



## 2 Scope

This specification applies to the TFT LCD module which is designed and manufactured by LCM Factory of Shenzhen K&D Technology Co.,Ltd.

## 3 Normative Reference

GB/T4619-1996 《Liquid Crystal Display Test Method》

GB/T2424 《Basic environmental Testing Procedures for Electric and Electronic Products.》

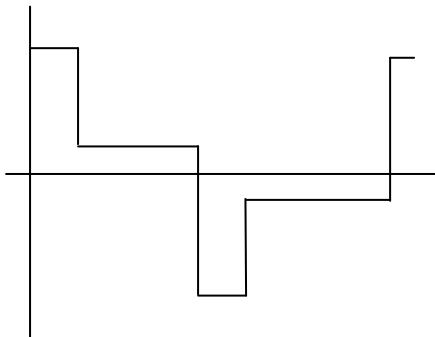
GB/T2423 《Basic Testing Procedures for Electric and Electronic Products》

IEC61747-1 《SIXTH PART GB2828`2829-87 《National Standard of PRC》

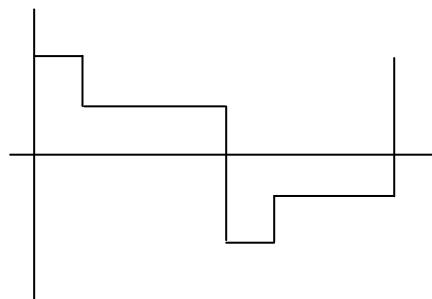
## 4 Definitions

### 4.1 Definitions of Vop

The definitions of threshold voltage  $V_{th1}$ ,  $V_{th2}$  the following typical waveforms are applied on liquid crystal by the method of equalized voltage for each duty and bias.



【 selected waveform 】



【 non-selected waveform 】

①  $V_{th1}$ : The voltage which the brightness of segment indicates 50% of saturated value on the conditions of selected waveform

( $f_f=80\text{Hz}$ ,  $\Phi=10^\circ$   $\theta=270^\circ$  at  $25^\circ\text{C}$ )

②  $V_{th2}$ : The voltage which the brightness of segment indicates 50% of saturated value on the conditions of non-selected waveform

( $f_f=80\text{Hz}$ ,  $\Phi=10^\circ$   $\theta=270^\circ$  at  $25^\circ\text{C}$ )

③  $V_{op}$ :  $(V_{th1}(50\%)+V_{th2}(50\%))/2$  ( $f_f=80\text{Hz}$ ,  $\Phi=10^\circ$   $\theta=270^\circ$  at  $25^\circ\text{C}$ )

### 4.2 Definition of Response Time Tr, Td

①Tr: The time required which the brightness of segment becomes 10% from 100% when waveform is switched to selected one from non-selected one. ( $f_f=80\text{Hz}$ ,  $\Phi=10^\circ$   $\theta=270^\circ$  at  $25^\circ\text{C}$ )

②Td: The time required which the brightness of segment becomes 90% from 10% when waveform is switched to selected one from selected one. ( $f_f=80\text{Hz}$ ,  $\Phi=10^\circ$   $\theta=270^\circ$  at  $25^\circ\text{C}$ )

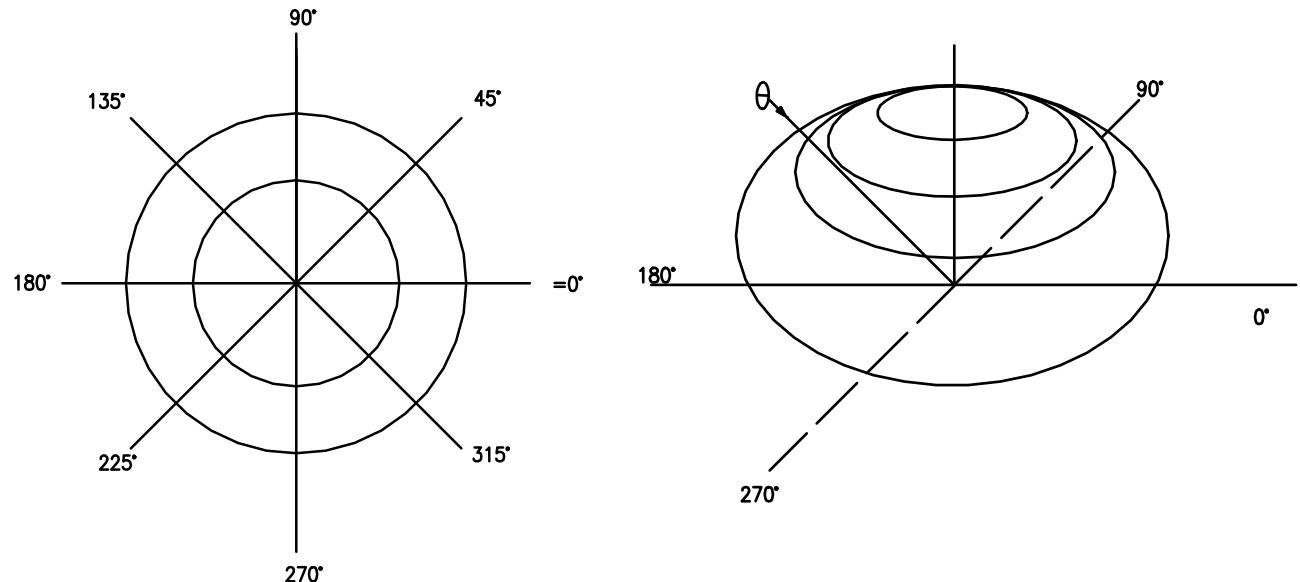


### 4.3 Definition of Contrast Ratio Cr

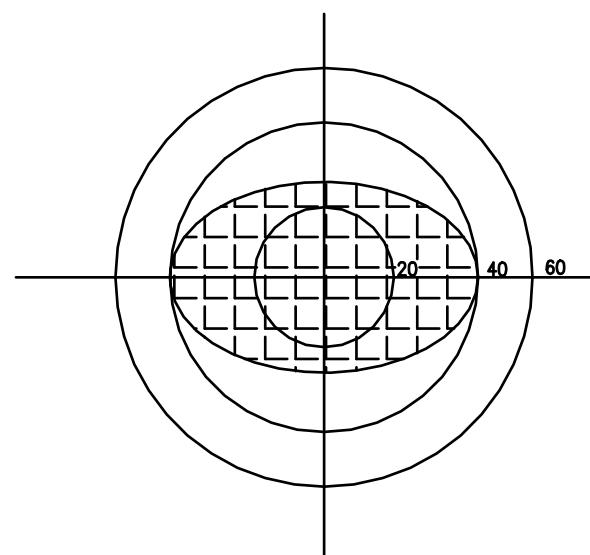
$$Cr = A/B$$

- ① A: Segments brightness in case of non-selected waveform
- ② B: Segments brightness in case of selected waveform

### 4.4 Definition of Angle and Viewing Range



Angular Graph: Contrast Ratio



Such as:  
Viewing Angle Range:  
80(Cr>2) Horizontal  
70(Cr>2) Vertical



## 5 Technology Specifications

### 5.1 Feature

This single-display module is suitable for use in Multidedia Player products.  
The LCD adopts one backlight with High brightness 12-lamps white LED.

- 1) Construction: 5.0" a-Si color TFT-LCD ,White LED backlight.
- 2) LCD:
  - 2.1 Amorphous-TFT 5.0-inch display, transmissive, normally white type.
  - 2.2 800(RGB)×480 dots Matrix.
  - 2.3 Narrow-contact ledge technique.
  - 2.4 LCD Driver IC: HX8264D × 1 and HX8664D × 1.
- 3) Low cross talk by frame rate modulation.
- 4) RGB interface.
- 5) Video signal interface: Parallel RGB or serial.

### 5.2 Mechanical Specifications

Item	Specifications	Unit
Dimensional outline	120.70(W) ×75.8(H)×4.3 Max(T)	mm
Active area	108.0(W) ×64.8 (H)	mm
Pixel size	135(W) ×135(H)	um
Resolution	800(RGB) × 480	pixel
Luminance	170 (Typ)	cd/m <sup>2</sup>

### 5.3 Absolute Max. Rating

Item	Symbol	Value			Unit	Remark
		Min	typ	Max		
Logic power supply	DVDD	3.0	3.3	3.6	V	
Driver power supply	AVDD	11	12	13	V	
Input high voltage	V <sub>IH</sub>	0.7DVDD	-	DVDD	V	
Input low voltage	V <sub>IL</sub>	0	-	0.3DVDD	V	
Operating temperature	T <sub>OPR</sub>	-20		+70	°C	
Storage temperature	T <sub>STG</sub>	-30		+80	°C	



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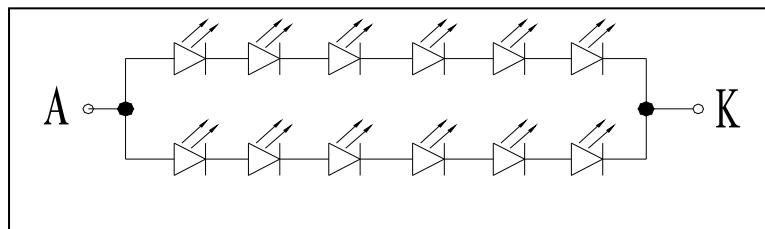
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### 5.6 LED back light specification (12 White Chips)

Item	Symbol	Condition	Min	Typ	Max	Unit
Forward Voltage	Vf	If=40mA	18	19.2	20.4	V
Uniformity (with L/G)	$\Delta B_p$	If=40mA	80	-	-	%
Luminance	$L_v$	If=40mA	-	4500	-	cd/m <sup>2</sup>

### LED CIRCUIT



### 5.7 Interface Pin Connections

PIN NO.	Symbol	Description
1	LED-K	LED backlight(Cathode)
2	LED-A	LED backlight(anode)
3	GND	Ground
4	VDD	Power supply (Digital +3.0V)
5-12	R0-R7	Red Data
13-20	G0-G7	Green Data
21-28	B0-B7	Blue Data
29	GND	Ground
30	CLK	Clodk ( <u>Latch data at clk falling edge</u> )
31	DISP	Display on/off
32	HSYNC	Horizontal sync input in RGB mode (short to GND if not used)
33	VSYNC	Vertical sync input in RGB mode (short to GND if not used)
34	DEN	Data Enable
35	NC	NC
36	GND	Ground
37	XR	T/p X-Right
38	YD	T/p Y-Bottom
39	XL	T/p X-Left
40	YU	T/p Y-Up



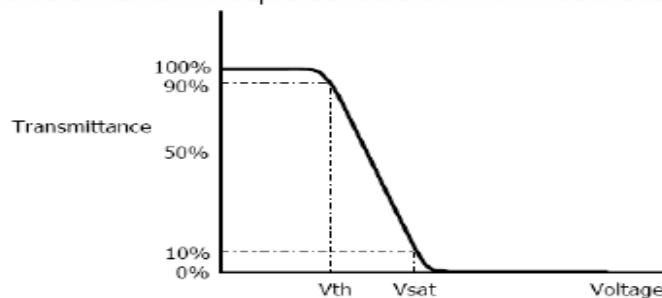
### 5.5 Optical specifications

T<sub>a</sub>=25°C

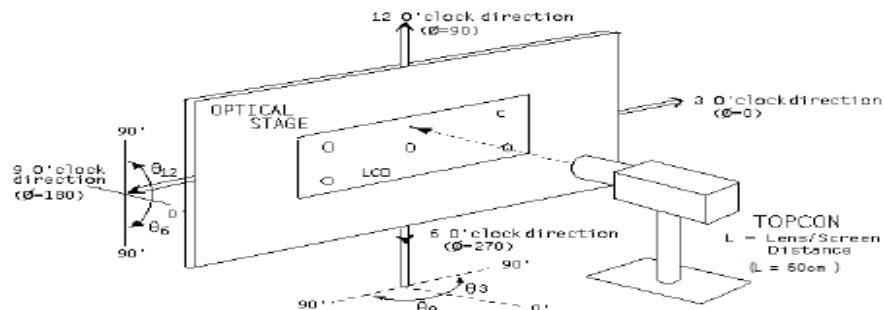
Item	Symbol	Condition	Min	Typ.	Max	Unit	Remark	
View Angle	θT	CR≥10	40	50	-	Degree	Note 2	
	θB		60	70	-			
	θL		60	70	-			
	θR		60	70	-			
Contrast Ratio	CR	θ=0°	400	500	-	-	Note1	
Response Time	T <sub>ON</sub>	25°C	-	20	25	ms	Note1 Note4	
	T <sub>OFF</sub>		-	-	-			
Color Filter Chromaticity	White	C-light	0.260	0.310	0.360	-	Just CF, without polarizer	
			0.280	0.330	0.380			
	Red		0.540	0.590	0.640			
			0.300	0.350	0.400			
	Green		0.298	0.348	0.398			
			0.520	0.570	0.620			
	Blue		0.095	0.145	0.195			
			0.060	0.110	0.160			
NTSC	-	-	45	50	-	%	Note 5	
Transmittance	L	-	3.8	4.1	-	%	Note1	

Test Conditions:

1. The ambient temperature is 25°C.
2. The test systems refer to Note 1 and Note 2.
3. Viewing angle, contrast ratio and transmittance are test the panel include EWV polarizer (NWF-LNSW) with LED backlight.
4. The value of transmittance in this spec is a reference which will be affected by polarizer finally.

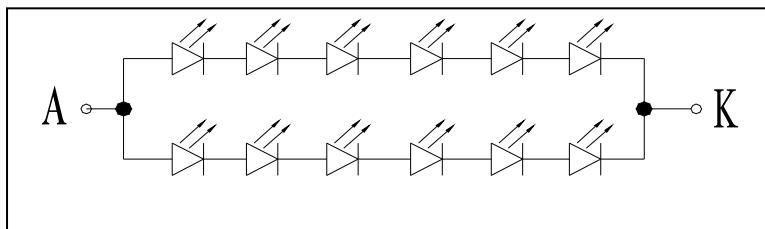


**Figure 2. Measurement Set Up**



**5.6 LED back light specification (12 White Chips)**

Item	Symbol	Condition	Min	Typ	Max	Unit
Forward Voltage	Vf	If=40mA	18	19.2	20.4	V
Uniformity (with L/G)	$\Delta B_p$	If=40mA	80	-	-	%
Luminance	$L_v$	If=40mA	-	4500	-	cd/m <sup>2</sup>

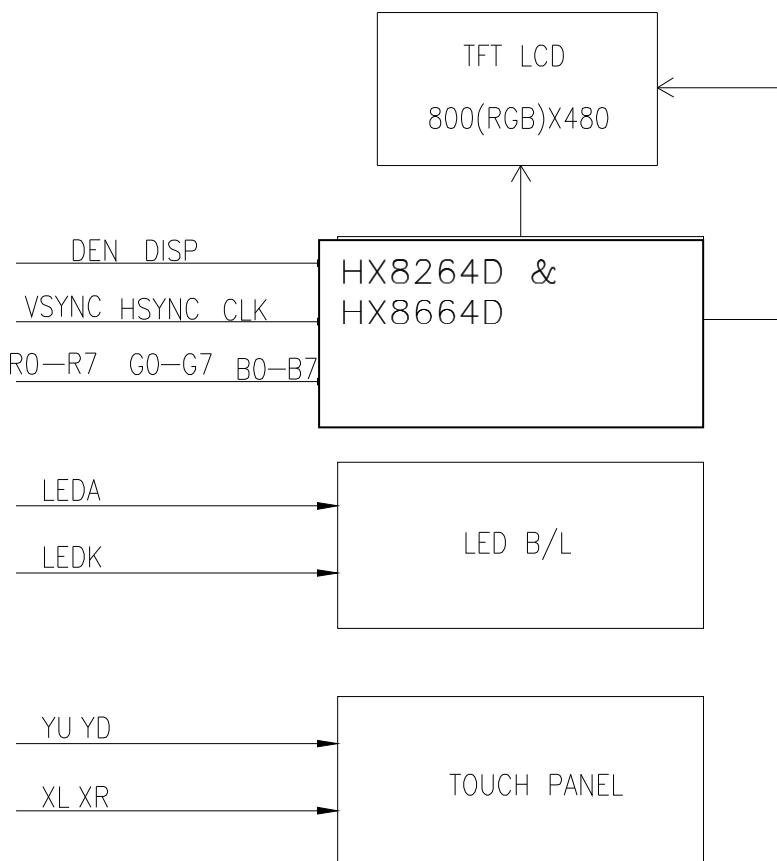
**LED CIRCUIT****5.7 Interface Pin Connections**

PIN NO.	Symbol	Description
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2	LED-A	LED backlight(anode)
3	GND	Ground
4	VDD	Power supply (Digital +3.0V)
5-12	R0-R7	Red Data
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37	XR	T/p X-Right
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39	XL	T/p X-Left
40	YU	T/p Y-Up



## 6 Signal timing diagram and Circuit block diagram

### 6.1 Circuit block diagram



### 6.2 Signal Timing Diagram

#### 6.2.1 Power ON/OFF Sequence

HX8264-D02 has a power on/off sequence control function. In order to prevent IC from power on reset fail, the rising time ( $T_{POR}$ ) of the digital power supply **VDD** should be maintained within the given specifications. Please refer to "AC Characteristics" for more detail on timing.

#### 6.2.2 Reset timing

The reset input must be held for at least 1ms after power is stable.



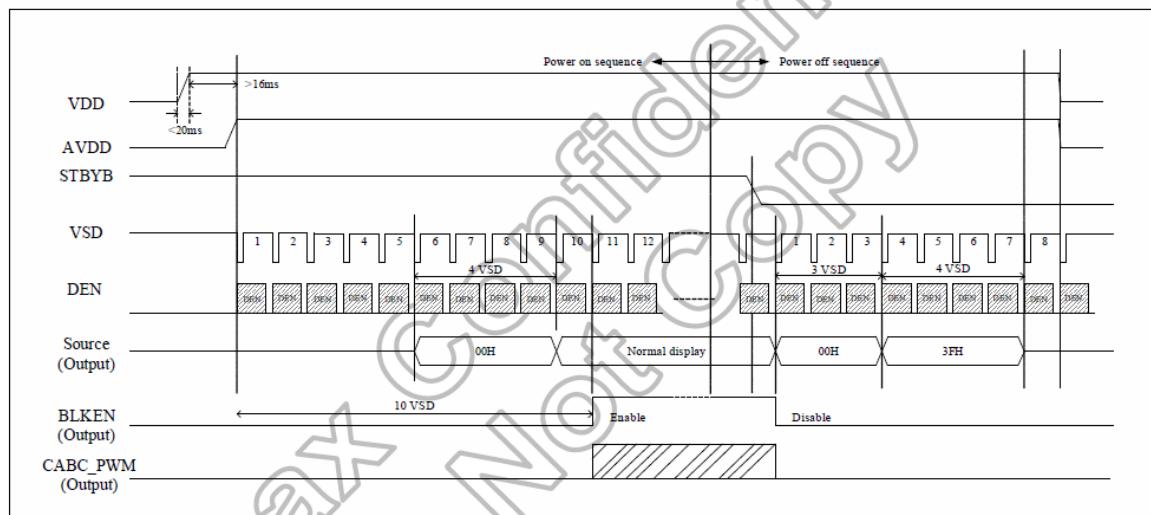
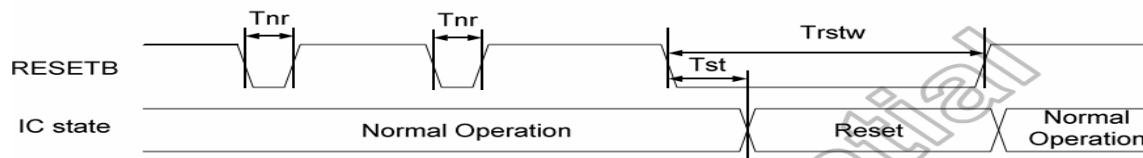
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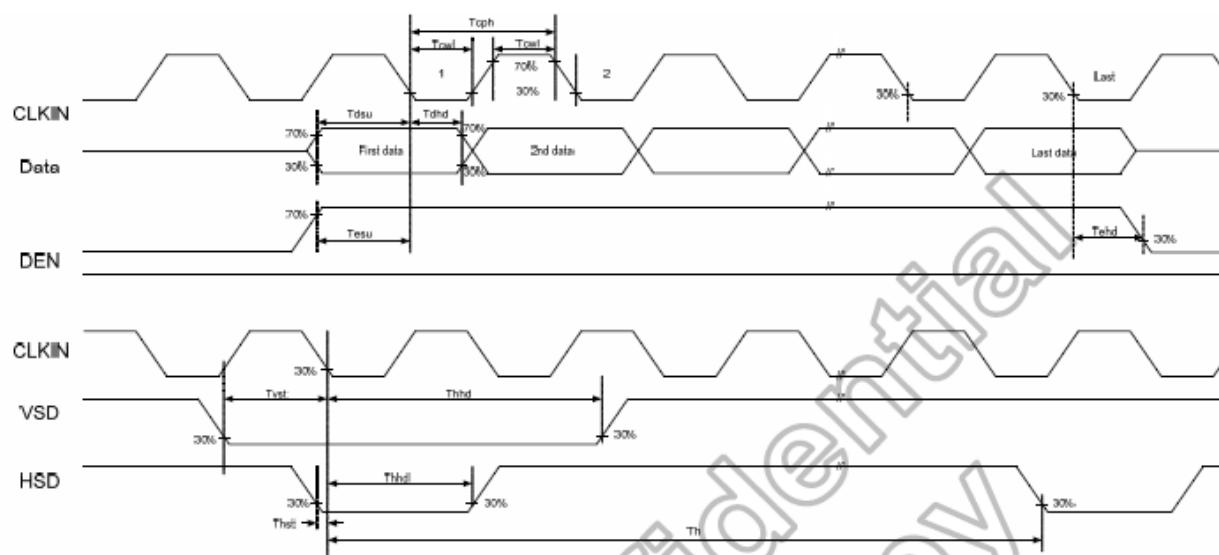
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#### Hardware reset timing

PARAMETER	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
RESETB low pulse width	$T_{rstw}$	10	-	-	$\mu s$
Negative noise pulse width	$T_{nr}$	-	-	2	$\mu s$
Reset start time	$T_{st}$	2	-	-	$\mu s$



#### 6.2.3 Timing Diagram of interface Signal





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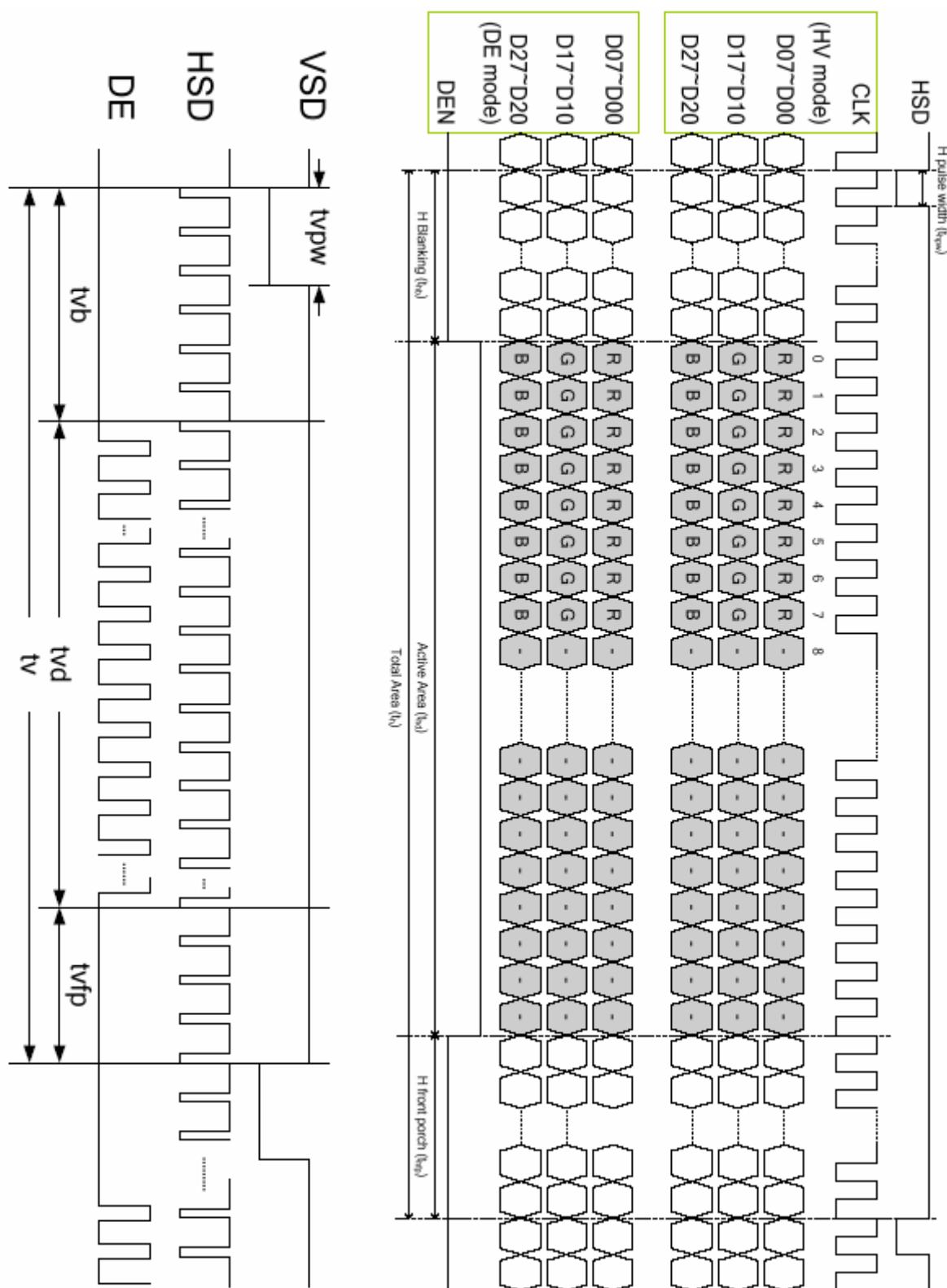
Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
HS setup time	$T_{hst}$	8	-	-	ns
HS hold time	$T_{hhd}$	8	-	-	ns
VS setup time	$T_{vst}$	8	-	-	ns
VS hold time	$T_{vhd}$	8	-	-	ns
Data setup time	$T_{dsu}$	8	-	-	ns
Data hold time	$T_{dhd}$	8	-	-	ns
DE setup time	$T_{esu}$	8	-	-	ns
DE hold time	$T_{ehd}$	8	-	-	ns
VDD Power On Slew rate	$T_{POR}$	-	-	20	ms
RSTB pulse width	$T_{Rst}$	10	-	-	us
CLKIN cycle time	$T_{cph}$	20	-	-	ns
CLKIN pulse duty	$T_{cwh}$	40	50	60	%
Output stable time	$T_{sst}$	-	-	6	us



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### Horizontal timing

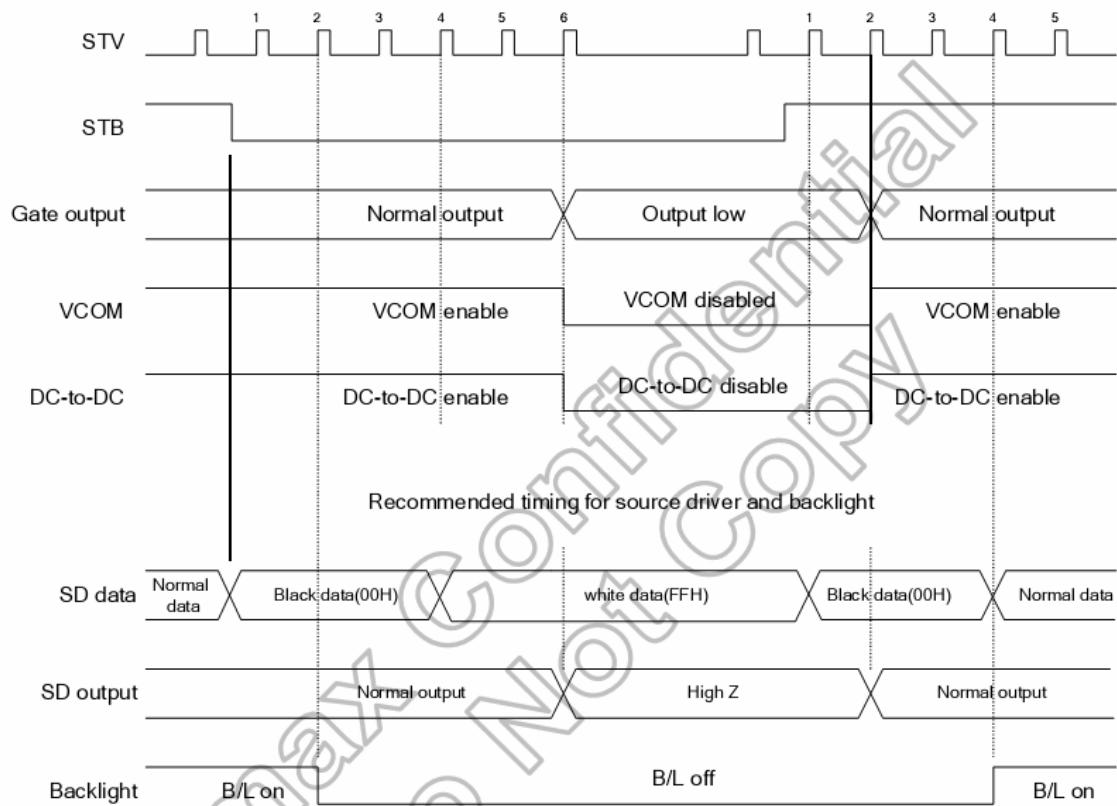
Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Horizontal Display Area	thd		800		DCLK
DCLK frequency	fclk	-	30	50	MHz
One Horizontal Line	th	889	928	1143	DCLK
HS pulse width	thpw	1	48	255	DCLK
HS Back Porch (Blanking)	thb		88		DCLK
HS Front Porch	thfp	1	40	255	DCLK
DE mode Blanking	th-thd	85	128	512	DCLK

### Vertical timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Vertical Display Area	tvd		480		T <sub>H</sub>
VS period time	tv	513	525	767	T <sub>H</sub>
VS pulse width	tvpw	3	3	255	T <sub>H</sub>
VS Back Porch (Blanking)	tvb		32		T <sub>H</sub>
VS Front Porch	tvfp	1	13	255	T <sub>H</sub>
DE mode Blanking	tv-tvd	4	45	255	T <sub>H</sub>



### 6.2.4 Gate Driver Timing Control



## 7 Reliability Test Conditions And Methods

NO	Item	Condition	Method
1	High / Low Temperature Storage	80°C/-30°C 120hrs	Check and record every 48Hrs
2	High / Low Temperature Life	70°C/-20°C 120hrs (operating mode)	Check and record every 48Hrs
3	High Temperature、High Humidity Operating	60°C,90% RH, 96Hrs	Check and record every 48hrs
4	Thermal Shock	-30°C(30Min) → 25°C(5Min) → 80°C(30Min) (conversion time, : 5 sec ) 20 cycles	Each 10 cycles end , check



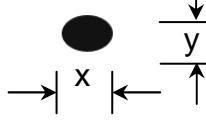
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5	Vibration	10Hz~55Hz~10Hz Amplitude: 1.5mm 2hrs for each direction(X,Y,Z)	Each direction end, Check the Appearance and Electrical Characteristics
6	Static Electricity	Gap mood: $\pm 1KV \sim \pm 8KV$ (10 times air discharge with positive/negative voltage voltage gap : 1kv) Touch mood: $\pm 1KV \sim \pm 4KV$	Each discharge end, Check the Electrical Characteristics
7	Curve	60 Thousand times, 40 times/min 150° ( according to die if exist)	Check and record every 2~4 thousand times
8	Slump	Free faller movement for each side、cording、angle (75cm High、6 sides、2 angle、2 cording)	End

## 8 Inspection standard

No	Item	Criterion									
01	Outline Dimension	In accord with drawing									
02	Position-finding Dimension Assemble Dimension	In accord with drawing									
03	LCD black spots, white spots (Round type)	Round type: non display 3.1 Small area LCD  Unit : mm <table border="1"> <thead> <tr> <th>Dimension</th> <th>Qualified Quantity</th> </tr> </thead> <tbody> <tr> <td><math>D \leq 0.1</math></td> <td>Ignore</td> </tr> <tr> <td><math>0.1 &lt; D \leq 0.15</math></td> <td>2</td> </tr> <tr> <td><math>D &gt; 0.15</math></td> <td>0</td> </tr> </tbody> </table>	Dimension	Qualified Quantity	$D \leq 0.1$	Ignore	$0.1 < D \leq 0.15$	2	$D > 0.15$	0	
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		<p>3.2 Large area LCD</p> <table border="1"> <thead> <tr> <th>Dimension</th><th>Qualified Quantity</th></tr> </thead> <tbody> <tr> <td><math>D \leq 0.1</math></td><td>Ignore</td></tr> <tr> <td><math>0.1 &lt; D \leq 0.15</math></td><td>2</td></tr> <tr> <td><math>0.15 &lt; D \leq 0.20</math></td><td>1</td></tr> <tr> <td><math>D &gt; 0.20</math></td><td>0</td></tr> </tbody> </table> <p>C-STN : if <math>D &gt; 0.1</math>, unqualified</p>	Dimension	Qualified Quantity	$D \leq 0.1$	Ignore	$0.1 < D \leq 0.15$	2	$0.15 < D \leq 0.20$	1	$D > 0.20$	0																					
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04	LCD black spots, white spots (Line Style)	<p>Unit : mm</p> <p>4.1 Small area LCD</p> <table border="1"> <thead> <tr> <th>Length</th><th>Width</th><th>Qualified Quantity</th></tr> </thead> <tbody> <tr> <td>-</td><td><math>\leq 0.015</math></td><td>Ignore</td></tr> <tr> <td><math>\leq 1.0</math></td><td><math>0.015 &lt; W \leq 0.025</math></td><td>2</td></tr> <tr> <td><math>\leq 2.0</math></td><td><math>0.025 &lt; W \leq 0.05</math></td><td>1</td></tr> <tr> <td>-</td><td><math>D &gt; 0.05</math></td><td>According to circle</td></tr> </tbody> </table> <p>4.2 Large area LCD</p> <table border="1"> <thead> <tr> <th>Length</th><th>Width</th><th>Qualified Quantity</th></tr> </thead> <tbody> <tr> <td>-</td><td><math>\leq 0.015</math></td><td>Ignore</td></tr> <tr> <td><math>\leq 2.0</math></td><td><math>0.015 &lt; W \leq 0.025</math></td><td>2</td></tr> <tr> <td><math>\leq 1.0</math></td><td><math>0.025 &lt; W \leq 0.05</math></td><td>1</td></tr> <tr> <td>-</td><td><math>D &gt; 0.05</math></td><td>According to circle</td></tr> </tbody> </table> <p>CSTN : If <math>W \geq 0.015</math>, unqualified Ignore beyond viewing area</p>	Length	Width	Qualified Quantity	-	$\leq 0.015$	Ignore	$\leq 1.0$	$0.015 < W \leq 0.025$	2	$\leq 2.0$	$0.025 < W \leq 0.05$	1	-	$D > 0.05$	According to circle	Length	Width	Qualified Quantity	-	$\leq 0.015$	Ignore	$\leq 2.0$	$0.015 < W \leq 0.025$	2	$\leq 1.0$	$0.025 < W \leq 0.05$	1	-	$D > 0.05$	According to circle	
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05	LCD Scratch 、 Threadlike Fiber	Same to NO.3 circle sightline and surface of LCD is vertical (2)Same to NO.3 line style	
06	POL	It is not admissible that POL is beyond the edge of glass, else, unqualified. It is essential that POL is over the 50 percent of width of frame , else ,unqualified. According to the drawing in case of special definition.	
07	IC/FPC Bonding	Scratch	Reject
		Intensity Of Adhesion	If lower than specification, reject
		Gold Fold Twist	Reject
07	IC/FPC Bonding	Silicon	According to outline, no gold outside, seal can not be higher than LCD
		FPC Gold Sever	Reject
08	SMT	Lack of Component、Polarity Inverse	If exist, reject
		Leak Solder、Virtual Solder	If exist, reject
		Short Circuit In Solder Point	If exist, reject
		Tin Ball	If exist, reject
		Tin Acumination	If visual, reject
		Height Solder Point	If higher 0.5mm than component. reject



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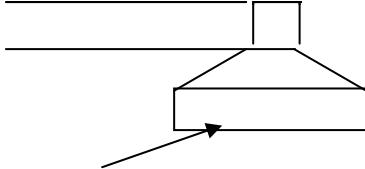
		Height of component	Either side higher 0.5mm than component, reject	
		Component Shift	<p>The diagram shows a component positioned above two solder pads on a PCB. The component has a height D. The distance from the center of the component to the center of the left solder pad is labeled X, and to the center of the right solder pad is labeled Y. The distance between the centers of the two solder pads is labeled Z. Arrows indicate the vertical height D and the horizontal distances X, Y, and Z.</p> <p><math>X &lt; 3/4Z</math>      reject <math>y &gt; 1/3D</math>      reject</p>	
08	SMT	Few Tin	<p>The diagram shows a PCB with a component mounted on it. A single solder pad is visible, and the angle of deflection is labeled θ. The PCB itself is also labeled.</p> <p>If <math>\theta \leq 20^\circ</math>      reject</p>	
		Component Deflection	<p>The diagram shows a component being deflected at an angle D from its original position over a solder pad. The deflection angle is indicated by a dashed line.</p>	
		Component Carcass Sideways	<p>The diagram shows a component carcass shifted sideways relative to a solder pad. The distance between the component and the pad is labeled Y.</p> <p>If <math>Y &gt; 1/3D</math>      reject</p>	
			Reject	



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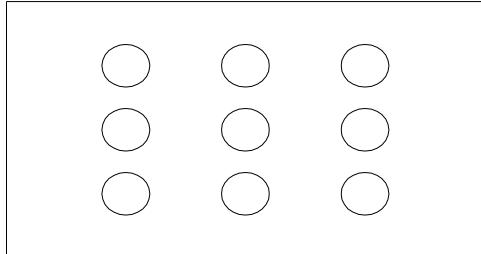
		Component Carcass Sideways	If exist with visual inspection , reject	
		Lot Tin	A: Tin accrete the solder side completely , hollowly ,Ok B: Tin accrete the solder side completely , full circle arc , ok C: Jointing include whole solder side, height of tin>50 percent of height of component, reject	
		Few Tin	A: Tin accrete the solder side completely , hollowly ,Ok B: height of tin > 1/3 of solder side of component , ok C: height of tin ≤ 1/3 of solder side of component, reject	
08	SMT	Normal  Jointing side		
09	Light	Short circuit 、 Open circuit	Forbid	
		Quality of CSTN Display	1、 Rolling strake with visual inspection, forbid 2、 Differentness of color in viewing area with visual inspection ( full white、 red、 green、 blue), forbid 3 、 Display change with visual inspection , forbid	



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10	Color Of CIE Coordinate				Drive LCD under normal condition, 25°C Φ=0 θ=0 Test white、red、green blue with DMS Record	
		x	y			
		white	±0.05	±0.05		
		Red	±0.05	±0.05		
		Green	±0.05	±0.05		
		Blue	±0.05	±0.05		
According to the specification or sample customer have approved						
11	Brightness	In accord with product specification	Drive condition is according to specification Measure location is in Follow Picture 3、Adjust brightness instrument to zero , burrow against the surface of LCD , press "measure" , record when the display is steady. (YOKOGAWA-3298)			
						
			Measure location			
12	CR (Max)	According to specification	According to product specification Measure instrument ( DMS-501 )			
13	Response time	According to specification	According to product specification Measure instrument ( DMS-501 )			
14	Viewing angle	According to specification	According to product specification Measure instrument ( DMS-501 )			
15	Vibration、Ring	Compare with the sample customer supply	Compare with the sample customer supply when assemble			
16	Frequency Of FPC Bend	According to the use of product ( main FPC of foldaway cell phone ≥6 thousand )	Measure instrument Bend angle : 150° Fix FPC in the casement when customer supply			



### 9 Handling Precautions

#### 9.1 Mounting method

The LCD panel of Daxian LCD module consists of two thin glass plates with polarizers which easily be damaged. And since the module is 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.

#### 9.2 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) , Sulfur (S)

If goods were sent without being silicon 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 (Cl), Sulfur (S) from customer, Responsibility is on customer.

#### 9.3 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.

#### 9.4 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

#### 9.5 Caution for operation

- It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage than 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 than the operating temperature range and on the other hand at higher temperature LCD's show 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.

### 9.6 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]

### 9.7 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

## 10 Precaution for use

### 10.1

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.

### 10.2

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 Daxian , 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.



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## 11 Dimensional Outline

