Chunghwa Picture Tubes, Ltd.
Technical Specification

To   : **HUI YING TUNG ELECTRONIC CO., LTD**

Date : 2008/08/14

CPT TFT-LCD
CLAA 220FA01

ACCEPTED BY:

APPROVED BY	CHECKED BY	PREPARED BY
JOE CHOU	**Tristan Wang**	**Product Planning Management General Division**

Doc. No:	**SPEC-CLAA220FA01-HUI YING -Ver1**	Issue Date:	2008/08/14

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Modification Record List _____

NO.	Issue Date	Modification Index	Modifier
A	2008/02/19	Tentative version for the customer	
B	2008/04/23	Confirm the specification of Backlight, including VL, VS and lifetime…………………………………………………….(P.5 & P.19)	

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_____
Datasheet Version.: 01

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Datasheet Version.: 01

1. OVERVIEW

ITEM	SPECIFICATION
Display Area(mm)	465.12 (H) × 290.7 (V) (22.0-inch diagonal)
Number of Pixels	1920 (H) × 1200(V)
Pixel Pitch(mm)	0.24225(H) × 0.24225(V)
Color Pixel Arrangement	RGB vertical stripe
Display Mode	Normally white, TN
Number of Colors	16.7M(6bits+Hi-FRC)
Brightness(cd/m^2)	$300cd/m^2$ (Typ.)(center, 7.5mA)
Viewing Angle(H/V)	170/160 (Typ.)
Surface Treatment	Anti-glare, 3H
Power consumption(W)	32.0(Typ.) (w/o Inverter)
Module Size(mm)	493.7 (W) × 320.1 (H) ×16.5 (D) (Typ.)
Module Weight(g)	2350(Typ.)
Backlight Unit	CCFL, 4 tubes(top × 2/bottom × 2) , Edge light

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ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
Power Supply Voltage for LCD	VCC	0	6	V	
Lamp Voltage	VL	760	950	Vrms	
Lamp Current	ILO	3.0	8.0	mArms	
Lamp Frequency	FL	40	80	kHz	
static electricity	VESDt	-200	200	V	*5)
	VESDc	-8000	8000	V	
Operation Temperature	Top	0	50	℃	*1). 2). 3). 6)
Storage Temperature	Tstg	-20	60	℃	*1). 2). 3)
Delayed Discharge Time	TD	--	1	sec	*8)

1).The relative temperature and humidity range are as below sketch, 90%RHMax.(Ta≦40℃).

2).The maximum wet bulb temperature ≦39℃(Ta＞40℃) and without dewing.

3).If you use the product in an environment which over the definition of temperature and humidity too long to effect the result of eye-etching.

4).The life time of the lamp is related to the current of the lamp, so please according to the description of the "(b) backlight" on page 7.

5).Test Condition: IEC 1000-4-2 VESDt: Contact discharge to input connector; $VESD_C$: Contact discharge to module

6).If you operate the product in normal temperature range, the center surface of panel should be under 60℃.

7).When lamp current is out of the absolute maximum range, the life will fall rapidly or shown unusual sign.

8).Delay lighting testing needs the volt above start voltage Vrms**.** Before the procedure tube needs typical lighting for 1 minute and stay in the temperature 25±2℃ for 24 hours and then testing in the same condition in dark room**.**

Relative humidity(%RH)

Temperature (°C)
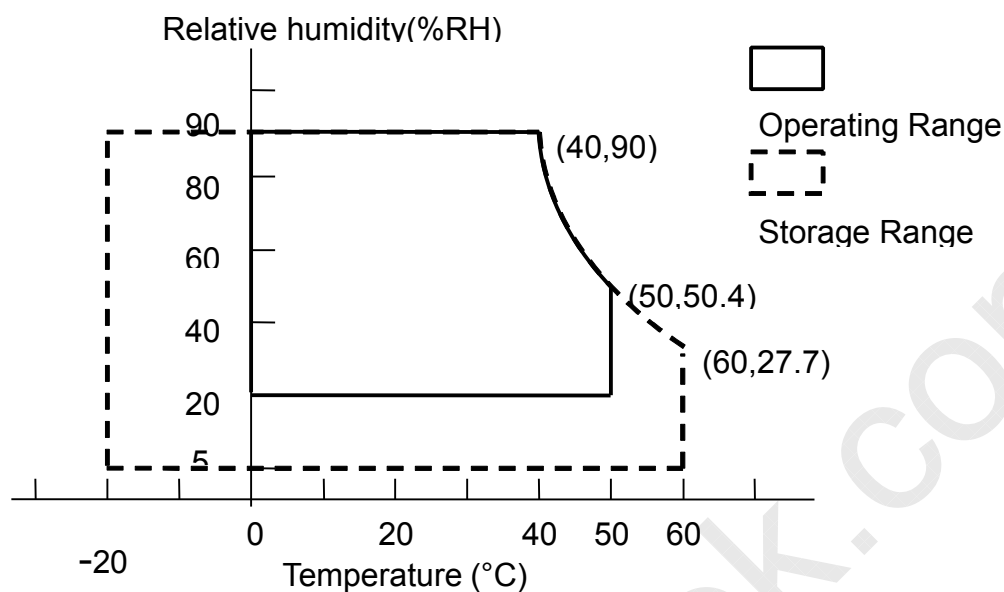
3. ELECTRICAL CHARACTERISTICS

(1).TFT-LCD   Ta=25℃

ITEM		SYMBOL	MIN	TYP	MAX	UNIT	REMARK
Power Supply Voltage for LCD		VCC	4.5	5.0	5.5	V	*1)
Power Supply Current for LCD		ICC	--	1000	1950	mA	*2)
Permissive Ripple Voltage for Logic		VRP	--	--	100	mVp-p	VCC=5.0V
Differential Resistance		Zm	90	100	110	Ω	
LVDS: IN+,IN-	The same motion input Voltage	VCM	1.125	1.25	1.375	V	*3)
	Differential input Voltage	∣VID∣	250	350	450	mV	
	High electric potential threshold voltage	VTH	-	-	100	mV	
	Low electric potential threshold voltage	VTL	-100	-	-	mV	
LCDInrush Current		Inrush	-	-	3	A	*4)
Power consumption		P	-	5	8	W	*2)

[Note]

$0.5\text{ms} < t1 < 10\text{ms}$ $t4 > 200\text{ms}$ $t7 > 1\text{sec}$

$0 < t2 < 50\text{ms}$ $0 < t5 < 50\text{ms}$

$t3 > 250\text{ms}$ $0.01\text{ms} < t6 < 10\text{ms}$

Vin=5.0V

4.5V   4.5V

data

LCD Power Supply
Logic Signal

0.5V   0.5V   0.5V

t1   t2   T5   T6   T7

VL

Backlight Power Supply

T3   T4

Data: RGB DATA, DCLK, DENA
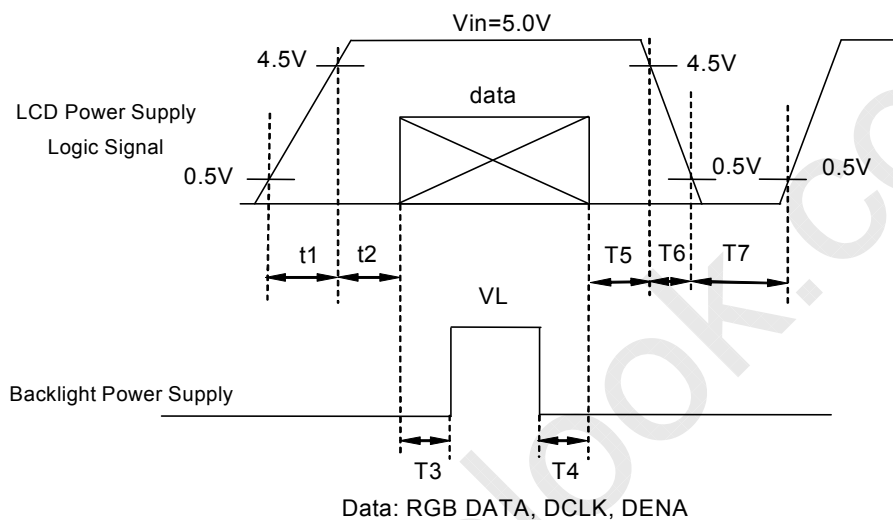
VCC-dip conditions:

(1) When $3.6\text{V} \leq \text{Vcc(min)} < 4.5\text{V}$: $td \leq 10$ ms

(2) When Vcc < 3.6 V, VCC-dip conditions should also follow the VCC-turn-on conditions.
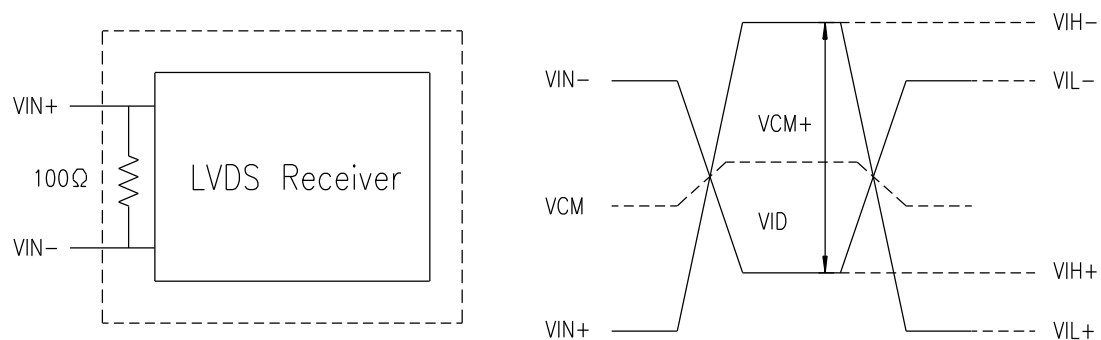
VCC

3.6V   4.5V

td
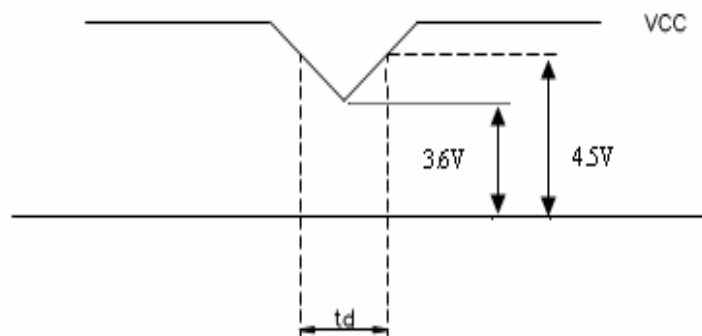
2). Typical value is measured when displaying horizontal gray scale line pattern:

64 gray level, 1920 line mode

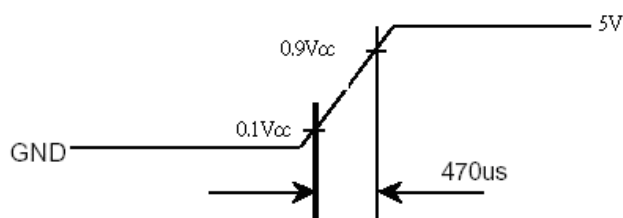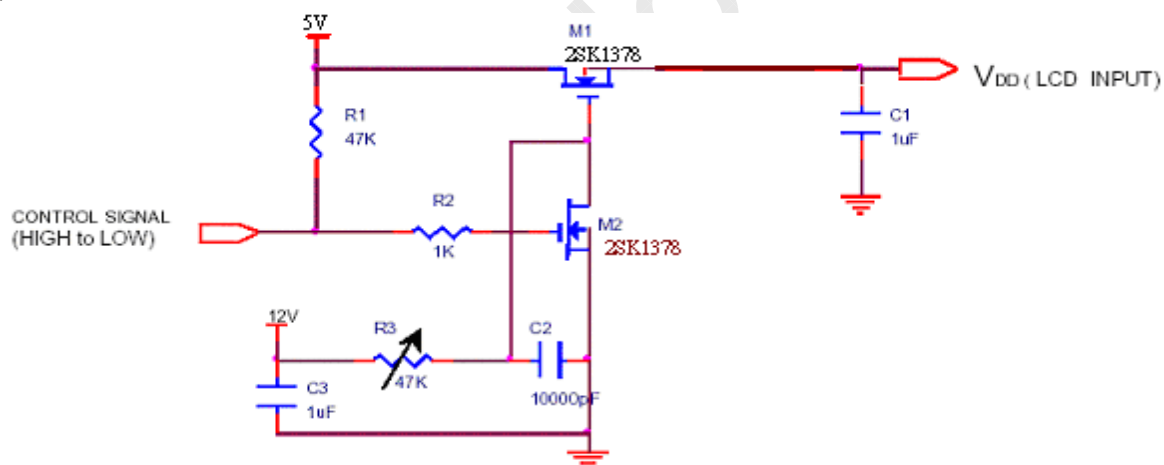VCC=5.0 V，f_H=65 kHz，f_V=60 Hz，f_{CLK}=73.5 MHz

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3).LVDS Signal definition:

VIN+：Positive differential DATA & CLK Input

VIN-： Negative differential DATA ＆ CLK Input

4).Irush Measurement Condition

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(2).Backlight

1. Electrical specification

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	REMARK
B/L Voltage	VL	702	780	847	Vrms	IL=7.5mA Ta=25℃
B/L Current	IL	7.0	7.5	8.0	mArms	*1) Ta=25℃
B/L operating current	ILO	3	7.5	8.0	mArms	*1) Ta=25℃
B/L power consumption	WL	—	23.4	26.6	W	IL=7.5mA Ta=25℃
Inverter Frequency	FI	40	50	60	kHz	*2) Ta=25℃
Starting Lamp Voltage	VS	—	—	1600	Vrms	Ta=0℃
		—	—	1400	Vrms	Ta=25℃

2. Lamp life time

ITEM	ILO at 3.0 mA	ILO at 7.5 mA	ILO at 8.0 mA	UNIT	REMARK
Lamp life time	45000	40000	30000	hr	
Rated time (turn on/off)	—	Min.100,000	—	time	*4)

[Note] Inverter vendor: Sumida, model: TWS-400-9656

1) If the waveform of light up-driving is asymmetric, the distribution of mercury inside the lamp tube will become unequally or will deplete the Ar gas in it. Then it may cause the abnormal phenomenon of lighting-up. Therefore, designers have to try their best to fulfill the conditions under the inverter designing-stage as below:

Ip : high side peak

I-p : low side peak
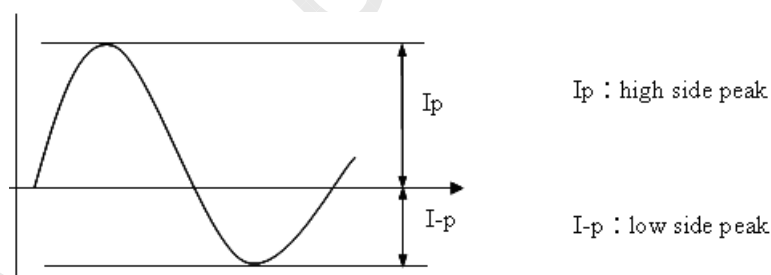
A : The degrees of unbalance = $|I_p - I_{-p}| / I_{rms}$ x100(%), & $|I_p - I_{-p}| / I_{cycle\,rms}$ x100(%),

B : The ratio of wave height = $I_p(or\ I_{-p}) / I_{rms}$, & $I_p(or\ I_{-p}) / I_{cycle\,rms}$,

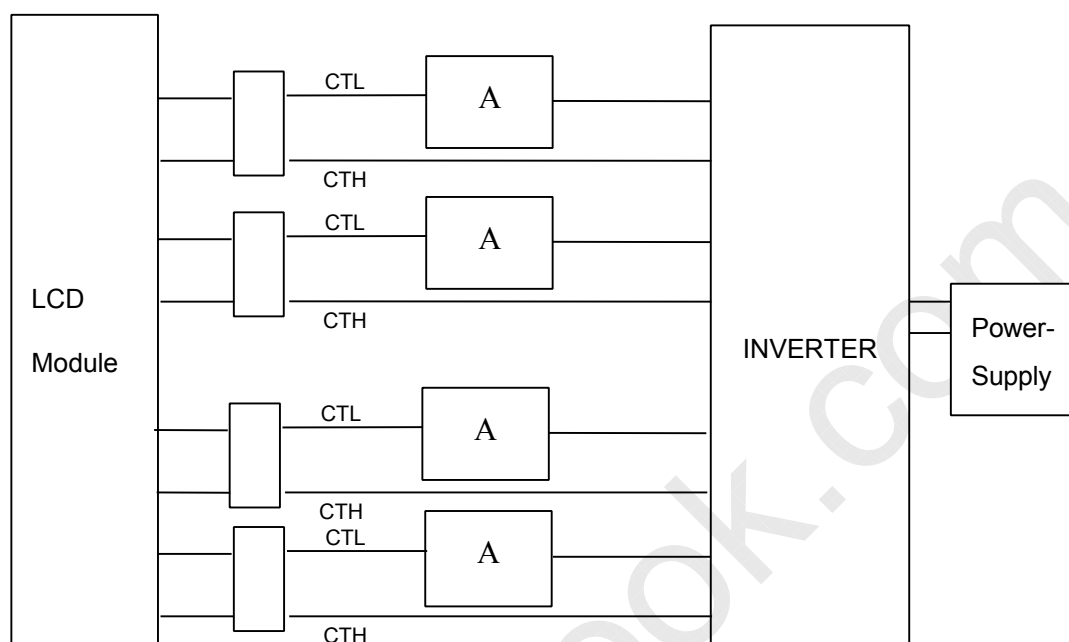A : The degrees of unbalance : <10%

B : The ratio of wave height : $< \sqrt{2} \pm 10\%$

*The property of single lamp

2) The lamp working current (I_{cyc}) of any waveform of light up-driving can not over the maximum of lamp typical current.($I_{cyc\ :}$ Cycle RMS of oscilloscope)

*Measure system: connector current meter with low voltage end

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3) Lamp Current measurement method (The current meter is inserted in cold line)

```
┌──────────┐                                                    ┌──────────┐
│          │    ┌──┐  CTL  ┌─────┐                              │          │
│          │────│  │───────│  A  │──────────────────────────────│          │
│          │    └──┘       └─────┘                              │          │
│          │         CTH                                        │          │
│          │    ┌──┐  CTL  ┌─────┐                              │          │
│   LCD    │────│  │───────│  A  │──────────────────────────────│          │  ┌────────┐
│          │    └──┘       └─────┘                              │ INVERTER │──│ Power- │
│  Module  │         CTH                                        │          │  │ Supply │
│          │    ┌──┐  CTL  ┌─────┐                              │          │  └────────┘
│          │────│  │───────│  A  │──────────────────────────────│          │
│          │    └──┘  CTH  └─────┘                              │          │
│          │    ┌──┐  CTL  ┌─────┐                              │          │
│          │────│  │───────│  A  │──────────────────────────────│          │
│          │    └──┘       └─────┘                              │          │
│          │         CTH                                        │          │
└──────────┘                                                    └──────────┘
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b. Frequency in 50~60kHz can make characteristics of electric and optics better.

c. Frequency in 45~80kHz won't damage the lifetime and reliability of lamp.

d. Lamp frequency of inverter may produce interference with horizontal(or vertical) 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.

    a.   Luminance (L) under 50% of specification.

    b.   Starting Lamp Voltage: over130% of the initial value. Ta=25℃

    a.   Lamp current is 7.5mA

    b.   Frequency is 10 sec.(on)/10 sec.(off)

    c.   Repeat it for 100 thousand times

    d.   The lamp hue variation must smaller than 0.03

    e.   It should not have motion fail when starting lamp voltage is lower than 130%of the initial value.

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4. INTERFACE PIN CONNECTION

(1) CN1

Outlet connector: FI-XB30SSRL-HF16 (JAE) (or equivalent)

PIN NO.	REMARK	FUNCTION
1	RXO0-	minus signal of odd channel 0(LVDS)
2	RXO0+	plus signal of odd channel 0(LVDS)
3	RXO1-	minus signal of odd channel 1(LVDS)
4	RXO1+	plus signal of odd channel 1(LVDS)
5	RXO2-	minus signal of odd channel 2(LVDS)
6	RXO2+	plus signal of odd channel 2(LVDS)
7	GND	GND
8	RXOC-	minus signal of odd clock channel (LVDS)
9	RXOC+	plus signal of odd clock channel (LVDS)
10	RXO3-	minus signal of odd channel 3(LVDS)
11	RXO3+	plus signal of odd channel 3(LVDS)
12	RXE0-	minus signal of even channel 0(LVDS)
13	RXE0+	plus signal of even channel 0(LVDS)
14	GND	GND
15	RXE1-	minus signal of even channel 1(LVDS)
16	RXE1+	plus signal of even channel 1(LVDS)
17	GND	GND
18	RXE2-	minus signal of even channel 2(LVDS)
19	RXE2+	plus signal of even channel 2(LVDS)
20	RXEC-	minus signal of even clock channel (LVDS)
21	RXEC+	plus signal of even clock channel (LVDS)
22	RXE3-	minus signal of even channel 3(LVDS)
23	RXE3+	plus signal of even channel 3(LVDS)
24	GND	GND
25	NC	NC
26	NC	Test pin (Can't connect to GND)
27	NC	NC
28	VCC	Power supply input voltage(5.0 V)
29	VCC	Power supply input voltage(5.0 V)
30	VCC	Power supply input voltage(5.0 V)

1) Keep the NC Pin and don't connect it to GND or other signals.

2) GND Pin must connect to the ground, don't let it be a vacant pin.

(2) CN2, 3, 4, 5 (BACKLIGHT)

CN2、CN3、CN4、CN5：BHSR-02VS-1 (JST)

<Mating connector: SM02B-BHSS-1-TB (JST)>

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No.	Pin	Symbol	Description
CN2	1	HV	High Voltage Output for CCFL Lamp 1
	2	LV	Low Voltage Output for CCFL Lamp 1
CN3	1	HV	High Voltage Output for CCFL Lamp 2
	2	LV	Low Voltage Output for CCFL Lamp 2
CN4	1	HV	High Voltage Output for CCFL Lamp 3
	2	LV	Low Voltage Output for CCFL Lamp 3
CN5	1	HV	High Voltage Output for CCFL Lamp 4
	2	LV	Low Voltage Output for CCFL Lamp 4

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5. INTERFACE TIMING

(1) Timing Characteristic

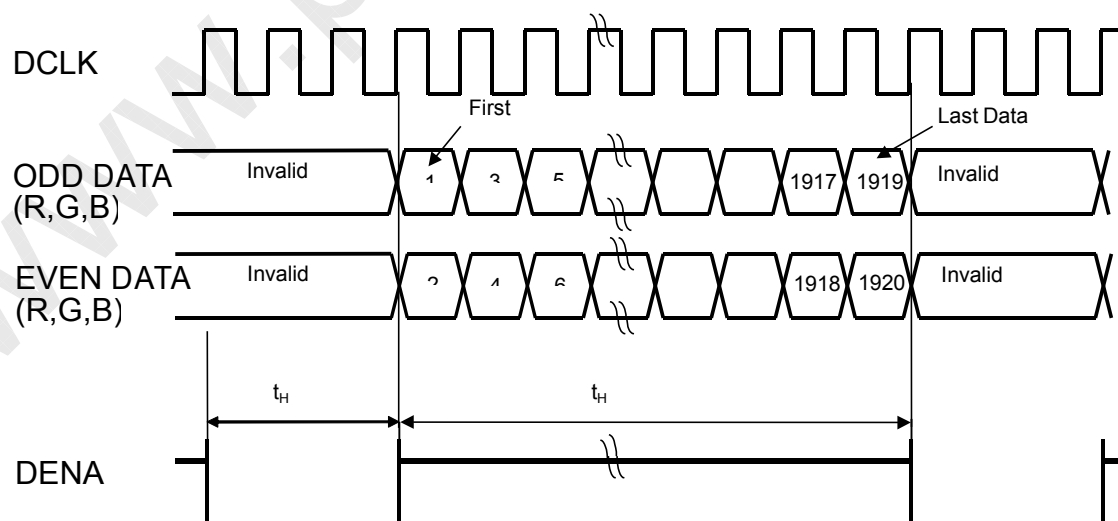| ITEM				SYMBOL	MIN.	TYP.	MAX.	UNIT
LCD Timing	DCLK		Freq.	f_{CLK}	60	77	83	MHz
			Cycle	t_{CLK}	16.67	12.99	12.05	ns
	DENA	Horizontal	Horizontal total time	t_H	992	1040	1075	t_{CLK}
			Horizontal effective time	t_{HA}	960	960	960	t_{CLK}
			Horizontal blank time	t_{HB}	32	80	115	t_{CLK}
		Vertical	Vertical frame Rate	Fr	50	60	69	Hz
			Vertical total time	t_V	1204	1235	1290	t_H
			Vertical effective time	t_{VA}	1200	1200	1200	t_H
			Vertical blank time	t_{VB}	4	35	90	t_H

[Note]

*1) DENA (data enable) usually is positive

*2) DCLK still inputs during blanking

*3) LVDS transmitter IC: SPFD3223A-HF081(Orise)

*4) LVDS IC：

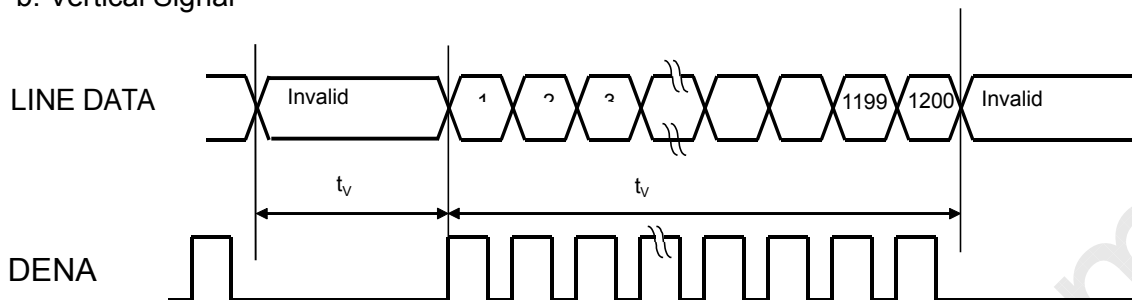| Receiver	Transmitter
DS90C384MTD(NS)	DS90C383MTD(NS)
SN75LVDS82(TI)	SN75LVDS83(TI)

*5) DE mode only

*6) It maybe cause flicker at 50Hz
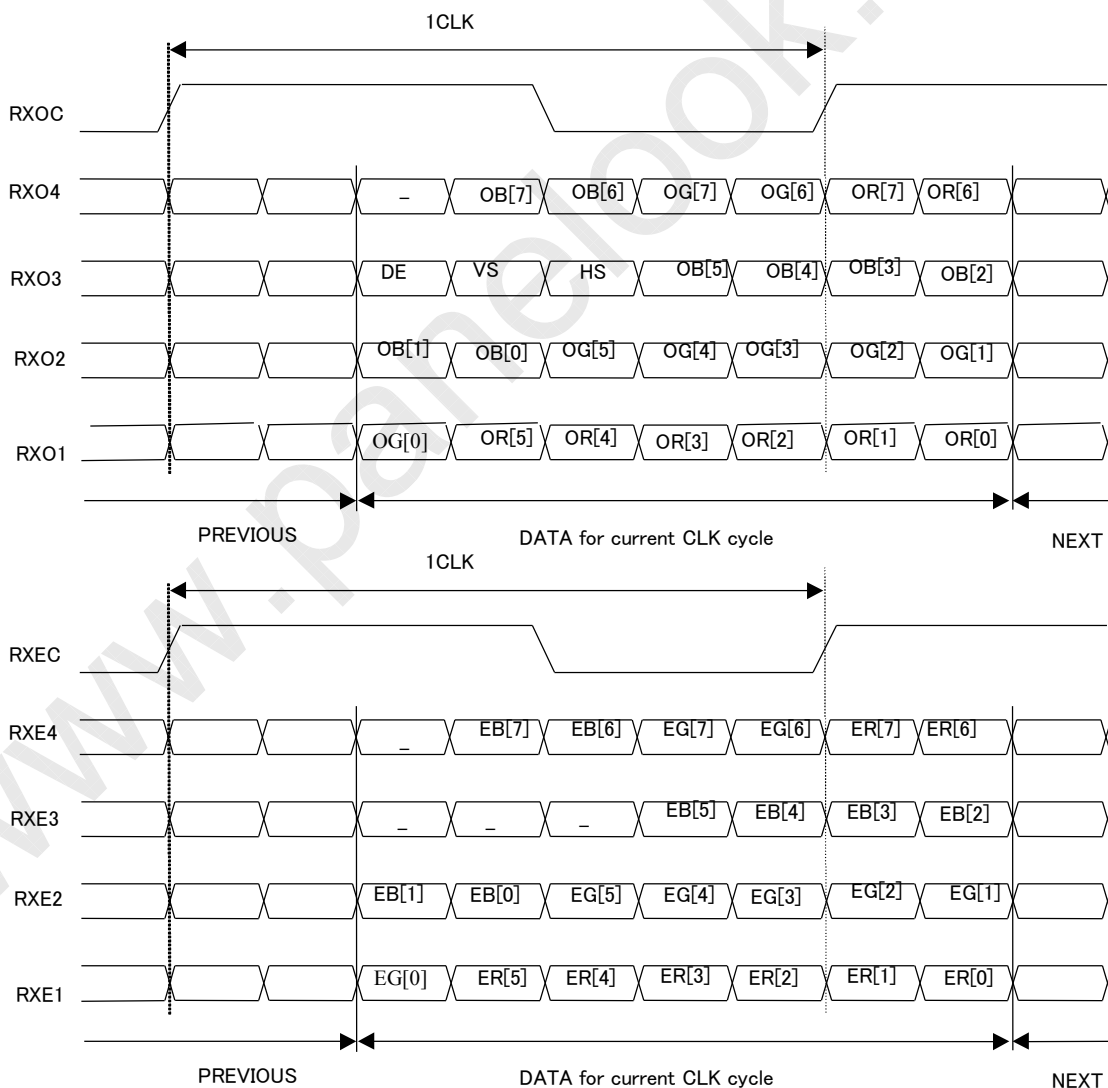
(2).Timing Chart

　　a. Horizontal Signal

b. Vertical Signal

LINE DATA

Invalid ... 1 ... 2 ... 3 ... 1199 ... 1200 ... Invalid

t_V ... t_V

DENA

(3).LVDS Data

For 6Bit+Hi-FRC

1CLK

RXOC

RXO4 — — OB[7] OB[6] OG[7] OG[6] OR[7] OR[6]

RXO3 — DE VS HS OB[5] OB[4] OB[3] OB[2]

RXO2 — OB[1] OB[0] OG[5] OG[4] OG[3] OG[2] OG[1]

RXO1 — OG[0] OR[5] OR[4] OR[3] OR[2] OR[1] OR[0]

PREVIOUS　　DATA for current CLK cycle　　NEXT

1CLK

RXEC

RXE4 — — EB[7] EB[6] EG[7] EG[6] ER[7] ER[6]

RXE3 — — — — EB[5] EB[4] EB[3] EB[2]

RXE2 — EB[1] EB[0] EG[5] EG[4] EG[3] EG[2] EG[1]

RXE1 — EG[0] ER[5] ER[4] ER[3] ER[2] ER[1] ER[0]

PREVIOUS　　DATA for current CLK cycle　　NEXT

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Color Data Assignment

COLOR	INPUT DATA	R DATA								G DATA								B DATA							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	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	0	0	0	0	0	0
	RED(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	BLUE(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	CYAN	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	MAGENTA	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	YELLOW	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	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	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	0	0	0	0	0	0
	RED(1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(255)	1	1	1	1	1	1	1	1	0	0	0	0	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	0	0	0	0	0	0
	GREEN(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	GREEN(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	GREEN(254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	GREEN(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	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	0	0	0	0	0	0
	BLUE(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	BLUE(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	BLUE(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	BLUE(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

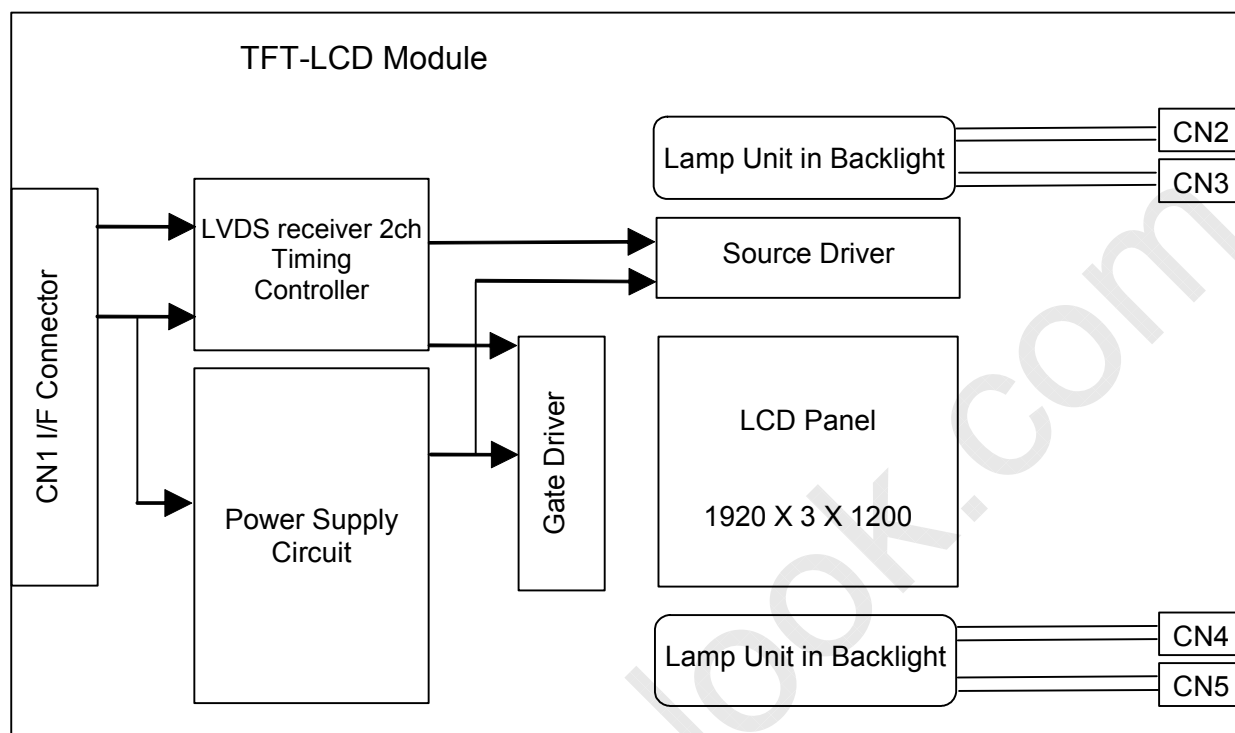[Note]　　1) Definition of gray scale: Color (n): n indicates gray scale level; higher n means brighter level.
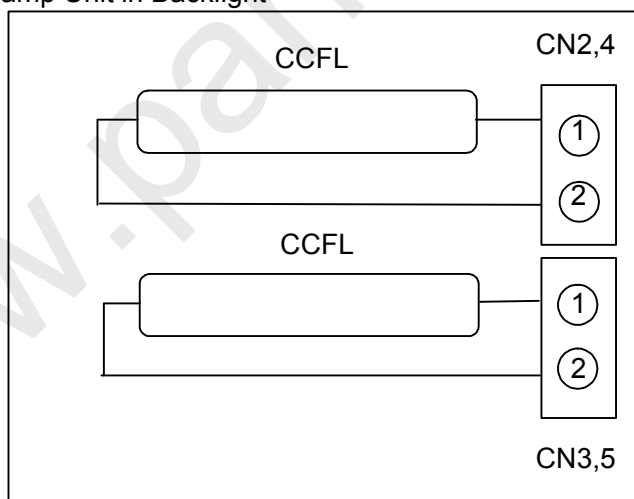
2) Data: 1-High, 0-Low.

3)For odd & even data also.

(4).Color Data Distribution

D(1,1)	D(2,1)	..	D(X,1)	..	D(1919,1)	D(1920,1)
D(1,2)	D(2,2)	..	D(X,2)	..	D(1919,2)	D(1920,2)
..	..	+	..	+	..	..
D(1,Y)	D(2,Y)	..	D(X,Y)	..	D(1919,Y)	D(1920,Y)
..	..	+	..	+	..	..
D(1,1199)	D(2,1199)	..	D(X,1199)	..	D(1919,1199)	D(1920,1199)
D(1,1200)	D(2,1200)	..	D(X,1200)	..	D(1919,1200)	D(1920,1200)

6. BLOCK DIAGRAM

TFT-LCD Module

CN1 I/F Connector

LVDS receiver 2ch Timing Controller

Power Supply Circuit

Gate Driver

Lamp Unit in Backlight — CN2 / CN3

Source Driver

LCD Panel

1920 X 3 X 1200

Lamp Unit in Backlight — CN4 / CN5

Lamp Unit in Backlight

CN2,4

CCFL

① ②

CCFL

① ②

CN3,5

7. MECHANICAL SPECIFICATION

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(1) Front side (Tolerance is ± 0.5mm unless noted)　　　　　　　　　　　　[Unit:mm]

(2) Rear side (Tolerance is ±0.5mm unless noted)   [Unit: mm]

175.75±1

116.15±1

130±1.0

130±1.0

HIGH VOLTAGE CAUTION

THE GROUP TFT LCD CONTAINS COLD CATHODE
FLUORESCENT LAMPS, PLEASE FOLLOW LOCAL
ORDINANCES AND REGULATIONS FOR ITS DISPOSAL

BARCODE AREA

(60.25)

(57.95)
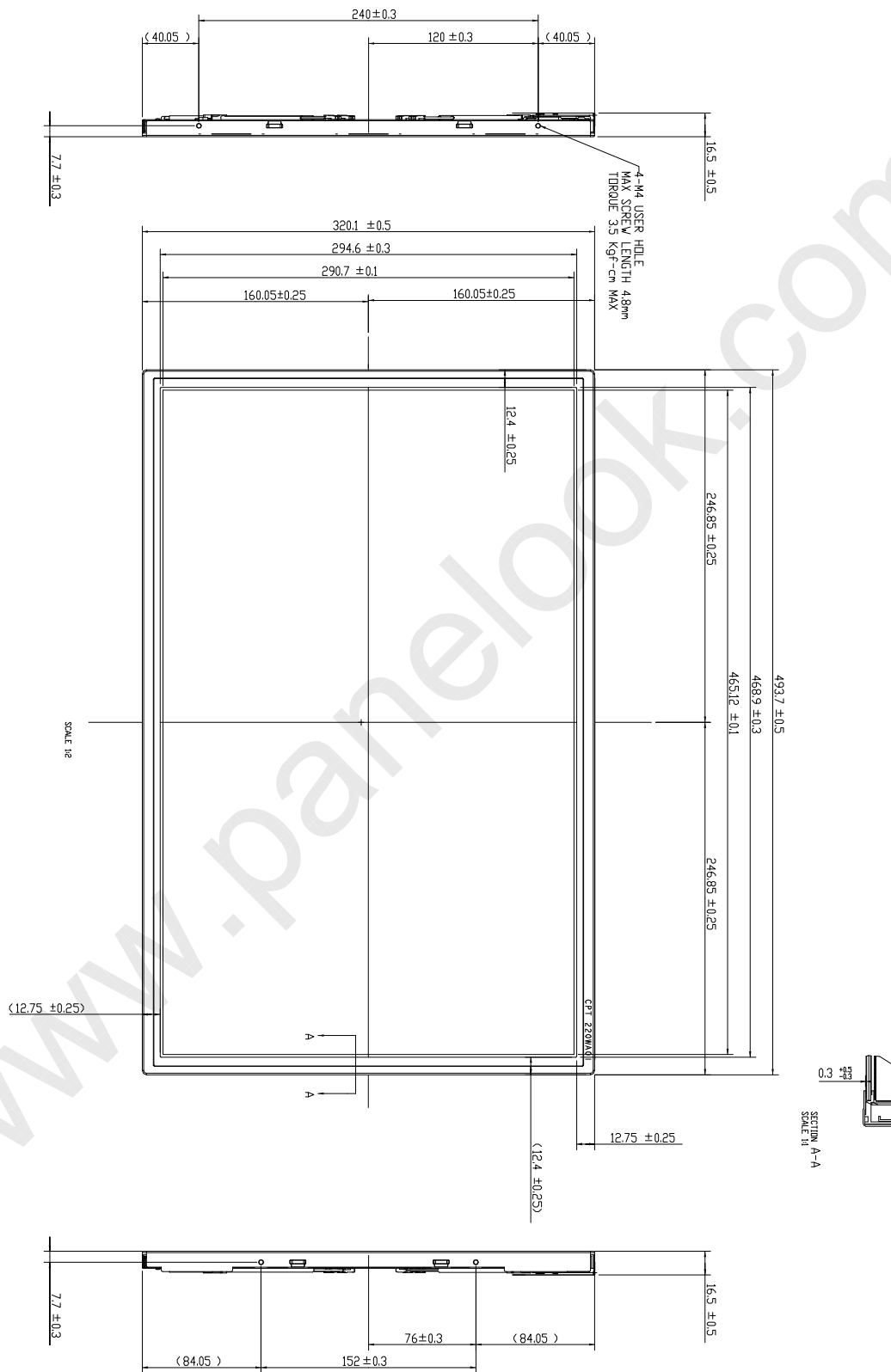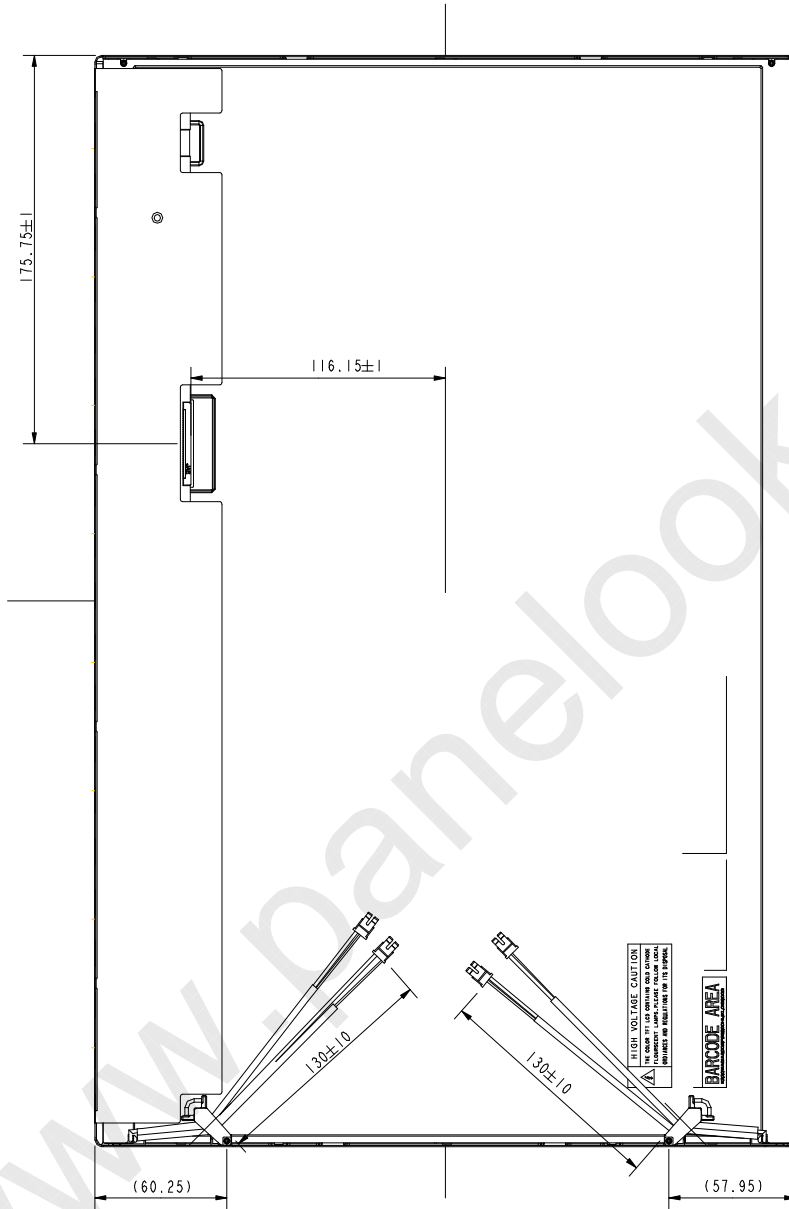
8. OPTICAL CHARACTERISTICS

Ta=25℃，VCC=5.0V

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
Contrast (CEN)		CR	θ=ψ= 0°	800	1000	--	--	*1) 2)
Luminance (CEN)		L	θ=ψ= 0°	250	300	--	cd/m²	*1) 3)
9P Uniformity		ΔL	θ=ψ= 0°	75	--	--	%	*1) 3)
Response Time		Tr+Tf	θ=ψ= 0°	--	5	8	ms	*5)
Cross talk		CT	θ=ψ= 0°	--	--	1.5	%	*6)
View angle	Horizontal	ψ	CR≧10	75/-75	85/-85	--	Deg.	*4)
	Vertical	θ		65/-75	75/-85	--	Deg.	
Color Coordinates	White	x	θ=ψ= 0°	0.283	0.313	0.343	Color Coordinates	*3)
		y		0.299	0.329	0.359		
	Red	x		(0.616)	(0.646)	(0.676)		
		y		(0.310)	(0.340)	(0.370)		
	Green	x		(0.254)	(0.284)	(0.314)		
		y		(0.587)	(0.617)	(0.647)		
	Blue	x		(0.116)	(0.146)	(0.176)		
		y		(0.056)	(0.086)	(0.116)		
Gamut		CG	θ=ψ= 0°	70	72		%	
Gamma		γ	VESA	2.0	2.2	2.4	--	*7)

[Note]

Color coordinate and color gamut are measured by CS-1000, and all the other items are measured by BM-5A (TOPCON). All these items are measured under the dark room condition (no ambient light).

Measurement Condition: IL=7.5mA × 4

Inverter: Sumida, model: TWS-400-9656－－ , Frequency=50kHz.

Definition of these measurement items is as follows:

1) Setup of Measurement Equipment

The LCD module should be turn-on to a stable luminance level to be reached. The measurement should be executed after lighting Backlight for 20 minutes and in a dark room.
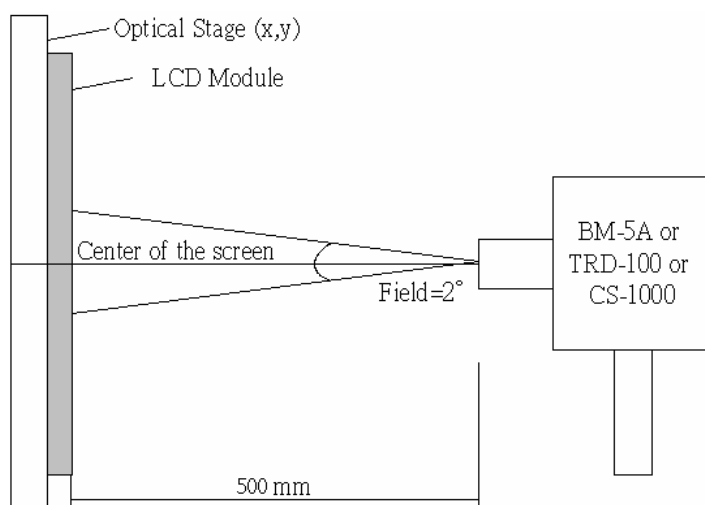
2) Definition of Contrast Ratio

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

3) Definition of Luminance and Luminance uniformity

Central luminance: The white luminance is measured at the center position "5" on the screen, see Fig.1 below. And the measure time is 30 min after discharged.

9P Luminance (AVG): The white luminance is measured at measuring points 1 to 9, see Fig.1 below.
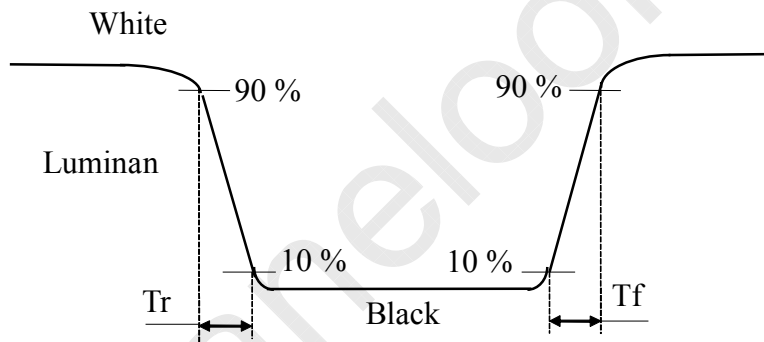
9P Uniformity: $\Delta L = (L_{MIN} / L_{MAX}) \times 100\%$
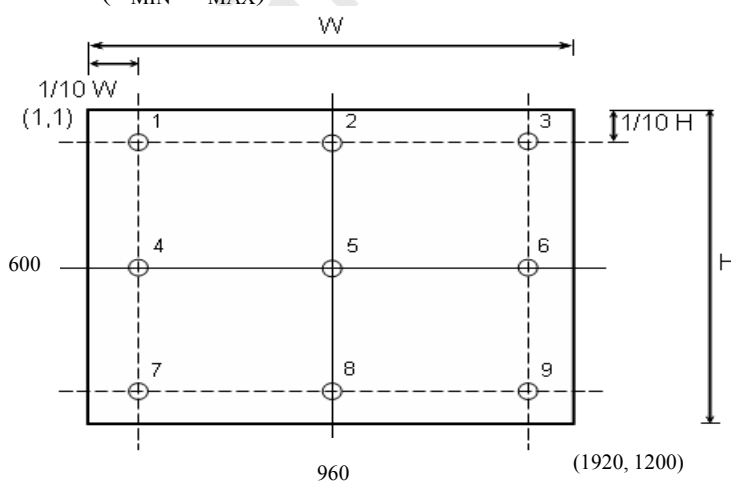
4).Definition of Viewing Angle (θ,ψ):

Datasheet Version.: 01
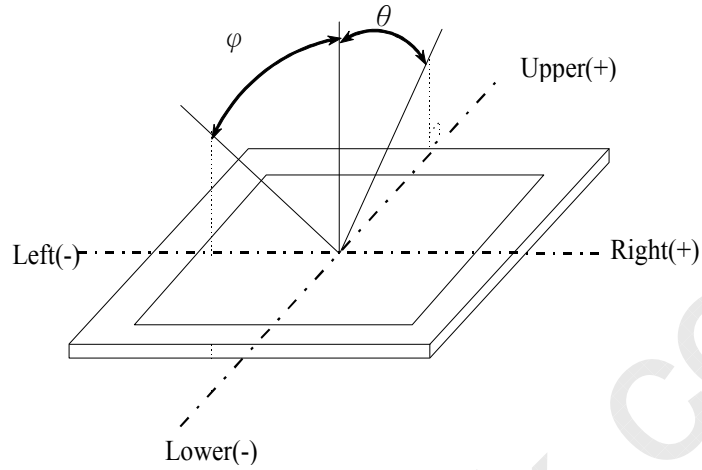
5) Definition of Response Time:

6) Definition of crosstalk:

CT= │ Y_B-Y_A │ /Y_A X 100 (%)

Y_A : The luminance of measured position at pattern A

Y_B : The luminance of measured position at pattern B with Gray level 0
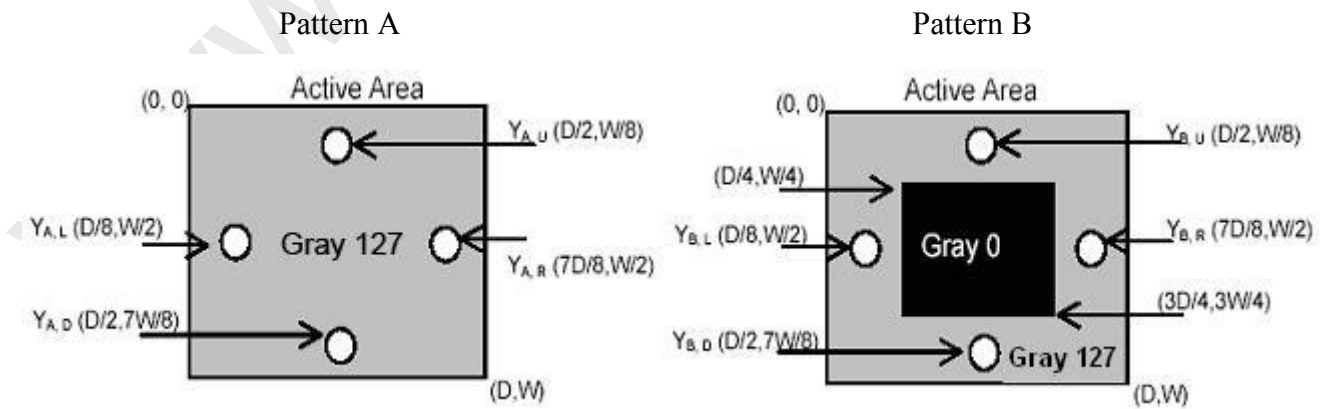
7) Definition of Gamma (γ), follow VESA standard sampling every 16 gray level (0,16,32,…..224,240,255)

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$$y = \gamma\, x - k$$

T
%

Gray level (LOG)

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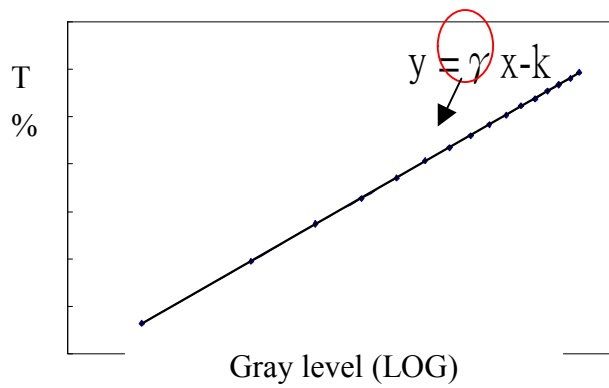
9. RELIABILITY TEST CONDITIONS

(1) Temperature and Humidity

TEST ITEMS	CONDITIONS
HIGH TEMPERATURE HIGH HUMIDITY OPERATION	50℃; 90%RH; 240h (No condensation)
HIGH TEMPERATURE HIGH HUMIDITY STORAGE	60℃; 90%RH; 48h (No condensation)
HIGH TEMPERATURE OPERATION	50℃; 240h
HIGH TEMPERATURE STORAGE	60℃; 240h
LOW TEMPERATURE OPERATION	0℃; 240h
LOW TEMPERATURE STORAGE	-20℃; 240h
THERMAL SHOCK	BETWEEN -20℃(1hr)AND 60℃(1hr); 100 CYCLES

(2) Shock & Vibration

ITEMS	CONDITIONS
SHOCK (NON-OPERATION)	Shock level:980m/s^2(100G) 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) ESD

POSITION	CONDITION(MDL turn off)
Connector	1. 200 pF，0 Ω，±250 V 2. contact mode for each pin
Module	1. 150 pF，330 Ω，±15K V 2. Air mode, test 25 times for each test point 3. Contact mode, 25 times for each test point

(4) Low Pressure test

| TEST ITEM	CONDITION
Low Pressure test(storage)	260HPa (30000 ft.) ；24 Hr

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(5) 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. DESIGNATION OF LOT MARK

(c)   (b)   (a)
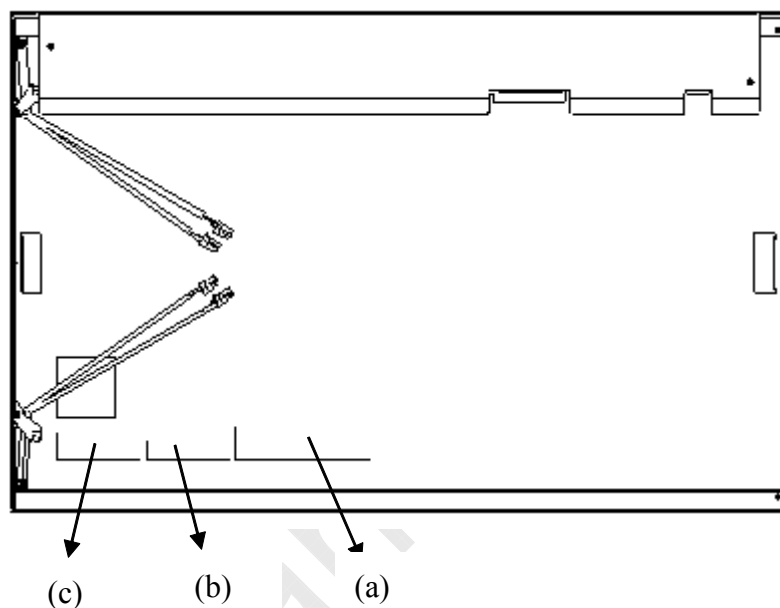
(a) 4_IN_1 LABEL: (Model Name: CLAA220FA01)

A	B	C	D	E	F	G	H	I

A：Year

B、C：Week

D、E、F、G、H：Serial No.

I：Factory Code

[Note]

(1) Year

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Mark	0	1	2	3	4	5	6	7	8	9

(2) Week

Week	1	2	3	4	5	6	7	8	9	10	11	12
Mark	01	02	03	04	05	06	07	08	09	10	11	12

(3) Serial No.

Serial No.	1~99,999
Mark	00001~99999

(4) Factory Code

Factory Code	T2 Factory	L Factory	WJ1 Factory	WJ2 Factory	WJ3 Factory	SDT Factory	FDT Factory	CTOC Factory
Mark	R	S	U	V	A	Z	F	Q

(b) PANEL LABEL：

EAT0PKHM

(c) B/L MAKER　LABEL：（R220FA01xxxxxxxxxxxxxxxxxxxx)

R220FA01xxxxxxxxxxxxxxxxxxxx

※ Location of Lot Mark

The label is attached to the backside of the LCD Module. This is subject to change without prior notice.
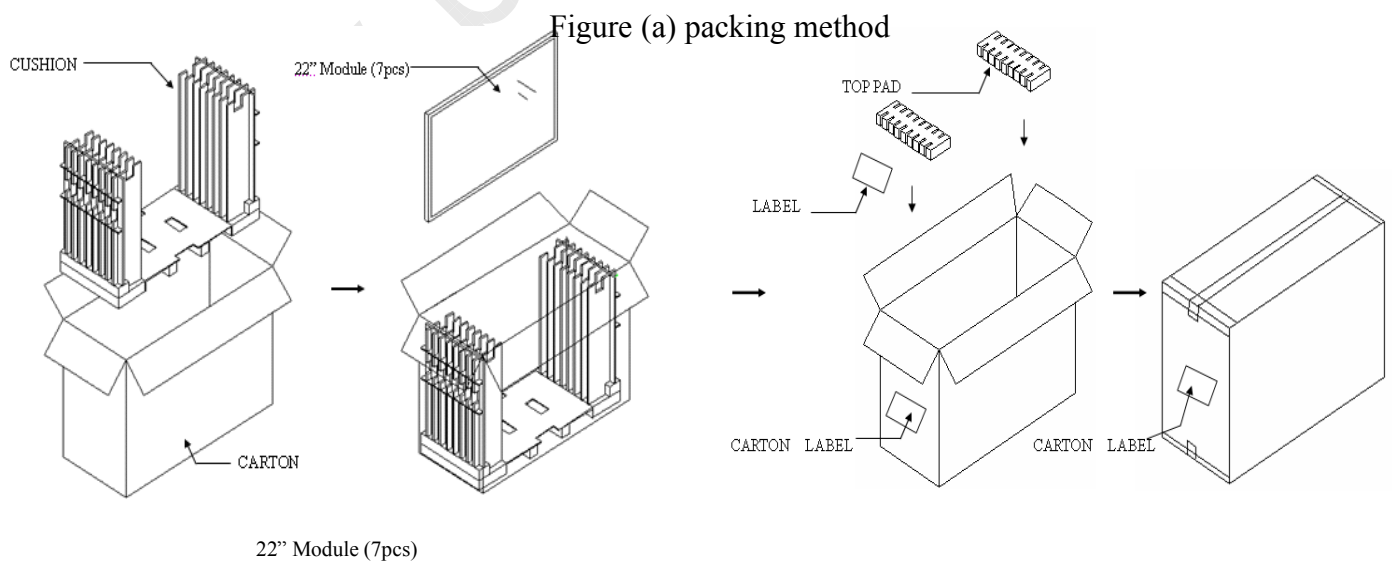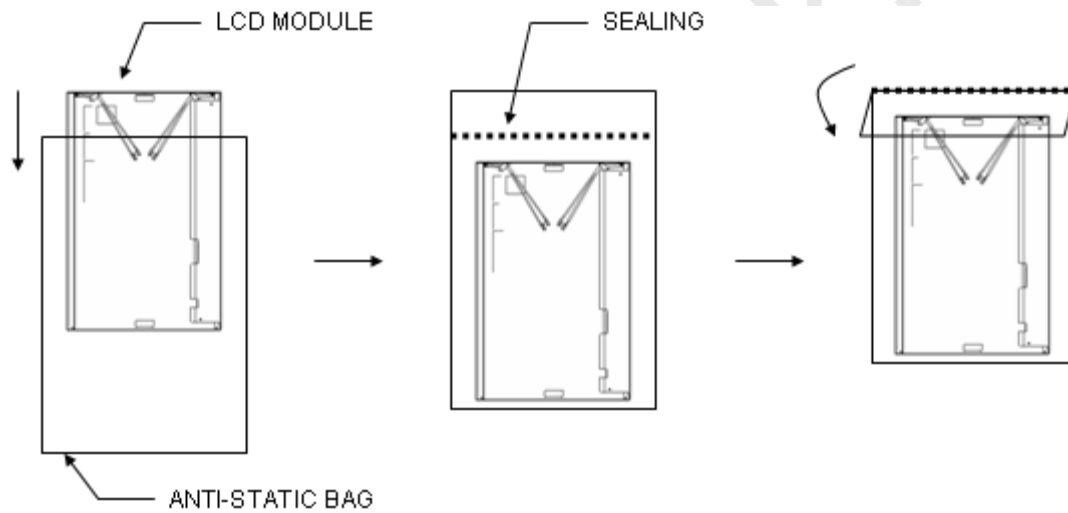
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11. PACKING CIFICATION

(1)Packing

- 7 LCD TV modules (max.) / 1 Box
- 24 box (max.) / 1 pallet
- Box dimensions: 564(L)×244(W)×412(H)
- Weight: approximately 22Kg (7 modules per box)

(2)Packing Method

Figure (a) and (b) are the packing method

Figure (a) packing method

22" Module (7pcs)

Cover Protector: L1230 × 50 × 50mm

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Pallet: 1150(L) × 1000(W) × 130(H) mm

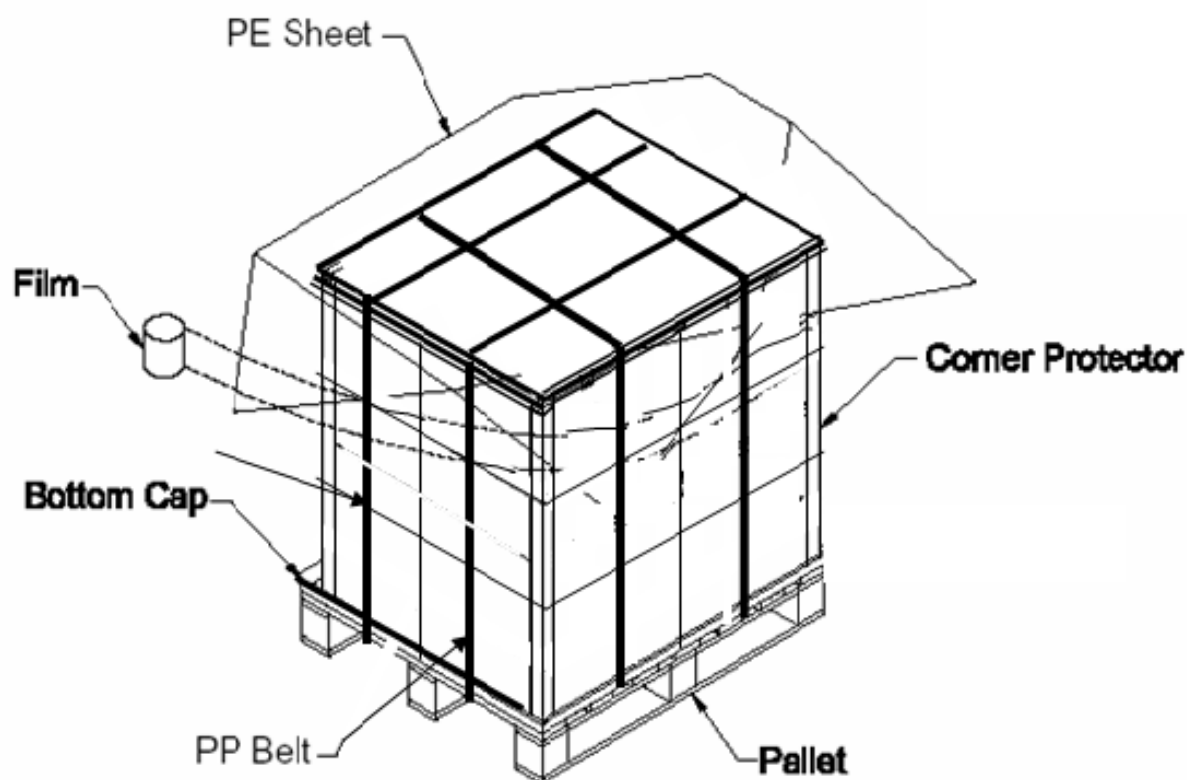Top/Bottom Cap: L1150 × 1000 × 130mm

Pallet stack: 1150(L) × 1000(W) × 1386(H) mm

Gross Weight: 541Kg(±2Kg)

Figure (b) packing method

12. 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.

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(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 wit 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 charge 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. PRECAUTFONSWITHELECTROSTATICS

(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℃.

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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 thoroughly 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 5 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.)