

DLC Display Co., Limited

德爾西顯示器有限公司



MODEL No: DLC0700JMG-6

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Record of Revision

Date	Revision No.	Summary
2012-01-11	1.0	Rev 1.0 was issued

1. Scope

This data sheet is to introduce the specification of DLC0700JMG-6 active matrix TFT module. It is composed of a color TFT-LCD panel, driver ICs, FPC and a backlight unit. The 7.0'' display area contains 1024 (RGB) x 600 pixels.

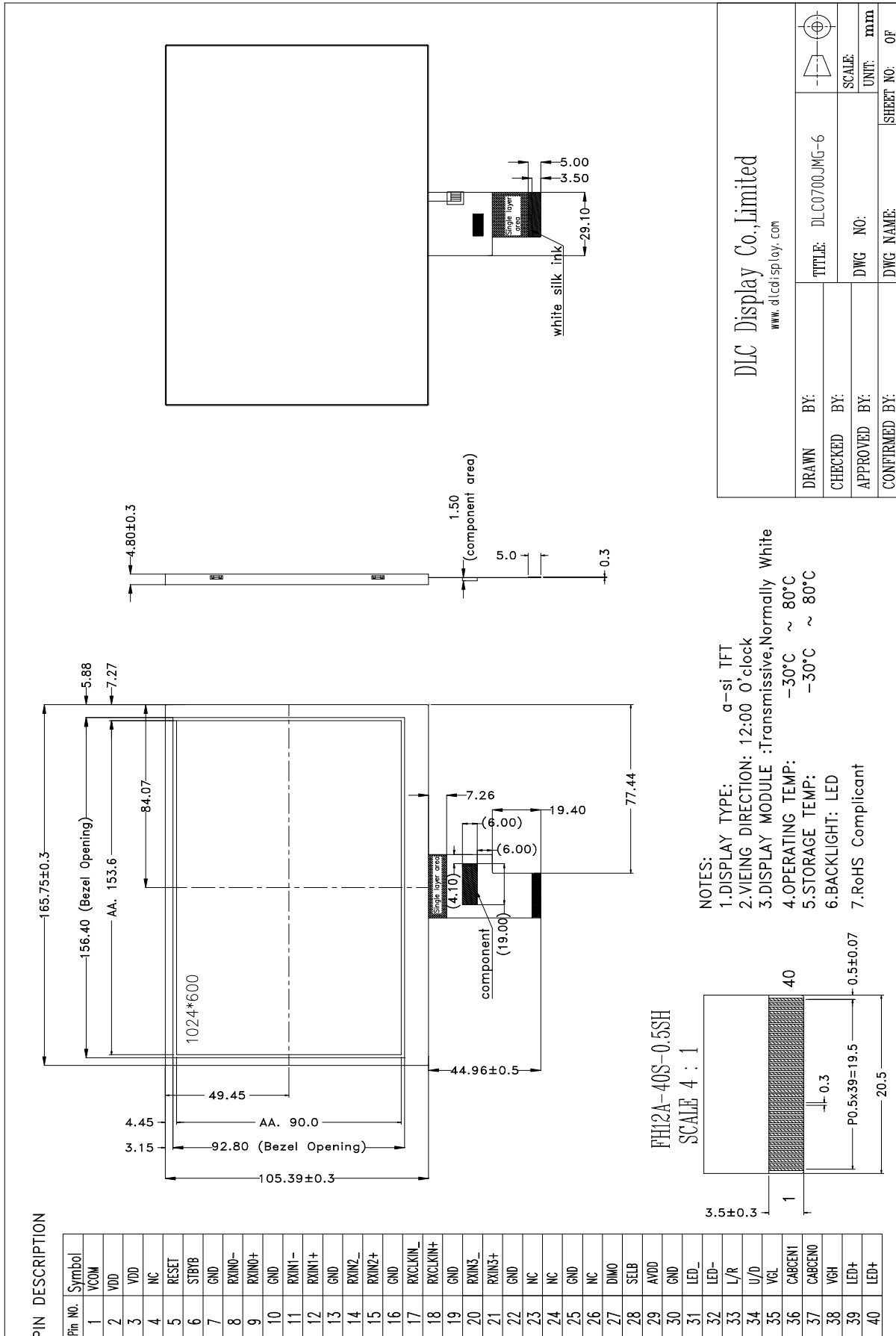
2. Application

Digital equipments which need color display, mobile navigator/video systems, tablet PC.

3. General Information

Item	Contents	Unit
Size	7.0	inch
Resolution	1024 (RGB)×600	/
Interface	LVDS	
Technology type	a-Si TFT	/
Pixel pitch	0.150×0.150	mm
Pixel Configuration	RGB stripe	
Outline Dimension (W x H x D)	165.75×105.39×4.80	mm
Active Area(W x H)	153.6×90.0	mm
Display Mode	TM, Normally White	/
Viewing Direction	12 O'clock	/
Backlight Type	LED	/

4. Outline Drawing



5. Interface signals

No	Symbol	Description	Remarks
1	VCOM	Common Voltage	
2	VDD	Power Voltage for digital circuit	
3	VDD	Power Voltage for digital circuit	
4	NC	No connection	
5	Reset	Global reset pin	
6	STBYB	Standby mode, Normally pulled high STBYB="1", Normally operation STBYB="0", Timing controller, source driver will turn off, all output are High-Z	
7	GND	Ground	
8	RXIN0-	- LVDS differential data input	
9	RXIN0+	+LVDS differential data input	
10	GND	Ground	
11	RXIN1-	-LVDS differential data input	
12	RXIN1+	+LVDS differential data input	
13	GND	Ground	
14	RXIN2-	-LVDS differential data input	
15	RXIN2+	+LVDS differential data input	
16	GND	Ground	
17	RXCLKIN-	-LVDS differential clock input	
18	RXCLKIN+	+LVDS differential clock input	
19	GND	Ground	
20	RXIN3-	-LVDS differential data input	
21	RXIN3+	+LVDS differential data input	
22	GND	Ground	
23	NC	No connection	
24	NC	No connection	
25	GND	Ground	
26	NC	No connection	
27	DIMO	Backlight CAB controller signal output	
28	SELB	6-bit / 8-bit mode select	Note 2
29	AVDD	Power for Analog Circuit	
30	GND	Ground	
31	LED-	LED Cathode	
32	LED-	LED Cathode	

33	L/R	Horizontal inversion	Note 4
34	U/D	Vertical inversion	Note 4
35	VGL	Gate off voltage	
36	CABCEN1	CABC H/W enable	Note 3
37	CABCEN0	CABC H/W enable	Note 3
38	VGH	Gate ON Voltage	
39	LED+	LED Anode	
40	LED+	LED Anode	

Note 1: The recommended FPC connector model is FH12A-40S-0.5SH manufactured by Hirose.

Note 2: If LVDS input data is 6 bits, SELB must be set to High;
If LVDS input data is 8 bits, SELB must be set to Low.

Note 3: When CABC_EN="00", CABC OFF.
When CABC_EN="01", user interface image.
When CABC_EN="10", still picture.
When CABC_EN="11", moving image.
When CABC off, don't connect DIMO, else connect it to backlight.

Note 4: When L/R="0", set right to left scan direction.
When L/R="1", set left to right scan direction.
When U/D="0", set top to bottom scan direction.
When U/D="1", set bottom to top scan direction.

6. Absolute maximum Ratings

6.1. Electrical Absolute max. ratings

Parameter	Symbol	MIN	MAX	Unit	Remark
Power Supply Voltage	VDD	-0.3	5.0	V	
	AVDD	6.5	13.5	V	
	VGH	-0.3	42.0	V	
	VGL	-20.0	0.3	V	

6.2. Environment Conditions

Item	Symbol	MIN	MAX	Unit	Remark
Operating Temperature	TOPR	-30	80	°C	
Storage Temperature	TSTG	-30	80	°C	

6.3 Backlight Unit

Item	Symbol	MIN	MAX	Unit	Remark
Forward Current	IF	-	60	mA	Each LED

7. Electrical Specifications

7.1 Electrical characteristics (Note 1)

GND=0V, Ta=25°C

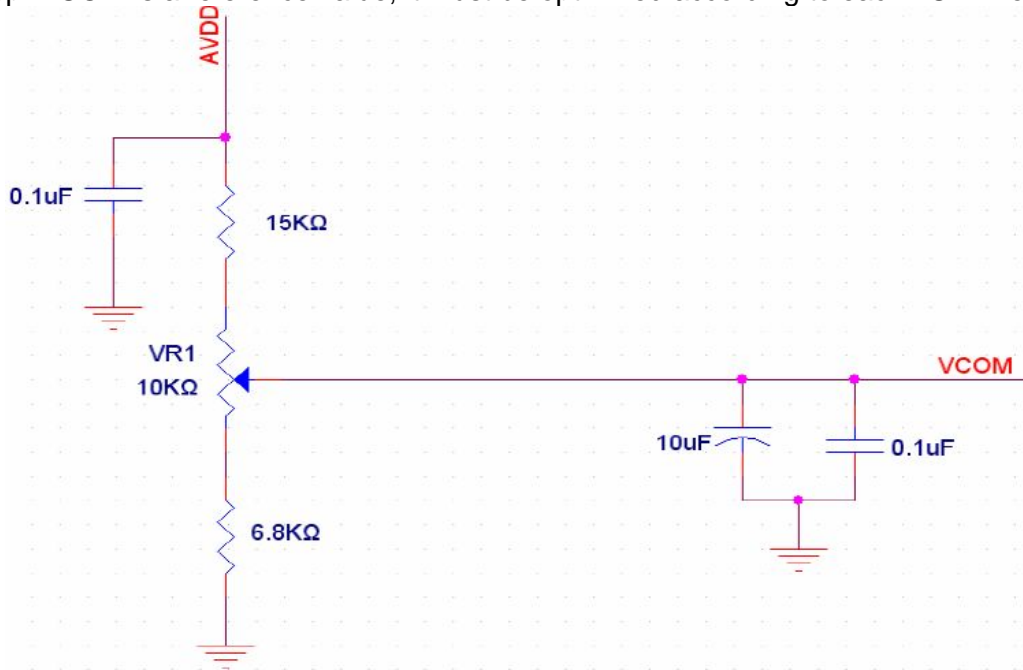
Item	Symbol	MIN	TYP	MAX	Unit	Remark
Digital Supply Voltage	VDD	3.0	3.3	3.6	V	Note 2
Analog Supply Voltage	AVDD	10.8	11.0	11.2	V	
Gate On Voltage	VGH	19.7	20.0	20.3	V	
Gate Off Voltage	VGL	-6.5	-6.8	-7.1	V	
Common Electrode Driving Signal	VCOM	2.7	(3.7)	4.7	V	Note 4
Input high voltage	VIH	0.7VDD	-	VDD		
Input low voltage	VIL	0	-	0.3VDD	V	Note 3

Note 1: Be sure to apply VDD and VGL to the LCD first, and then apply VGH.

Note 2: VDD setting should match the signals output voltage (refer to Note 3) of customer's system board.

Note 3: LVDS, Reset.

Note 4: Typ. VCOM is a reference value, it must be optimized according to each LCM. Be sure to use VR.

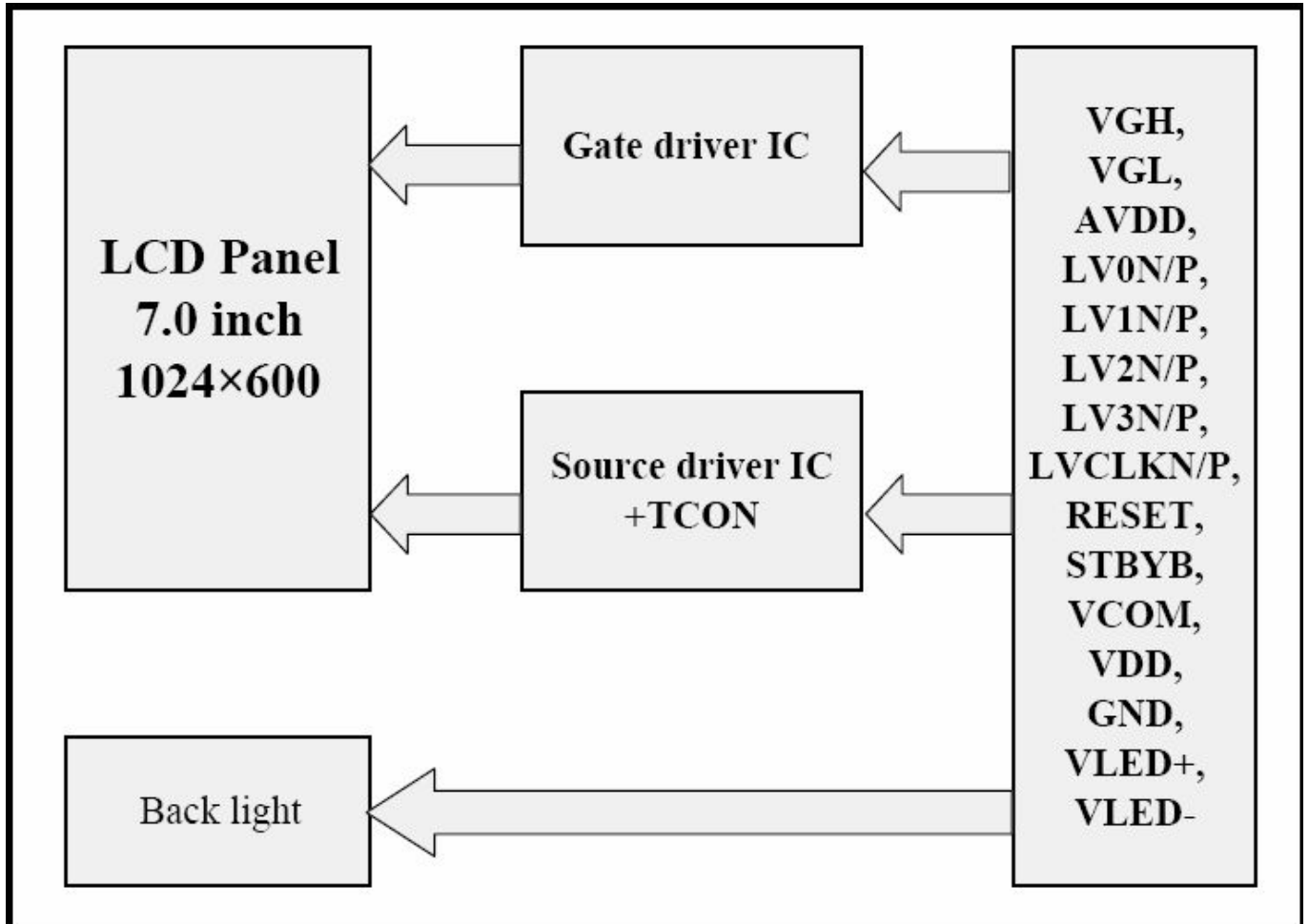


7.2 LED Backlight

Ta=25°C

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	IF	-	360	420	mA	18 LEDs (3 LED Serial, 6 LED Parallel)
Forward Voltage	VF	-	9.9	10.5	V	

7.3 Schematic of LCD module system

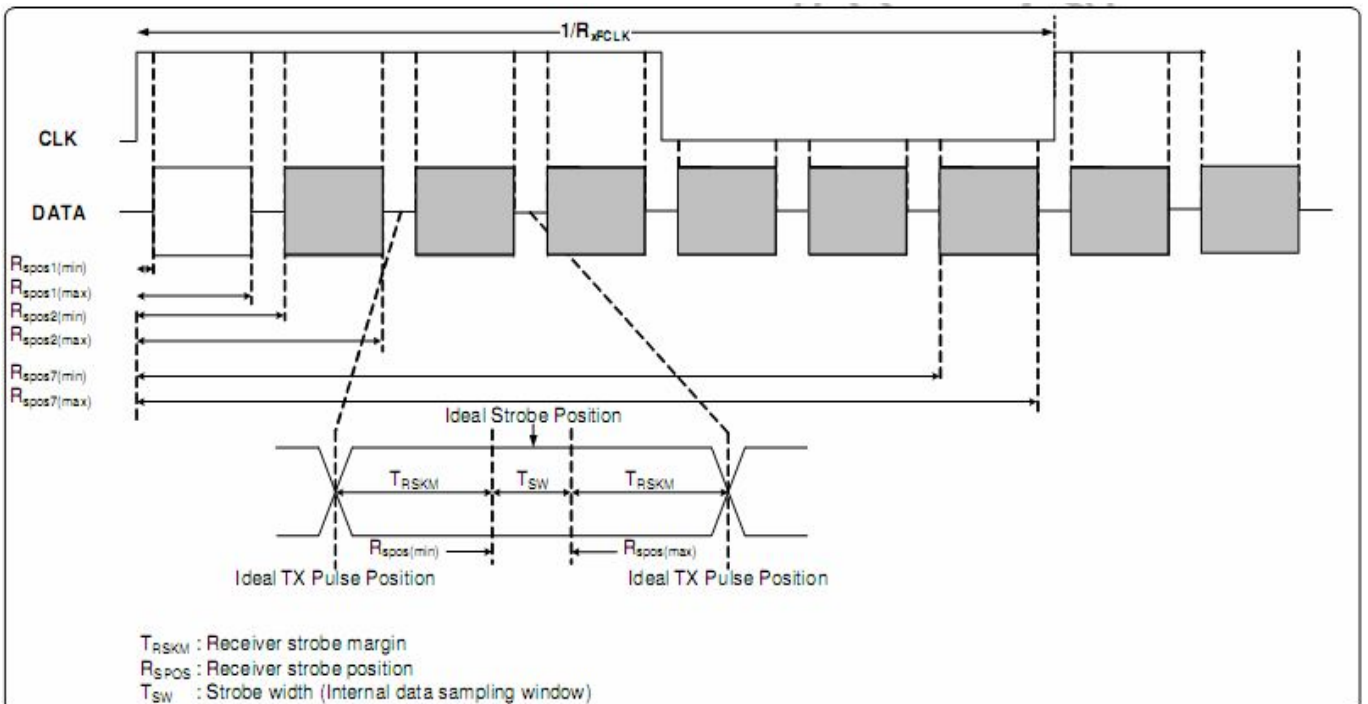
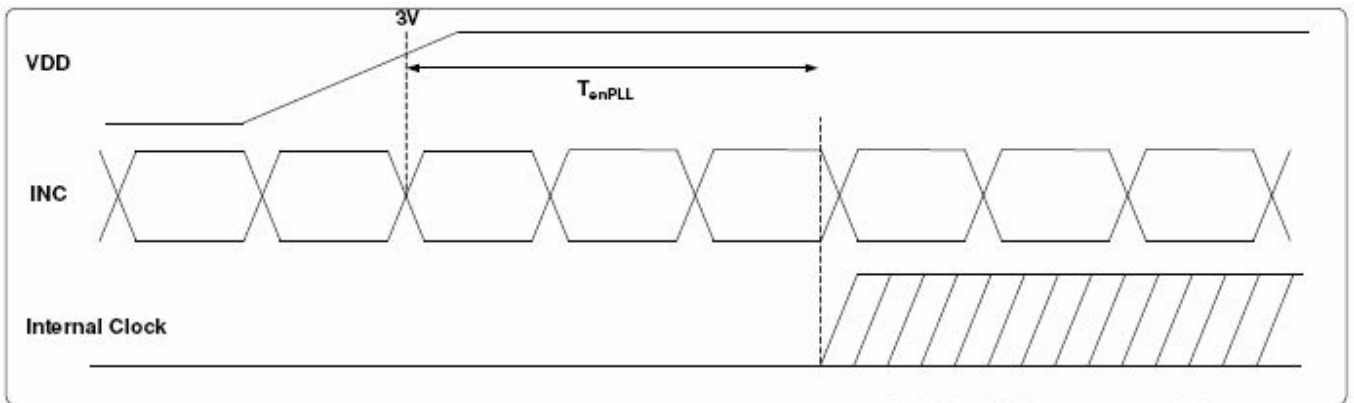
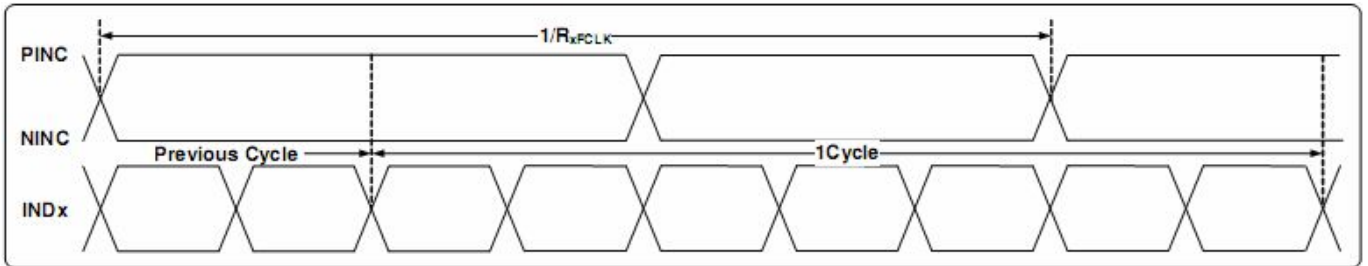


8. Command/AC Timing

8.1 AC Electrical Characteristics

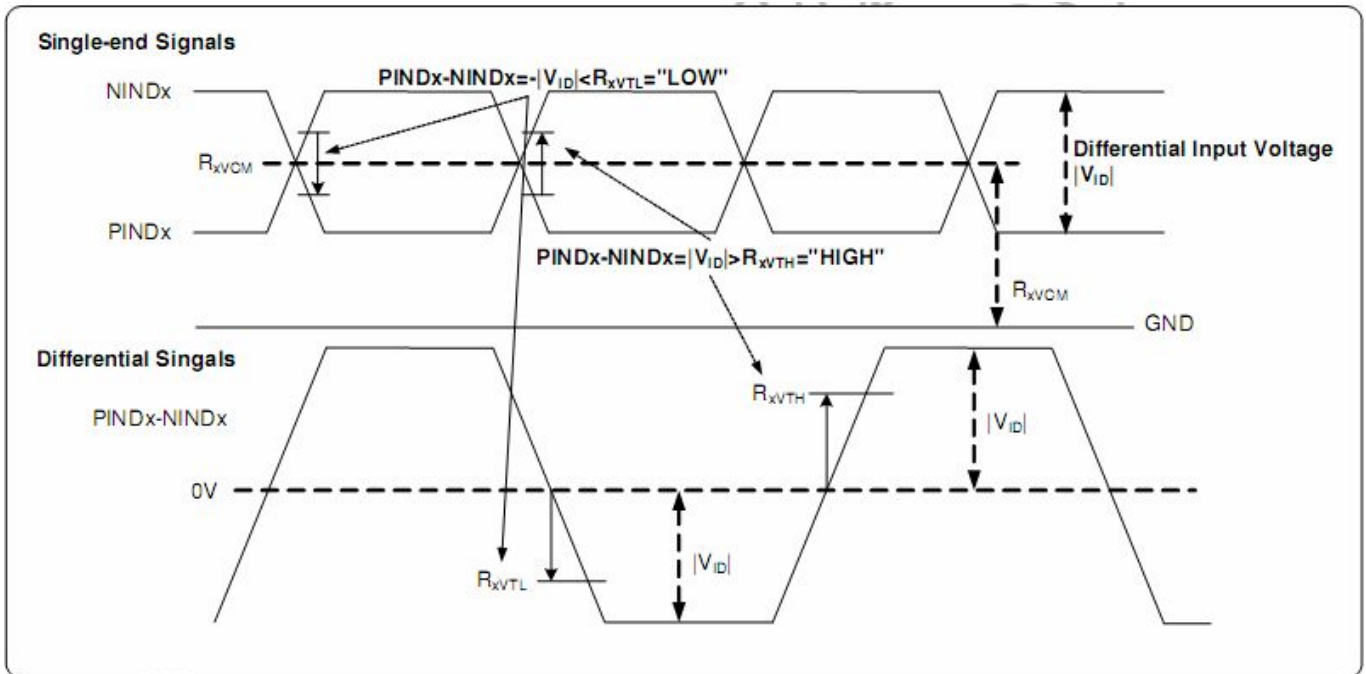
Parameter	Symbol	Min	Typ	Max	Unit	Remark
Clock Frequency	RxFCLK	40.8	51.2	71	MHz	
Input data skew margin	TRSKM	500	-	-	ps	
Clock high time	TLVCH	-	$4/(7 * RxFCLK)$	-	ns	
Clock low time	TLVCL	-	$3/(7 * RxFCLK)$	-	ns	
PLL wake-up time	TenPLL	-	-	150	us	

8.2 Input Clock and Data Timing Diagram



8.3 DC Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Remark
Differential input high Threshold voltage	RXVTH	-	-	0.1	V	
Differential input Low Threshold voltage	RXVTL	-0.1	-	-	V	
Input voltage range	RXVIN	0	-	2.4	V	
Differential input common Mode voltage	RXVCM	$ VID /2$	-	$2.4- VID /2$	V	
Differential input voltage	$ VID $	0.2	v	0.6	V	
Differential input leakage Current	RVXliz	-10	v	10	uA	
LVDS Digital Operating Current	Iddlvs	-	15(TBD)	30(TBD)	mA	Fclk=65MHz,VDD=3.3V
LVDS Digital Stand-by Current	Istlvds	-	10(TBD)	50(TBD)	uA	Clock & all functions are stopped

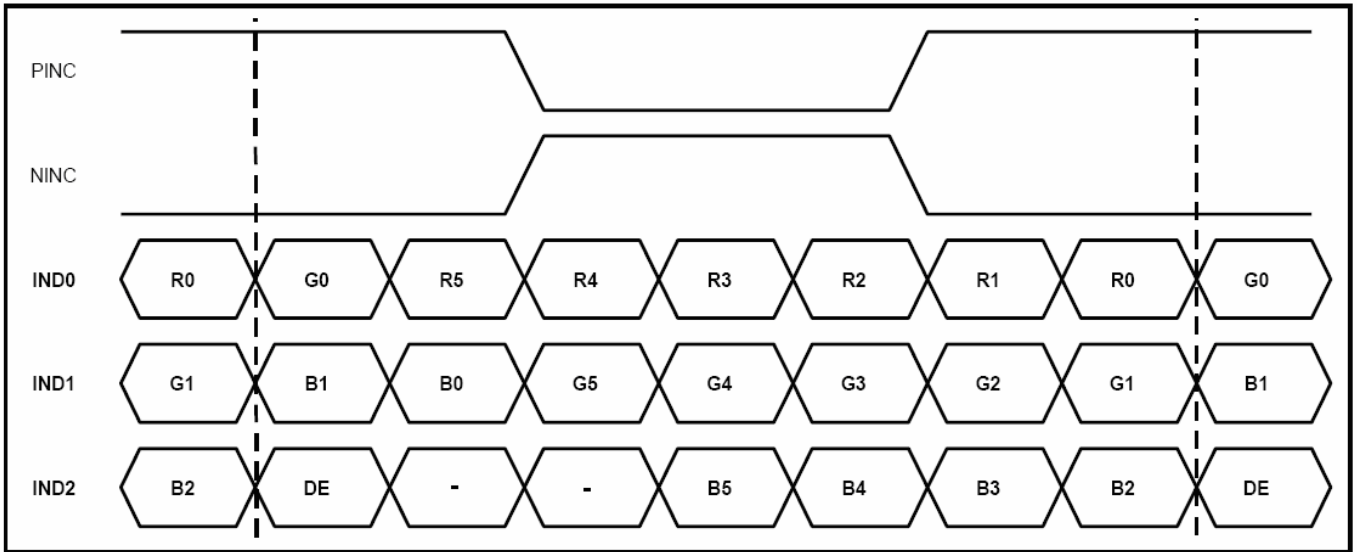


8.4 Timing

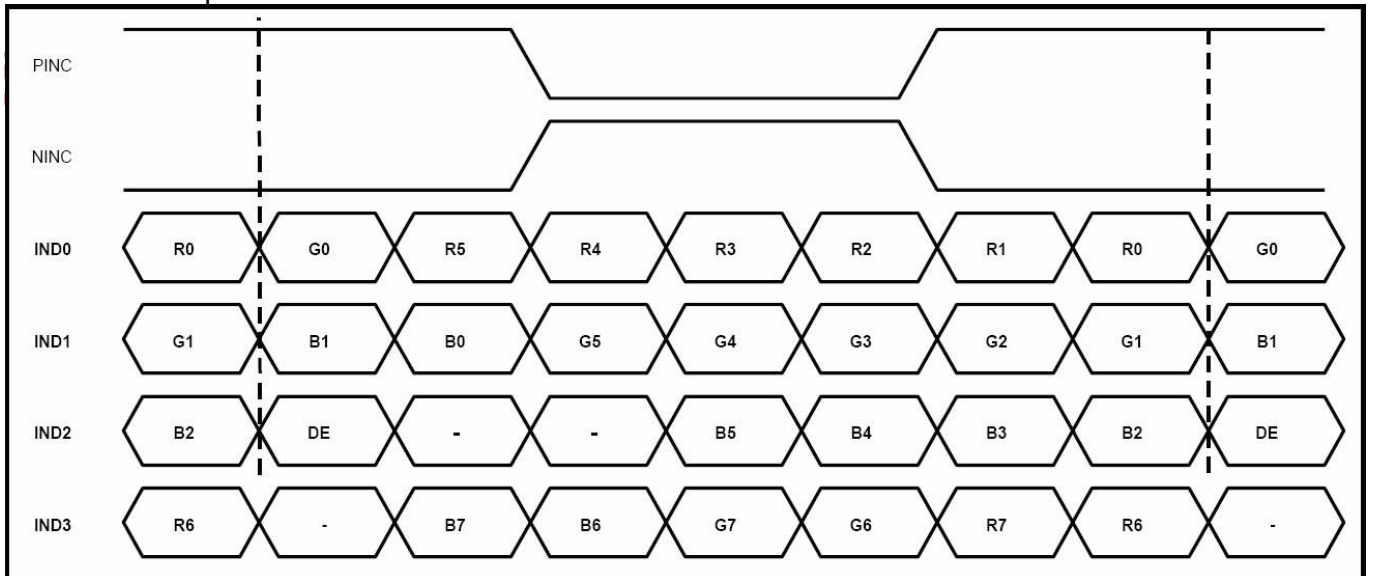
Parameter	Symbol	Min	Typ	Max	Unit	Remark
Clock frequency	fclk	40.8	51.2	67.2	MHz	Frame rate=60Hz
Horizontal display area	thd	1024			DCLK	
HS period time	th	1114	1344	1400	DCLK	
HS Blanking	thbp+thfp	90	320	376	DCLK	
Vertical display area	tvd	600			H	
VS period time	tv	610	635	800	H	
VS Blanking	tvbp+tvfp	10	35	200	H	

8.5 Data Input Format

6 bit LVDS input

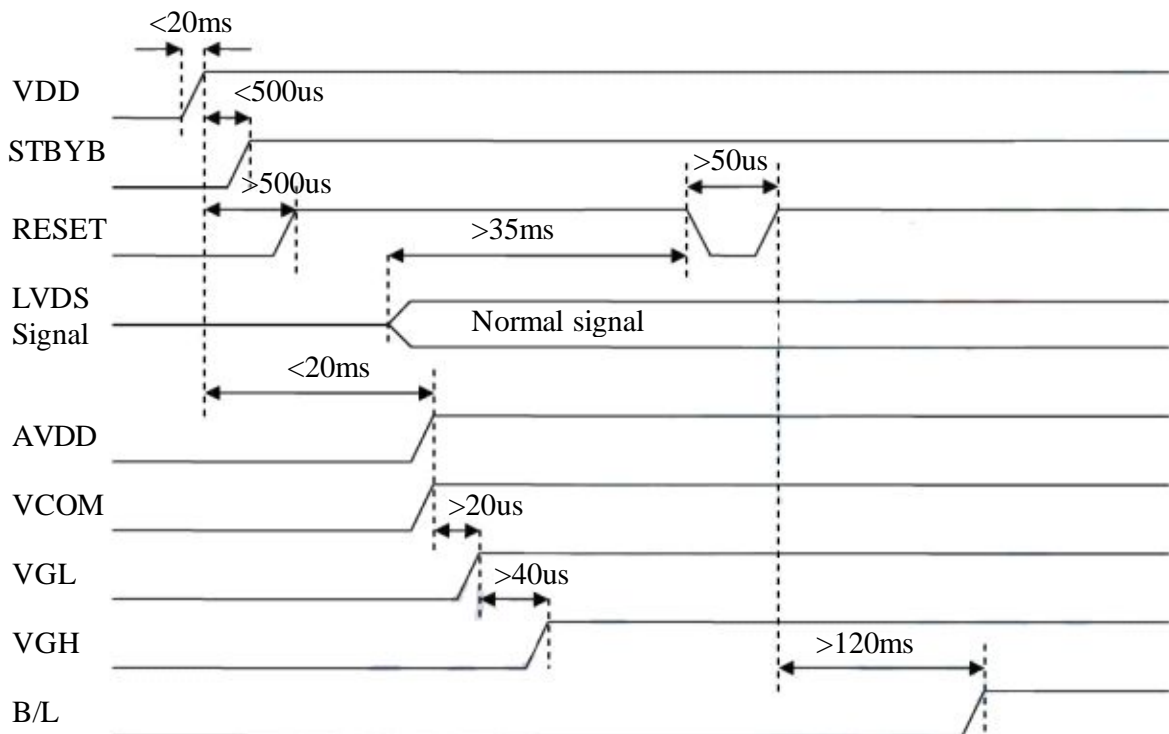


8 bit LVDS input

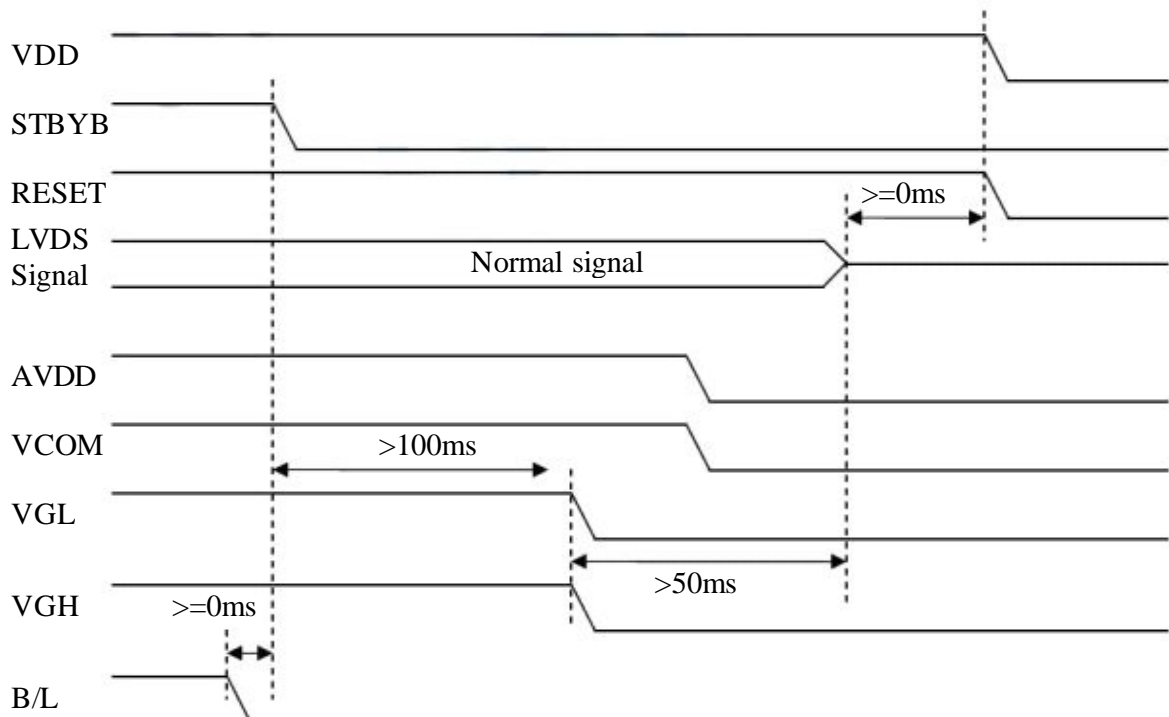


8.6 POWER ON/OFF SEQUENCE

a. Power on:



b. Power off:



9. Optical Specification

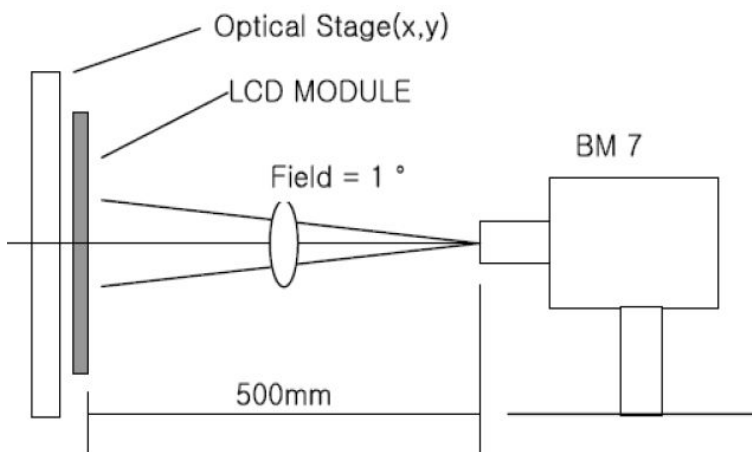
Ta=25°C

Item	Symbol	Condition	Min	Typ.	Max.	Unit	Remark
Contrast Ratio	CR	$\theta=0^\circ$	500	(700)	-		Note1 Note2
Response Time	Ton	25°C	-	10	20	ms	Note1 Note3
	Toff			15	30		
View Angles	θT	$CR \geq 10$	-	70	-	Degree	Note 4
	θB		-	75	-		
	θL		-	75	-		
	θR		-	75	-		
Chromaticity	White	x	Brightness is on	0.26	0.31	0.36	Note5, Note1
		y		0.28	0.33	0.38	
	Red	x		-	TBD		
		y		-	TBD		
	Green	x		-	TBD		
		y		-	TBD		
	Blue	x		-	TBD		
		y		-	TBD		
Luminance	L		400	500	-	cd/m ²	Note1 Note6
Uniformity	U		70	75	-	%	Note1 Note7

Note 1: Definition of optical measurement system.

Temperature = 25°C(±3°C)

LED back-light: ON, Environment brightness < 150 lx

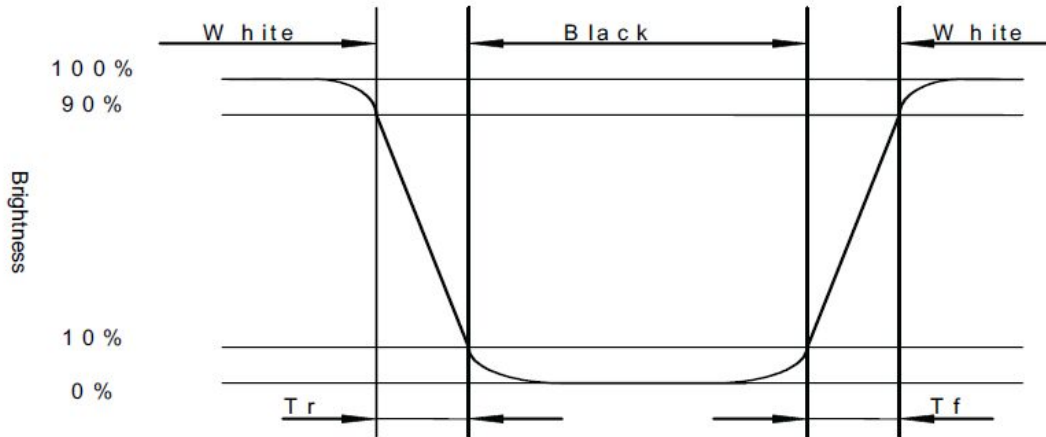


Note 2: Contrast ratio is defined as follow:

$$\text{Contrast Ratio} = \frac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all black pixels}}$$

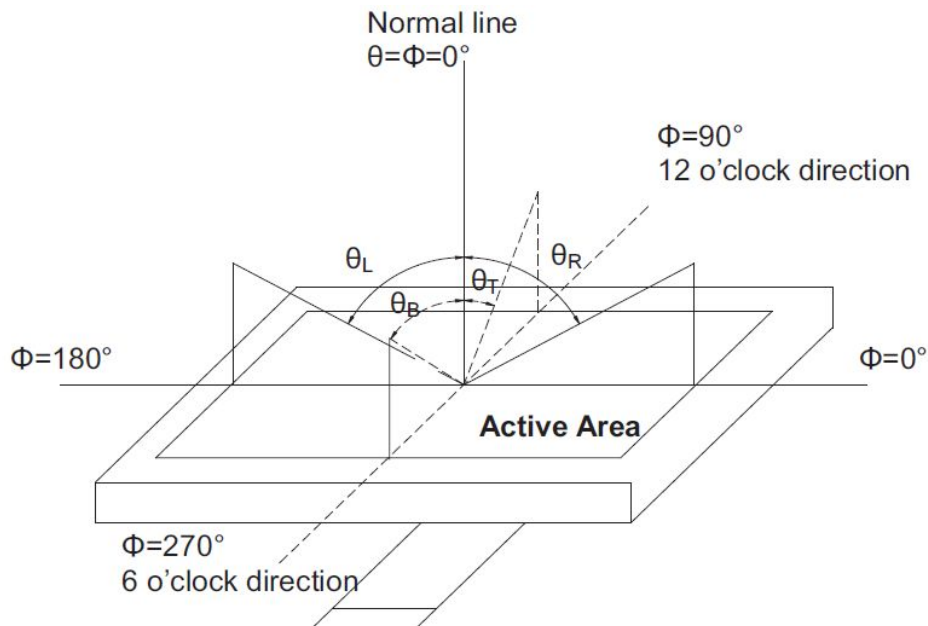
Note 3: Response time is defined as follow:

Response time is the time required for the display to transition from black to white (Rise Time, T_r) and from white to black (Decay Time, T_f).



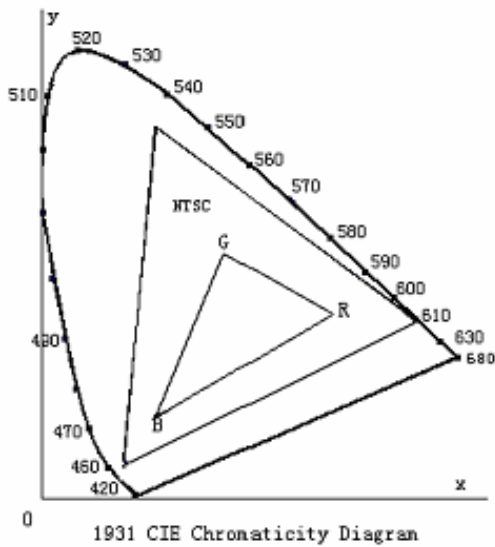
Note 4: Viewing angle range is defined as follow:

Viewing angle is measured at the center point of the LCD.



Note 5: Color chromaticity is defined as follow: (CIE1931)

Color coordinates measured at center point of LCD



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

Note 6: Luminance is defined as follow:

Luminance is defined as the brightness of all pixels “White” at the center of display area on optimum contrast.

Note 7: Luminance Uniformity is defined as follow:

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

$$\text{Uniformity (U)} = \frac{\text{Minimum Luminance(brightness) in 9 points}}{\text{Maximum Luminance(brightness) in 9 points}}$$

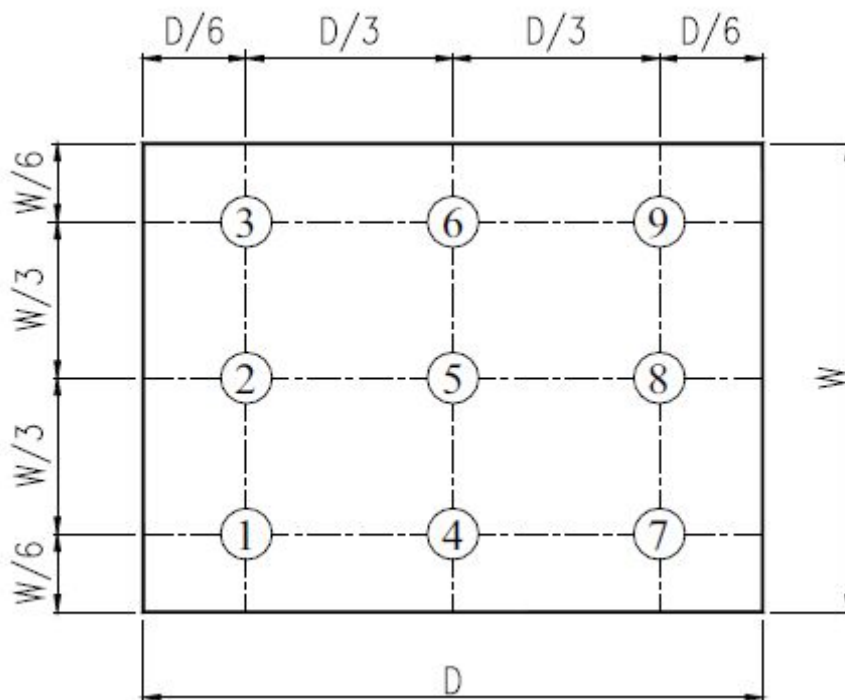


Fig. 2 Definition of uniformity

10. Environmental / Reliability Tests

No	Test Item	Condition	Judgment criteria
1	High Temp Operation	Ts=+80°C, 240hrs	Per table in below
2	Low Temp Operation	Ta=-30°C, 240hrs	Per table in below
3	High Temp Storage	Ta=+80°C, 240hrs	Per table in below
4	Low Temp Storage	Ta=-30°C, 240hrs	Per table in below
5	High Temp & High Humidity Storage	Ta=+40°C, 90% RH 240 hours	Per table in below (polarizer discoloration is excluded)
6	Thermal Shock (Non-operation)	-30°C 30 min~+80°C 30 min, Change time:5min, 20 Cycles	Per table in below
7	ESD (Operation)	± 2KV, Human Body Mode, 100pF/1500 Ω	Per table in below
8	Vibration (Non-operation)	Random Vibration : 0.015G*G/Hz from 5-100HZ, -6dB/Octave from 100-200HZ 2 hours for each direction of X. Y. Z. (6 hours for total)	Per table in below
9	Shock (Non-operation)	100G 6ms, ± X, ± Y, ± Z 3 times for each direction	Per table in below
10	Package Drop Test	Height:60 cm 1 corner, 3 edges, 6 surfaces	Per table in below

INSPECTION	CRITERION(after test)
Appearance	No Crack on the FPC, on the LCD Panel
Alignment of LCD Panel	No Bubbles in the LCD Panel No other Defects of Alignment in Active area
Electrical current	Within device specifications
Function / Display	No Broken Circuit, No Short Circuit or No Black line No Other Defects of Display

11. Precautions for Use of LCD Modules

11.1 Safety

The liquid crystal in the LCD is poisonous. Do not put it in your mouth. If the liquid crystal touches your skin or clothes, wash it off immediately using soap and water.

11.2 Handling

- A. The LCD and touch panel is made of plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.
- B. Do not handle the product by holding the flexible pattern portion in order to assure the reliability
- C. Transparency is an important factor for the touch panel. Please wear clear finger sacks, gloves and mask to protect the touch panel from finger print or stain and also hold the portion outside the view area when handling the touch panel.
- D. Provide a space so that the panel does not come into contact with other components.
- E. To protect the product from external force, put a covering lens (acrylic board or similar board) and keep an appropriate gap between them.
- F. Transparent electrodes may be disconnected if the panel is used under environmental conditions where dew condensation occurs.
- G. Property of semiconductor devices may be affected when they are exposed to light, possibly resulting in IC malfunctions.
- H. To prevent such IC malfunctions, your design and mounting layout shall be done in the way that the IC is not exposed to light in actual use.

11.3 Static Electricity

- A. Ground soldering iron tips, tools and testers when they are in operation.
- B. Ground your body when handling the products.
- C. Power on the LCD module before applying the voltage to the input terminals.
- D. Do not apply voltage which exceeds the absolute maximum rating.
- E. Store the products in an anti-electrostatic bag or container.

11.4 Storage

- A. Store the products in a dark place at $+25^{\circ}\text{C} \pm 10^{\circ}\text{C}$ with low humidity (40% RH to 60% RH). Don't expose to sunlight or fluorescent light.
- B. Storage in a clean environment, free from dust, active gas, and solvent.

11.5 Cleaning

- A. Do not wipe the touch panel with dry cloth, as it may cause scratch.
- B. Wipe off the stain on the product by using soft cloth moistened with ethanol. Do not allow ethanol to get in between the upper film and the bottom glass. It may cause peeling issue or defective operation. Do not use any organic solvent or detergent other than ethanol.

11.6 Cautions for installing and assembling

Bezel edge must be positioned in the area between the Active area and View area. The bezel may press the touch screen and cause activation if the edge touches the active area. A gap of approximately 0.5mm is needed between the bezel and the top electrode. It may cause unexpected activation if the gap is too narrow. There is a tolerance of 0.2 to 0.3mm for the outside dimensions of the touch panel and tail. A gap must be made to absorb the tolerance in the case and connector.

