

# IIDWay Technology Co. Ltd

## PRODUCT SPECIFICATIONS

For Customer: \_\_\_\_\_

: APPROVAL FOR SPECIFICATION

Customer Model No. \_\_\_\_\_

: APPROVAL FOR SAMPLE

Module No.: GZ70151-DTT070WV

Date : 2024.4.9

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### For Customer's Acceptance:

Approved By	Comment

PREPARED	CHECKED	APPROVER
YZJ		



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## **3. General Specifications**

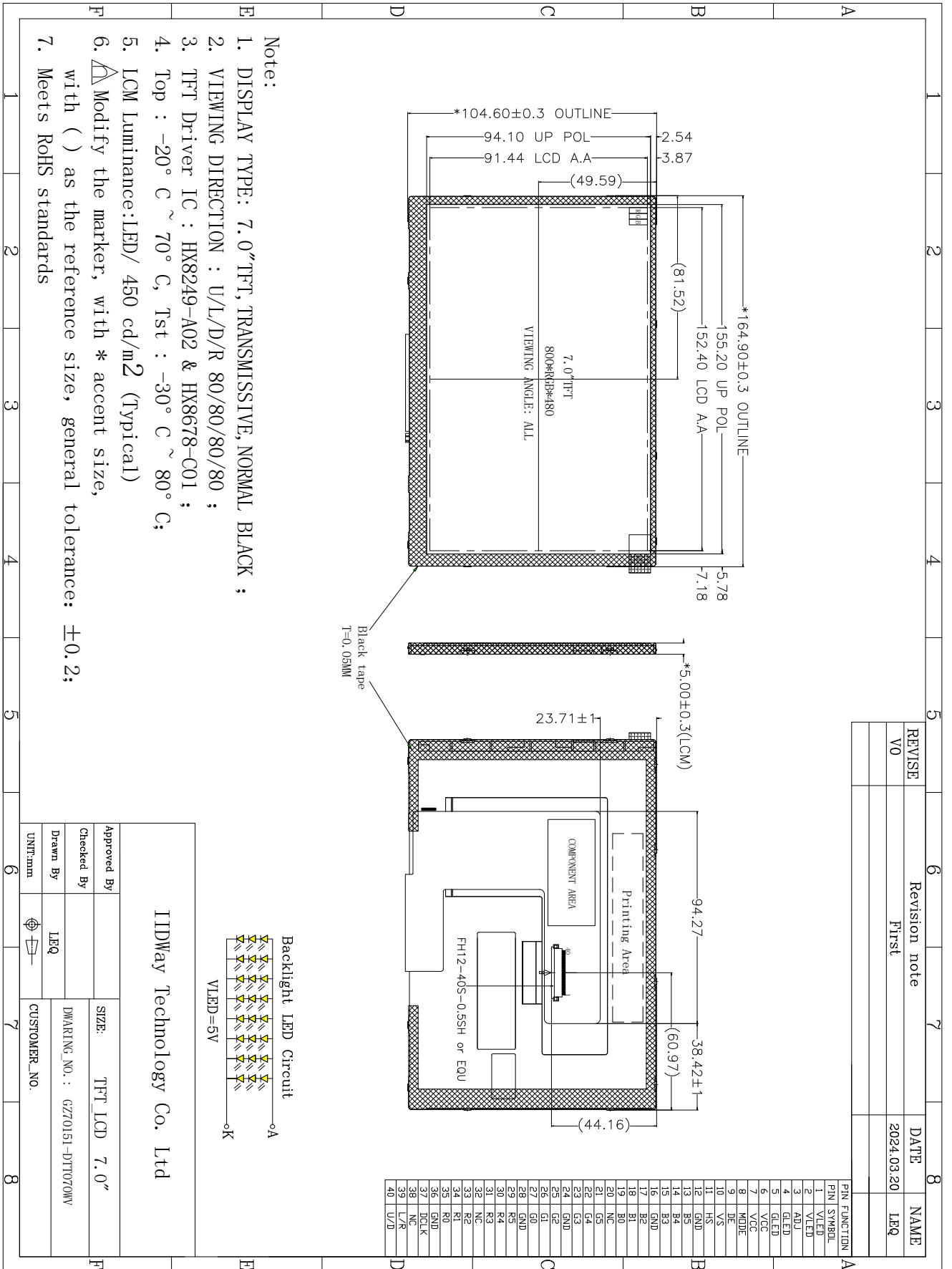
*GZ70151-DTT070WV is a TFT-LCD module. It is composed of a TFT-LCD panel, driver IC, FPC, a back light unit. The 7.0" display area contains 800x480 pixels and can display up to 16.7M colors. This product accords with RoHS environmental criterion.*

Item	Contents	Unit	Note
LCD Type	TFT	-	
Display color	16.7M	1	
Viewing Direction	ALL	O'Clock	
Operating temperature	-20~+70	°C	
Storage temperature	-30~+80	°C	
Module size	Refer to outline drawing	mm	
Active Area(W×H)	152.4X91.44	mm	
Number of Dots	800×480	dots	
Driver IC	HX-8249-A02&HX8678-C01	-	
Power Supply Voltage	3.3	V	
Backlight	3X12-LEDs (white)	pcs	
Interface	RGB18bits	-	

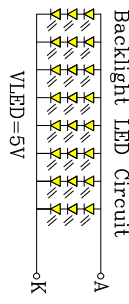
Note1: Color tune is slightly changed by temperature and driving voltage.

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## 4.Outline.Drawing



- Note:
1. DISPLAY TYPE: 7.0" TFT, TRANSMISSIVE, NORMAL BLACK ;
  2. VIEWING DIRECTION : U/L/D/R 80/80/80/80 ;
  3. TFT Driver IC : HX8249-A02 & HX8678-C01 ;
  4. Top : -20° C ~ 70° C, Tst : -30° C ~ 80° C;
  5. LCM Luminance: LED/ 450 cd/m<sup>2</sup> (Typical)
  6.  $\Delta$  Modify the marker, with \* accent size, with ( ) as the reference size, general tolerance: ±0.2;
  7. Meets RoHS standards



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Approved By	SIZE: TFT_LCD 7.0"
Checked By	DWARING_NO.: G270151-DTT070WV
Drawn By	LEQ
UNIT:mm	CUSTOMER_NO.

REVISE	Revision note	DATE	NAME
V0	First	2024.03.20	LEQ

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## 5. Absolute Maximum Ratings( $T_a=25^\circ\text{C}$ )

### 5.1 Electrical Absolute Maximum Ratings.( $V_{SS}=0V, T_a=25^\circ\text{C}$ )

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	$V_{DD}$	-0.3	4.0	V	1, 2

Notes:

1. If the module is above these absolute maximum ratings. It may become permanently damaged. Using the module within the following electrical characteristic conditions are also exceeded, the module will malfunction and cause poor reliability.
2.  $V_{DD} > V_{SS}$  must be maintained.
3. Please be sure users are grounded when handing LCD Module.

### 5.2 Environmental Absolute Maximum Ratings.

Item	Storage		Operating	
	MIN.	MAX.	MIN.	MAX.
Ambient Temperature	$-30^\circ\text{C}$	$80^\circ\text{C}$	$-20^\circ\text{C}$	$70^\circ\text{C}$
Humidity	-	-	-	-

1. The response time will become lower when operated at low temperature.
2. Background color changes slightly depending on ambient temperature.

The phenomenon is reversible.

3.  $T_a < 40^\circ\text{C}$ : 85%RH MAX.

$T_a > 40^\circ\text{C}$ : Absolute humidity must be lower than the humidity of 85%RH at  $40^\circ\text{C}$ .

## 6. Electrical Specifications and Instruction Code

### 6.1 Electrical characteristics( $V_{SS}=0V, T_a=25^\circ\text{C}$ )

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
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Power supply	VDD	Ta=25°C	2.7	3.3	3.6	V	
Input voltage	'H'	V <sub>IH</sub>	V <sub>DD</sub> =3.3V	0.7V <sub>DD</sub>	-	V <sub>DD</sub>	V
	'L'	V <sub>IL</sub>	V <sub>DD</sub> =3.3V	0	-	0.3V <sub>DD</sub>	V

Note: If one of the above items is exceeded its maximum limitation momentarily, the quality of the product may be degraded. Absolute maximum limitation, therefore, specify the values exceeding which the product may be physically damaged. Be sure to use the product within the recommend range.

## 6.2 LED backlight specification(VSS=0V , Ta=25 °C)

Item	Symbol	Condition	Min	Typ	Max	Unit	Note
Supply voltage VLED	V <sub>f</sub>	I <sub>f</sub> =160mA	-	5	-	V	
Uniformity	Δ Bp	I <sub>f</sub> =160mA	75	-	-	%	
LED Life Time	-	-	30K	-	-	hr	1

Note 1: Brightness to be decreased to 50% of the initial value at ambient temperature TA=25 °C

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## 6.3 Interface signals

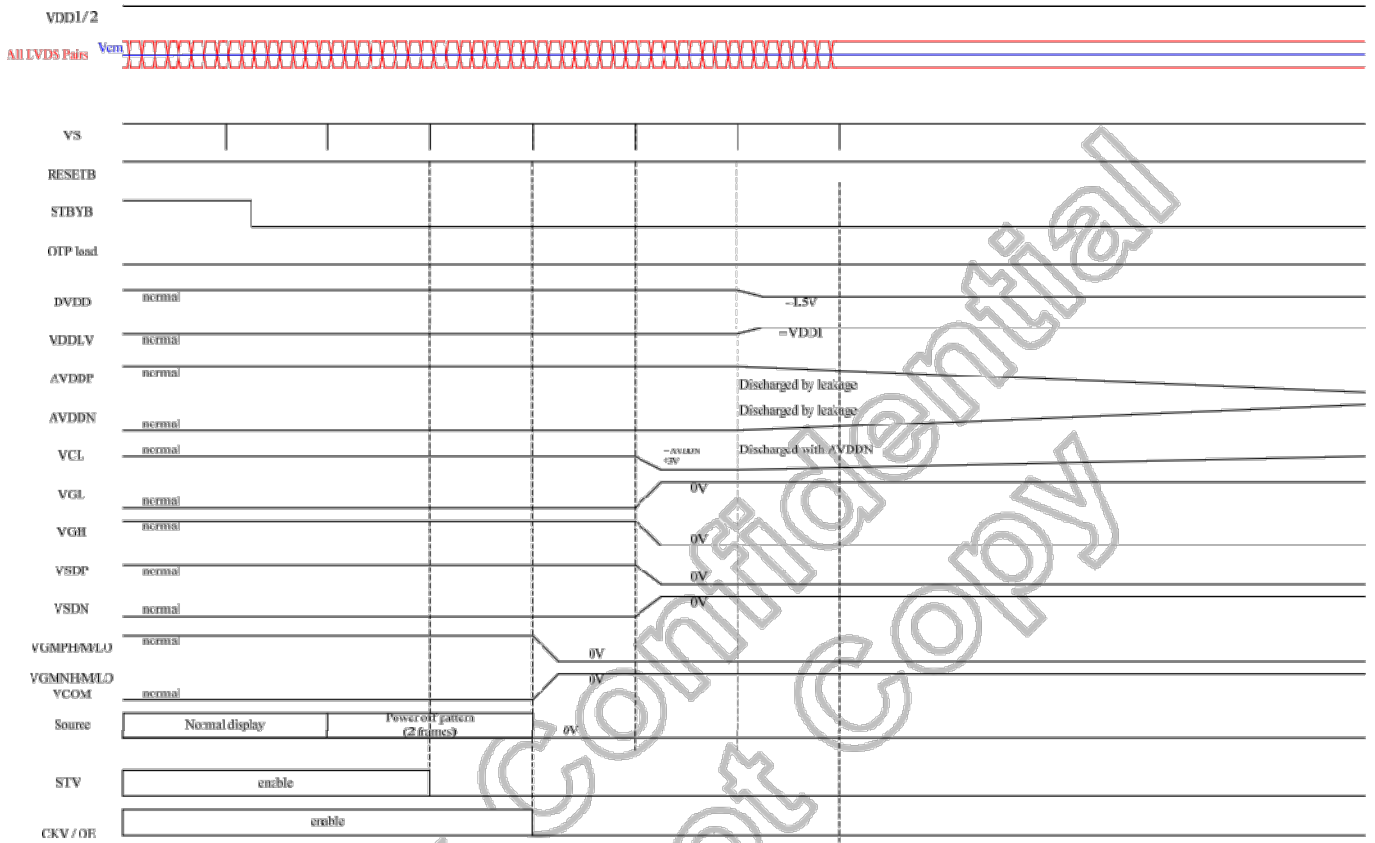
### 6.3.1 LCM PIN

Pin No.	Symbol	I/O	Function
1-2	VLED	P	LED back light(Anode)
3	ADJ	I	Adjustable voltage pin
4-5	GLED	P	LED back light(Cathode)
6-7	VCC	P	Analog or digital supply voltage
8	MODE	I	DE/SYNC mode select. Normally pull high. MODE="1": DE mode. (Default) MODE="0": HSD/VSD mode. Analog or digital supply voltage
9	DE	I	Data enable signal
10	VS	I	Vertical synchronizing signal
11	HS	I	Line synchronizing signal
12	GND	P	Ground
13-15	B5-B3	I	Blue data input pin
16	GND	P	Ground
17-19	B2-B0	I	Blue data input pin
20	NC		No connection
21-23	G5-G3	I	Green data input pin
24	GND	P	Ground
25-27	G2-G0	I	Green data input pin
28	GND	P	Ground
29-31	R5-R3	I	Red data input pin
32	NC		No connection
33-35	R2-R0	I	Red data input pin
36	GND	P	Ground
37	DCLK	I	Dot clock signal
38	NC		No connection
39	L/R	I	Gate driver Left/Right scan control.
40	U/D	I	Gate driver Up/Down scan control.



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## Power off sequence



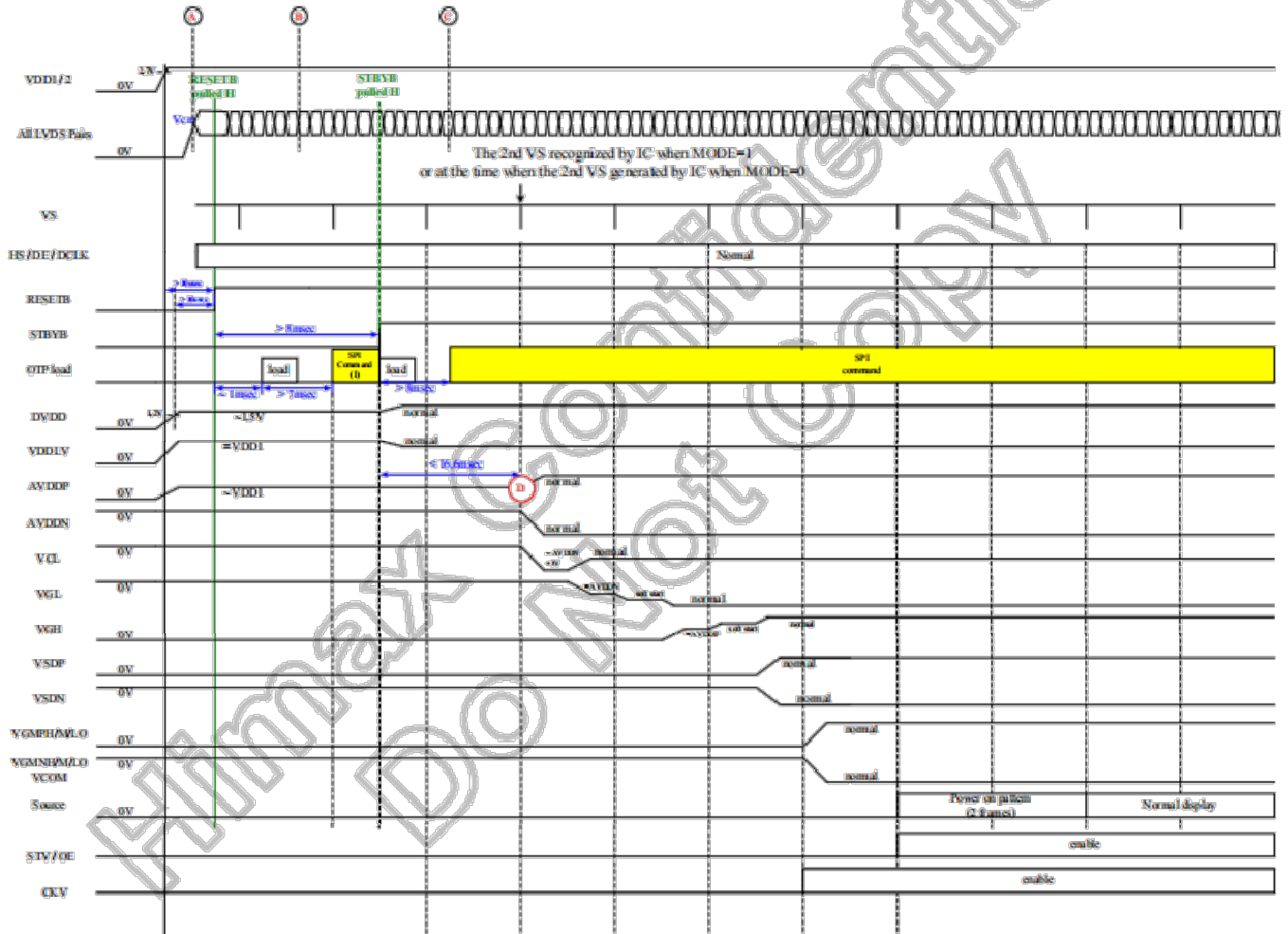
### 6.4.2 Power on/off sequence with external AVDDP/AVDDN

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## Power on sequence

The application system can apply LVDS signals from point A (VDD is ready and not reset completed), B (reset completed and in standby mode), or C (reset completed and non-standby mode).

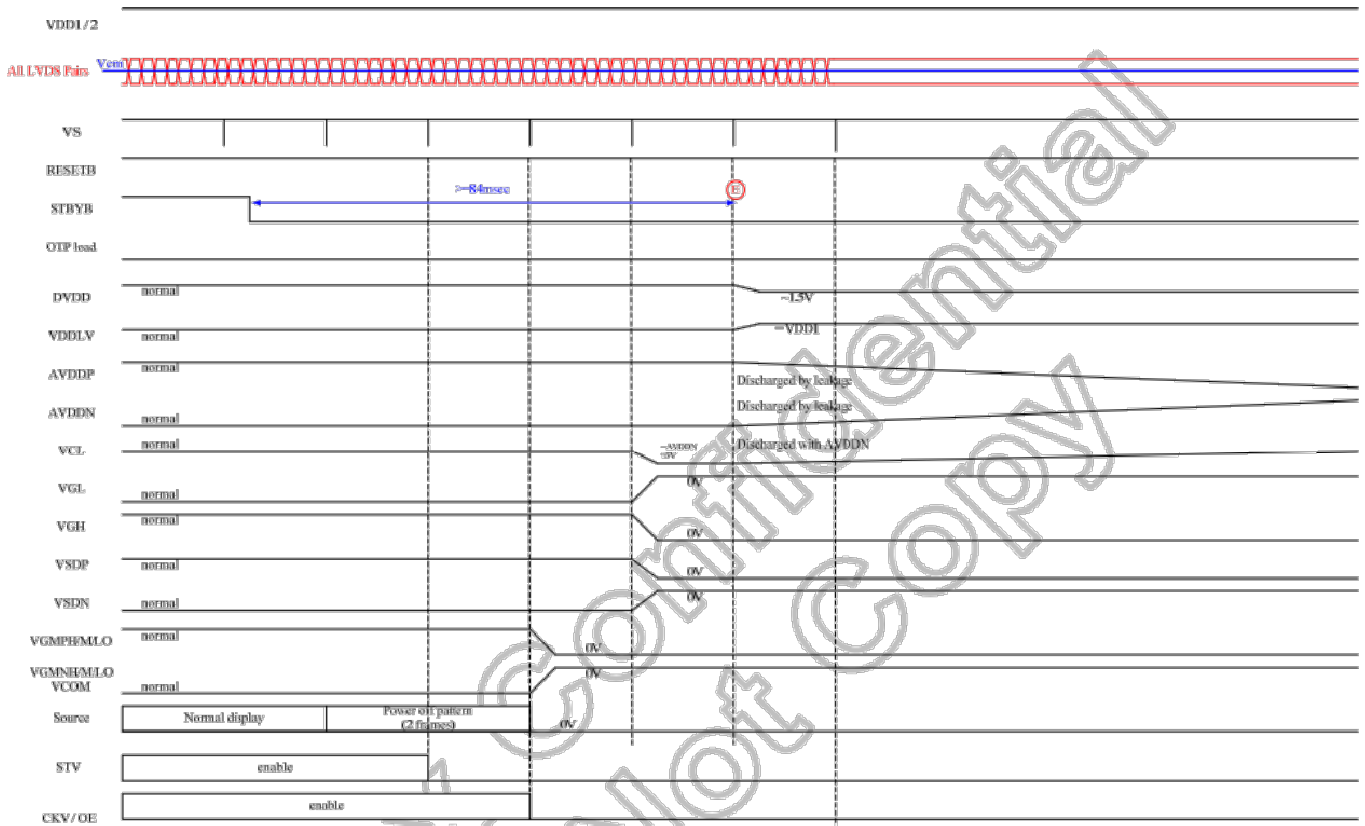
And external power AVDDP/AVDDN needs to be supplied before point D.



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## Power off sequence

External power AVDDP/AVDDN needs to be removed after point E.



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## 6.5 Timing Characteristics

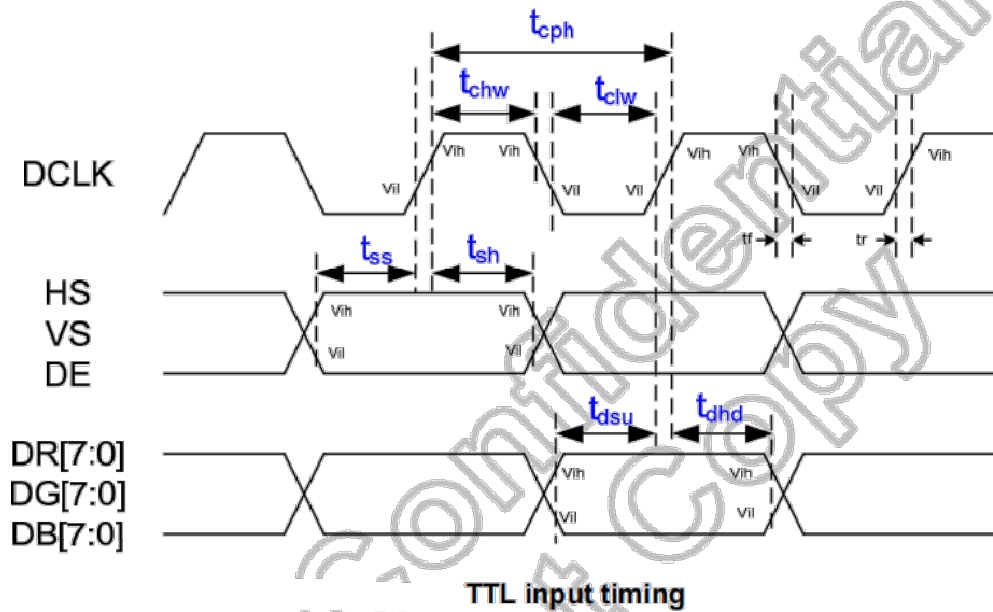
### 6.5.1 AC Electrical Characteristics

(VDD1=VDD2=2.7 to 3.6V, VSS1=VSS2=VSSA=0V, T<sub>OP</sub>=25°C)

Parameter	Symbol	Conditions	Spec.			Unit
			Min.	Typ.	Max.	
Operating frequency, TTL mode	F <sub>TTL</sub>	-	5.25	-	60	MHz
Operating frequency, LVDS mode	F <sub>LVDS</sub>	-	10	-	85	MHz
Supply voltage for main power and digital I/O	VDD1 VDD2	-	2.7	-	3.6	V
Low level input voltage	V <sub>IL</sub>	-	VSS1-0.3	-	0.3*VDD1	V
High level input voltage	V <sub>IH</sub>	-	0.7*VDD1	-	VDD1+0.3	V
High level output voltage	V <sub>OH</sub>	-	VDD1-0.4	-	-	V
Low level output voltage	V <sub>OL</sub>	-	VSS1	-	VSS1+0.4	V
Pull low / high resistor	R <sub>I</sub>	For digital input pins	200	350	850	KΩ
Low level input leakage current	I <sub>LKGL</sub>	For digital input pins with pull high resistor	-18	-	2	μA
		For digital input pins without pull high resistor	-2	0	2	μA
High level input leakage current	I <sub>LKGH</sub>	For digital input pins with pull low resistor	-2	-	18	μA
		For digital input pins without pull low resistor	-2	0	2	μA

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## Input signal timing



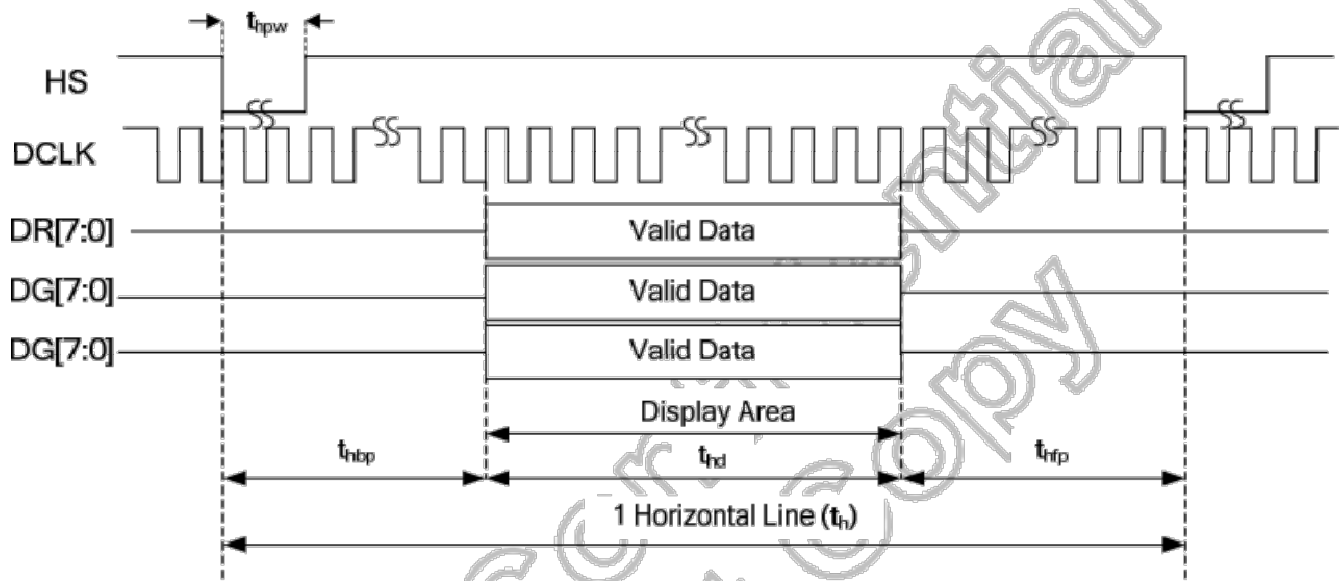
TTL input timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK period	$T_{cph}$	16.8	-	-	ns
DCLK clock high width	$T_{chw}$	6	-	-	ns
DCLK clock low width	$T_{cdw}$	6	-	-	ns
VS setup time	$T_{ss}$	5	-	-	ns
VS hold time	$T_{sh}$	5	-	-	ns
HS setup time	$T_{ss}$	5	-	-	ns
HS hold time	$T_{sh}$	5	-	-	ns
DE setup time	$T_{ss}$	5	-	-	ns
DE hold time	$T_{sh}$	5	-	-	ns
Data setup time	$T_{dsu}$	5	-	-	ns
Data hold time	$T_{dhd}$	5	-	-	ns
Input signal rising time	$T_r$	-	-	10	ns
Input signal falling time	$T_f$	-	-	10	ns

## Sync mode

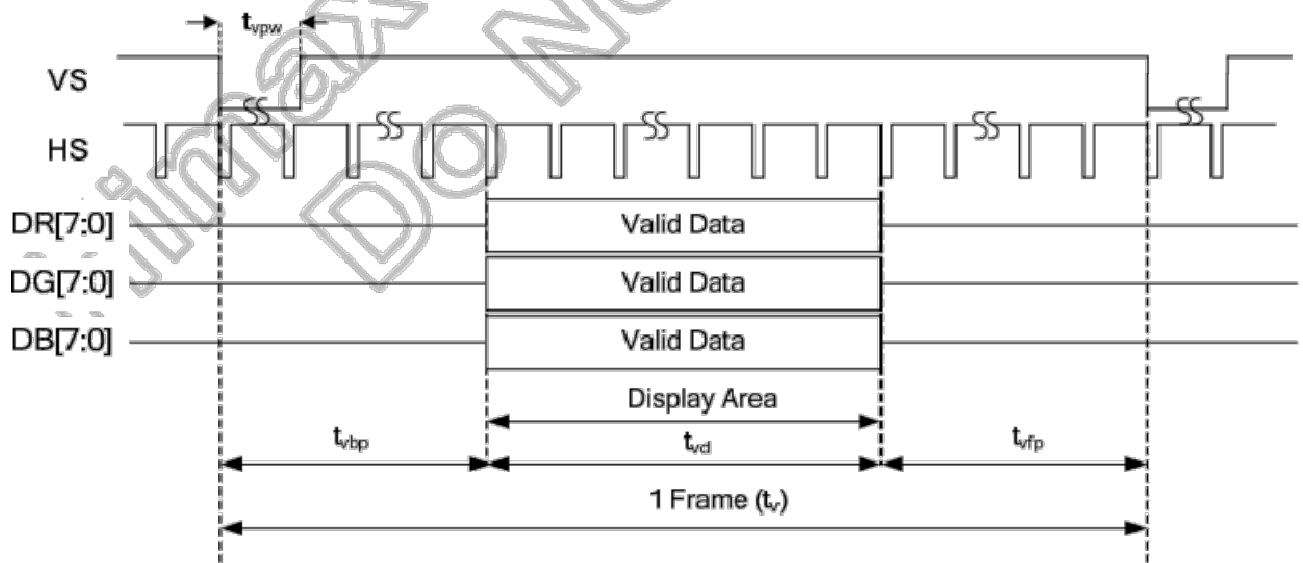
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## • Horizontal



Horizontal input timing at Sync mode

## • Vertical

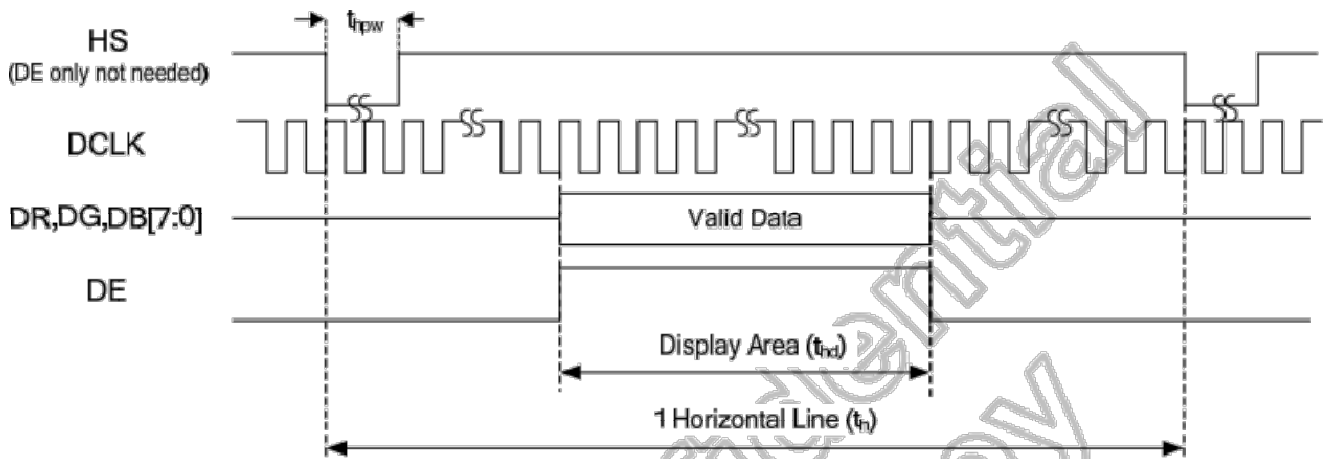


Vertical input timing at Sync mode

DE mode

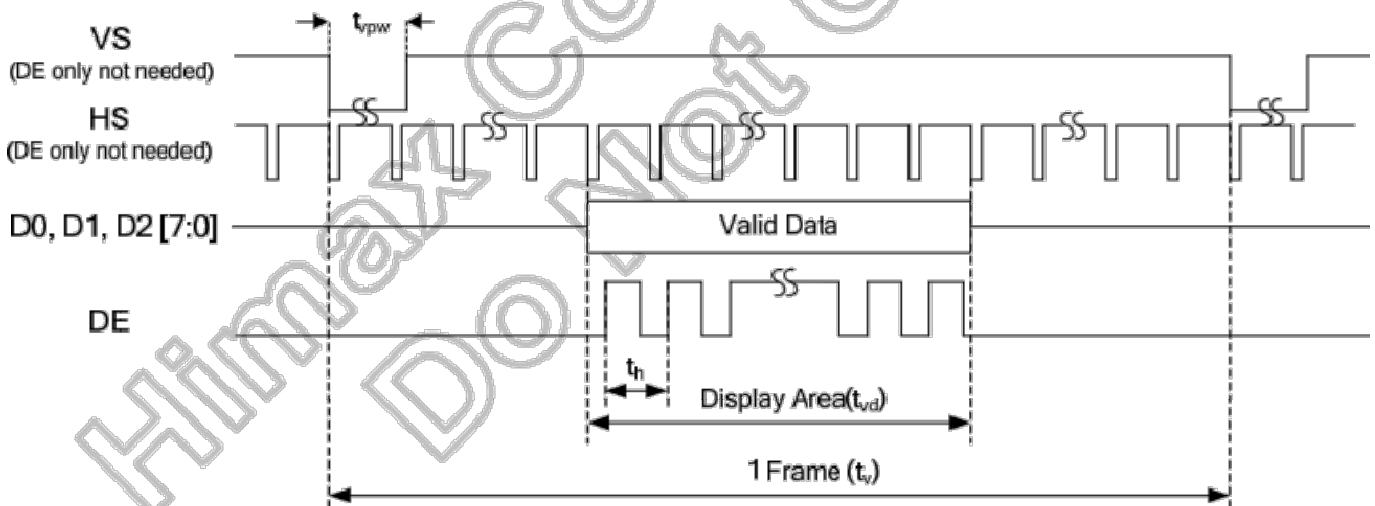
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## • Horizontal



Horizontal input timing at DE only mode

## • Vertical



Vertical input timing at DE only mode

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## 7. Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note	
Brightness	Bp	$\theta=0^\circ$	-	450	-	Cd/m <sup>2</sup>	1	
Uniformity	$\Delta$ Bp	$\Phi=0^\circ$	75	-	-	%	1,2	
Viewing Angle	3:00	Cr $\geq$ 10	-	80	-	Deg	3	
	6:00		-	80	-			
	9:00		-	80	-			
	12:00		-	80	-			
Contrast Ratio	Cr	$\theta=0^\circ$	800	1000	-	-	4	
Response Time	T <sub>r</sub> +T <sub>f</sub>	$\Phi=0^\circ$	-	25	35	ms	5	
Color of CIE Coordinate	W	x	$\theta=0^\circ$	Typ-0 .05	TBD	Typ+0. 05	-	1,6
		y					-	
	R	x					-	
		y					-	
	G	x					-	
		y					-	
	B	x					-	
		y					-	
NTSC Ratio	S		67	70	-	%		

*Note : The parameter is slightly changed by temperature, driving voltage and materiel*

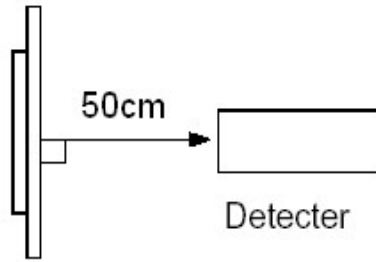
*Note 1: The data are measured after LEDs are turned on for 5 minutes. LCM displays full white. The brightness is the average value of 9 measured spots. Measurement equipment BM-7 ( $\Phi$ 5mm)*

*Measuring condition:*

- *Measuring surroundings: Dark room.*
- *Measuring temperature: Ta=25 °C.*
- *Adjust operating voltage to get optimum contrast at the center of the display.*

*Measured value at the center point of LCD panel after more than 5 minutes while backlight turning on.*

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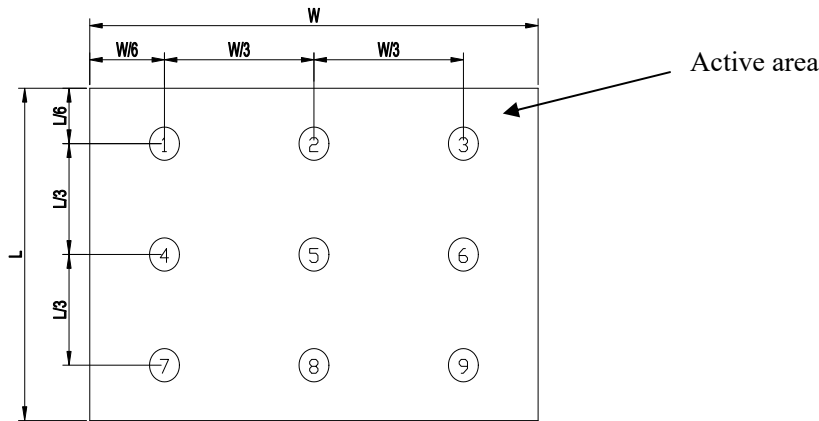


Note 2: The luminance uniformity is calculated by using following formula.

$$\Delta Bp = Bp (\text{Min.}) / Bp (\text{Max.}) \times 100 (\%)$$

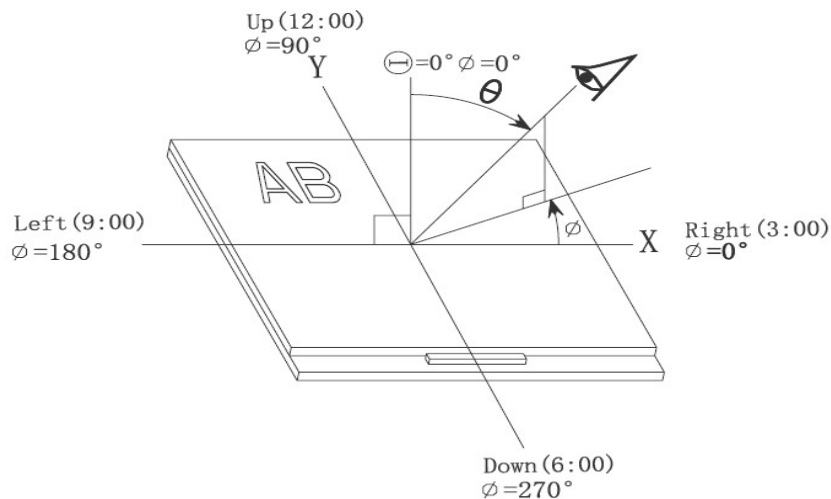
$Bp (\text{Max.})$  = Maximum brightness in 9 measured spots

$Bp (\text{Min.})$  = Minimum brightness in 9 measured spots.



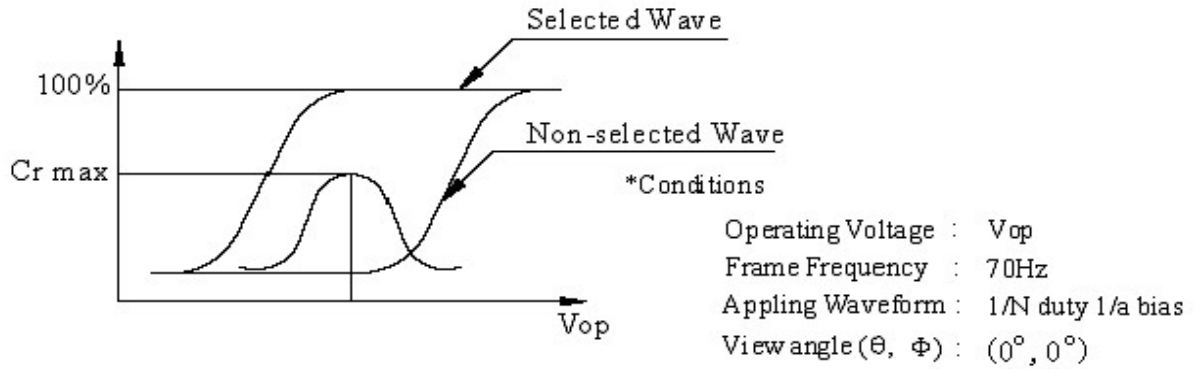
Note 3: The definition of viewing angle:

Refer to the graph below marked by  $\vartheta$  and  $\phi$



Note 4: Definition of contrast ratio.( Test LCD using DMS501)

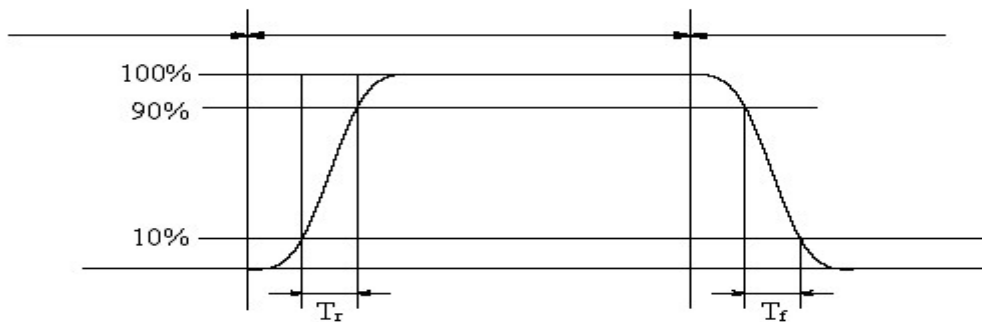
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$$\text{Contrast ratio}(Cr) = \frac{\text{Brightness of selected dots}}{\text{Brightness of non-selected dots}}$$

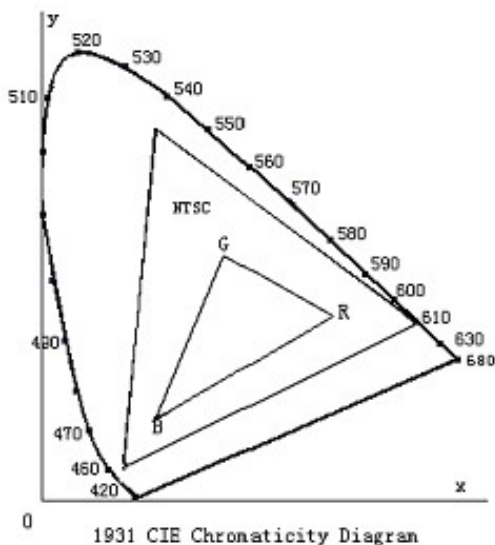
Note 5: Definition of Response time. (Test LCD using DMS501):

The output signals of photo detector are measured when the input signals are changed from "black" to "white"(falling time) and from "white" to "black"(rising time), respectively. The response time is defined as the time interval between the 10% and 90% of amplitudes. Refer to figure as below.



The definition of response time

Note 6: Definition of Color of CIE Coordinate and NTSC Ratio.



Color gamut:

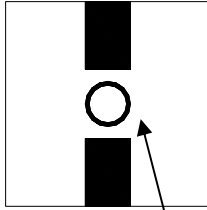
$$S = \frac{\text{area of RGB triangle}}{\text{area of NTSC triangle}} \times 100\%$$

Note 7: Definition of cross talk.

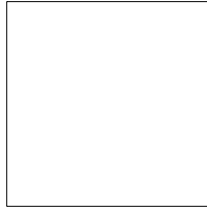
$$\text{Cross talk ratio}(\%) = \frac{|\text{pattern A Brightness} - \text{pattern B Brightness}|}{\text{pattern A Brightness}} \times 100$$

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Pattern A



Pattern B

*Measurement point(center)*

*Electric volume value=3F+/-3Hex*

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## 8. Reliability Test Items and Criteria

No	Test Item	Test condition	Criterion
1	High Temperature Storage	80°C±2°C 96H Restore 2H at 25°C Power off	1. After testing, cosmetic and electrical defects should not happen. 2. Total current consumption should not be more than twice of initial value.
2	Low Temperature Storage	-30°C±2°C 96H Restore 2H at 25°C Power off	
3	High Temperature Operation	70°C±2°C 96H Restore 2H at 25°C Power on	
4	Low Temperature Operation	-20°C±2°C 96H Restore 4H at 25°C Power on	
5	High Temperature/Humidity Operation	60°C±2°C 90%RH 96H Power on	
6	Temperature Cycle	<del>-30°C</del> → 80°C 30min 5min 30min after 5 cycle, Restore 2H at 25°C Power off	

Note: Operation: Supply 3.3V for logic system.

The inspection terms after reliability test, as below

ITEM	Inspection
Contrast	CR>50%
IDD	IDD<200%
Brightness	Brightness>60%
Color Tone	Color Tone+/-0,05

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## **9. Precautions for Use of LCD Modules**

### **9.1 Handling Precautions**

9.1.1 *The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.*

9.1.2 *If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.*

9.1.3 *Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.*

9.1.4 *The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.*

9.1.5 *If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:*

— Isopropyl alcohol                      — Ethyl alcohol

*Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:*

— Water                                      — Ketone                                      — Aromatic solvents

9.1.6 *Do not attempt to disassemble the LCD Module.*

9.1.7 *If the logic circuit power is off, do not apply the input signals.*

9.1.8 *To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.*

*a. Be sure to ground the body when handling the LCD Modules.*

*b. Tools required for assembly, such as soldering irons, must be properly ground.*

*c. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.*

*d. The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.*

### **9.2 Storage precautions**

9.2.1 *When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent*

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*lamps.*

*9.2.2 The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:*

*Temperature :           0°C ~ 40°C*

*Relatively humidity: ≤80%*

*9.2.3 The LCD modules should be stored in the room without acid, alkali and harmful gas.*

**9.3 The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.**

**END**

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