BOE

LCD Module Specification

Module P/N: JH123T00500

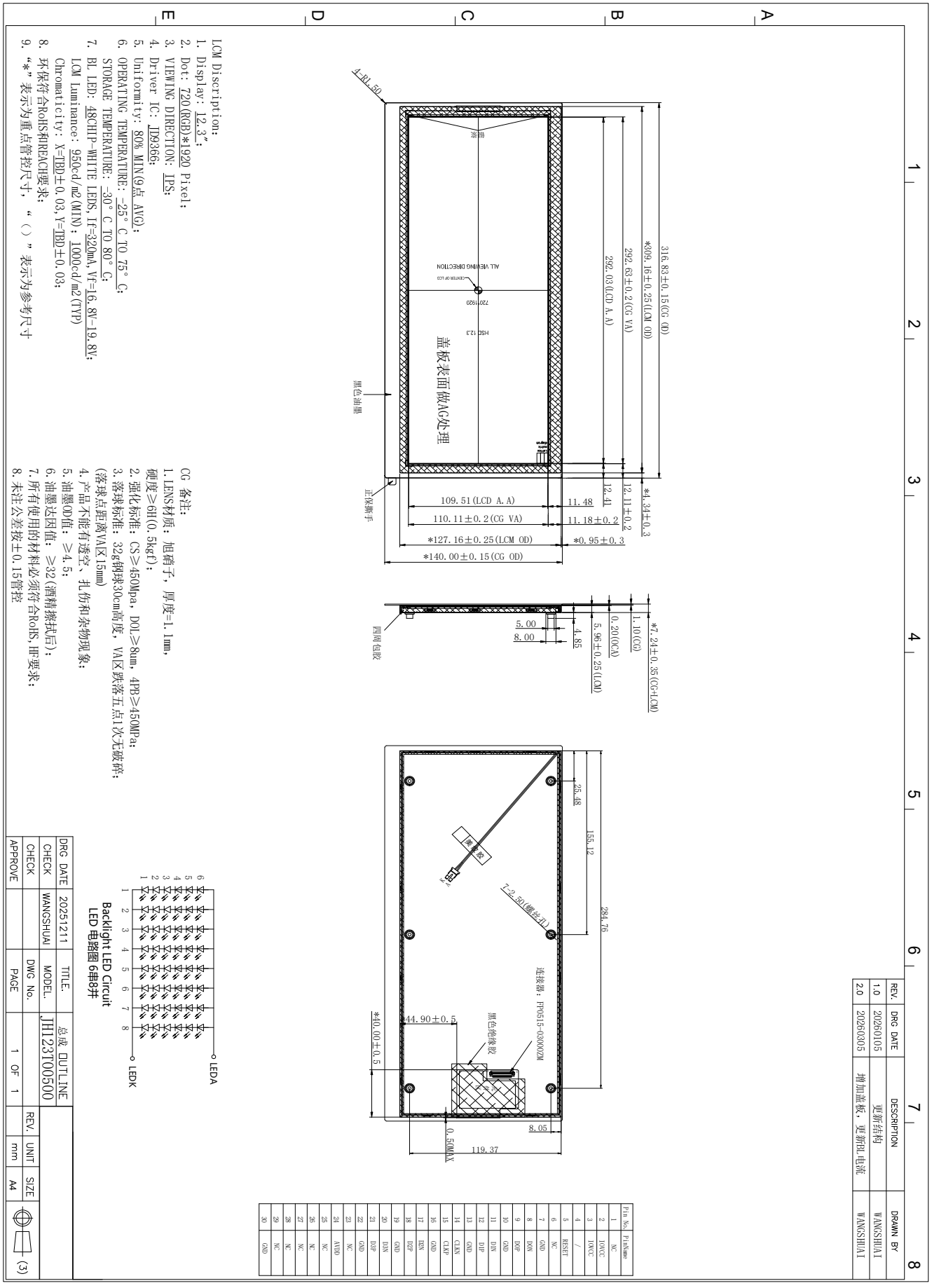
Version: 1.0

Description : 12.3inch TFT 720*1920 Pixels with LED backlight, wide viewing angle

1.General Features

Item	Spec	Remark
Display Mode	Normally Black ,transmissive	
Viewing Direction	ALL Viewing	
Input Signals	MIPI	
Outline Dimensions	140(H)×316.83(W)×7.24(D) .	mm/With CG
Active Area	109.51H()×292.03(W)	mm
Number of Pixels	720×RGB×1920 Pixels	
Dot Pitch	0.1521(H)×0.1521 (V)	mm
Pixel Arrangement	RGB Vertical stripes	
Drive IC	JD9366	

2.Outline Dimension



LCM Discription:

1. Display: 12.3";
2. Dot: 720(RGB)*1920 Pixel;
3. VIEWING DIRECTION: IPS;
4. Driver IC: ID9366;
5. Uniformity: 80% MIN(9点 AVG);
6. OPERATING TEMPERATURE: -25° C TO 75° C;
   STORAGE TEMPERATURE: -30° C TO 80° C;
7. BL LED: 48CHIP-WHITE LEDS, If=320mA, Vf=16.8V-19.8V;
   LCM Luminance: 950cd/m2(MIN); 1000cd/m2(TYP)
   Chromaticity: X=TBD±0.03, Y=TBD±0.03;
8. 环保符合RoHS和REACH要求;
9. "*"表示为重点管控尺寸，"（）"表示为参考尺寸

CG 备注:

1. LENS材质：旭硝子，厚度=1.1mm，
   硬度≥6H(0.5kgf);
2. 强化标准：CS≥450Mpa，DOL≥8um，4PB≥450MPa;
3. 落球标准：32g钢球30cm高度，VA区跌落五点1次无破碎;
   (落球点距离VA区15mm)
4. 产品不能有透空、扎伤和杂物现象;
5. 油墨OD值：≥4.5;
6. 油墨达因值：≥32(酒精擦拭后);
7. 所有使用的材料必须符合RoHS,HF要求;
8. 未注公差按±0.15管控

Pin No.	PinName
1	NC
2	IOVCC
3	IOVCC
4	/
5	RESET
6	NC
7	GND
8	DON
9	DOP
10	GND
11	DIN
12	DIP
13	GND
14	CLKN
15	CLKP
16	GND
17	DZN
18	DZP
19	GND
20	D3N
21	D3P
22	GND
23	NC
24	AVDD
25	NC
26	NC
27	NC
28	NC
29	NC
30	GND

REV.	DRG DATE	DESCRIPTION	DRAWN BY
1.0	20260105	更新结构	WANGSHUAI
2.0	20260305	增加盖板，更新BL电流	WANGSHUAI

DRG DATE	20251211	TITLE.	总成 OUTLINE
CHECK	WANGSHUAI	MODEL.	JH123T00500
CHECK		DWG No.	REV.
APPROVE		PAGE 1 OF 1	UNIT mm / SIZE A4

(3)

3. Reliability and Inspection Standard

No.	Test Item		Test Conditions	INSPECTION AFTER TEST
1	High Temperature	Storage	80℃, 120Hrs	Inspection after 2-4hours storage at room temperature,the samples should be free from defects: 1,Air bubble in the LCD. 2,Seal leak. 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.
		Operation	75℃, 120Hrs	
2	Low Temperature	Storage	-30℃, 120Hrs	
		Operation	-25℃, 120Hrs	
3	High Temperature and High Humidity		60℃,90%RH, 48Hrs	
4	Temperature Cycle(storage)		-20 ~ 60℃, 1H /cycle , Total 10 Cycles,	
5	Vibration Test		10Hz~150Hz, 100m/s2, 30min	
6	ESD Test		Voltage:±4KV R: 330Ω C: 150pF Air discharge, 10time	
7	Drop Test(package state)		300mm, concrete floor, 1corner, 3edges, 6 sides	1.After testing, cosmetic and electrical defects should not happen. 2.the product should remain at initial place 3.Product uncovered or package broken is not permitted.

REMARK:
1,The Test samples should be applied to only one test item.
2,Sample for each test item is 3pcs.
3,For Damp Proof Test, Pure water(Resistance＞10MΩ)should be used.
4,Failure Judgment Criterion: Basic Specification Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.

4.Absolute Maximum Ratings

Symbol	Parameter	Unit	Value	Note
IOVCC	Interface Supply Voltage	V	-0.3 to +3.6	Note(3),(4)
VCI	Logic Supply Voltage	V	-0.3 to +6.6	Note(3),(5)
VCIP	Analog Supply Voltage	V	-0.3 to +6.6	Note(3) (6)
VCCH	High speed interface Supply Voltage	V	-0.3 to +3.6	Note(3) (7)
AVDD	Positive Voltage input	V	-0.3 to +6.6	Note(8)
AVEE	Negative Voltage input	V	0 to -6.6	Note(9)
VGH	Power Supply Voltage	V	-0.3 to +25	Note(10)
VGL	Power Supply Voltage	V	0 to -16	Note(11)

Note: (1) Permanent device damage may occur if absolute maximum conditions are exceeded.
(2) Functional operation should be restricted to the conditions described under DC Characteristics.
(3) IOVCC, VSSD must be maintained.
(4) To make sure IOVCC ≥ VSSD.
(5) To make sure VCIP≥ AVSS.
(6) To make sure VCI≥ AVSS.
(7) To make sure VCCH ≥ VSSH.
(8) To make sure AVDD ≥ AVSS.
(9) To make sure AVSS ≥ AVEE
(10) To make sure VGH ≥ AVSS.
(11) To make sure AVSS ≥ VGL
VGH +|VGL| < 30V

5.Electrical Specification

Item		Sym.	Min	Typ.	Max	Unit	Note
Power for Circuit Driving		AVDD	9	10	11	V	
		DVDD	1.7	1.8	1.9	V	
Logic Input Voltage	Low Voltage	V_{IL}	0	-	0.3 IOVCC	V	
	High Voltage	V_{IH}	0.7 IOVCC	-	IOVCC	V	
Logic Output Voltage	Low Voltage	V_{OL}	0	-	0.2 IOVCC	V	
	High Voltage	V_{OH}	0.8 IOVCC	-	IOVCC	V	

6.Driving Backlight

Item	Sym.	Min	Typ.	Max	Unit	Note
Backlight driving voltage	V_{BL}	16.8	-	19.8	V	
Backlight driving current	I_{BL}	-	320	-	mA	
Life Time	-	10,000	20,000	-		Note 3

Note 1: (Unless specified, the ambient temperature Ta=25℃)
Note 2: The recommended operating conditions refer to a range in which operation of this product is guaranteed. Should this range is exceeded, the operation cannot be guaranteed even if the values may be without the absolute maximum ratings.
Note 3: If LED is driven by high current, high ambient temperature & humidity condition. The life time of LED will be reduced. Operating life means brightness goes down to 50% initial brightness. Typical operating life time is estimated data.

7.Optical Specifications

Optical characteristics are determined after the unit has been 'ON' and stable for approximately 30 minutes in a dark environment at 25 ℃. The values specified are at an approximate distance 500mm from the LCD surface at a viewing angle of Φ and θ equal to 0°.

Item	Sym.	Values			Unit	Note
		Min.	Typ.	Max.		
1)Contrast Ratio	C/R	800	1000	-		FIG.1
2)Luminance Uniformity	δ WHITE	70	80	-	%	Note5
3)Luminance	L	950	1000	-	cd/m^2	
4)Response time	Tr	-	25	30	ms	FIG.2
	Tf					
5)Viewing Angle	θ_T	-	80	-	Degree	FIG.3
	θ_B	-	80	-		
	θ_L	-	80	-		
	θ_R	-	80	-		
6)Chromaticity	Wx	Typ -0.03	TBD	Typ +0.03		
	Wy		TBD			
	Rx		-			
	Ry		-			
	Gx		-			
	Gy		-			
	Bx		-			
	By		-			
NTSC	70%					TYP

◆ Measurement System

Notes:

1. Contrast Ratio(CR) is defined mathematically as :

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

2. Surface luminance is the center point across the LCD surface 500mm from the surface with all pixels displaying white. For more information see FIG 1.

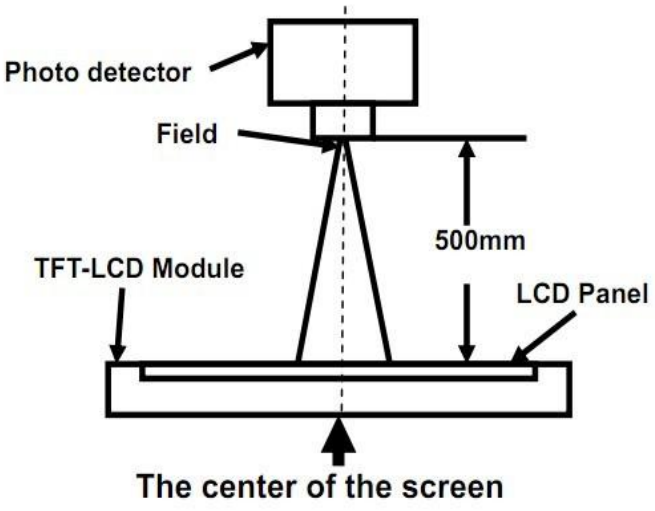
3. Response time is the time required for the display to transition from white to black (Rising Time, Tr) and from black to white (Falling Time, Tf). For additional information see FIG 2.

4. Viewing angle is the angle at which the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see FIG 3..

5. The uniformity in surface luminance（δ WHITE）is determined by measuring luminance at each test position 1 through 9, and then dividing the maximum luminance of 9 points luminance by minimum luminance of 9 points luminance.

$$\delta \text{ WHITE} = \frac{\text{Minimum Surface Luminance with all white pixels}}{\text{Maxi mum Surface Luminance with all white pixels}}$$

FIG. 1 Optical Characteristic Measurement Equipment and Method



Item	Photo detector	Field
Contrast Ratio	SR-3A	1°
Luminance		
Chromaticity		
Lum Uniformity		
Response Time	BM-7A	2°

FIG. 2 The definition of Response Time

The response time is defined as the following figure and shall be measured by switching the input signal for “black” and “white”.

Response Time = Rising Time(Tr) + Falling Time(Tf)

- Rising Time(Tr) : Full White 90% → Full White 10% Transmittance.
- Falling Time(Tf) : Full White 10% → Full White 90% Transmittance.

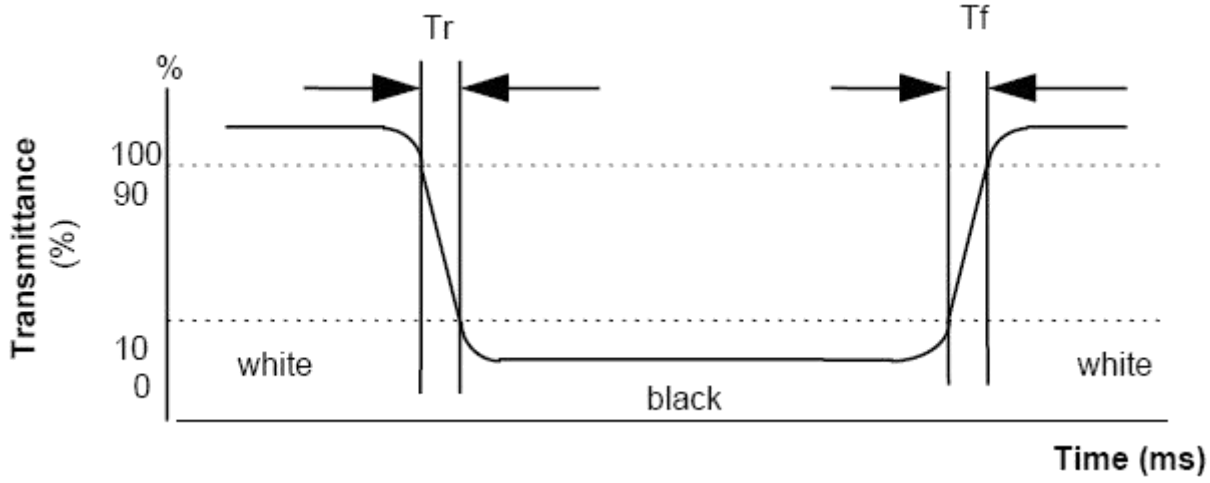
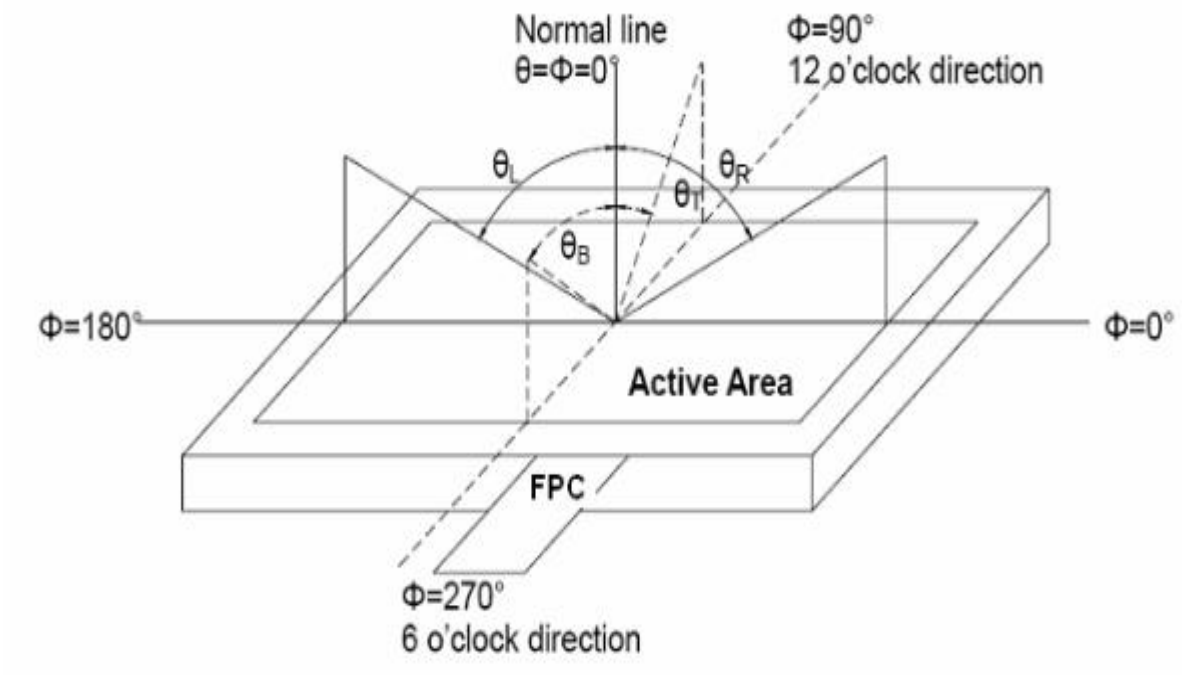
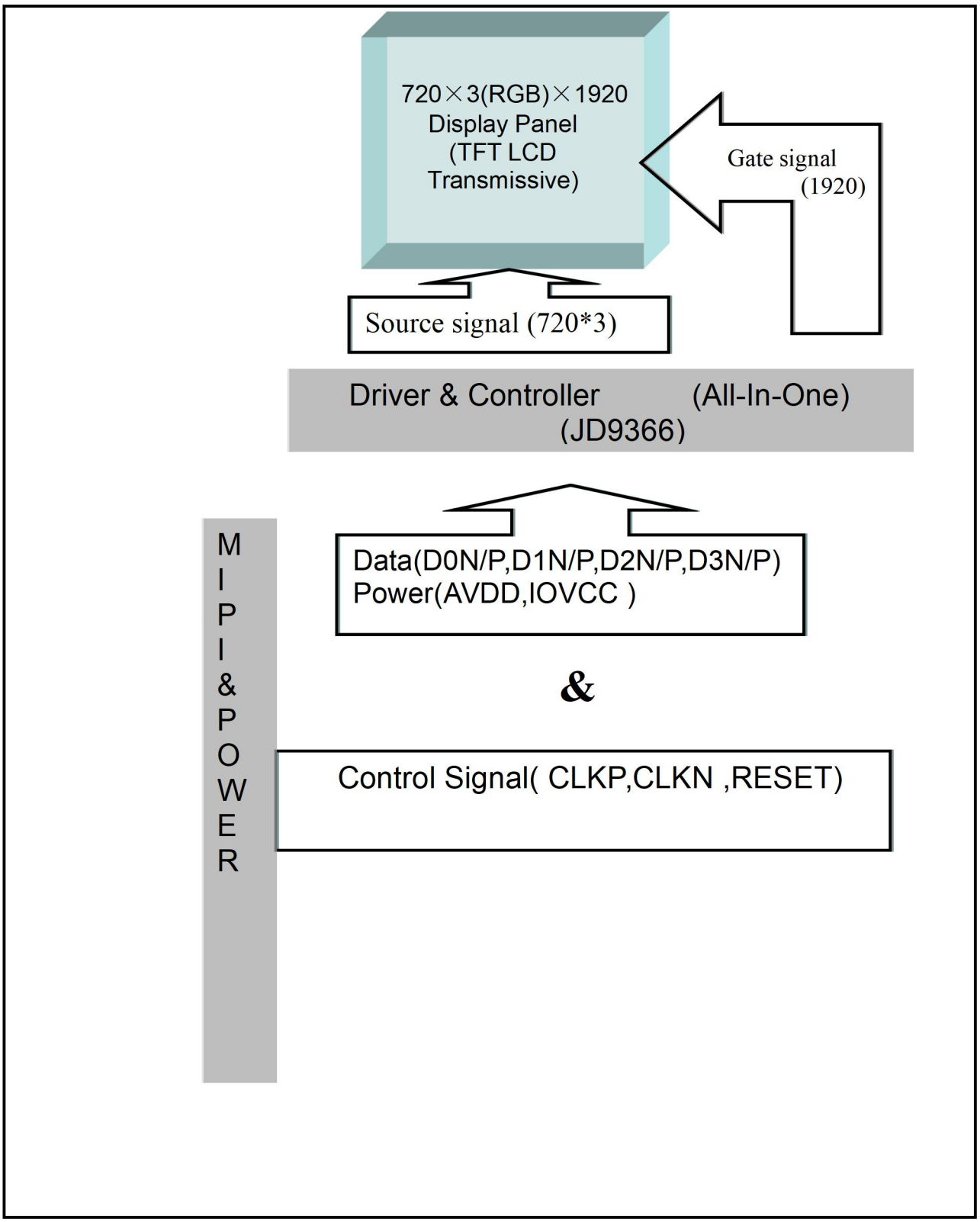


FIG. 3 The definition of Viewing Angle

Use Fig. 1(Test Procedure) under Measurement System to measure the contrast from the measuring direction specified by the conditions as the following figure.



8.Block Diagram



9.Pin Description

Item	Terminal	Functions
1	VCOM	NC
2	IOVCC	Power for Digital Circuit（1.8V）
3	IOVCC	Power for Digital Circuit（1.8V）
4	NC	NC
5	RESET	Global reset pin. Active Low to enter Reset State.
6	NC	NC
7	GND	Ground
8	MIPI_D0-	Negative MIPI differential data inputs0-
9	MIPI_D0+	Positive MIPI differential data inputs0+
10	GND	Ground
11	MIPI_D1-	Negative MIPI differential data inputs1-
12	MIPI_D1+	Positive MIPI differential data inputs1+
13	GND	Ground
14	MIPI_CLK-	Negative MIPI differential clock inputs
15	MIPI_CLK+	Positive MIPI differential clock inputs
16	GND	Ground
17	MIPI_D2-	Negative MIPI differential data inputs2-
18	MIPI_D2+	Positive MIPI differential data inputs2+
19	GND	Ground
20	MIPI_D3-	Negative MIPI differential data inputs3-
21	MIPI_D3+	Positive MIPI differential data inputs3+
22	GND	Ground
23	NC	NC
24	AVDD	Power for Analog Circuit (10V)
25	NC	NC
26	NC	NC
27	NC	NC
28	NC	NC
29	NC	NC
30	GND	Ground

10.Timing Characteristics

10.1. High Speed Mode Characteristics

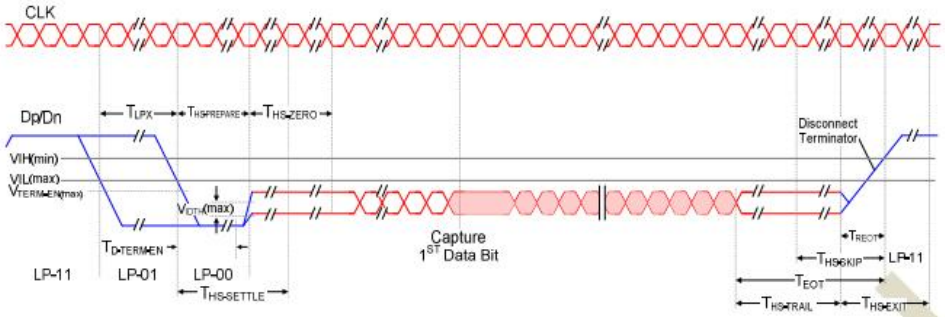


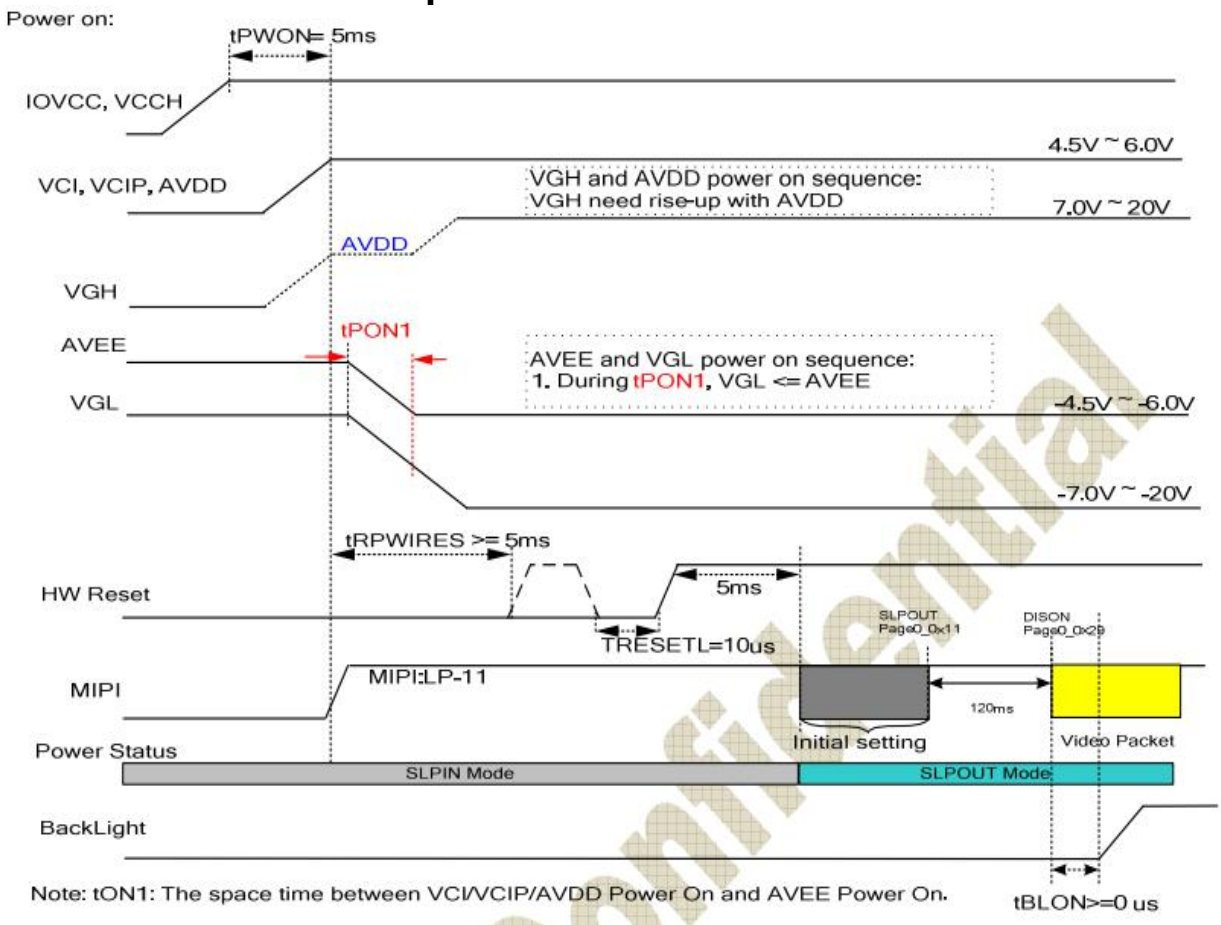
Figure 11.7: High-Speed Data Transmission in Bursts

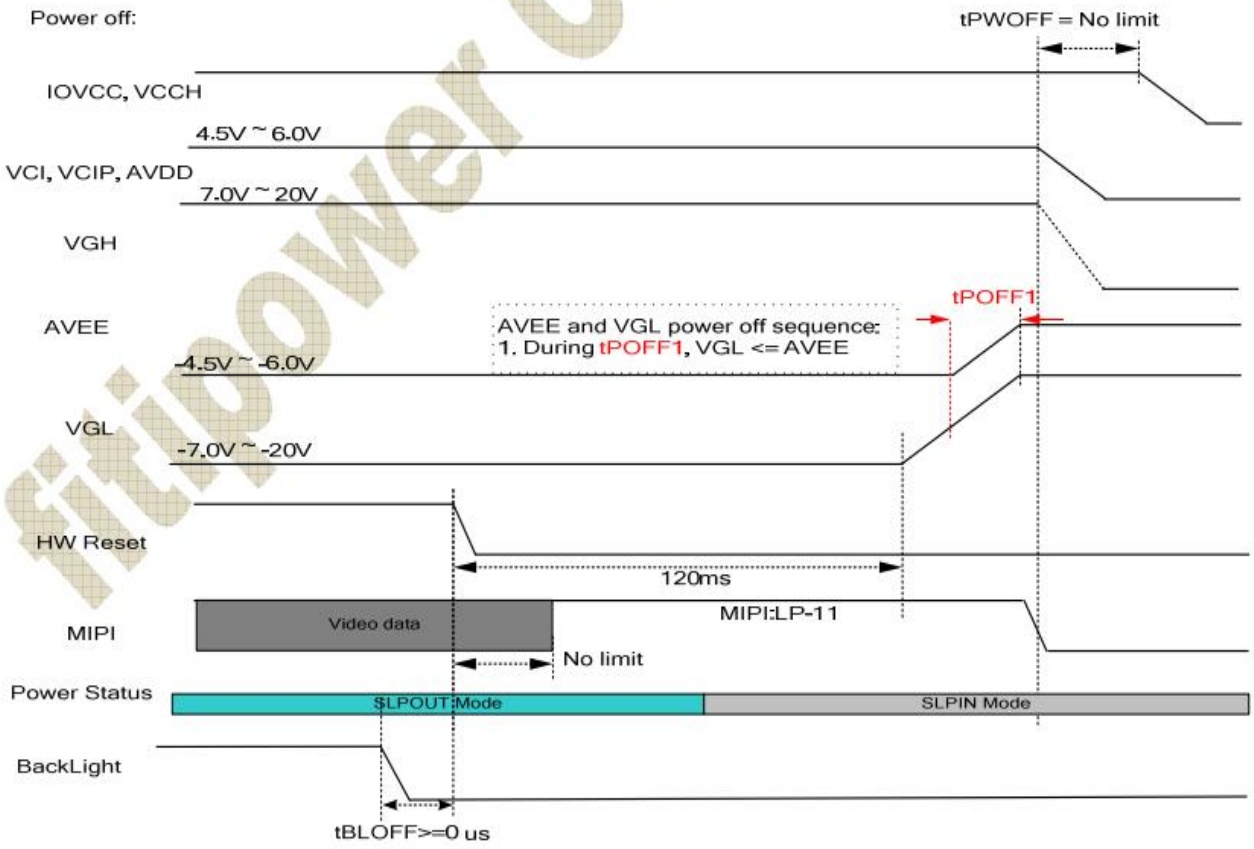
Parameter	Description	Min	Typ	Max	UNIT
T_{LPX}	Transmitted length of any Low-Power state period	50	-	-	ns
$T_{HS-PREPARE}$	Time that the transmitter drives the Data Lane LP-00 Line state immediately before the HS-0 Line state starting the HS transmission	40 + 4*UI	-	85 + 6*UI	ns
$T_{HS-PREPARE}$ + $T_{HS-ZERO}$	$T_{HS-PREPARE}$ + time that the transmitter drives the HS-0 state prior to transmitting the Sync sequence.	145 + 10*UI	-	-	ns
$T_{D-TERM-EN}$	Time for the Data Lane receiver to enable the HS line termination.	-	-	35 + 4*UI	ns
$T_{HS-SETTLE}$	Time interval during which the HS receiver shall ignore any Data Lane HS transitions.	85 + 6*UI	-	145 + 10*UI	ns
$T_{HS-TRAIL}$	Time that the transmitter drives the flipped differential state after last payload data bit of a HS transmission burst	Max(n*8*UI, 60+n*4*UI)	-	-	ns
$T_{HS-EXIT}$	Time that the transmitter drives LP-11 following a HS burst.	100	-	-	ns

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
HS low pulse width	HS	-	6	18	78	DCK
Horizontal back porch	HBP	-	5	18	78	DCK
Horizontal front porch	HFP	-	5	18	78	DCK
Horizontal blanking period	HBLK	HS+HBP+HFP	16	54 (Note1)	88	DCK
Horizontal active area	HDISP	-	-	800	-	DCK
Pixel Clock	PCLK	-	63.06 (Note2)	67.33 (Note2)	81.51 (Note2)	MHz

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Vertical low pulse width	VS	-	2	4	200 Note(1)	Line
Vertical front porch	VFP	-	4	20	200	Line
Vertical back porch	VBP	-	2	10	200 Note(1)	Line
Vertical blanking period	VBK	VS+VBP+VFP	8	34	250	Line
Vertical active area	-	VDISP	-	1280	-	Line
Vertical Refresh rate	VRR	-	-	60	-	Hz

10.2 Power On/Off Sequence





10.3. Reset Operation

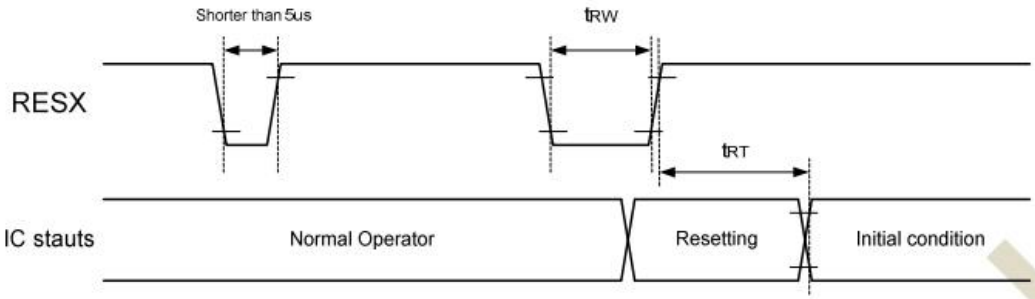


Figure 11.1: Reset input timings

Symbol	Parameter	Related pins	Min.	Max.	Unit
t_{RW}	Reset pulse width(2)	RESX	10	-	µs
t_{RT}	Reset complete time(3)	-	-	5 (Note 5)	ms
		-	-	120 (Note 6, 7)	ms

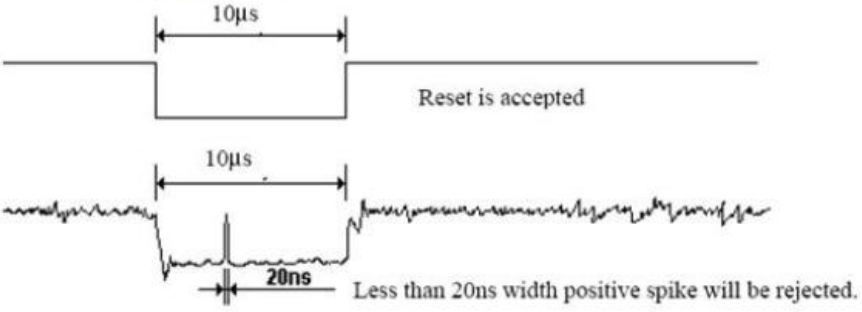
Note: (1) The reset complete time also required time for loading ID bytes from OTP to registers. This loading is done every time when there is HW reset cancel time (tRT) within 5 ms after a rising edge of RESX.

(2) Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below.

RESX Pulse	Action
Shorter than 5 µs	Reset Rejected
Longer than 10 µs	Reset
Between 5 µs and 10 µs	Reset Start

(3) During the resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out –mode. The display remains the blank state in Sleep In –mode) and then returns to Default condition for H/W reset.

(4) Spike Rejection also applies during a valid reset pulse as shown below:



(5) When Reset is applied during Sleep In Mode.

(6) When Reset is applied during Sleep Out Mode.

(7) It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.

11.PRECAUTIONS FOR USING LCD MODULES

Handing Precautions

(1) The display panel is made of glass and polarizer. As glass is fragile, it tends to become or chipped during handling especially on the edges. Please avoid dropping or jarring. Do not subject it to a mechanical shock by dropping it or impact.
(2) If the display panel is damaged and the liquid crystal substance leaks out, be sure not to get any in your mouth. If the substance contacts your skin or clothes, wash it off using soap and water.
(3) Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary. Do not touch the display with bare hands. This will stain the display area and degraded insulation between terminals (some cosmetics are determined to the polarizer).
(4) The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully. Do not touch, push or rub the exposed polarizers with anything harder than an HB pencil lead (glass, tweezers, etc.). Do not put or attach anything on the display area to avoid leaving marks on. Condensation on the surface and contact with terminals due to cold will damage, stain or dirty the polarizer. After products are tested at low temperature they must be warmed up in a container before coming is contacting with room temperature air.
(5) If the display surface becomes contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If it is heavily contaminated, moisten cloth with one of the following solvents
- Isopropyl alcohol
- Ethyl alcohol
Do not scrub hard to avoid damaging the display surface.
(6) Solvents other than those above-mentioned may damage the polarizer. Especially, do not use the following.
- Water
- Ketone
- Aromatic solvents
Wipe off saliva or water drops immediately, contact with water over a long period of time may cause deformation or color fading. Avoid contacting oil and fats.
(7) Exercise care to minimize corrosion of the electrode. Corrosion of the electrodes is accelerated by water droplets, moisture condensation or a current flow in a high-humidity environment.
(8) Install the LCD Module by using the mounting holes. When mounting the LCD module make sure it is free of twisting, warping and distortion. In particular, do not forcibly pull or bend the I/O cable or the backlight cable.
(9) Do not attempt to disassemble or process the LCD module.
(10) NC terminal should be open. Do not connect anything.
(11) If the logic circuit power is off, do not apply the input signals.
(12) Since LCM has been assembled and adjusted with a high degree of precision, avoid applying excessive shocks to the module or making any alterations or modifications to it.
- Do not alter, modify or change the shape of the tab on the metal frame.
- Do not make extra holes on the printed circuit board, modify its shape or change the positions of components to be attached.
- Do not damage or modify the pattern writing on the printed circuit board.
- Absolutely do not modify the zebra rubber strip (conductive rubber) or heat seal connector.

- Except for soldering the interface, do not make any alterations or modifications with a soldering iron.
- Do not drop, bend or twist LCM.

Storage Precautions

When storing the LCD modules, the following precaution is necessary.

(1) Store them in a sealed polyethylene bag. If properly sealed, there is no need for the dessicant.

(2) Store them in a dark place. Do not expose to sunlight or fluorescent light, keep the temperature between 0°C and 35°C.

(3) The polarizer surface should not come in contact with any other objects. (We advise you to store them in the container in which they were shipped).

Others

Liquid crystals solidify under low temperature (below the storage temperature range) leading to defective orientation or the generation of air bubbles (black or white). Air bubbles may also be generated if the module is subject to a low temperature.

If the LCD modules have been operating for a long time showing the same display patterns, the display patterns may remain on the screen as ghost images and a slight contrast irregularity may also appear. A normal operating status can be regained by suspending use for some time. It should be noted that this phenomenon does not adversely affect performance reliability.

To minimize the performance degradation of the LCD modules resulting from destruction caused by static electricity etc., exercise care to avoid holding the following sections when handling the modules.

- Exposed area of the printed circuit board.
-Terminal electrode sections.