Shenzhen HB Science & Technology Co,. Ltd

Technical Specification

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CPT TFT-LCD

CLAA150XG08

APPROVED BY	CHECKED BY	PREPARED BY
		TFT-LCD Plant Application Div.

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Content

1. OVERVIEW

CLAA150XG08 is 15" color TFT-LCD (Thin Film Transistor Liquid Crystal Display) module composed of LCD panel, RSDS driver ICs, control circuit and backlight.

By applying 6 bit digital data, 1024× 768, 262K-color images are displayed on the 15" diagonal screen.

Interface of data and control signals is Typ. 32.5 MHz digital. 2 pixel data are transmitted per cycle. Inverter for backlight is not included in this module. General specification are summarized in the following table:

ITEM	SPECIFICATION
Display Area(mm)	304.1(H)x228.1(V) (15.0-inch diagonal)
Number of Pixels	1024(H)x768(V)
Pixel Pitch(mm)	0.297(H)x0.297(V)
Color Pixel Arrangement	RGB vertical stripe
Display Mode	Normally white TN
Number of Colors	262144(6bits/color)
Brightness(cd/m^2)	250cd/m^2(Typ.)
Viewing Angle	-60~60(H),-55~45(V)(Typ.)
Wide Viewing Angle Technology	Optical Compensation Film
Surface Treatment	Anti-glare
Electrical Interface	CMOS(VIN=3~5V,2 pixel/clock)
Total Module Power(W)	6.2(Typ.)
Optimum Viewing Angle	6 o'clock
Module Size(mm)	326.0(W)x251.0(H)x12.0(D)
Module Weight(g)	1100
Backlight Unit	CCFL, 2 tables, edge-light(top/bottom)

The LCD Products listed on this document are not suitable for use of aerospace equipment, submarine cables, nuclear reactor control system and life support systems. If customers intend to use these LCD products for above application or not listed in "Standard" as follows, please contact our sales people in advance.

Standard: Computer, Office equipment, Communication equipment, Test and Measurement equipment, Machine tool, Industrial robot, Audio and Visual equipment, Other consumer products.

2. ABSOLUTE MAXIMUM RATINGS

ITEM		SYMBOL	MIN.	MAX.	UNIT
Power Supply Voltage for Logic		VDDD	-	3.6	V
Power Supply Voltage for DC-DC		VCC	-	13.2	V
Logic input Voltage	High	VIH	-	3.6	V
	Low	VIL	-0.5	-	V
Operation Temperature *1)		Top	0	50	℃
Storage Temperature *1)		Tstg	-20	60	℃

Note:

*1)Humidity

Relative Humidity ≦95% (Ta≦ 40℃)

Wet Bulb Temperature ≦39℃(Ta≧40℃)

3. ELECTRICAL CHARACTERISTICS

(a)TFT-LCD

ITEM		SYMBOL	MIN	TYP	MAX	UNIT	Remark
Power Supply Voltage for Logic		VDDD	3.0	3.3	3.6	V	Note1
Power Supply Current for Logic		IDD	-	(100)	(300)	mA	Note2
Permissive Ripple Voltage for Logic		VRP	-	-	100	mV	
Power Supply Voltage for DC-DC		VCC	10.8	12	13.2	V	
Power Supply Current for DC-DC		ICC	-	(120)		mA	
Permissive Ripple Voltage for DC-DC		VRC	-	-	(50)	mV	
Input Threshold Voltage	High	VTH	2.2	3.3	5.5	V	
	Low	VTL	0	-	0.8	V	

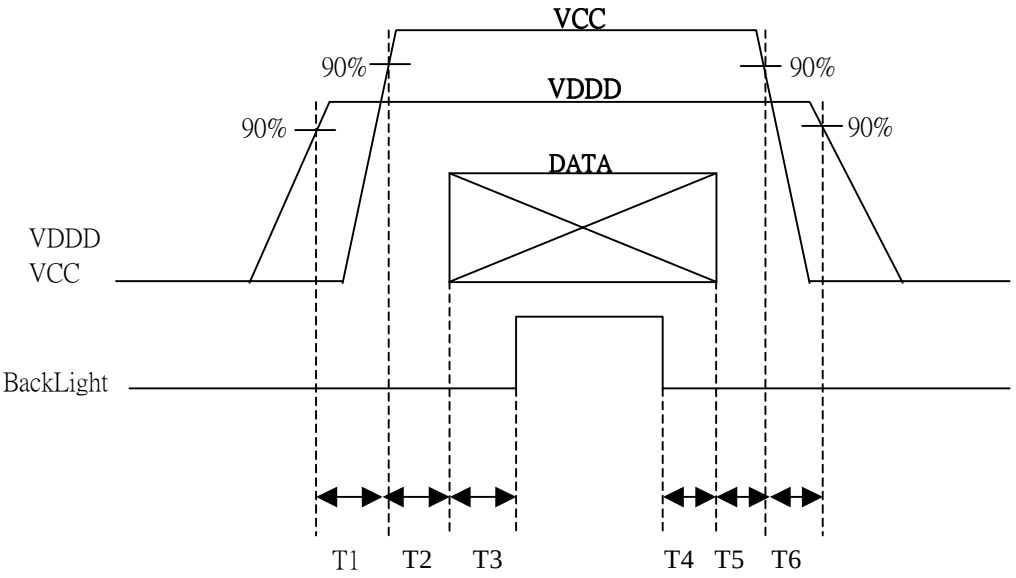
[Note 1]

Power sequence

VDDD->VEEG,VDDA,VCOM->VDDG

0<T1、T2、T4、T5、T6≦10ms

200ms≦T3

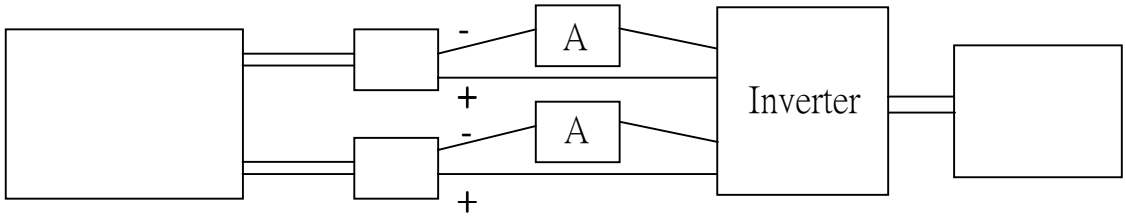


[Note 2] Typical current situation : 64-gray-bar pattern, 768 line mode

(b)Backlight

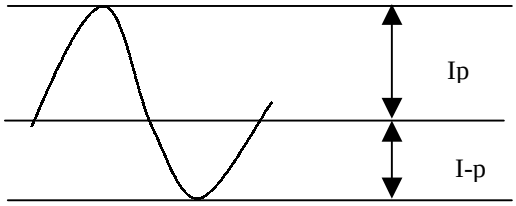
ITEM	SYMBOL	MIN	TYP	MAX	UNIT	REMARK
Lamp Voltage	VL	-	650	-	V	IL=7.0mA
Lamp Current	IL	5.0	7.0	8.0	mA	Note1
Interter Frequency	FL	40	50	60	kHz	Note2
Starting Lamp Voltage	VS	1700	-	-	V	Ta=0℃，Note3
		1500	-	-	V	Ta=25℃，Note3
Lamp life Time	LT	40000		-	hr	IL=6.0mA Continuous Operation

[Note 1] Lamp Current measurement method (The current meter is inserted in cold line)
If the lamp current is less than 5mA,the damage wouldn't happen.



[Note 2] Lamp frequency of inverter may produce interference with horizontal synchronous frequency,and this may cause horizontal beat on the display.Therefore,please adjust lamp frequency,and keep inverter as far from module as possible or use electronic shielding between inverter and module to avoid the interference.

The degrees of unbalance: less than 10%
The ratio of wave height: less than $\sqrt{2}$ ±10%



Ip: high side peak

I-p: low side peak

The degrees of unbalance = |Ip-I-p|/Irms*100(%)
The ratio of wave height = Ip(or I-p)/Irms

[Note 3]
Definition of the lamp life time
Luminance: L under 50% of specification
Starting Lamp Voltage: VS < 1700V, Ta=0℃
VS < 1500V, Ta=25℃

(C) RSDS CHARACTERISTICS

ITEM	SYMBOL	CONDICTION	MIN	TYP	MAX	UNIT
RSDS Input high voltage high level	VIHRSDS	VCMRSDS=+1.2V	100	200	-	mV
RSDS Input high voltage low level	VILRSDS	VCMRSDS=+1.2V	-	-200	-100	mV
RSDS common mode Input voltage range	VCMRSDS	VIHRSDS=+100mV VILRSDS=-100mV	1.0	-	1.4	V
RSDS leakage of input current	IDL	DxxP,DxxN,CLKP,CLKN	-10	-	10	uV

4. INTERFACE PIN CONNECTION

(a) CN1(Source side signal)
Used connector: IL-FHR-B50S-HF (JAE)

PIN	Symbol	Function	PIN	Symbol	Function
1	GND		2	B2P	RSDS Blue Data(+)
3	B2N	RSDS Blue Data (-)	4	GND	
5	B1P	RSDS Blue Data (+)	6	B1N	RSDS Blue Data (-)
7	GND		8	B0P	RSDS Blue Data (+)
9	B0N	RSDS Blue Data (-)	10	GND	
11	G2P	RSDS Green Data (+)	12	G2N	RSDS Green Data (-)
13	GND		14	G1P	RSDS Green Data (+)
15	G1N	RSDS Green Data (-)	16	GND	
17	G0P	RSDS Green Data (+)	18	G0N	RSDS Green Data (-)
19	GND		20	CLKP	RSDS CLK (+)
21	CLKN	RSDS CLK (-)	22	GND	
23	R2P	RSDS Red Data (+)(MSB)	24	R2N	RSDS Red Data (-)
25	GND		26	R1P	RSDS Red Data (+)
27	R1N	RSDS Red Data (-)	28	GND	
29	R0P	RSDS Red Data (+)	30	R0N	RSDS Red Data (-)
31	GND		32	STH	Start pulse
33	LP	Latch Pulse	34	POL	M signal
35	HMS	Data polarity inverting pin	36	GND	
37	CLKV		38	STV	Shift data pin
39	OE	Gate Driver Output Enable	40	TEST(VCOM)	N.C.
41	GND		42	3.3V	3.3V
43	3.3V	3.3V	44	3.3V	3.3V
45	GND		46	12V	12V
47	12V	12V	48	NC	
49	NC		50	NC	

(B)CN2,3(BACKLIGHT)
Backlight-side connector: BHR-03VS-1(JST)
Inverter-side connector: SM02(8.0)B-BHS-1(JST)

Pin No.	Symbol	Function
1	CTH	VBLH(High voltage)
3	CTL	VBLL(Low voltage)

[Note]
VBLH-VBLL = VL

5. INTERFACE TIMING

(a)Timing Specifications

Horizontal signal:

Item	Symbol	Min	Typ	Max	Unit
CLK pulse width	Tw	15	-	-	ns
CLK pulse width (H)	Twh	6	-	-	ns
CLK pulse width (L)	Twl	6	-	-	ns
DATA set-up time	Tst1	2	-	-	ns
DATA hold time	Thd1	0.2	-	-	ns
STH set-up time	Tst2	4	-	-	ns
STH hold time	Thd2	2	-	-	ns
STH pulse width	Twsth	1CLKP	-	2CLKP	CLKP period
LP pulse width (H)	Twlp	5CLKP	-	2	us
Last data time	Tldt	1CLKP	-	-	CLKP period
CLK-LP time	Tclk-lp	4	-	-	ns
LP-POL time	Tlp-pol	10	-	-	ns
POL-LP time	Tpol-lp	14	-	-	ns
OE pulse width	Toe	2.4	2.9	3.4	us
OE-LP time	Toe-lp	1.9	2.4	2.9	us

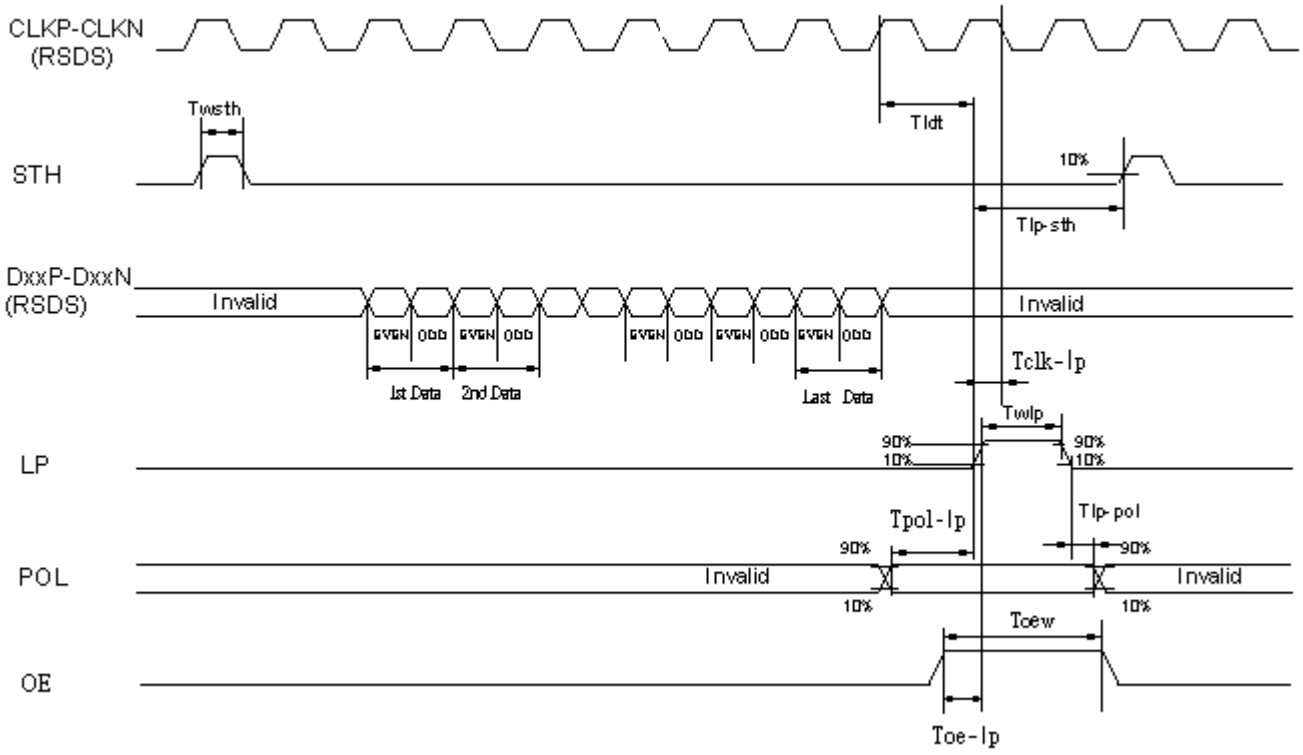
Vertical sigal:

Item	Symbol	MIN	TYP	MAX	Unit
STV set-up time	tst(STV)	1	-	-	μs
STV hold time	thd(STV)	1	-	-	μs
CLKV period	tw(CLKV)	8	-	-	μs
CLKV High width	twH(CLKV)	3.5	-	-	μs
CLKV Low width	twL(CLKV)	3.5	-	-	μs

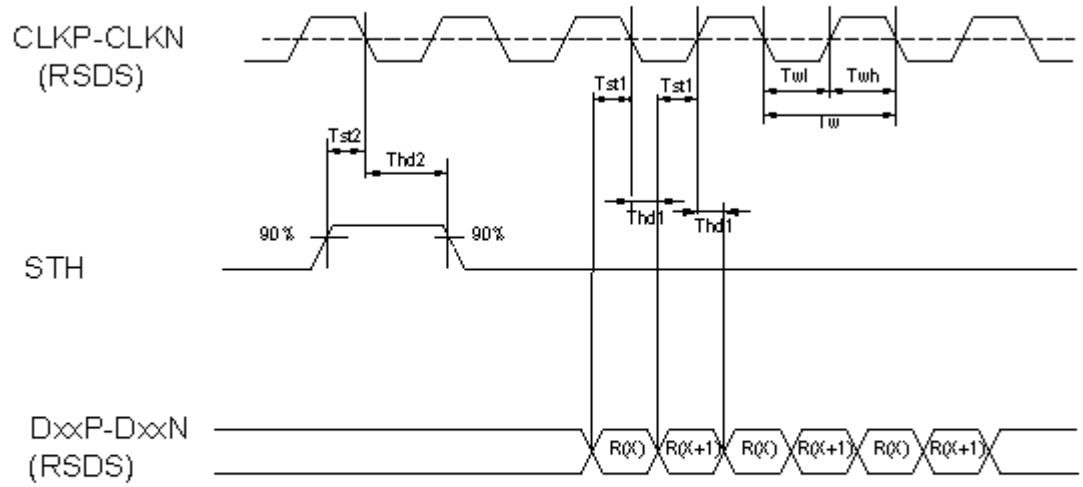
(b) Timing Chart

a. Horizontal Timing Chart

Timing Diagram 1

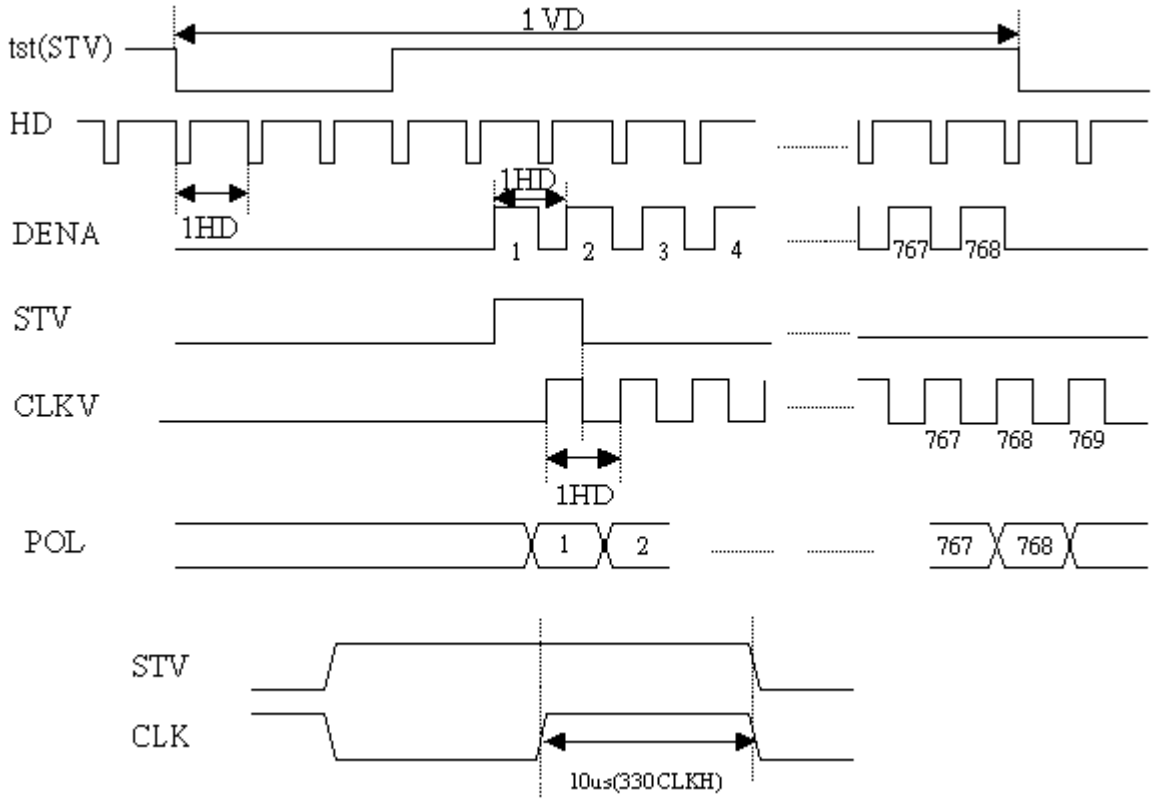


Timing Diagram 2

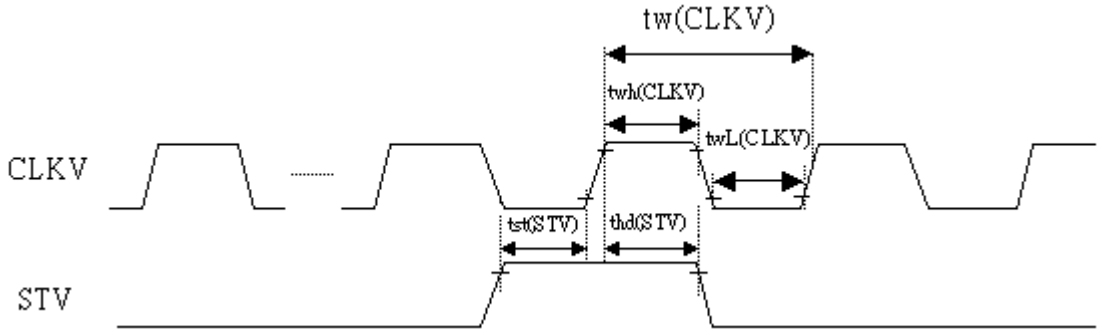


b. Vertical Timing Chart

Vertical Signal 1



Vertical Signal 2



c. Color Data Assignment

COLOR	INPUT DATA	R DATA						G DATA						B DATA					
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
		MSB					LSB	MSB					LSB	MSB					LSB
BASIC COLOR	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED (63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN (63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	BLUE (63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	CYAN	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	MAGENTA	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	YELLOW	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
	WHITE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
RED	RED (0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED (1)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	RED (2)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED (62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED (63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
GREEN	GREEN (0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN (1)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	GREEN (2)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	GREEN (62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	GREEN (63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
BLUE	BLUE (0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BLUE (1)	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
	BLUE (2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	BLUE (62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	BLUE (63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

[Note]

(1)Definition of gray scale:

Color(n) : n indicates gray scale level.

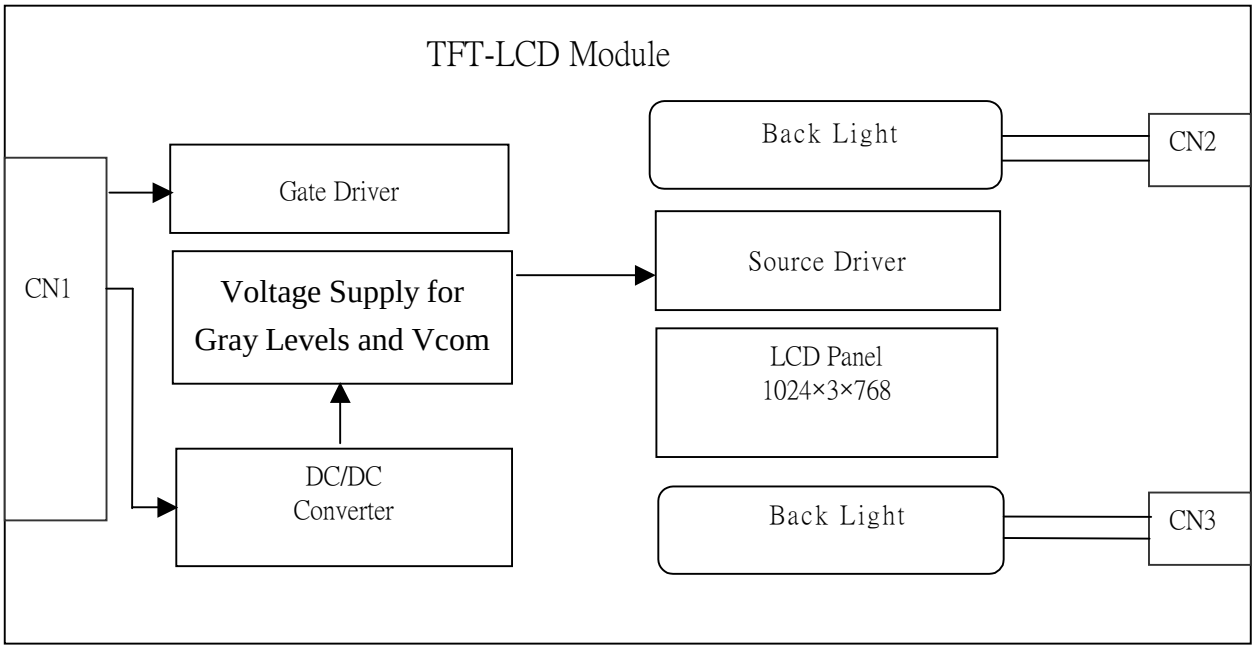
Higher n means brighter level.

(2)Data:1-High,0-Low.

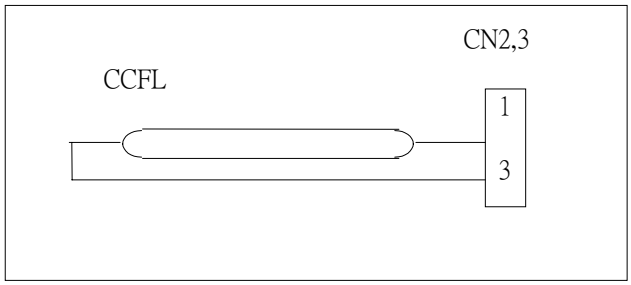
(d)Color Data Assignment

D(1,1)	D(2,1)	--	D(X,1)	--	D(1023,1)	D(1024,1)
D(1,2)	D(2,2)	--	D(X,2)	--	D(1023,2)	D(1024,2)
|	|	+	..	+	|	|
D(1,Y)	D(2,Y)	--	D(X,Y)	--	D(1023,Y)	D(1024,Y)
|	|	+	..	+	|	|
D(1,767)	D(2,767)	--	D(X,767)	--	D(1023,767)	D(1024,767)
D(1,768)	D(2,768)	--	D(X,768)	--	D(1023,768)	D(1024,768)

6. BLOCK DIAGRAM



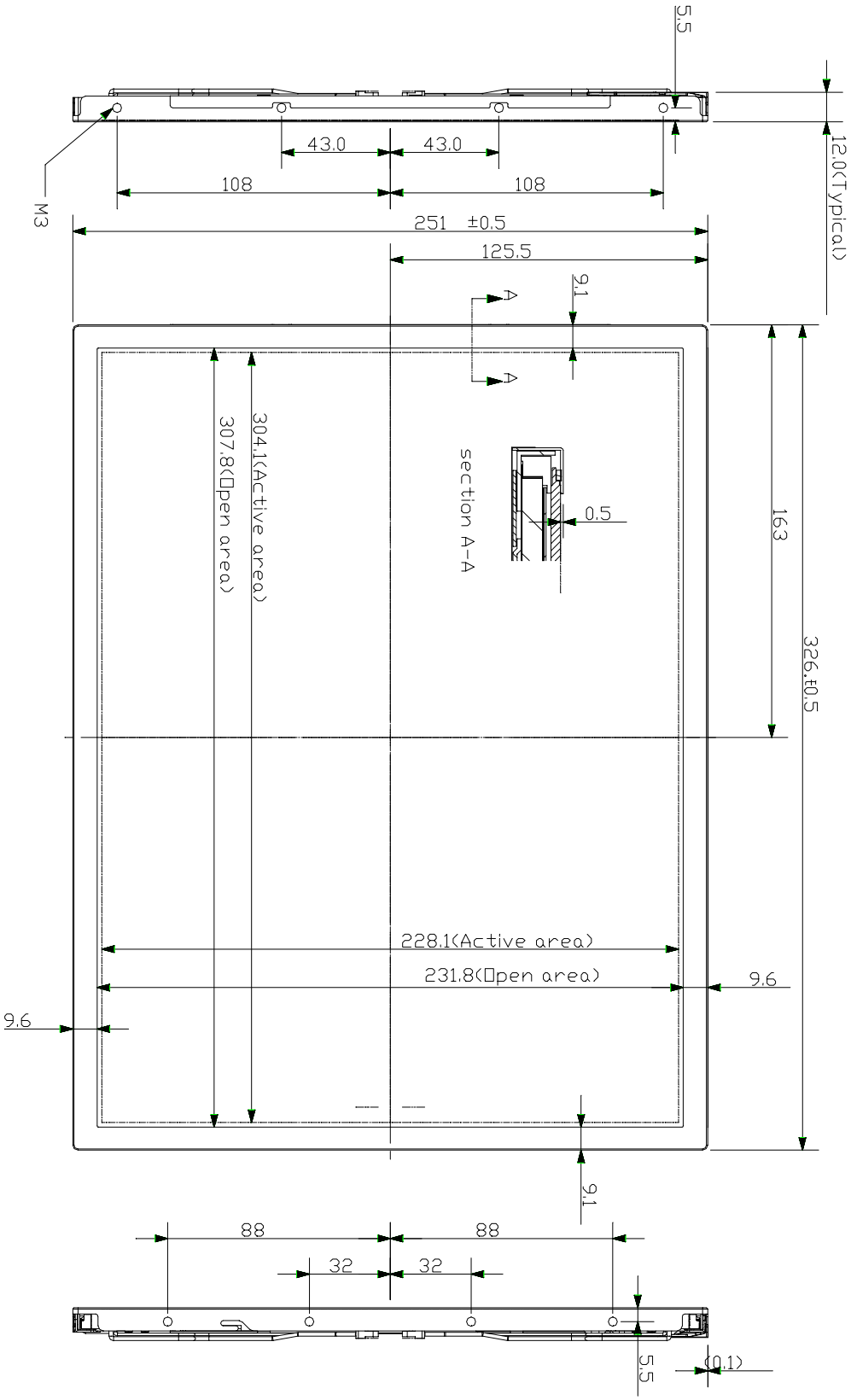
Back Light



7. MECHANICAL SPECIFICATION

(a) Front side

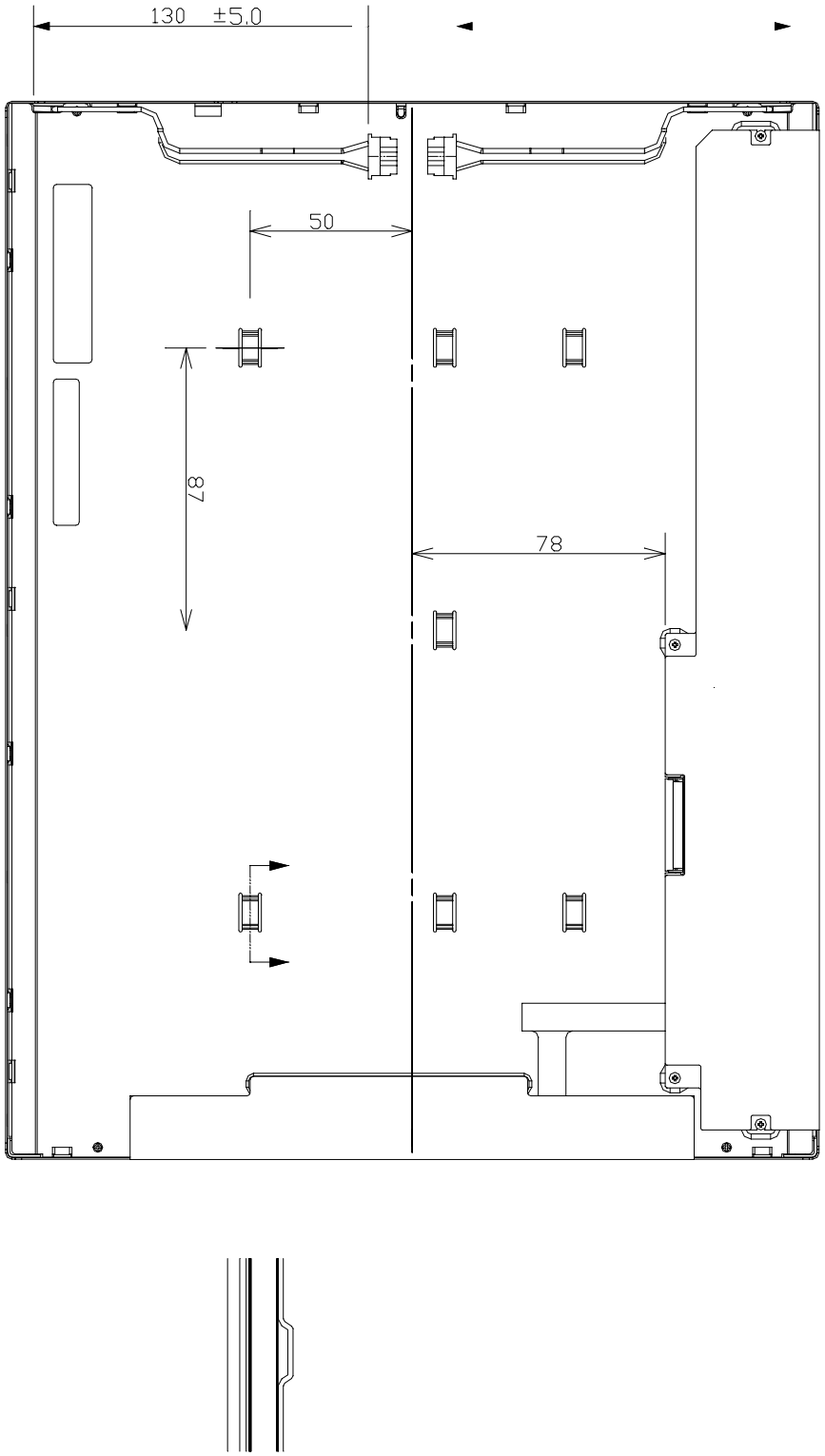
Unit: mm



Tolerance is ±0.5mm unless noted

(b) Rear side

Unit: mm



Tolerance is ±0.5mm unless noted

8.OPTICAL CHARACTERISTICS

Ta = 25°C , Vcc=5.0V

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Contrast Ratio		CR	θ =ϕ=0°	--	350	--	--
Luminance	Normal	LW	θ =ϕ=0°	(200)	(250)	--	cd/m^2
	Uniformity	ΔLW	θ =ϕ=0°	--	--	25	%
Response Time (Black/White)		Tr	θ =ϕ=0°	--	13	50	ms
		Tf		--	27	50	ms
Viewing Angle	Horizontal	ϕ	CR≧10	-50 ~ 50	-60 ~ 60	--	°
	Vertical	θ		-45 ~ 35	-55 ~ 45	--	°
Image sticking		tis	2hours	--	--	2	s
Cross talk		CMR	$\theta = \varphi$ =0	--	--	1	%
Color Coordinates	Red	Rx Ry	θ =ϕ=0°	--	(0.645) (0.344)	--	--
	Green	Gx Gy		--	(0.308) (0.566)	--	
	Blue	Bx By		--	(0.142) (0.089)	--	
	White	Wx Wy		--	(0.317) (0.330)	--	

[Note]

These items are measured using BM-5A(TOPCON) OR LCD-7000 (Outsuka Electronic) under the dark room condition(no ambient light) after more than 30 minutes from turning on the lamp unless noted.

*) Condition: IL=8.0mA, Inverter Frequency=50kHz

Definition of these measurement items are as follows:

(1)Definition of Contrast Ratio

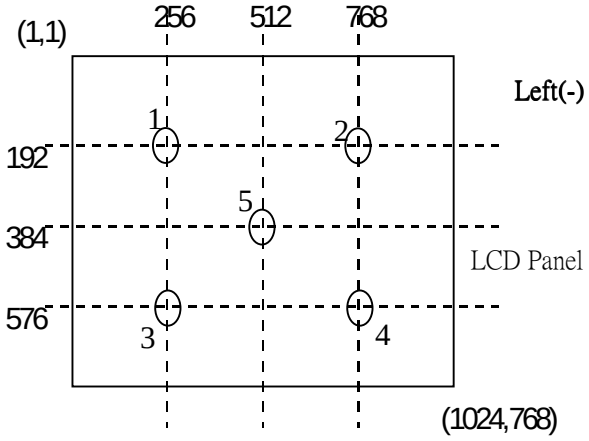
CR=ON(White)Luminance/OFF(Black)Luminance

(2)Definition of Luminance and Luminance uniformity

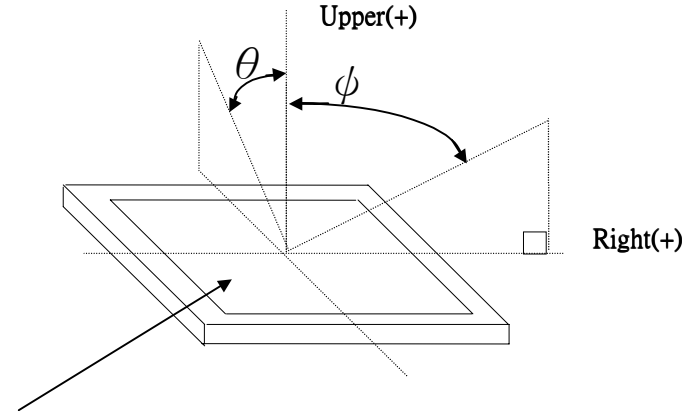
ΔL=[L(MAX)/L(MIN)-1]× 100

Measure White Luminance on the below 5 points

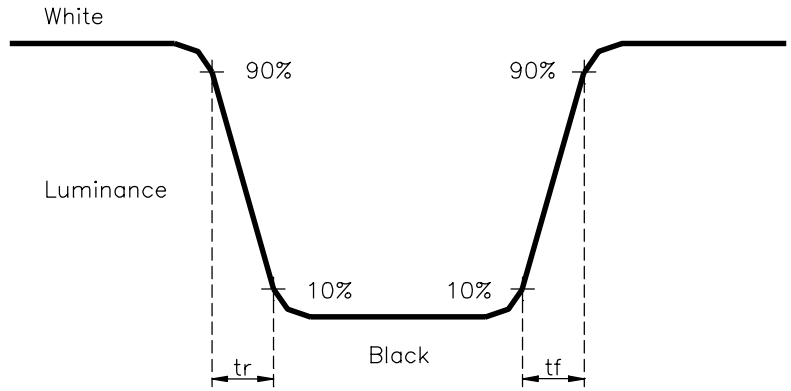
MEASUREMENT POINTS



(3)Definition of Viewing Angle(θ , ϕ)



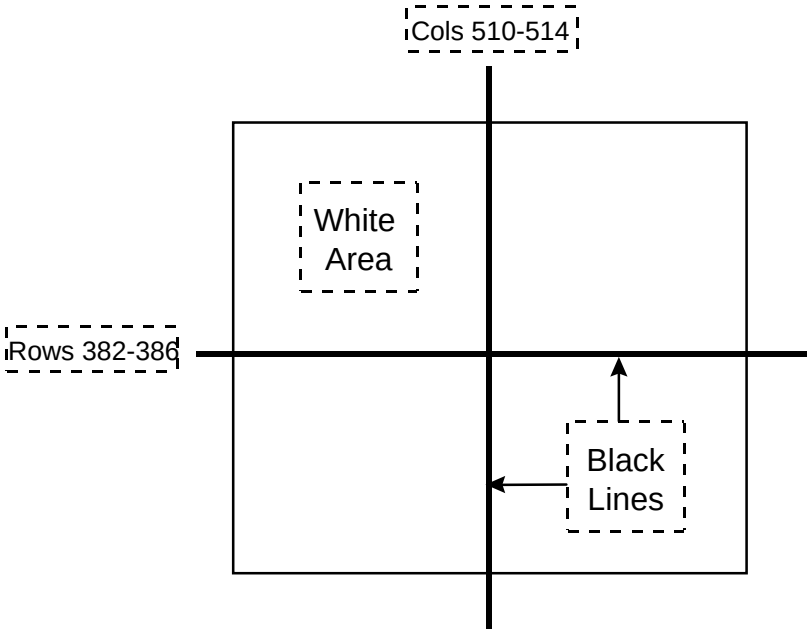
(4)Definition of Response Time



(5)Image sticking:

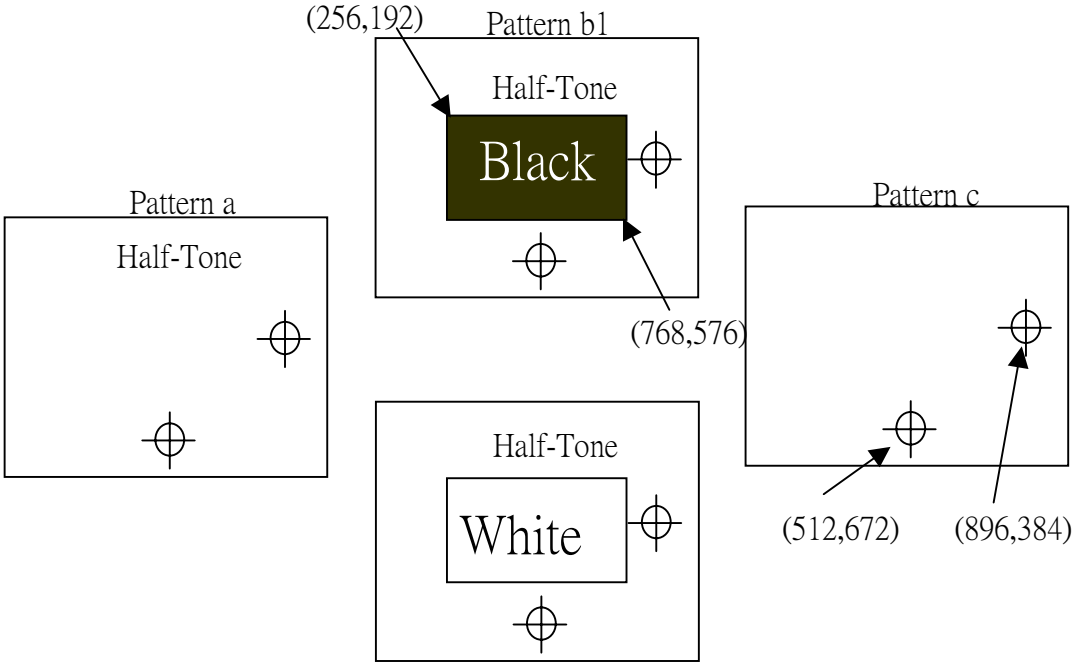
Continuously display the test pattern shown in the figure below for two-hours. Then display a completely white screen. The previous image shall not persist more than two seconds at 25℃.

TEST PATTERN FOR IMAGE STICKING TEST



(6)Definition of Cross talk Modulation Ratio

CMR = MAX (***(| (Lb1-La) / Lc |) ×100*** , ***(| (Lb2 – La) / Lc |) ×100***)



9.RELIABILITY TEST CONDITIONS

(1)Temperature and Humidity

TEST ITEMS	CONDITIONS
HIGH TEMPERATURE HIGH HUMIDITY OPERATION	40℃; 90%RH; 240h (No condensation)
HIGH TEMPERATURE OPERATION	50℃; 240h
LOW TEMPERATURE STORAGE	0℃; 240h
THERMAL SHOCK	BETWEEN -20℃(1hr)AND 60℃(1hr); 5 CYCLES
HIGH TEMPERATURE STORAGE	60℃; 240h
LOW TEMPERATURE OPERATION	0℃; 240h

(2)Shock & Vibration

ITEMS	CONDITIONS
SHOCK (NON-OPERATION)	Shock level:1470m/s^2(150G) Waveform: half sinusoidal wave, 2ms Number of shocks: one shock input in each direction of three mutually perpendicular axes for a total of six shock inputs
VIBRATION (NON-OPERATION)	Vibration level: 9.8m/s^2(1.0G) zero to peak Waveform: sinusoidal Frequency range: 5 to 500 Hz Frequency sweep rate: 0.5 octave/min Duration: one sweep from 5 to 500Hz in each of three mutually perpendicular axis(each x,y,z axis: 1 hour, total 3 hours)

(3)Judgment standard

The judgment of the above test should be made as follow:

Pass: Normal display image with no obvious non-uniformity and no line defect. Partial transformation of the module parts should be ignored.

Fail: No display image, obvious non-uniformity, or line defects.

10. HANDLING PRECAUTIONS FOR TFT-LCD MODULE

Please pay attention to the followings in handling- TFT-LCD products;

1 ASSEMBLY PRECAUTION

(1) Please use the mounting hole on the module side in installing and do not beading or wrenching LCD in assembling. And please do not drop, bend or twist LCD module in handling.

(2) Please design display housing in accordance with the following guide lines.

(2.1) Housing case must be destined carefully so as not to put stresses on LCD all sides and not to wrench module. The stresses may cause non-uniformity even if there is no non-uniformity statically.

(2.2) Keep sufficient clearance between LCD module back surface and housing when the LCD module is mounted. Approximately 1.0 mm of the clearance in the design is recommended taking into account the tolerance of LCD module thickness and mounting structure height on the housing.

(2.3) When some parts, such as, FPC cable and ferrite plate, are installed underneath the LCD module, still sufficient clearance is required, such as 0.5mm. This clearance is, especially, to be reconsidered when the additional parts are implemented for EMI countermeasure.

(2.4) Design the inverter location and connector position carefully so as not to give stress to lamp cable, or not to interface the LCD module by the lamp cable.

(2.5) Keep sufficient clearance between LCD module and the others parts, such as inverter and speaker so as not to interface the LCD module. Approximately 1.0mm of the clearance in the design is recommended.

(3) Please do not push or scratch LCD panel surface with any-thing hard. And do not soil LCD panel surface by touching with bare hands. (Polarizer film, surface of LCD panel is easy to be flawed.)

(4) Please do not press any parts on the rear side such as source TCP, gate TCP, control circuit board and FPCs during handling LCD module. If pressing rear part is unavoidable, handle the LCD module with care not to damage them.

(5) Please wipe out LCD panel surface with absorbent cotton or soft cloth in case of it being soiled.

(6) Please wipe out drops of adhesives like saliva and water on LCD panel surface immediately. They might damage to cause panel surface variation and color change.

(7) Please do not take a LCD module to pieces and reconstruct it. Resolving and reconstructing modules may cause them not to work well.

(8) Please do not touch metal frames with bare hands and soiled gloves. A color change of the metal frames can happen during a long preservation of soiled LCD modules.

(9) Please pay attention to handling lead wire of backlight so that it is not tugged in connecting with inverter.

2 OPERATING PRECAUTIONS

(1) Please be sure to turn off the power supply before connecting and disconnecting signal input cable.

(2) Please do not change variable resistance settings in LCD module. They are adjusted to the most suitable value. If they are changed, it might happen LCD does not satisfy the characteristics specification.

(3) Please consider that LCD backlight takes longer time to become stable of radiation characteristics in low temperature than in room temperature.

(4) A condensation might happen on the surface and inside of LCD module in case of sudden change of ambient temperature.

(5) Please pay attention to displaying the same pattern for very long time. Image might

stick on LCD. If then, time going on can make LCD work well.

(6) Please obey the same caution descriptions as ones that need to pay attention to ordinary electronic parts.

3 PRECAUTIONS WITH ELECTROSTATICS

(1) This LCD module use CMOS-IC on circuit board and TFT-LCD panel, and so it is easy to be affected by electrostatics. Please be careful with electrostatics by the way of your body connecting to the ground and so on.

(2) Please remove protection film very slowly on the surface of LCD module to prevent from electrostatics occurrence.

4 STORAGE PRECAUTIONS

(1) When you store LCDs for a long time, it is recommended to keep the temperature between 0℃ ~40℃ without the exposure of sunlight and to keep the humidity less than 90%RH.

(2) Please do not leave the LCDs in the environment of high humidity and high temperature such as 60℃ 90%RH.

(3) Please do not leave the LCDs in the environment of low temperature; below -20℃.

5 SAFETY PRECAUTIONS

(1) When you waste LCDs, it is recommended to crush damaged or unnecessary LCDs into pieces and wash them off with solvents such as acetone and ethanol, which should later be burned.

(2) If any liquid leaks out of a damaged-glass cell and comes in contact with the hands, wash off throughly with soap and water.

6 OTHERS

(1) A strong incident light into LCD panel might cause display characteristics' changing inferior because of polarizer film, color filter, and other materials becoming inferior. Please do not expose LCD module direct sunlight Land strong UV rays.

(2) Please pay attention to a panel side of LCD module not to contact with other materials in preserving it alone.

(3) For the packaging box, please pay attention to the followings:

(3.1) Packaging box and inner case for LCD are designed to protect the LCDs from the damage or scratching during transportation. Please do not open except picking LCDs up from the box.

(3.2) Please do not pile them up more than 3 boxes. (They are not designed so.) And please do not turn over.

(3.3) Please handle packaging box with care not to give them sudden shock and vibrations. And also please do not throw them up.

(3.4) Packing box and inner case for LCDs are made of cardboard. So please pay attention not to get them wet. (Such like keeping them in high humidity or wet place can occur getting them wet.)