



SPECIFICATION FOR TFT LCD MODULE

CUSTOMER : _____

CUSTOMER MODULE : _____

HL MODEL : HG101HD008

Preliminary Specification

Final Specification

Customer Confirmation column:

Approved by : _____ Dept. : _____ Data : _____

Please return one of the copies of the specification with your signature to us within two weeks after you receive this document. If it is not returned, we will assume that you agree to the entire contents of this specification document.

Designed by	Checked by	Approved by



Table of contents

1.0	General Description.....	4
2.0	Absolute Maximum Ratings.....	5
3.0	Optical Characteristics.....	6
4.0	Power On/Off Sequence.....	9
5.0	Electrical Characteristics.....	11
6.0	Reliability Test Items.....	17
7.0	Interface Pin Connection.....	18
8.0	Outline Dimension.....	19
9.0	Package specification.....	20
10.0	General Precaution.....	21



1.0 General description

1.1 Introduction

HG101HD008 is **QLED** model a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT LCD panel, a driving circuit and a back light system. This TFT LCD has a **10.1 (16:9) inch** diagonally measured active display area with **720p(1280 horizontal by 720 vertical pixel array)** resolution. The TFT-LCD panel used for this module is adapted for a low reflection and higher color type.

1.2 Features

- 4 lanes LVDS Interface
- Data enable signal mode
- 8-bit color depth, display 16.7M colors
- Low driving voltage and low power consumption
- ROHS Compliant

1.3 General information

Item		Specification	Unit	Remarks
Outline Dimension		235(H) x 143(V) x 2.9(body)	mm	Tolerance: ±0.2mm
Display area		224.64(W) x 126.36(H)	mm	
Number of Pixel		1280(H) x RGB x 720(V)	pixels	
Pixel pitch		0.1554(H) x 0.1554(V)	mm	
Pixel arrangement		Pixels RGB stripe arrangement		
Display mode		Normally Black		
Surface treatment		IPS Film		
Weight		TBD (Typ.)	gram	
Back-light		Single LED (Side-Light type)		
Power Consumption	B/L System	2.856(Max.)	watt	
Driver IC		TBD		*Using IC
Polarizer : zhuyou		Up: 0° sand surface Down 90° smooth surface	pcs	

1.4 Mechanical Information

Item		Min.	Typ.	Max.	Unit
Module Size	Horizontal(H)	234.8	235	235.2	mm
	Vertical(V)	142.8	143	143.2	mm
	Depth(D)	4.1	4.3	4.5	mm



2.0 ABSOLUTE MAXIMUM RATINGS

2.1 Electrical Absolute Rating (GND=AGND=0V)

Parameter	Symbol	Spec.			Unit	Note
		Min.	Typ.	Max.		
Interface Supply Voltage	IOVCC	-	-	-	V	
Logic Supply Voltage	VCI	+2.3	-	+3.6	V	
Analog Supply Voltage	VCIP	-	-	-	V	
High speed interface Supply Voltage	VCCH	-	-	-	V	
Positive Voltage input	AVDD	+4.5	-	+6	V	
Negative Voltage input	AVEE	-6	-	-4.5	V	
Power Supply Voltage	VGH	+11	-	+24	V	
Power Supply Voltage	VGL	-17	-	-6	V	
Operation Temperature	TOPR	-20	-	+60	°C	
Storage Temperature	TSTG	-30	-	+70	°C	

Note: (1) All of the Voltages listed above are with respect to GND=0V.

2.2 TFT LCD Power Supply Voltage

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	VCI	-	3.3	-	V
	AVDD	9	-	13	V
	VGH	11	-	24	V
	VGL	-6	-	-17	V



2.3 Back-light Unit

Parameter	Symbol	Min	Typ	Max.	Unit	Note
LED Current	I_L	-	-	180	mA	Ta=25°C
LED Voltage	V_L	-	9.6	-	V	Ta=25°C
LED Life-time	h	20000	-	-	V	Ta=25°C, If=20mA

2.4 Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	Topa	-20	60	°C	
Storage Temperature	Tstg	-30	70	°C	



3.0 OPTICAL CHARACTERISTICS

3.1 Optical Specifications

Item	Symbol	Temp	Condition	Min	Typ	Max	Unit	Remark	
Viewing Angle range	Horizontal	θ_L	CR > 10	75	85	--	Deg	Note (1,2)	
		θ_R		75	85				
	Vertical	θ_U		75	85	--	Deg		
		θ_D		75	85				
Luminance Contrast ratio	CR		$\theta = 0^\circ$	900	1200	--	--	Note (1,2)	
Brightness	YL			380	400	--	Cd/cm ²	Note (4,5)	
Transmittance	T(%)		$\theta = 0^\circ$	--	4.1	--	%		
Color Gamut (C light)				--	70	--	%		
Reproduction of color (C-light)	White	Xw	$\theta = 0^\circ$	-0.02	0.296	+0.02		Note (1,4)	
		Yw							0.322
	Red	Rx							0.662
		Ry							0.317
	Green	Gx							0.266
		Gy							0.577
	Blue	Bx							0.143
		By							0.087
Response Time (Rising + Falling)	Trt		Ta= 25° C $\theta = 0^\circ$	--	30	40	ms	Note (1,3)	
Optical View Direction	ALL							Note (1)	

3.2 Measuring Condition

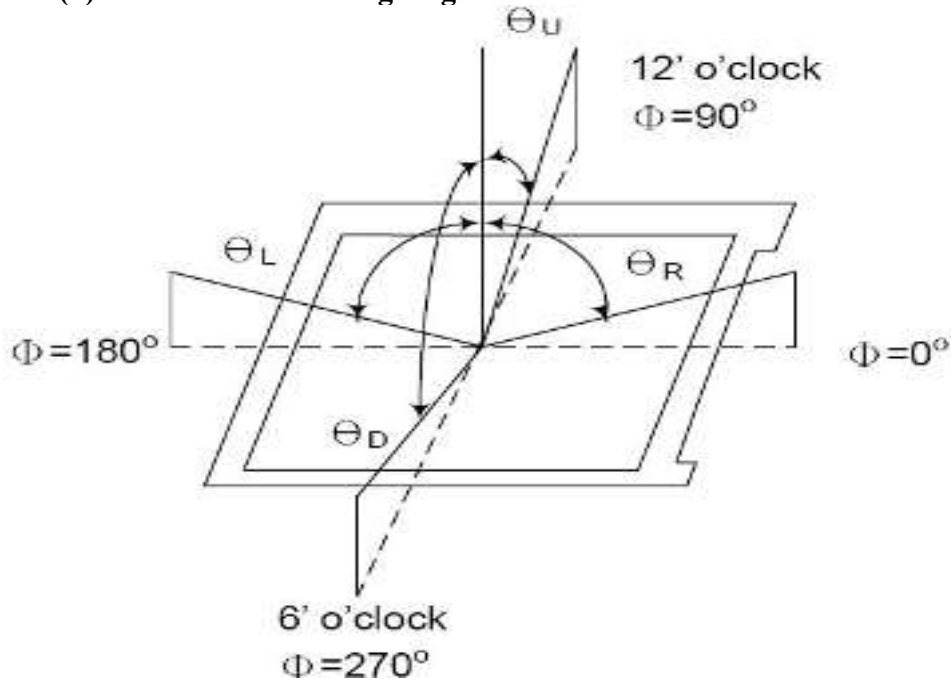
Measuring surrounding: dark room
 Ambient temperature: 25±2°C
 15min. warm-up time.

3.3 Measuring Equipment

FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-7 for other optical characteristics. Measuring spot size: 20 ~ 21 mm



Note (1) Definition of Viewing Angle :

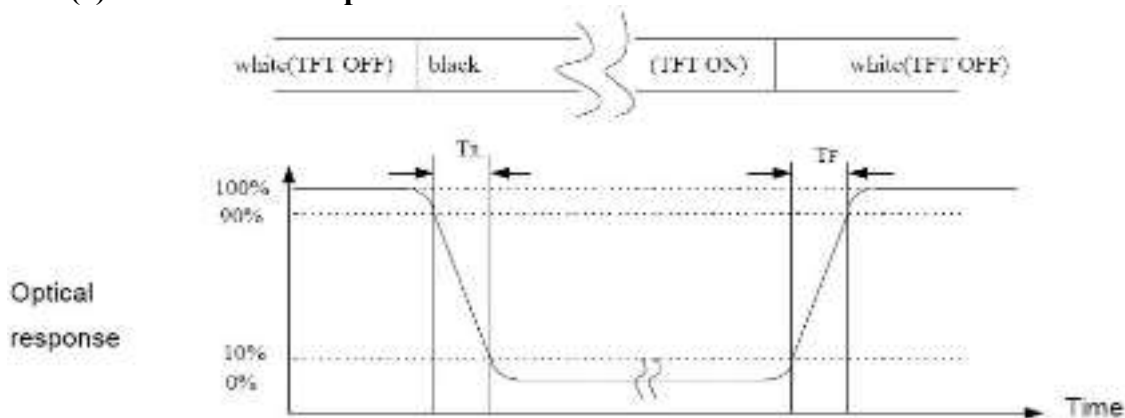


Note (2) Definition of Contrast Ratio (CR):

Measured at the center point of panel

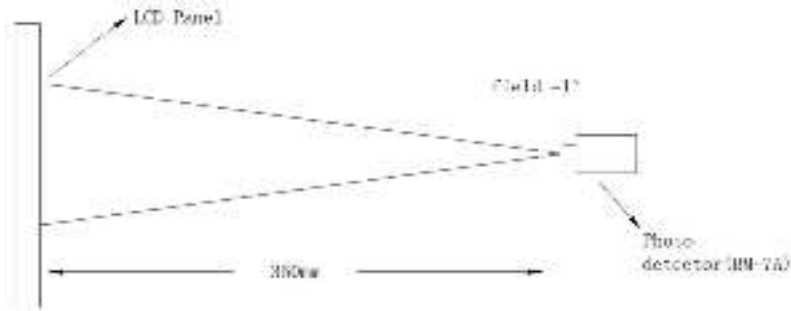
$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

Note (3) Definition of Response Time: Sum of TR and TF

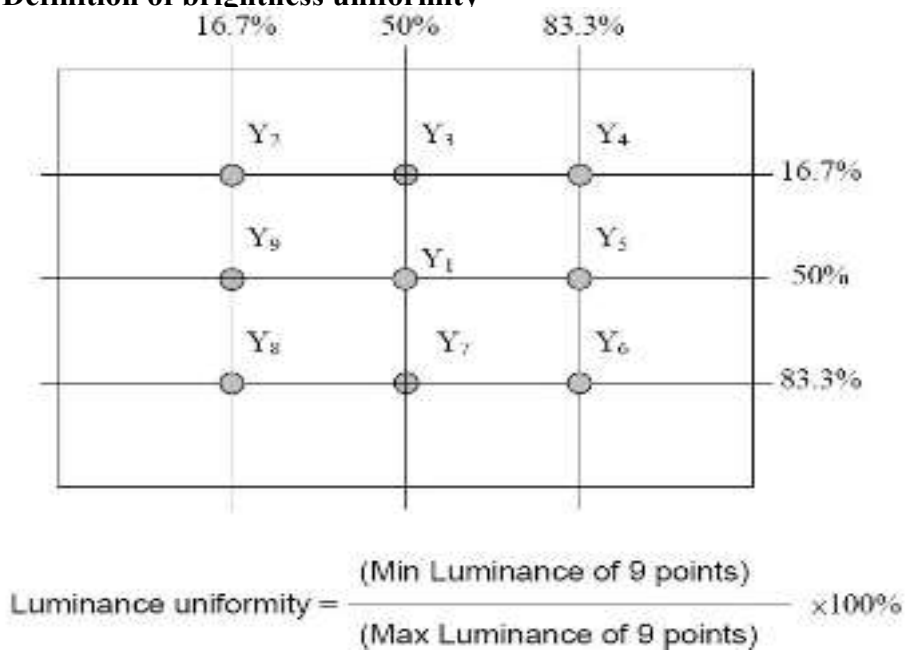




Note (4) Definition of optical measurement setup



Note (5) Definition of brightness uniformity



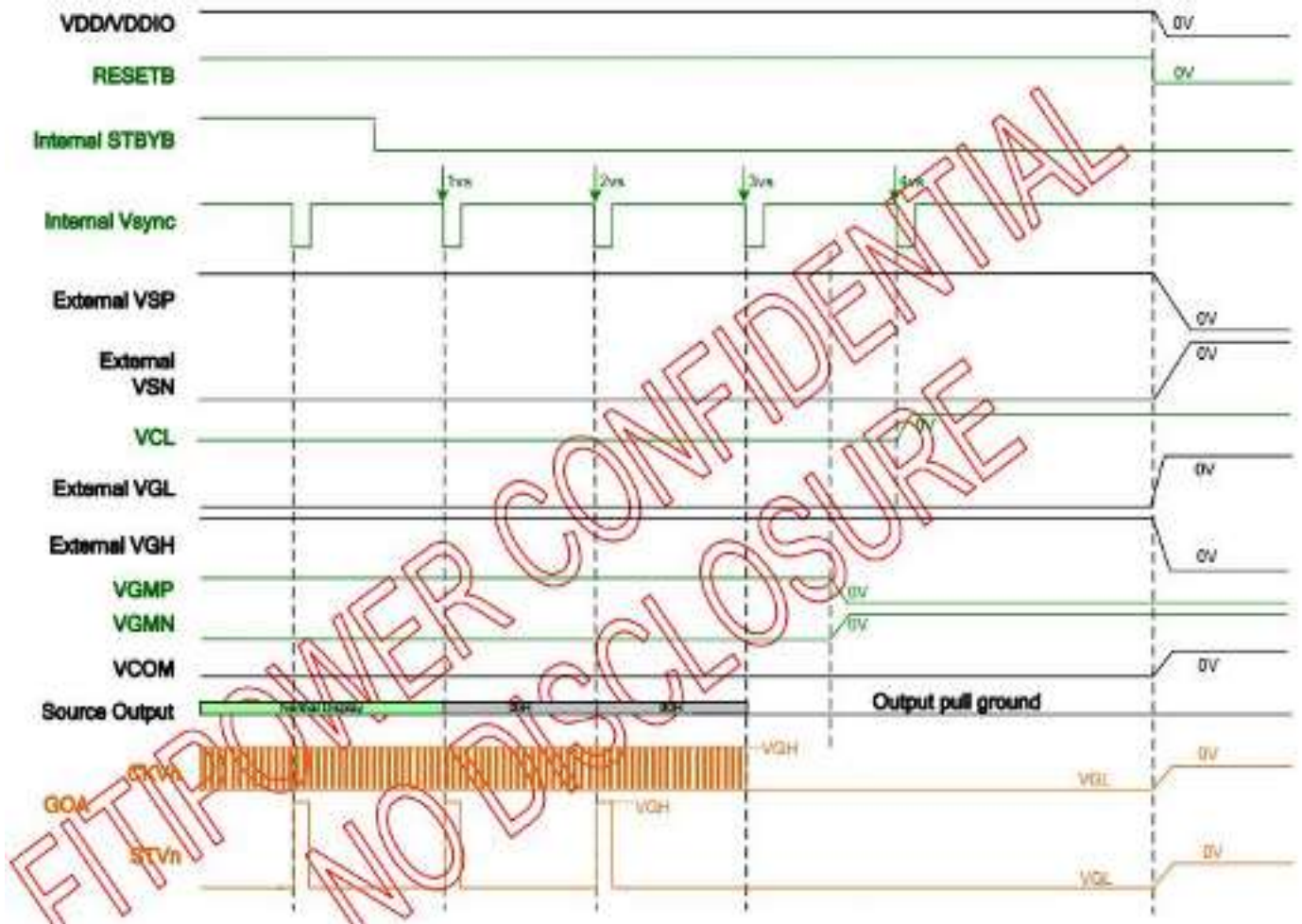


4.0 Power On/Off Sequence

To prevent the device damage from latch up, the power on/off sequence shown Below must be followed.



Power on sequence



Power off sequence



5.0 ELECTRICAL CHARACTERISTICS

5.1 DC characteristics

(Test condition: VDD=VDDIO=VDDIF=2.3~3.6V, TA=-20℃~+85℃, VSS=VSSA=0V)

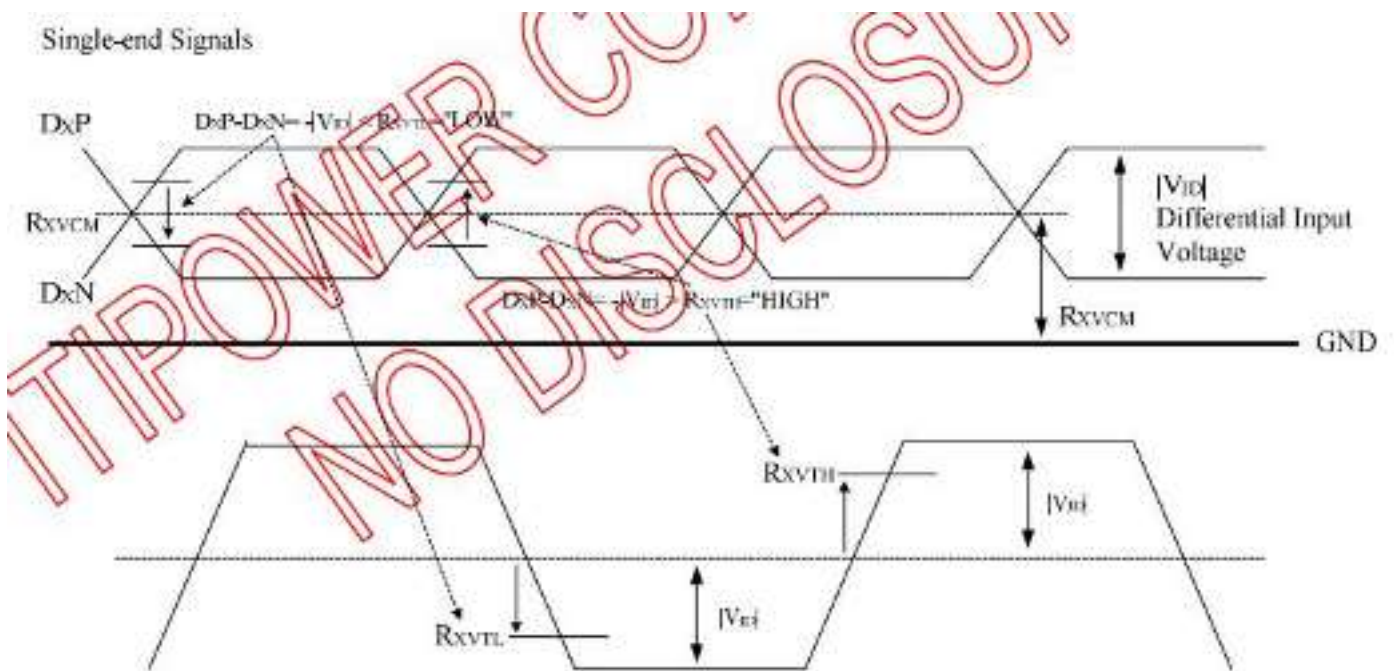
Parameter	Symbol	Spec.			Unit	Note
		Min.	Typ.	Max.		
VDDIO Input high level voltage	VIH	0.8 x VDDIO		VDDIO	V	
VDDIO input low level voltage	VIL	VSS		0.2 x VDDIO	V	
Input Leakage Current	Ileak	(-1)		(+1)	μA	
VGH_REG output voltage	VGH_REG	9	16	22	V	
VGL_REG output voltage	VGL_REG	-15	-10	-4.5	V	
VGMP output voltage	VGMP	3.5	4.24	5.8	V	
VGMN output voltage	VGMN	-5.8	-4.64	-3.5	V	
VGL output voltage	VGL	-17	-12	-6	V	
VGH output voltage	VGH	11	18	24	V	
VCL output voltage	VCL	-3	-2.8	-2.1	V	
VCOM output voltage	VCOM	-2.405	-1.5	-0.5	V	
Input terminal resistance	ZID		100		ohm	
Source output level deviation	Graycode = 0 ~ 14		TBD		mV	
	Graycode = 241 ~ 255		TBD		mV	
	Graycode = 15 ~ 31		TBD		mV	
	Graycode = 208 ~ 240		TBD		mV	
Source output offset deviation	Graycode = 32 ~ 207		TBD		mV	
	Graycode = 0 ~ 14	-	TBD		mV	
	Graycode = 241 ~ 255	-	TBD		mV	
	Graycode = 15 ~ 31	-	TBD		mV	
Current consumption	Graycode = 208 ~ 240	-	TBD		mV	
	Graycode = 32 ~ 207	-	TBD		mV	
	Analog Operating	IAOP		TBD	mA	
Rush current	Analog Stand-by	IAST		TBD	mA	
		Ivddpeak		TBD	mA	



(VDD=VDDIO=VDDIF=2.3 to 3.6V, VSS=VSSA=VSS_IF=0V, TA=-20 to +85°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Differential input high threshold voltage	R_{xvth}	+0.1	0.2	0.3	V	$R_{xvcm}=1.2V$
Differential input low threshold voltage	R_{xvtl}	-0.3	-0.2	-0.1	V	
Input voltage range (singled-end)	R_{xvk}	0.7	-	1.7	V	
Differential input common mode voltage	R_{xvcm}	1	1.2	1.4	V	$ V_{id} =0.2$
Differential input impedance	Z_{in}	80	100	125	ohm	
Differential input voltage	$ V_{id} $	0.2	-	0.6	V	
Differential input leakage current	I_{ccvds}	-10	-	+10	uA	
LVDS Digital Operating Current	I_{DDVDD}	-	15	20	mA	$F_{clock}=80MHz, VDD=3.3V$, Input pattern: 55h->Aah->55h->Aah
LVDS Digital Stand-by Current	I_{DDVDD}	-	-	250	uA	Clock & all Functions are stopped

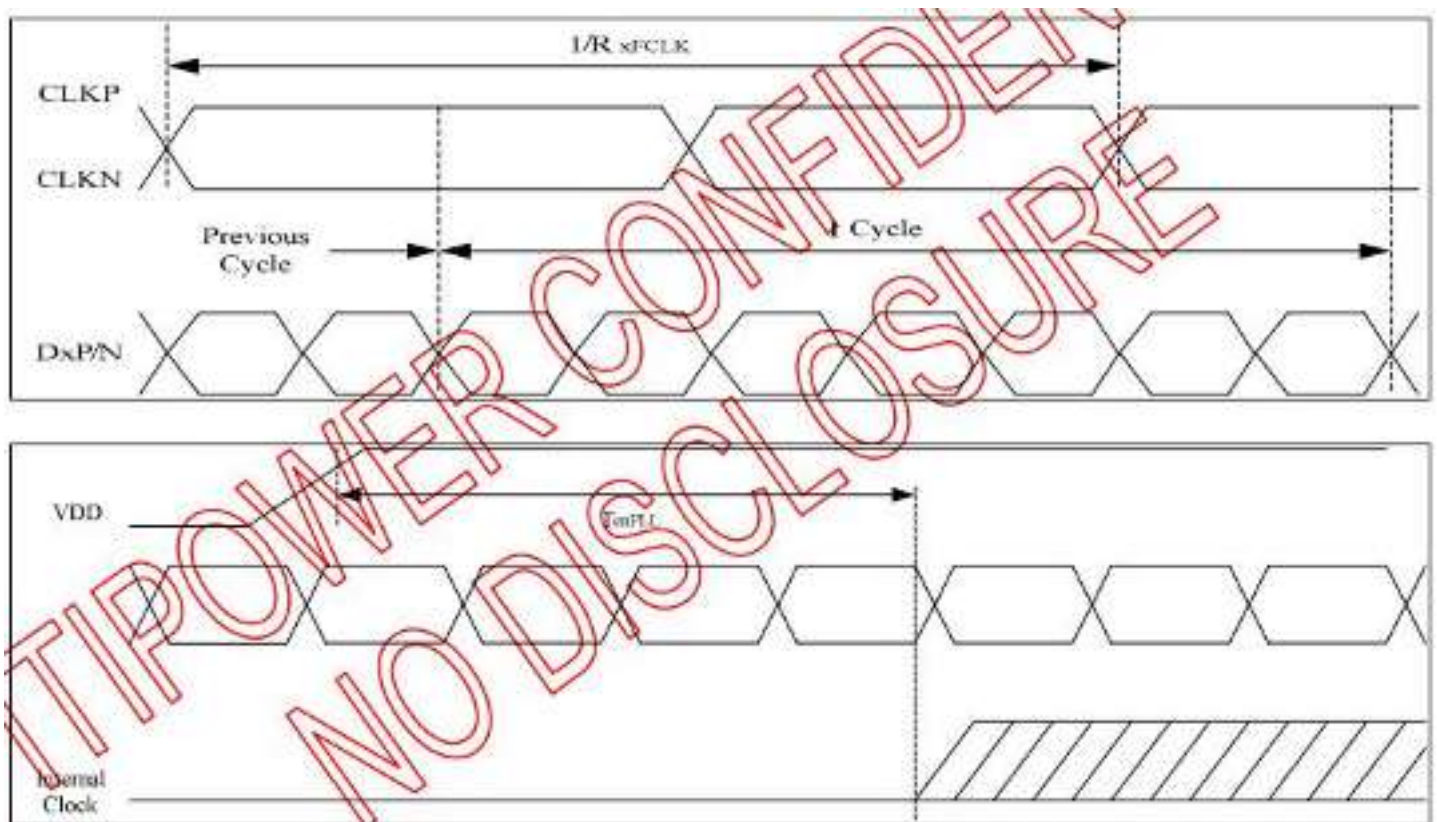
Single-end Signals

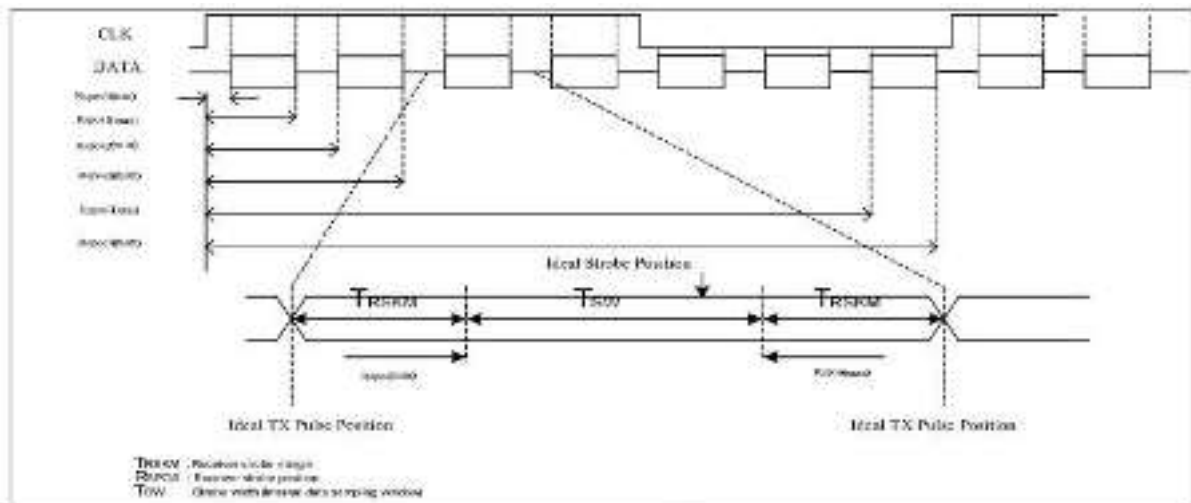




5.2 LVDS AC characteristics

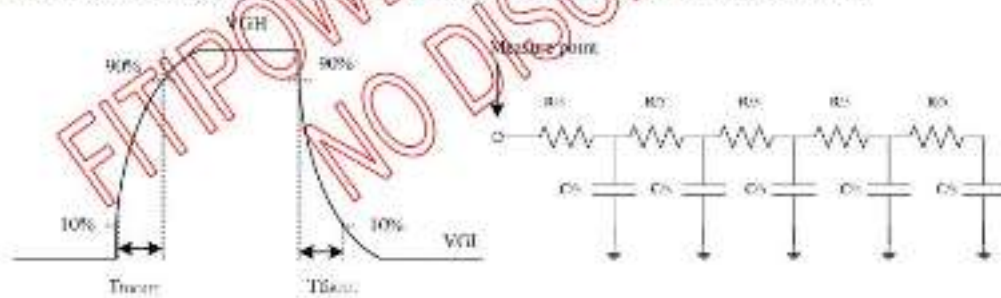
Parameter	Symbol	Spec.			Unit	Condition
		Min.	Typ.	Max.		
Clock frequency	R_{xCLK}	30	-	TBD	MHz	Refer to input timing table for each display resolution
Input data skew margin	T_{RskM}	500	-	-	ps	[VID] = 200mV $R_{xVCM} = 1.2V$ $R_{xCLK} = 81MHz$
Clock high time	T_{LVCH}	-	$4/(7 * R_{xCLK})$	-	ns	
Clock low time	T_{LVCL}	-	$3/(7 * R_{xCLK})$	-	ns	
PLL wake-up time	T_{wPLL}	-	-	150	us	



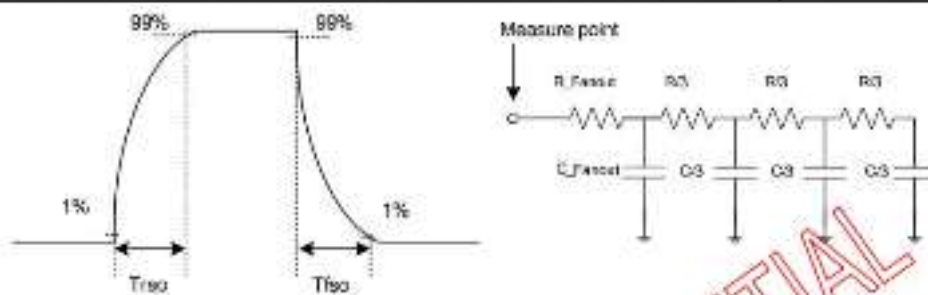


5.3 OUTPUT TIMING

Panel control signal output (GOUTL[1]-GOUTL[22], GOUTR[1]-GOUTR[22])



Parameter	Symbol	Condition	Spec.			Unit
			Min.	Typ.	Max	
Panel control signal rising time	$T_{riseGOUT}$	TBD	-	-	TBD	μs
Panel control signal falling time	$T_{fallGOUT}$	TBD	-	-	TBD	μs



$R_{data_total} = 25.072k(\text{ohm})$
 $C_{data_total} = 83 \text{ pF}$

Parameter	Symbol	Condition	Spec.			Unit
			Min.	Typ.	Max	
Source driver rising time	T_{rso}			3.52		μs
Source driver falling time	T_{fsa}			2.8		μs



Parameter	Symbol	Min.	Typ.	Max	Unit	Note
Horizontal Display Area	thd	1280			DCLK	
DCLK frequency	felk	-	66.2	-	MHz	
HSD Period	th	-	1320	-	DCLK	
HS pulse width	thpw	-	2	-	DCLK	
HS Back Porch(Blanking)	thbp	23			DCLK	
HS Front Porch	thfp	-	15	-	DCLK	

Parameter	Symbol	Min.	Typ.	Max	Unit	Note
Vertical Display Area	tvd	720			TH	
VS period time	tv	-	890	-	TH	
VS pulse width	tvpw	-	10	-	TH	
VS Back Porch(Blanking)	tvbp	88			TH	
HS Front Porch	tvfp	-	72	-	TH	

6.0 Reliability test items

Test Item	Test Conditions	Notes
High temperature Operation	Ta= +60°C, 96hrs	
Low temperature Operation	Ta= -20°C, 96hrs	
High Temperature Storage	Ta= +70°C, 96hrs	
Low Temperature Storage	Ta= -30°C, 96hrs	
Humidity Test	60°C ,Humidity 90% ,96hrs	
Thermal Shock Test	-20°C,30min ~ +60°C,30min (30 cycle)	
Vibration Test(Packing)	Sine Wave 1.04G, 5~500Hz, XYZ 30min/each direction	



7.0 INTERFACE PIN CONNECTION

Signal of interface

Terminal No.	Symbol	I/O	Functions
1	VCOM (NC)	-	Common voltage
2	DVDD	P	Power for Di ital Circuit
3	DVDD	P	Power for Di ital Circuit
4	NC	I	NC
5	RESET	I	Global reset pin.
6	STBYB	I	Standby mode,normally pull high STBYB="1", normally opration STBYB="0", timing control,source driver will turn off
7	GND	P	Ground
8	RXIN0-	I	Negative LVDS differential data inputs
9	RXIN0+	I	Positive LVDS differential data inputs
10	GND	P	Ground
11	RXIN1-	I	Negative LVDS differential data inputs
12	RXIN1+	I	Positive LVDS differential data inputs
13	GND	P	Ground
14	RXIN2-	I	Negative LVDS differential data inputs
15	RXIN2+	I	Positive LVDS differential data inputs
16	GND	P	Ground
17	RXCLKIN-	I	Negative LVDS differential clock inputs
18	RXCLKIN+	I	Positive LVDS differential clock inputs
19	GND	P	Ground
20	RXIN3-	I	Negative LVDS differential data inputs
21	RXIN3+	I	Positive LVDS differential data inputs
22	GND	P	Ground
23	NC	-	NC
24	NC	-	NC
25	GND	P	Ground
26	NC	-	NC
27	NC	-	NC
28	SELB (NC)	-	6bit/8bit mode select SELB="1", input data is 6bit, SELB="0", input data is 8bit,
29	NC	-	NC
30	GND	P	Ground
31	LED-	P	LED Cathode
32	LED-	P	LED Cathode

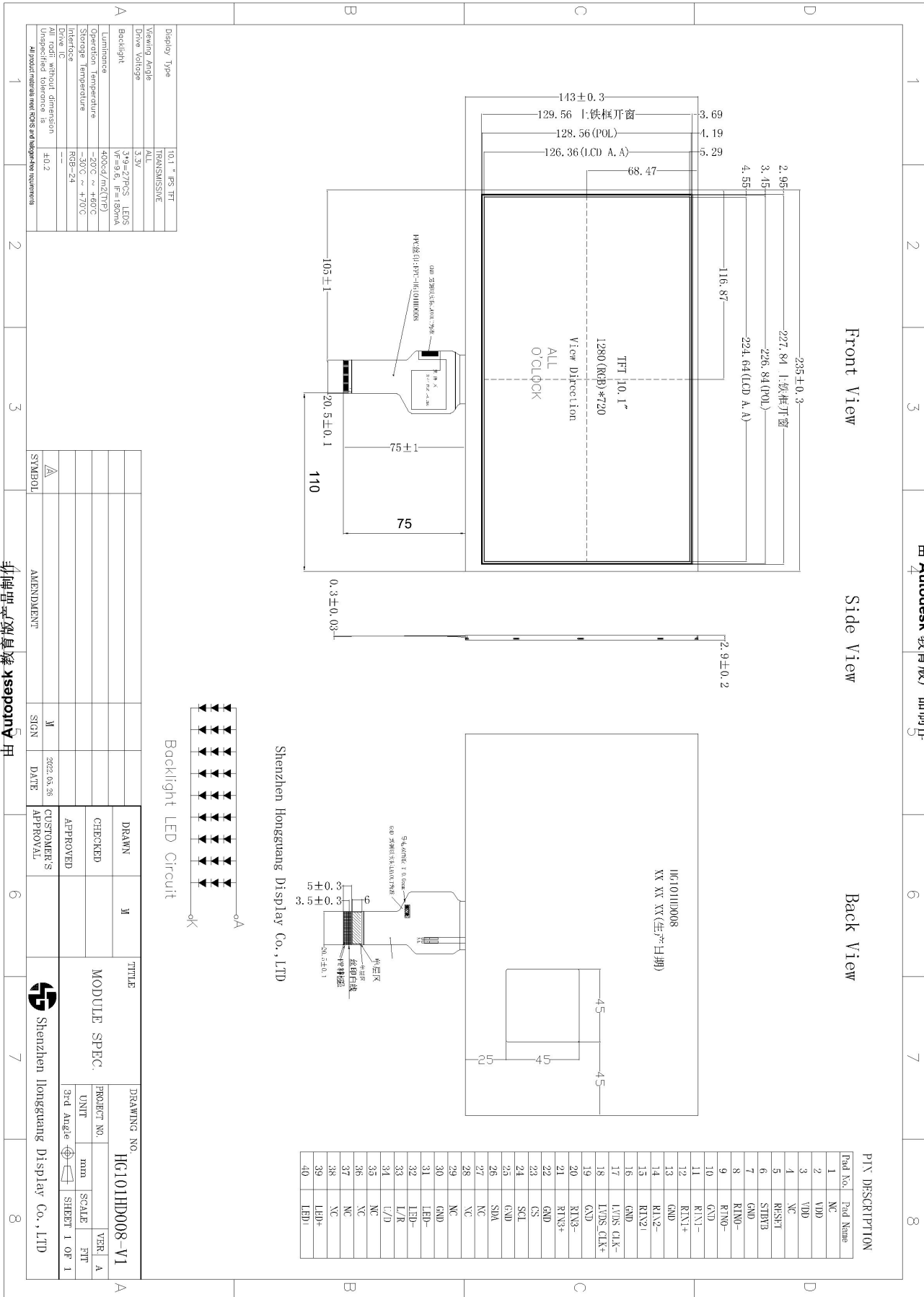


33	L/R	I	Left / right selection
34	U/D	I	Up/down selection
35	VGL(NC)	-	Gate OFF Voltage
36	CABCEN1(NC)	-	CABC H/W enable
37	CABCEN0(NC)	-	CABC H/W enable
38	VGH(NC)	-	Gate ON Voltage
39	LED+	P	LED Anode
40	LED+	P	LED Anode



8.0 OUTLINE DIMENSION

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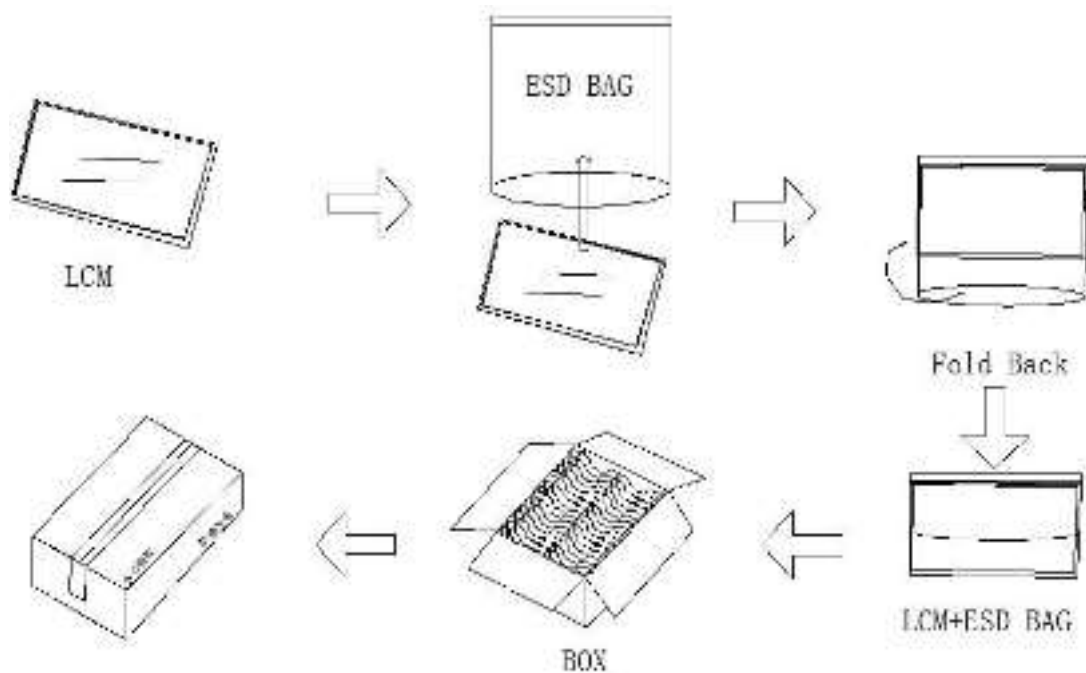


9.0 Package Specification

9.1 Packing form

LCM Moudle	LCM Qty. in the box	Box size	Note
HG101HD008	50 pcs/box		

9.2 Packing assembly drawing



	Material	Notice
Box	Corrugated Paper Board	(AB Flute)
Partition/Pad	Corrugated Paper Board	(B Flute)
Corner Pad	Corrugated Paper Board	(AB Flute)
ESD bag	PE	



10.0 General precaution

10.1 Use Restriction

This product is not authorized for use in life supporting systems, aircraft navigation control systems, military systems and any other application where performance failure could be life threatening or otherwise catastrophic.

10.2 Disassembling or Modification

Do not disassemble or modify the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display. HG does not warrant the module, if customers disassemble or modify the module.

10.3 Breakage of LCD Panel

10.3.1. If LCD panel is broken and liquid crystal spills out, do not ingest or inhale liquid crystal, and do not contact liquid crystal with skin.

10.3.2. If liquid crystal contacts mouth or eyes, rinse out with water immediately.

10.3.3. If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.

10.3.4. Handle carefully with chips of glass that may cause injury, when the glass is broken.

10.4 Electric Shock

10.4.1. Disconnect power supply before handling LCD module.

10.4.2. Do not pull or fold the LED cable.

10.4.3. Do not touch the parts inside LCD modules and the fluorescent LED's connector or cables in order to prevent electric shock.

10.5 Absolute Maximum Ratings and Power Protection Circuit

10.5.1. Do not exceed the absolute maximum rating values, such as the supply voltage variation, input voltage variation, variation in parts' parameters, environmental temperature, etc., otherwise LCD module may be damaged.

10.5.2. Please do not leave LCD module in the environment of high humidity and high temperature for a long time.

10.5.3. It's recommended to employ protection circuit for power supply.

10.6 Operation

10.6.1 Do not touch, push or rub the polarizer with anything harder than HB pencil lead.

10.6.2 Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD module for incoming inspection or assembly.

10.6.3 When the surface is dusty, please wipe gently with absorbent cotton or other soft material.

10.6.4 Wipe off saliva or water drops as soon as possible. If saliva or water drops contact with polarizer for a long time, they may causes deformation or color fading.

10.6.5 When cleaning the adhesives, please use absorbent cotton wetted with a little petroleum benzine or other adequate solvent.

10.7 Mechanism

Please mount LCD module by using mouting holes arranged in four corners tightly.

10.8 Static Electricity

10.8.1 Protection film must remove very slowly from the surface of LCD module to prevent from electrostatic occurrence.

10.8.2. Because LCD module use CMOS-IC on circuit board and TFT-LCD panel, it is very weak to electrostatic discharge. Please be careful with electrostatic discharge. Persons who handle the module should be grounded through adequate methods.

10.9 Strong Light Exposure

The module shall not be exposed under strong light such as direct sunlight. Otherwise, display characteristics may be changed.

10.10 Disposal

When disposing LCD module, obey the local environmental regulations.