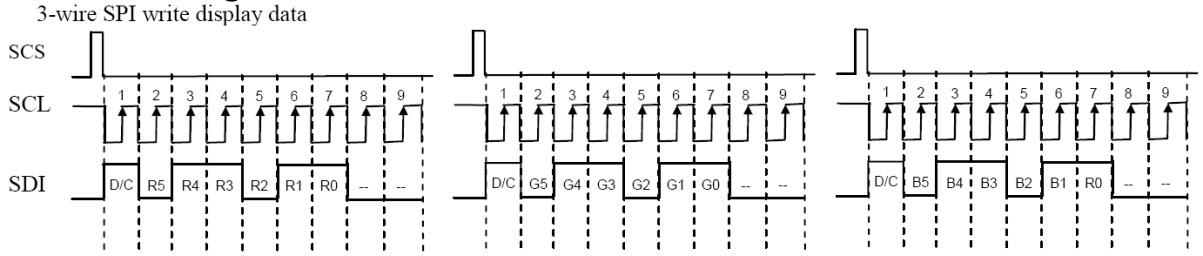
Read Cycle



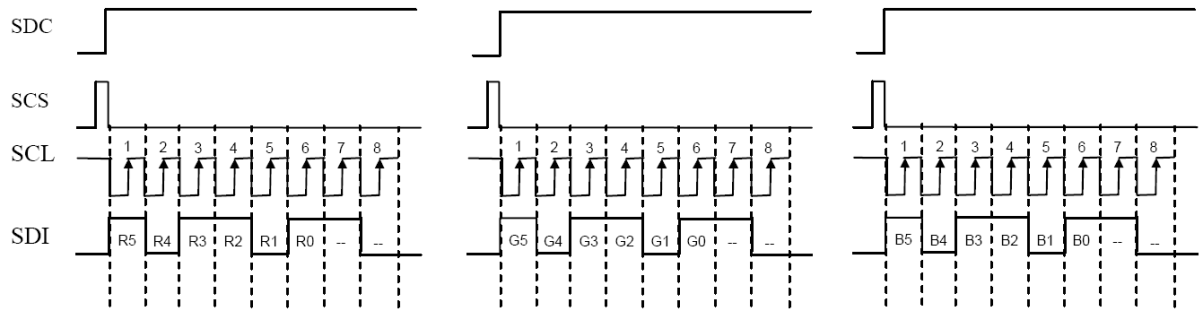
Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time (write cycle)	75	-	-	ns
t_{cycle}	Clock Cycle Time (read cycle) (Based on VOL/VOH = 0.3*VDDIO/0.7*VDDIO)	450	-	-	ns
t_{AS1}	Address Setup Time between (R/$\overline{W}$) and D/$\overline{C}$	0	-	-	ns
t_{AH1}	Address Hold Time between (R/$\overline{W}$) and D/$\overline{C}$	0	-	-	ns
t_{AS2}	Address Setup Time between (R/$\overline{W}$) and $\overline{CS}$	0	-	-	ns
t_{AH2}	Address Hold Time between (R/$\overline{W}$) and $\overline{CS}$	0	-	-	ns
t_{DSW}	Data Setup Time (D0~D7, WRITE)	5	-	-	ns
t_{DHW}	Data Hold Time (D0~D7, WRITE))	5	-	-	ns
t_{ACC}	Data Access Time (D0~D7, READ)	250	-	-	ns
t_{OH}	Output Hold time (D0~D7, READ)	100	-	-	ns
PW_{CSL}	Pulse width /CS low (write cycle)	40	-	-	ns
PW_{CSH}	Pulse width /CS high (write cycle)	25	-	-	ns
PW_{CSL}	Pulse width /CS low (read cycle)	500	-	-	ns
PW_{CSH}	Pulse width /CS high (read cycle)	500	-	-	ns
t_R	Rise time	-	-	4	ns
t_F	Fall time	-	-	4	ns

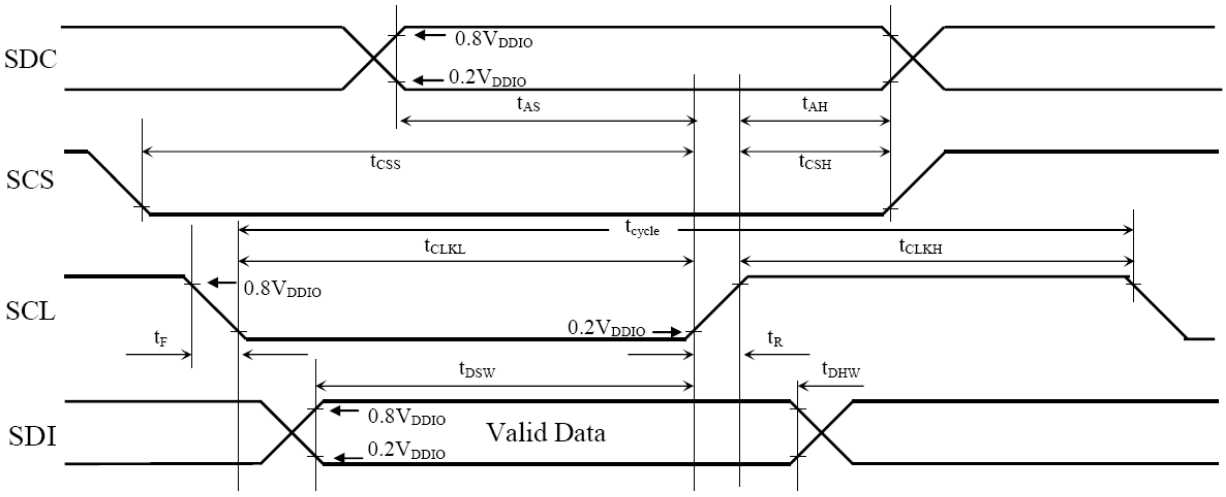
7.4 SPI Timing Characteristics

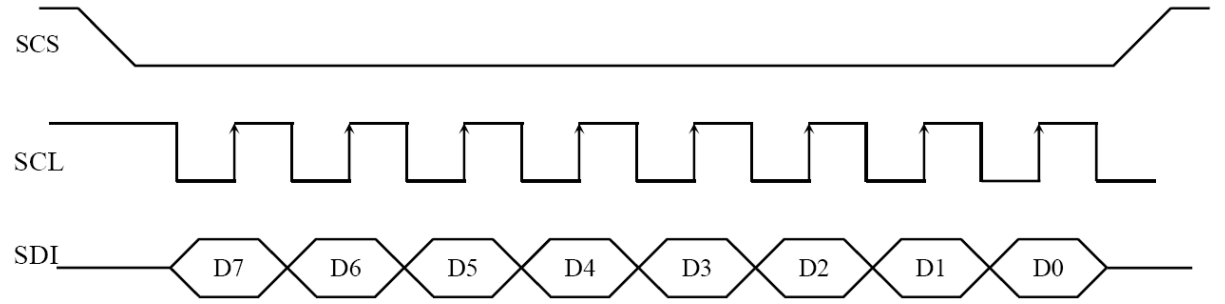
3-wire SPI write display data



4-wire SPI write display data

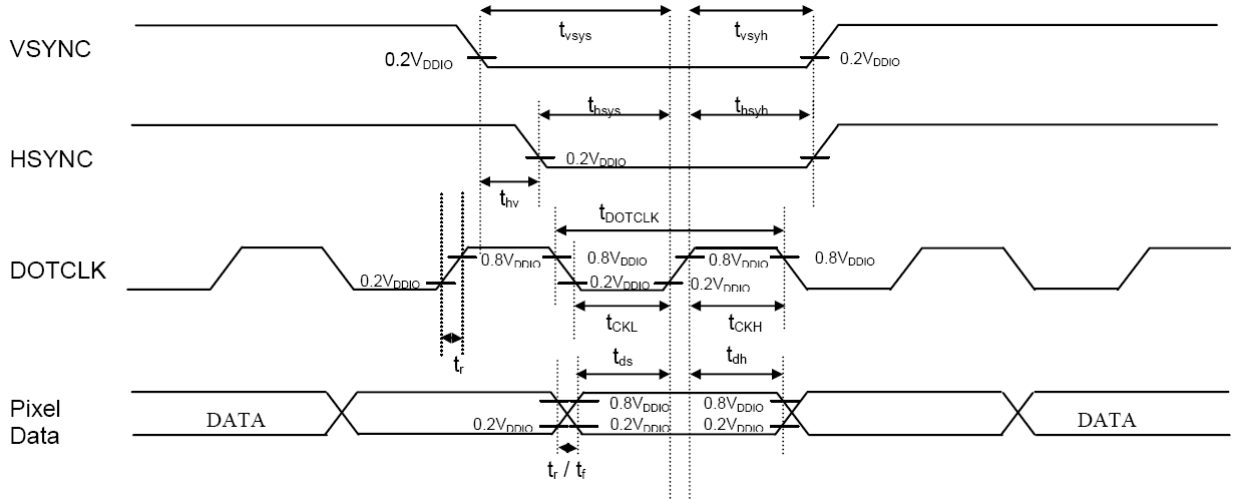






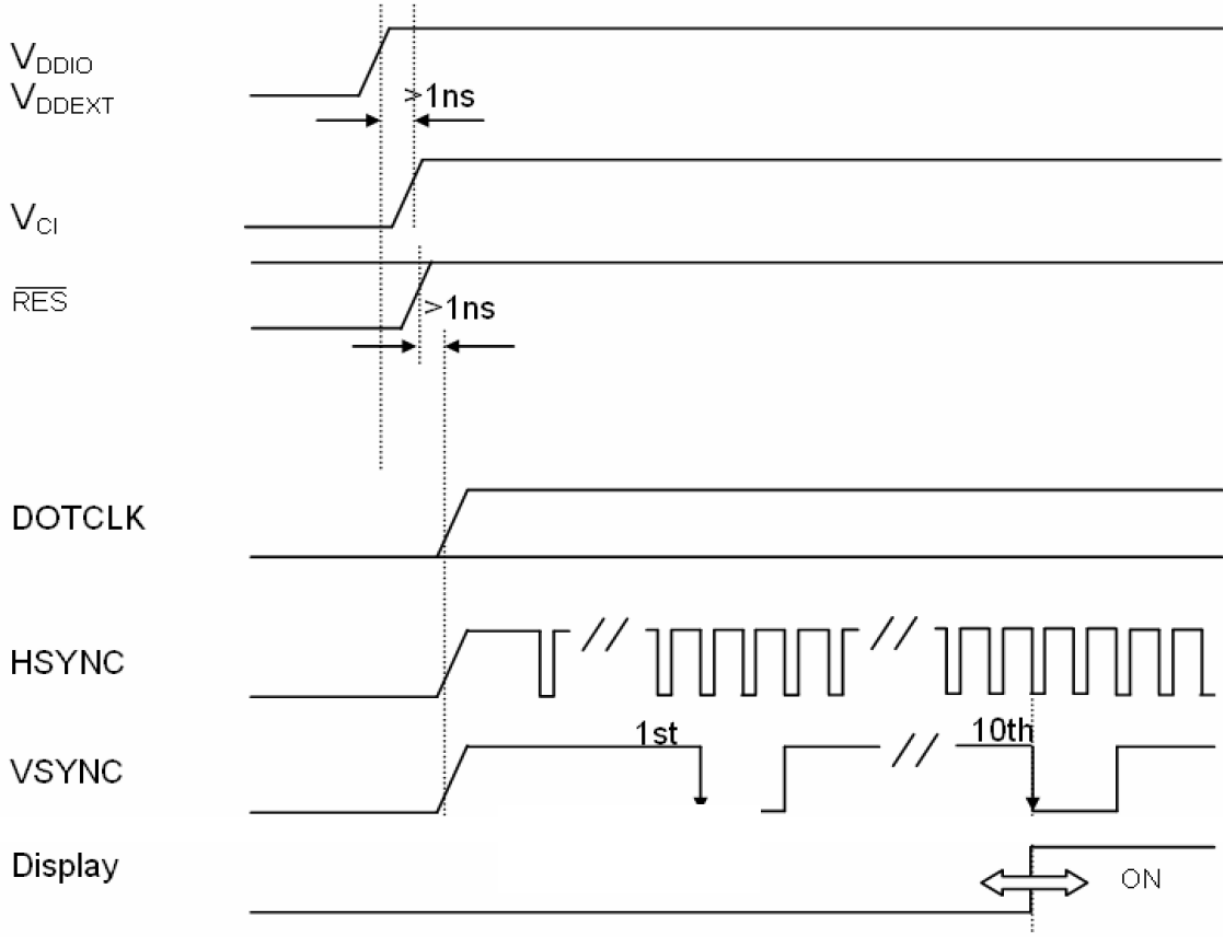
Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time	77	-	-	ns
f_{CLK}	Serial Clock Cycle Time SPI Clock tolerance = +/- 2 ppm	-	-	15	MHz
t_{AS}	Register select Setup Time	4	-	-	ns
t_{AH}	Register select Hold Time	5	-	-	ns
t_{CSS}	Chip Select Setup Time	2	-	-	ns
t_{CSH}	Chip Select Hold Time	10	-	-	ns
t_{DSW}	Write Data Setup Time	5	-	-	ns
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

7.5 RGB Timing Characteristics

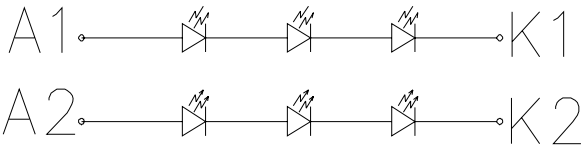


Symbol	Parameter	Min	Typ	Max	Unit
f_{DOTCLK}	DOTCLK Frequency (70Hz frame rate)	1	5.5	8.2	MHz
t_{DOTCLK}	DOTCLK Period	122	182	1000	ns
t_{VSYS}	Vertical Sync Setup Time	20	-	-	ns
t_{VSYH}	Vertical Sync Hold Time	20	-	-	ns
t_{HSYS}	Horizontal Sync Setup Time	20	-	-	ns
t_{HSYH}	Horizontal Sync Hold Time	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

7.6 Power Up Sequence for RGB mode



8. Backlight Charasterics



Item	Symbol	MIN	TYP	MAX	UNIT	Test Condition
Supply Voltage	Vf	8.4	9.6	10.2	V	If=30mA
Supply Current	If	-	30	50	mA	-
Luminous Intensity for LCM	-	220	250	-	Cd/m^2	If=30mA
Uniformity for LCM	-	80	-	-	%	If=30mA
Life Time	-	50000	-	-	Hr	If=30mA
Backlight Color	White					

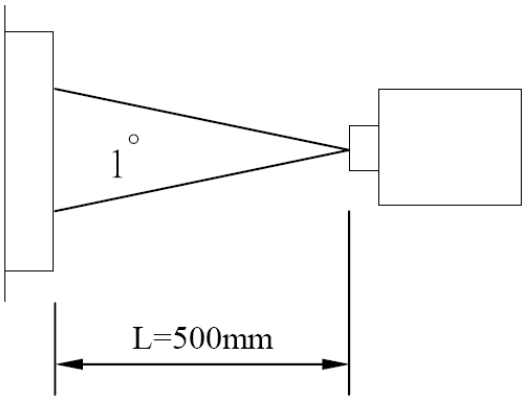
9. Optical Characteristics

(Note1，Note2) (Using Normal Polarizer +CPT Backlight, reference only)

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
Transmittance		T		(5.7)	(6.76)		%	
Contrast Ratio		CR		(320)	(400)	—		Note3
Response Time		Tr	θ=ψ=0°	—	(8)	(12)	ms	Note4
		Tf		—	(17)	(23)	ms	
Viewing angle	Upper	θ	CR≧10	(90)	(100)	—	°	Note5
	Lower					—	°	
	Left	ϕ		(110)	(120)	—	°	
	Right					—	°	
Color Filter Chromacicity	R	x	θ=ψ=0°	0.627	0.647	0.667		Note6
		y		0.316	0.336	0.356		
		Y		17.5	20.5	23.5		
	G	x		0.29	0.31	0.33		
		y		0.556	0.576	0.596		
		Y		57.5	60.5	63.5		
	B	x		0.116	0.136	0.156		
		y		0.109	0.129	0.149		
		Y		11.7	14.7	17.7		
	W	x		0.285	0.305	0.325		
		y		0.314	0.334	0.354		
		Y		28.9	31.9	34.9		
	NTSC			—	61		—	

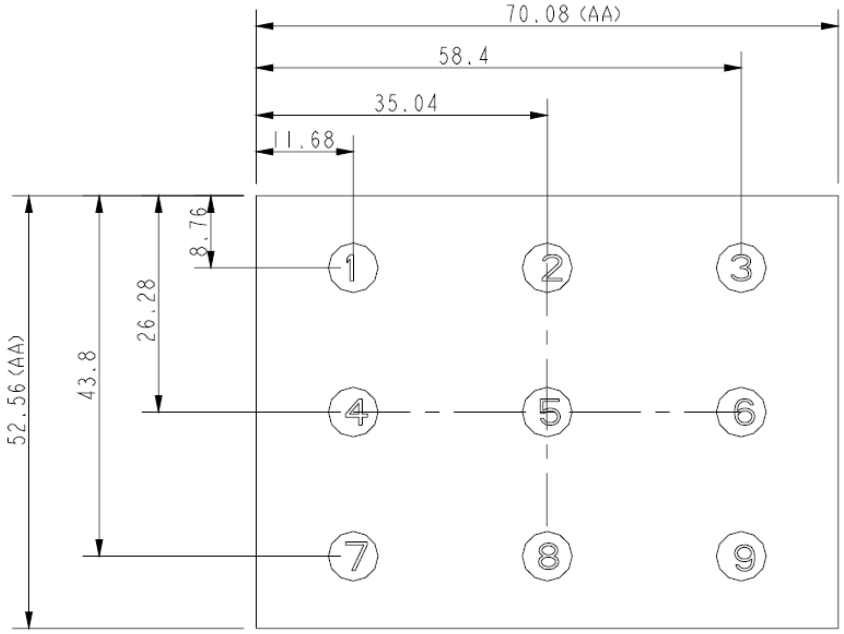
Note 1.Ambient condition：25℃±2℃，60±10%RH，under 10 Lunx in the darkroom。

Note 2.Measure device：
BM-5A (TOPCON)，
viewing cone= 1 °，
IL=20mA。



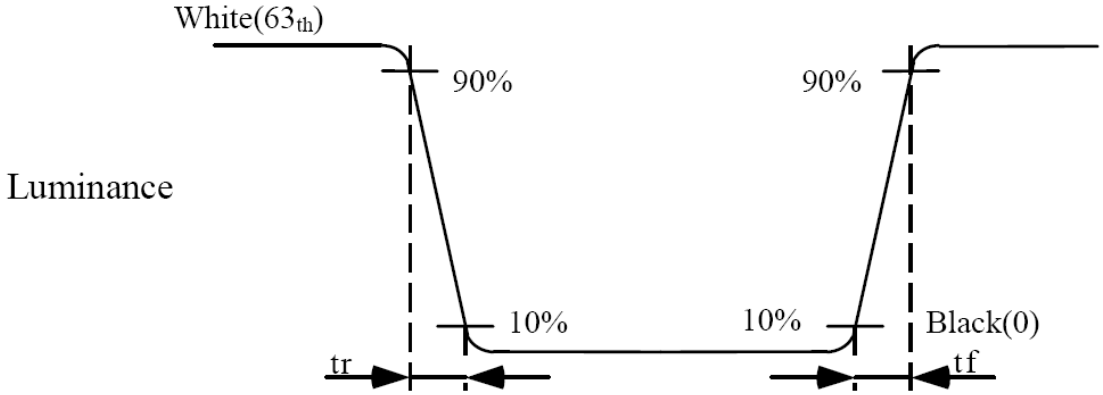
Note 3. Definition of Contrast Ratio：

CR = White Luminance (ON) / Black Luminance (OFF)



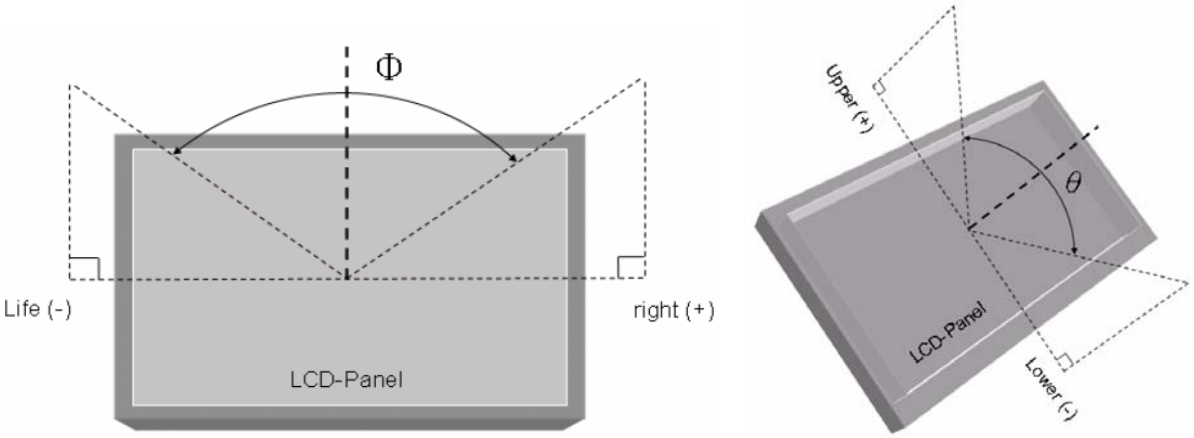
Measuring point

Note 4. Definition of response time：The response time is defined as the time interval between the 10% and 90% amplitudes.



Definition of Response Time (White - Black)

Note 5. Definition of view angle(θ，ψ)：



Definition of Viewing Angle

Note 6. Light source: C light.

10. Reliability Test Conditions And Methods

NO.	TEST ITEMS	TEST CONDITION	INSPECTION AFTER TEST
①	High Temperature Storage	80℃±2℃×200Hours	Inspection after 2~4hours storage at room temperature,the samples should be free from defects: 1,Air bublle in the LCD. 2,Sealleak. 3,Non-display. 4,Missing segments. 5,Glass crack. 6,Current IDD is twice higher than initial value. 7,The surface shall be free from damage. 8,The electric charateristic requirements shall be satisfied.
②	Low Temerature Storage	-30℃±2℃×200Hours	
③	High Temperature Operating	70℃±2℃×120Hours	
④	Low Temperature Operating	-20℃±2℃×120Hours	
⑤	Temperature Cycle(Storage)	-20℃ ⟺ 25℃ ⟺ 70℃ (30min) (5min) (30min) 1cycle Total 10cycle	
⑥	Damp Proof Test (Storage)	50℃±5℃×90%RH×120Hours	
⑦	Vibration Test	Frequency:10Hz~55Hz~10Hz Amplitude:1.5M X,Y,Z direction for total 3hours (Packing Condition)	
⑧	Drooping Test	Drop to the ground from 1M height one time every side of carton. (Packing Condition)	
⑨	ESD Test	Voltage:±8KV,R:330Ω,C:150PF,Air Mode,10times	

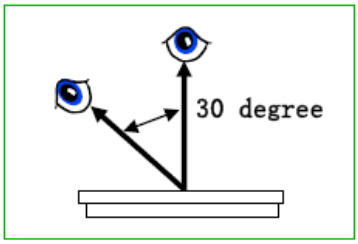
REMARK:
1,The Test samples should be applied to only one test item.
2,Sample side for each test item is 5~10pcs.
3,For Damp Proof Test,Pure water(Resistance＞10MΩ)should be used.
4,In case of malfunction defect caused by ESD damage,if it would be recovered to normal state after resetting,it would be judge as a good part.
5,EL evaluation should be excepted from reliability test with humidity and temperature:Some defects such as black spot/blemish can happen by natural chemical reaction with humidity and Fluorescence EL has.
6,Failure Judgment Criterion:Basic Specification Electrical Characteristic,Mechanical Characteristic,Optical Characteristic.

11. Inspection Standard

This standard apply to TFT module specification.

1. Inspection condition:

Under daylight lamp 20～40W， product distance inspector'eye 30cm,incline degree 30° 。



2. Inspection standard

<table>
<tr><th>NO.</th><th>Item</th><th>Inspection standard</th><th>Rate</th></tr>
<tr><td>2.1</td><td>Dot</td><td>Case of Dot defect is below
① Bright Dot (whit spot) : "0"
② Dark Dot (black spot) : "0" (In case of Dark Dot on Main TFT LCD)
- NG if there's full Dot defect.
- Damaged less than the size of sub-pixel is not counted as defect
- Dots darker than the size of sub-pixel are not defined as bright dot defect
<table><tr><th>area / size（mm）</th><th>Acceptable number</th></tr><tr><td>Φ≤0.10</td><td>ignore</td></tr><tr><td>0.10＜Φ≤0.15</td><td>3</td></tr><tr><td>0.15＜Φ≤0.20</td><td>2</td></tr><tr><td>0.25＜Φ≤0.25</td><td>1</td></tr><tr><td>0.25＜Φ</td><td>0</td></tr></table></td><td rowspan="2">minor</td></tr>
<tr><td>2.2</td><td>line</td><td><table><tr><th colspan="2">Size（mm）</th><th>Acceptable number</th></tr><tr><td>ignore</td><td>W≤0.03</td><td>ignore</td></tr><tr><td>L≤4.0</td><td>0.03＜W≤0.04</td><td>2</td></tr><tr><td>L≤4.0</td><td>0.04＜W≤0.05</td><td>1</td></tr><tr><td></td><td>0.05＜W</td><td>Treat with dot non-conformance</td></tr></table></td></tr>
</table>

12. Handling Precautions

12.1 Mounting method

The LCD panel of SC LCD module consists of two thin glass plates with polarizes which easily be damaged. And since the module in so constructed as to be fixed by utilizing fitting holes in the printed circuit board.

Extreme care should be needed when handling the LCD modules.

12.2 Caution of LCD handling and cleaning

When cleaning the display surface, Use soft cloth with solvent [recommended below] and wipe lightly

- Isopropyl alcohol
- Ethyl alcohol

Do not wipe the display surface with dry or hard materials that will damage the polarizer surface.

Do not use the following solvent:

- Water
- Aromatics

Do not wipe ITO pad area with the dry or hard materials that will damage the ITO patterns

Do not use the following solvent on the pad or prevent it from being contaminated:

- Soldering flux
- Chlorine (Cl) , Salfur (S)

If goods were sent without being sili8con coated on the pad, ITO patterns could be damaged due to the corrosion as time goes on.

If ITO corrosion happen by miss-handling or using some materials such as Chlorine (CI), Salfur (S) from customer, Responsibility is on customer.

12.3 Caution against static charge

The LCD module use C-MOS LSI drivers, so we recommended that you:

Connect any unused input terminal to Vdd or Vss, do not input any signals before power is turned on, and ground your body, work/assembly areas, assembly equipment to protect against static electricity.

12.4 packing

- Module employ LCD elements and must be treated as such.
- Avoid intense shock and falls from a height.
- To prevent modules from degradation, do not operate or store them exposed direct to sunshine or high temperature/humidity

12.5 Caution for operation

- It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage then the limit cause the shorter LCD life.
- An electrochemical reaction due to direct current causes LCD's undesirable deterioration, so that the use of direct current drive should be avoided.
- Response time will be extremely delayed at lower temperature then the operating temperature range and on the other hand at higher temperature LCD's how dark color in them. However those phenomena do not mean malfunction or out of order with LCD's, which will come back in the specified operation temperature.
- If the display area is pushed hard during operation, some font will be abnormally displayed but it resumes normal condition after turning off once.
- A slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit.

Usage under the maximum operating temperature, 50%Rh or less is required.

12.6 storage

In the case of storing for a long period of time for instance, for years for the purpose or replacement use, the following ways are recommended.

- Storage in a polyethylene bag with the opening sealed so as not to enter fresh air outside in it . And with no desiccant.
- Placing in a dark place where neither exposure to direct sunlight nor light's keeping the storage temperature range.
- Storing with no touch on polarizer surface by the anything else.
  [It is recommended to store them as they have been contained in the inner container at the time of delivery from us

12.7 Safety

- It is recommendable to crash damaged or unnecessary LCD's into pieces and wash off liquid crystal by either of solvents such as acetone and ethanol, which should be burned up later.
- When any liquid leaked out of a damaged glass cell comes in contact with your hands, please wash it off well with soap and water

13. Precaution For Use

13.1

A limit sample should be provided by the both parties on an occasion when the both parties agreed its necessity. Judgment by a limit sample shall take effect after the limit sample has been established and confirmed by the both parties.

13.2

On the following occasions, the handing of problem should be decided through discussion and agreement between responsible of the both parties.

- When a question is arisen in this specification
- When a new problem is arisen which is not specified in this specifications
- When an inspection specifications change or operating condition change in customer is reported to RX LCD , and some problem is arisen in this specification due to the change
- When a new problem is arisen at the customer's operating set for sample evaluation in the customer site.

14. Packing Method