Chunghwa Picture Tubes, Ltd.
Technical Specification

To :

Date : 130905

CPT TFT-LCD

CLAA101WJ06

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Title：CLAA101WJ06 Technical Specification

Modification Record List

NO.	Issue Date	Modification Index
1	2013/04/11	First Edition
2	2013/04/15	Page4 Brightness 280min→300 min Consumption of Power 2.86W→2.64W
3		Page8 Forward Current 17.5mA→18mA Power consumption 1.89W→1.94W Luminance 280nits min →300nits min
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Title：CLAA101WJ06 Technical Specification

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1. OVERVIEW

CLAA101WJ06 is 10.1” color TFT-LCD (Thin Film Transistor Liquid Crystal Display) module composed of LCD panel, driver ICs, control circuit and backlight. By applying 8 bit digital data, 1366×RGB (3) ×768, 16.7M-color images are displayed on the 10.1” diagonal screen. general specifications are summarized in the following table：

ITEM	SPECIFICATION
Display Area	223.341 (H)x125.568 (V) (mm)
Number of Pixels	1366 ×RGB(H)×768 (V)
Pixel Pitch	163.5(H) x 163.5(V) um
Color Pixel Arrangement	RGB vertical stripe
Display Mode	Normally Black
Number of Colors	16.7M
Gamut	50%(Typ)
Optimum Viewing Angle	--
Response Time	30ms (Typ)/35ms (Max)
Surface Treatment	HC
Viewing Angle	80°、80° / 80°、80°(Min) 89°、89° / 89°、89°(Typ.)
Brightness	350 cd/m^2 (Center Point) (Typ) 300 cd/m^2 (Center Point) (Min)
Uniformity	5 point：80%(Min.) 13 point：70%(Min.)
Consumption of Power	2.64W (Max)
Module Size	234.53 x138.97(V)x 2.4 (W/o)(Typ) 234.53 x138.97(V)x 4.2 (W/P)(Typ)
Module Weight	115g (Max.)

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

The following are maximum value, which if exceeded, may cause faulty operation or damage to the unit.

ITEM	SYMBOL	MIN.	MAX.	UNIT	NOTE
LCD Power Voltage	VCC	0	3.6	V	
Operation Temperature	Top	0	50	℃	*1). 2). 3). 4)
Storage Temperature	Tstg	-25	65	℃	*1). 2). 3)

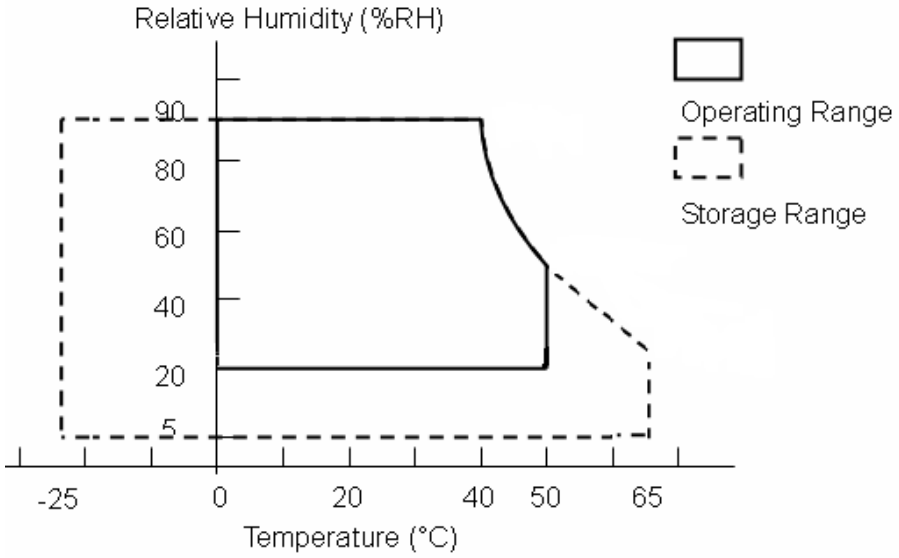
【Note】

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

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

*3) If product in environment which over the definition of the relative temperature and humidity out of range too long, it will affect visual of LCD.

*4) If you operate LCD in normal temperature range, the center surface of panel should be under 50℃.



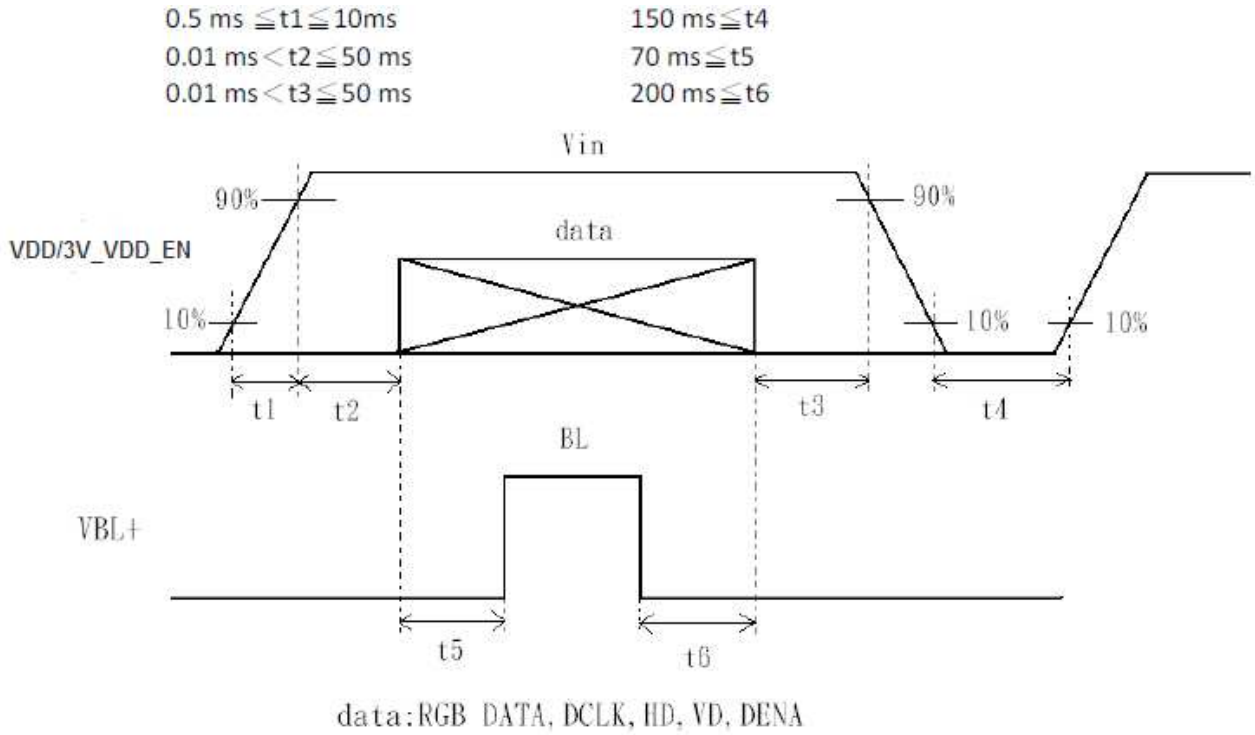
3. ELECTRICAL CHARACTERISTICS

(A) TFT LCD

TEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
LCD Power Voltage	VCC	3.0	3.3	3.6	V	*1)
LCD Power Current	ICC	-		233	mA	*2)
LCD Power	PDD	-	-	0.7	W	*2)
Rush Current	Irush	-	-	2	A	*3)

【Note】

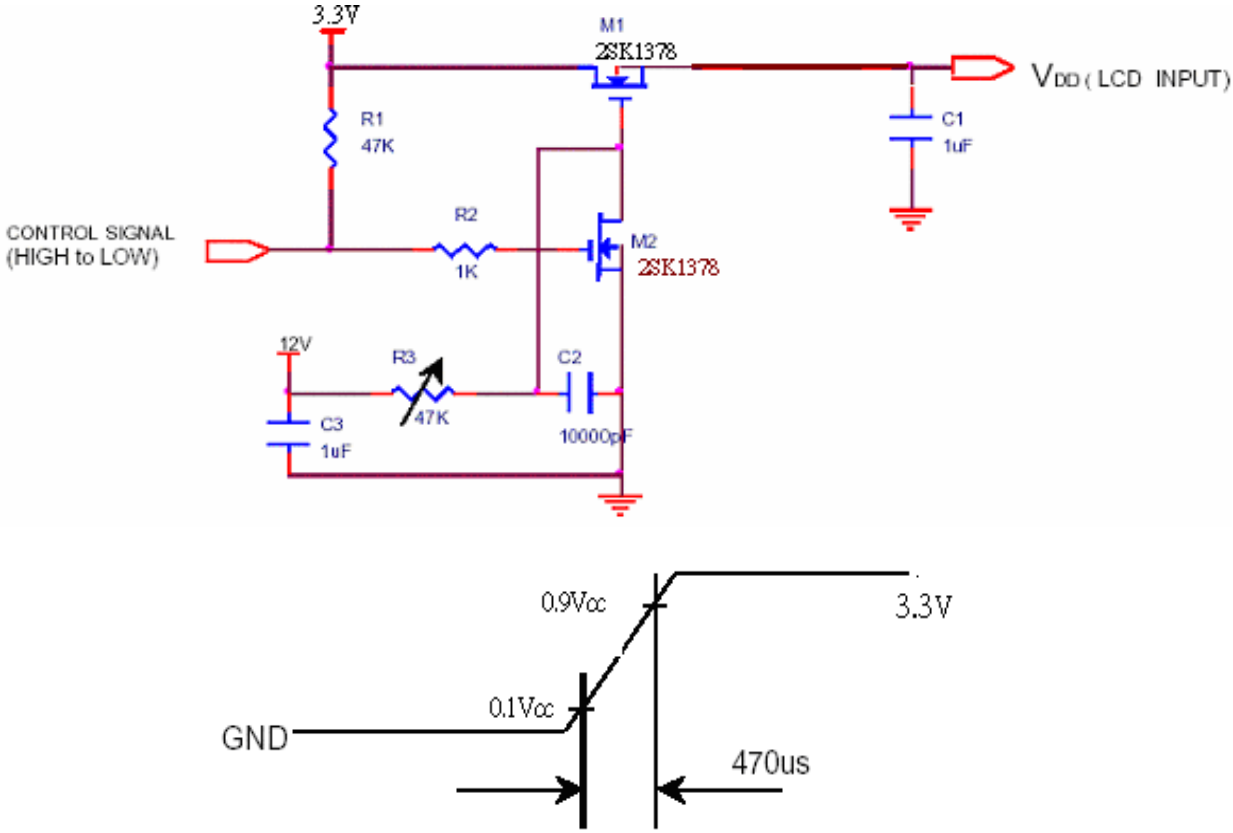
*1) Power Sequence：



*2) Max value is White Pattern：

Circuit condition (Max.)：VCC=3 V，f_V=59.96 Hz ，f_H=50.25 kHz，f_{CLK}=80.4 MHz

*3) Irush measure condition



(B) BACK LIGHT

(a.) ELECTRICAL CHARACTERISTICS

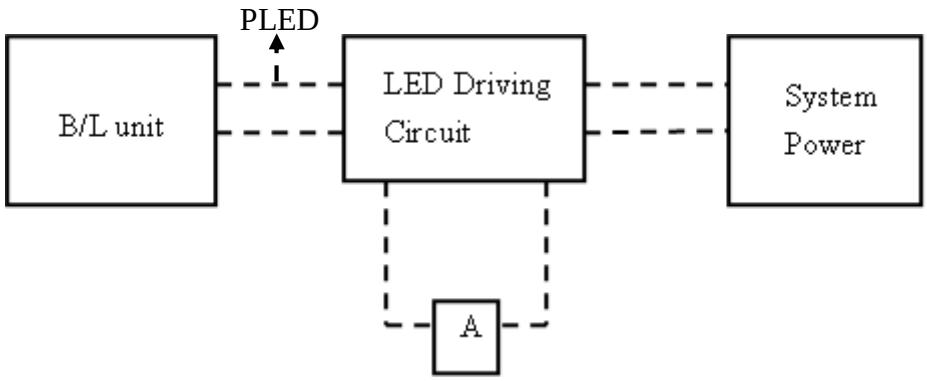
Ta=25℃

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
LED total Input Voltage	VBL+	16.2	16.8	18	V	
LED total Input Current	IBL+	-	108	-	mA	
Forward Voltage per LED	VF	2.7	2.8	3	V	
Forward Current per LED	IF	-	18	-	mA	*1)
Power consumption	PLED	-		1.94	W	*2)
PWM Frequency	PWM_BL	180	200	1K	Hz	
Duty ratio	Dim	5		100	%	

(b) LED LIFE – TIME

ITEM	Condition	min	typ	max	UNIT	NOTE
LIFE TIME	I_F=20mA、Ta=25℃	15000			hrs	*3)

*1). Measure method：Forward Current is measured by utilizing a current meter as show below.



*2) Calculator value for reference $I_F \times V_F \times N$ = PLED

*3) Life time means that estimated time to 50% degradation of initial luminous intensity.

*4) This Backlight have 6 LED strings. Every LED string consists of 6 pcs LED .

4. Connector Interface PIN & Function

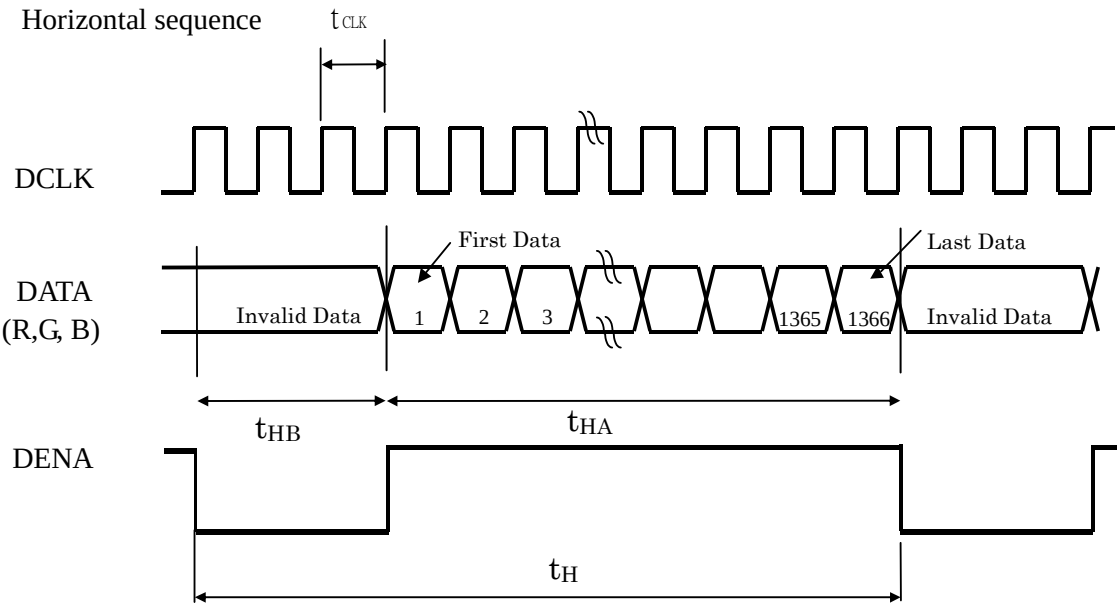
Connector 40pin : 20455-040E-12or equivalent

Pin No	symbol	description
1	VLED_VCC	Anode for BLU
2	VLED_VCC	
3	NC	BIST(Only for Aging)
4	VLED_Isink1	Current Sink for LED String
5	VLED_Isink2	
6	VLED_Isink3	
7	VLED_Isink4	
8	VLED_Isink5	
9	VLED_Isink6	
10	GND	GROUND
11	LEDPWM_MB	Back light PWM control, MB to Tcon
12	LEDPWM_Tcon	Back light PWM control, Tcon to MB
13	SDA	EDID data
14	SCL	EDID Clock
15	GND	GROUND
16	RX0N	-LVDS Differential Data Input
17	RX0P	+LVDS Differential Data Input
18	GND	GROUND
19	RX1N	-LVDS Differential Data Input
20	RX1P	+LVDS Differential Data Input
21	GND	GROUND
22	RX2N	-LVDS Differential Data Input
23	RX2P	+LVDS Differential Data Input
24	GND	GROUND
25	RXCN	-LVDS Differential Clock Input
26	RXCP	+LVDS Differential Clock Input
27	GND	GROUND
28	RX3N	-LVDS Differential Data Input
29	RX3P	+LVDS Differential Data Input
30	GND	GROUND
31	ID	reserved 0 ohm to GND (default mount)
32	ID	reserved 0 ohm to GND (default mount)
33	3V_VDD_EN	Enable logic 3V_VDD: High=enable; Low= disable,1.8V level
34	GND	GROUND
35	VDD	3.3V input
36	VDD	
37	VDD	
38	NC	NC
39	NC	
40	NC	

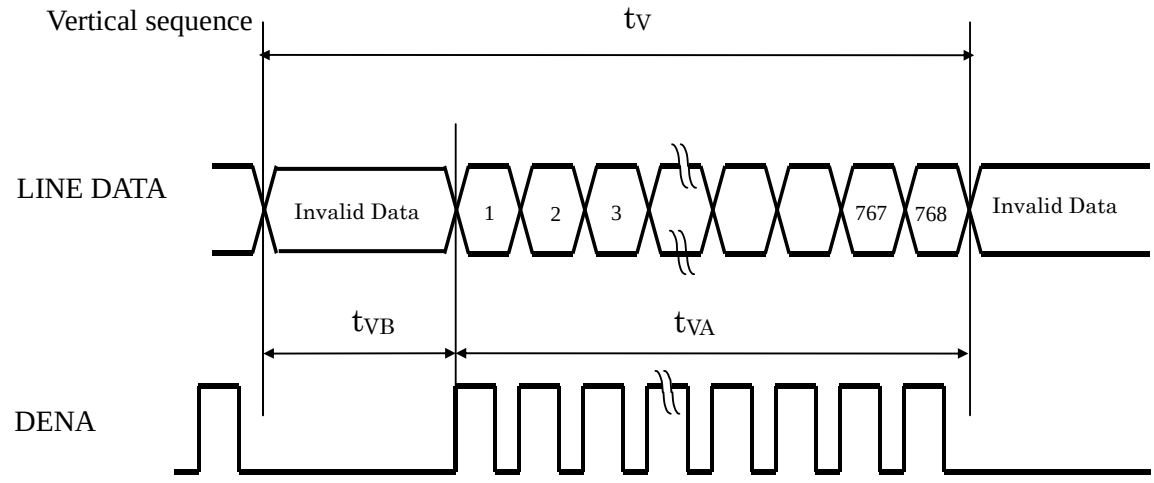
5. INTERFACE TIMING CHART

(1)

(a) LVDS input time sequence



(b) LCD input time sequence



(2) Timing Chart

ITEM				SYNBOL	MIN	TYP	MAX	UNIT
LCD Timing	Frame Rate			-	60	60	60	Hz
	DCLK		Frequency	f_{CLK}	68	80.4	85.5	MHz
	DENA	Horizontal	Horizontal total time	t_H	1430	1600	1651	t_{CLK}
			Horizontal Active time	t_{HA}	1366	1366	1366	t_{CLK}
			Horizontal Blank time	t_{HB}	64	234	285	t_{CLK}
		Vertical	Vertical total time	t_V	793	838	863	t_H
			Vertical Active time	t_{VA}	768	768	768	t_H
			Vertical Blank time	t_{VB}	25	70	95	t_H

【Note】

*1) DENA (DATA ENABLE) usually is positive.

*2) During the whole blank period, DCLK should keep input.

(3) DATA mapping

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】

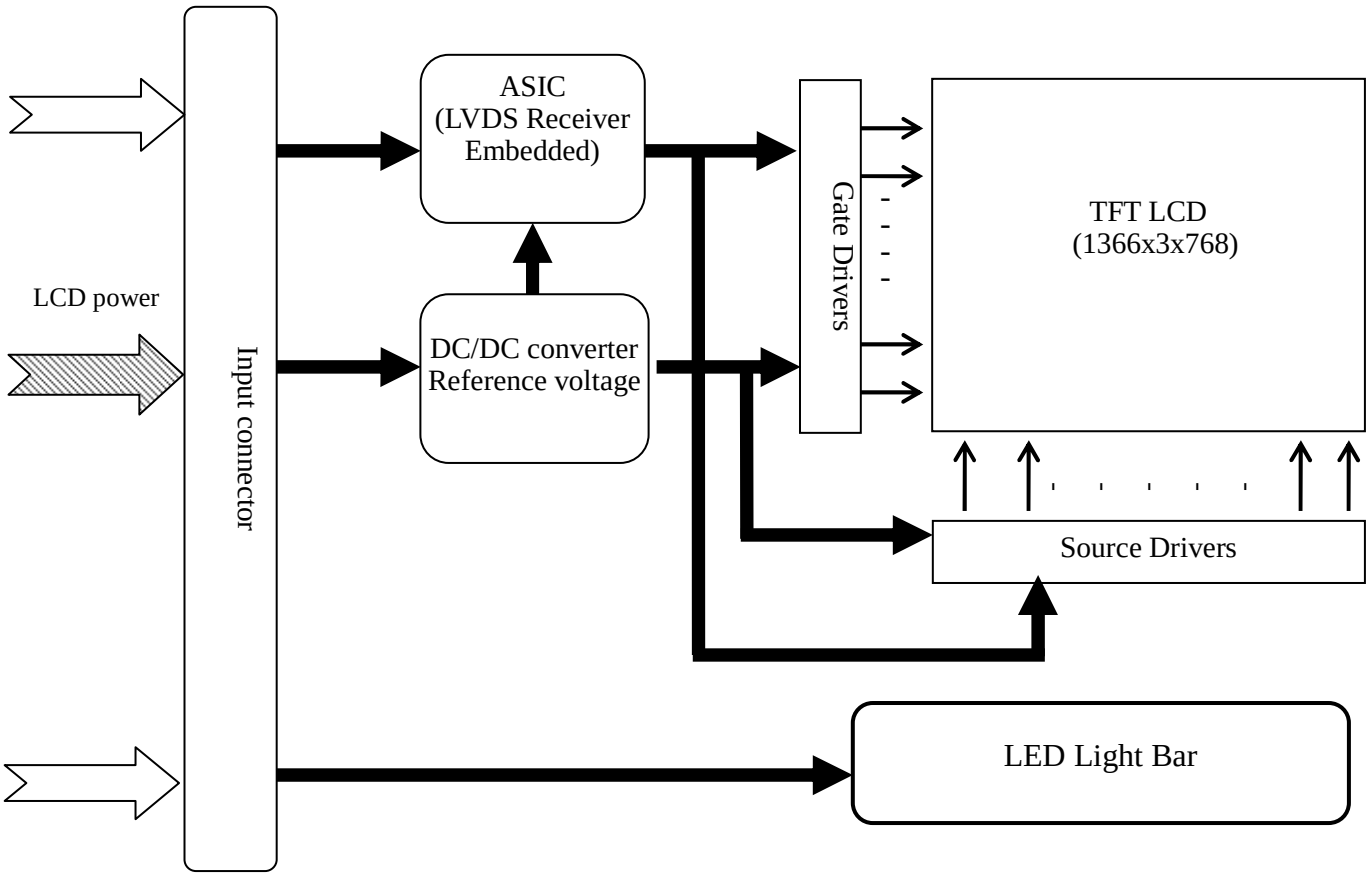
1) Gray level:

Color(n)：n is level order; higher n means brighter level.

2) DATA:

1: high，0: low

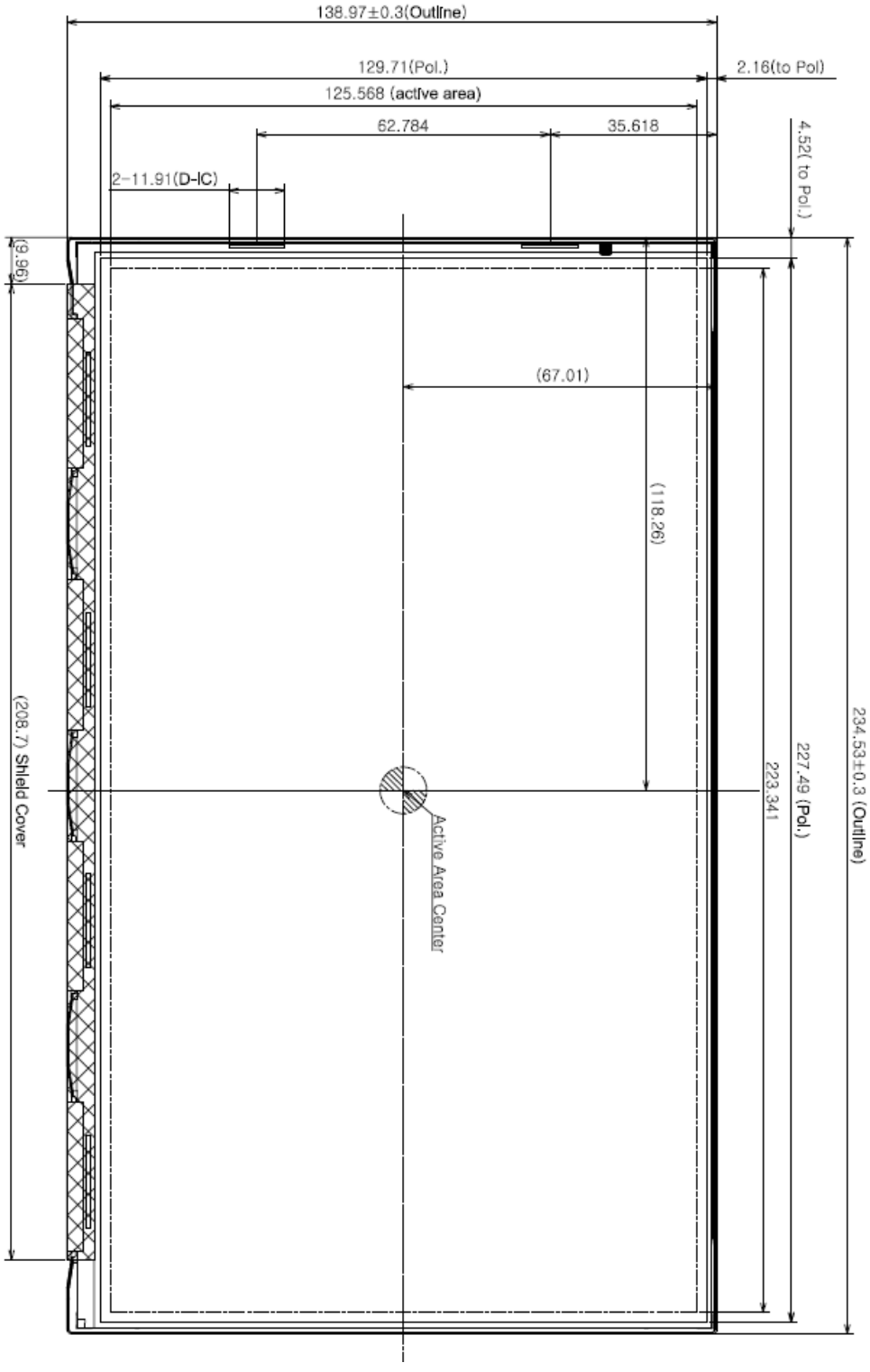
6. BLOCK DIAGRAM



7. MECHANICAL SPECIFICATION

(1) Front side

The tolerance, not show in the figure, is ±0.2mm. **[Unit： mm]**



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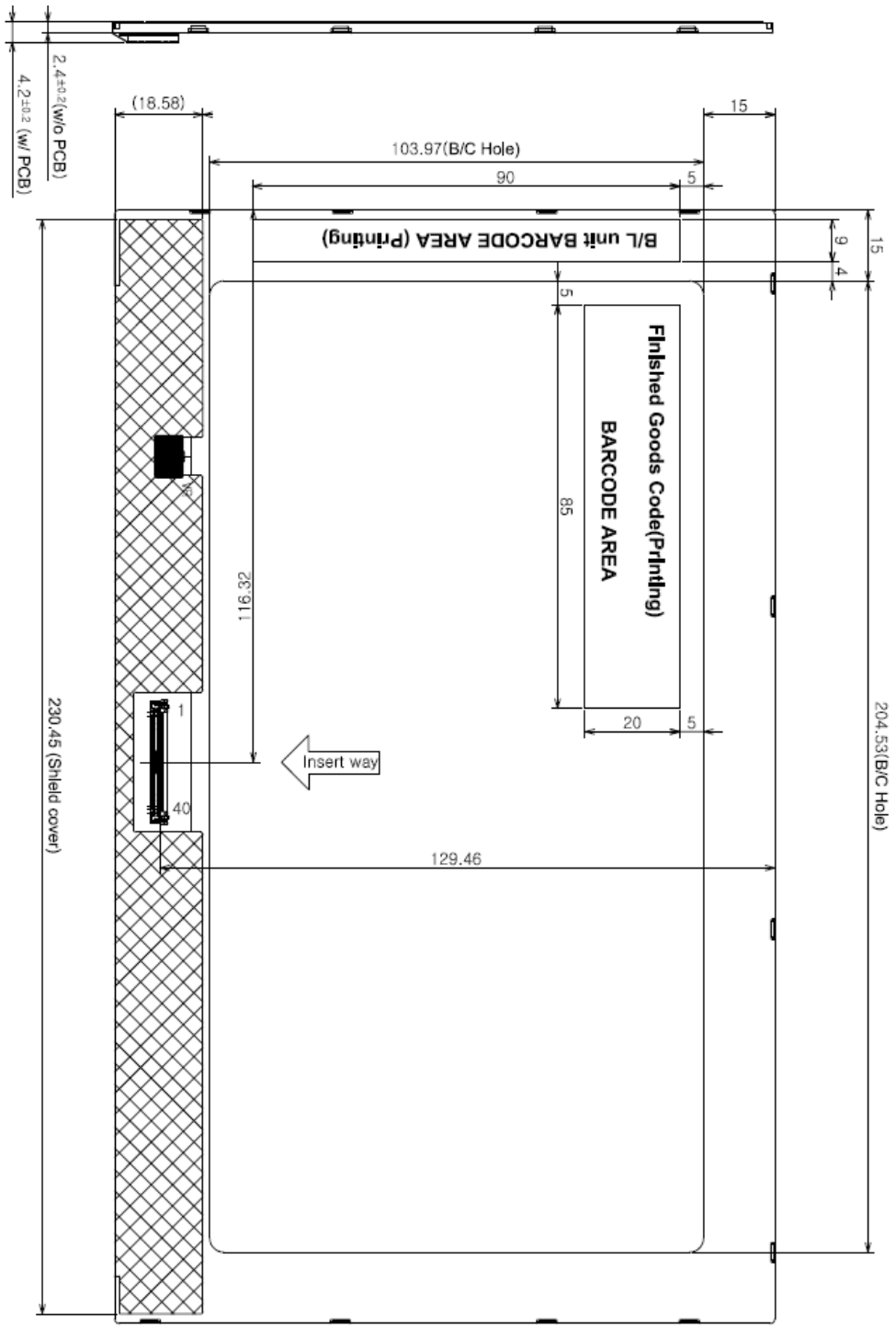
2) Rear side

The tolerance, not show in the figure, is ±0.2mm. **[Unit： mm]**



8. OPTICAL CHARACTERISTICS

Ta=25℃，VDD=3.3V

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Contrast Ratio		CR	θ＝ψ＝ 0°	600	800	--	--	*1) 2)
Luminance (C)		L	θ＝ψ＝ 0°	300	350	--	cd/m^2	*1) 3)
Uniformity(5P)		ΔL	θ＝ψ＝ 0°	80	--	--	%	*1) 3)
Uniformity(13P)		ΔL	θ＝ψ＝ 0°	70	--	--	%	*1) 3)
Response Time		Tr+Tf	θ＝ψ＝ 0°	--	30	35	ms	*5)
Cross talk		CT	θ＝ψ＝ 0°	--	--	2	%	*6)
View angle	Horizontal	Ψ	CR≧10	80/-80	89/-89	--	°	*4)
	Vertical	θ		80/-80	89/-89	--	°	*4)
Color Temperature Coordinate	W	x	θ＝ψ＝ 0°	0.283	0.313	0.343	--	*3)
		y		0.299	0.329	0.359		
	R	x		0.586	0.616	0.646	--	
		y		0.304	0.334	0.364		
	G	x		0.310	0.340	0.370	--	
		y		0.539	0.569	0.599		
	B	x		0.119	0.149	0.179	--	
		y		0.086	0.116	0.146		
Gamut			θ＝ψ＝ 0°	45	50	--	%	
Gamma		γ	GL	2.0	2.2	2.4	--	*7)

Color coordinate and color gamut are measured by SRUL1R, response time is measured by TRD-100,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=17.5mA(each LED)

Definition of these measurement items is as follows:

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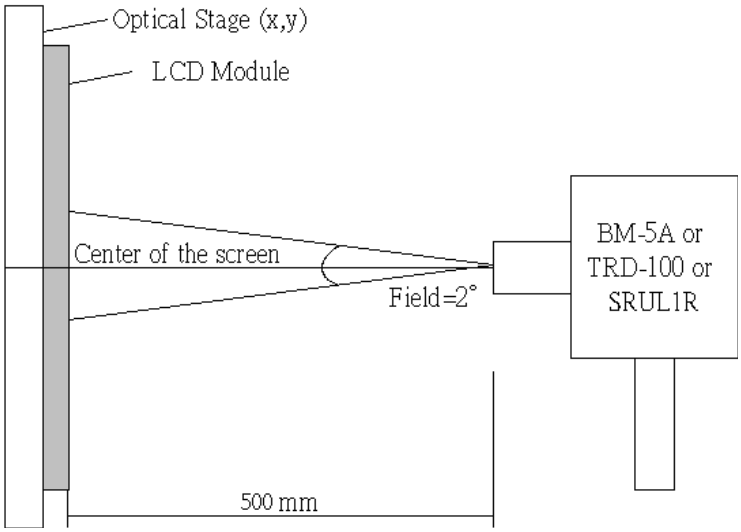
*1) Setup of Measurement Equipment

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.

5P Luminance (AVG): The white luminance is measured at measuring points 5、10、11、12、13, see Fig.1 below.

5P Uniformity: Δ L = (Lmax Lmin /) ×100%

13P Luminance (AVG): The white luminance is measured at measuring points 1~13, see Fig.1 below.

13P Uniformity: Δ L = (Lmax Lmin /) ×100%

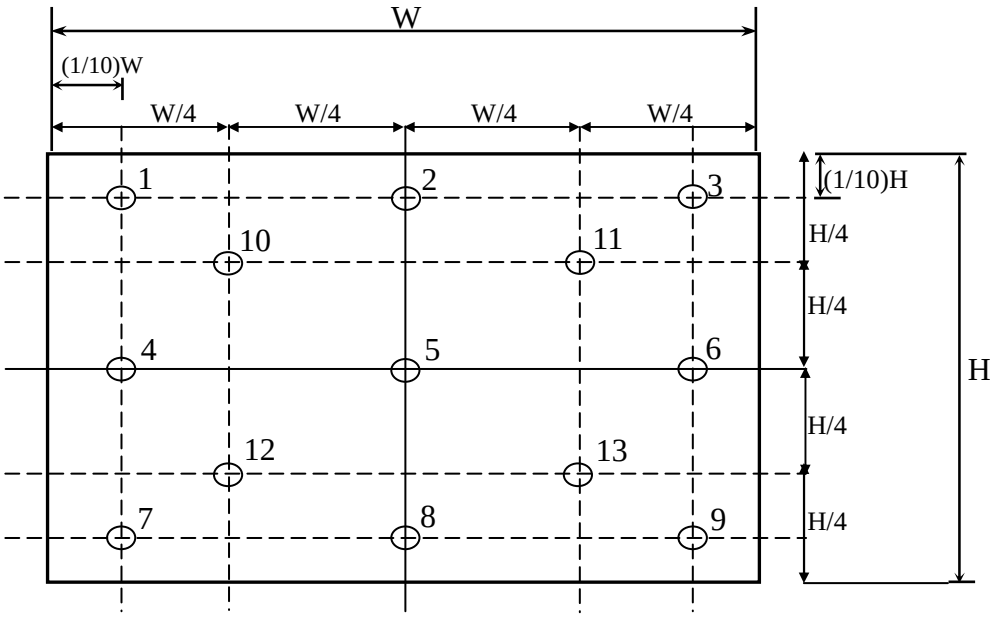
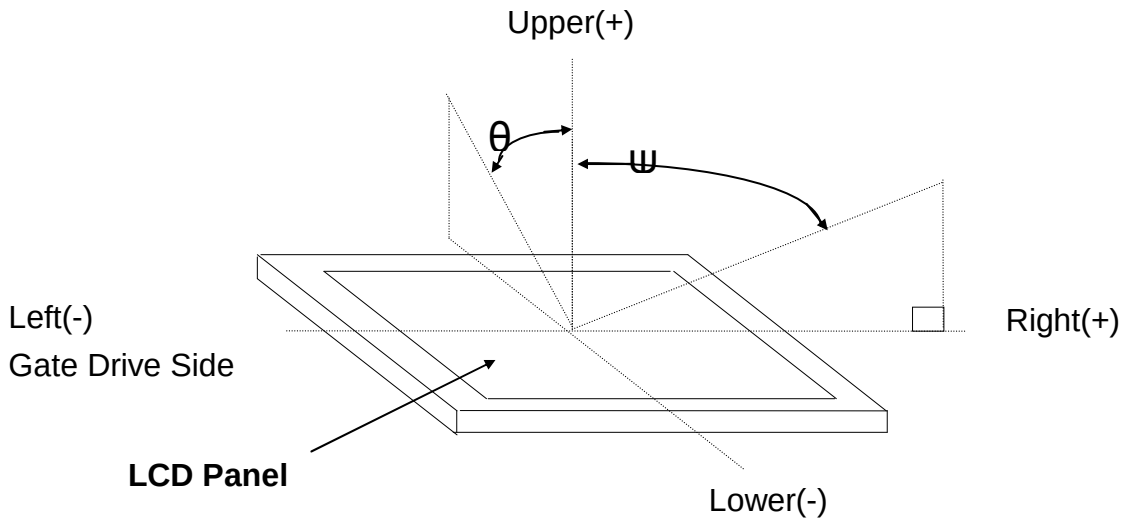
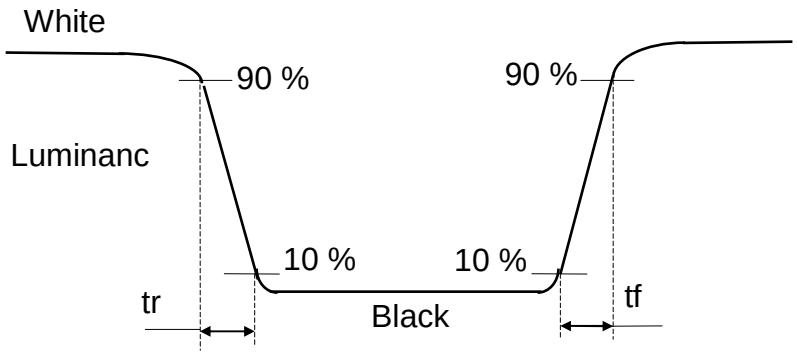


Fig.1 Measure point (Active area)

***4) Definition of view angle(θ，ψ)**



***5) Definition of response time**



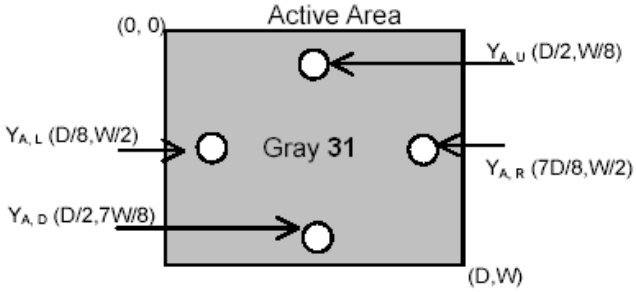
***6) Crosstalk Modulation Ratio:**

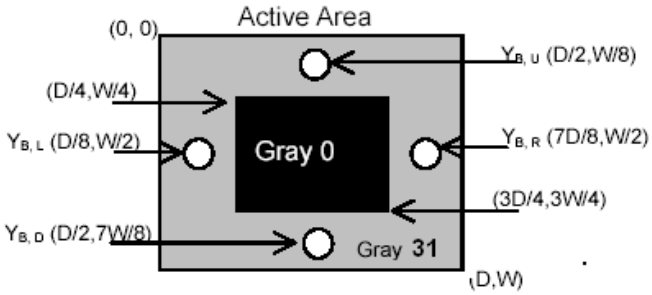
CT=｜Y_B-Y_A｜ / Y_A×× 100%

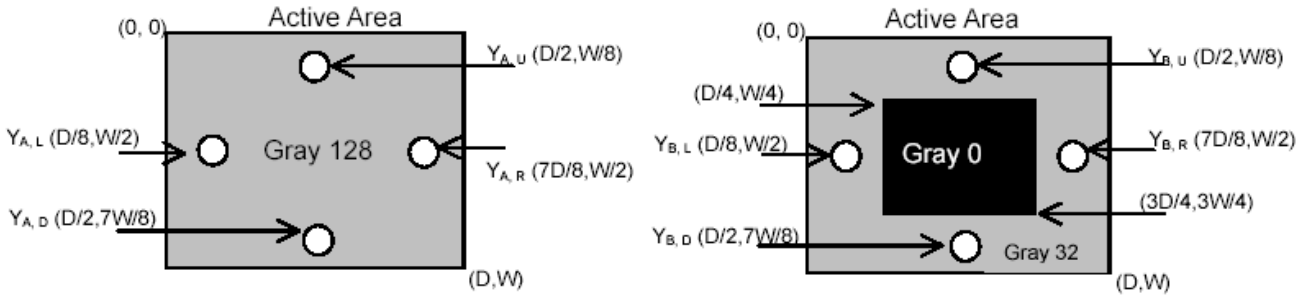
Y_A、Y_B measure position and definition

Y_A means luminance at gray level 31(exclude gray level 0 pattern)

Y_B means luminance at gray level 31(include gray level 0 pattern)

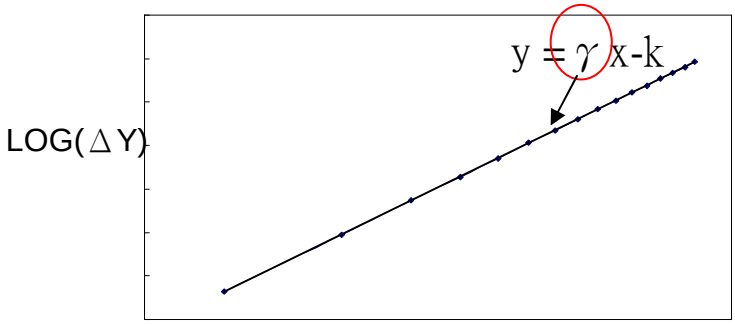






***7) Definition of Gamma (VESA)**

Based on Customer Sample, take the average value as a standard center value and the variation range of gamma value caused by loop voltage error should be between +/- 0.2. the bellow figure shows how to obtain the gamma curve and γ (from gray level: 0、4、8-----60、63).



9. RELIABILITY TEST CONDITIONS

Test Items	Conditions
High Temp. Storage Test	60℃，240 Hrs
High Temp. Operating Test	50℃，240Hrs
Low Temp. Storage Test	-20℃，240 Hrs
Low Temp. Operating Test	0℃，240 Hrs
High Temp/ High Humidity Operating Test	50℃，80% RH，240Hrs
High Temp./High Humidity Storage Test	60℃，90% RH ，240Hrs
Thermal Shock Test	-20℃(0.5 Hr)~60℃(0.5 Hr) 27 Cycles
FPC Bending test	Bending degree is 180, bending 30 times and the bending radius is 1.0mm
FPC Insert/Remove test	30 times FPC insert/remove
Shock Test	980m/s2,Action time: 6ms, Time: 3 times for each direction, Direction:+/－X, +/－Y, +/－Z
ESD	Air +/－15KV ,contact +/－8KV , No damage
Package Vibration test	Frequency range: 10-55Hz, 1.2Grms, swep time: 1 minute, test period: 2 hours for each direction of X, Y, Z
Package Drop test	Height: 60cm, 1 corner, 3 edges, 6 surfaces: 1 time for each direction

【Note】

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. PACKING INFORMATION

(1) Packing order

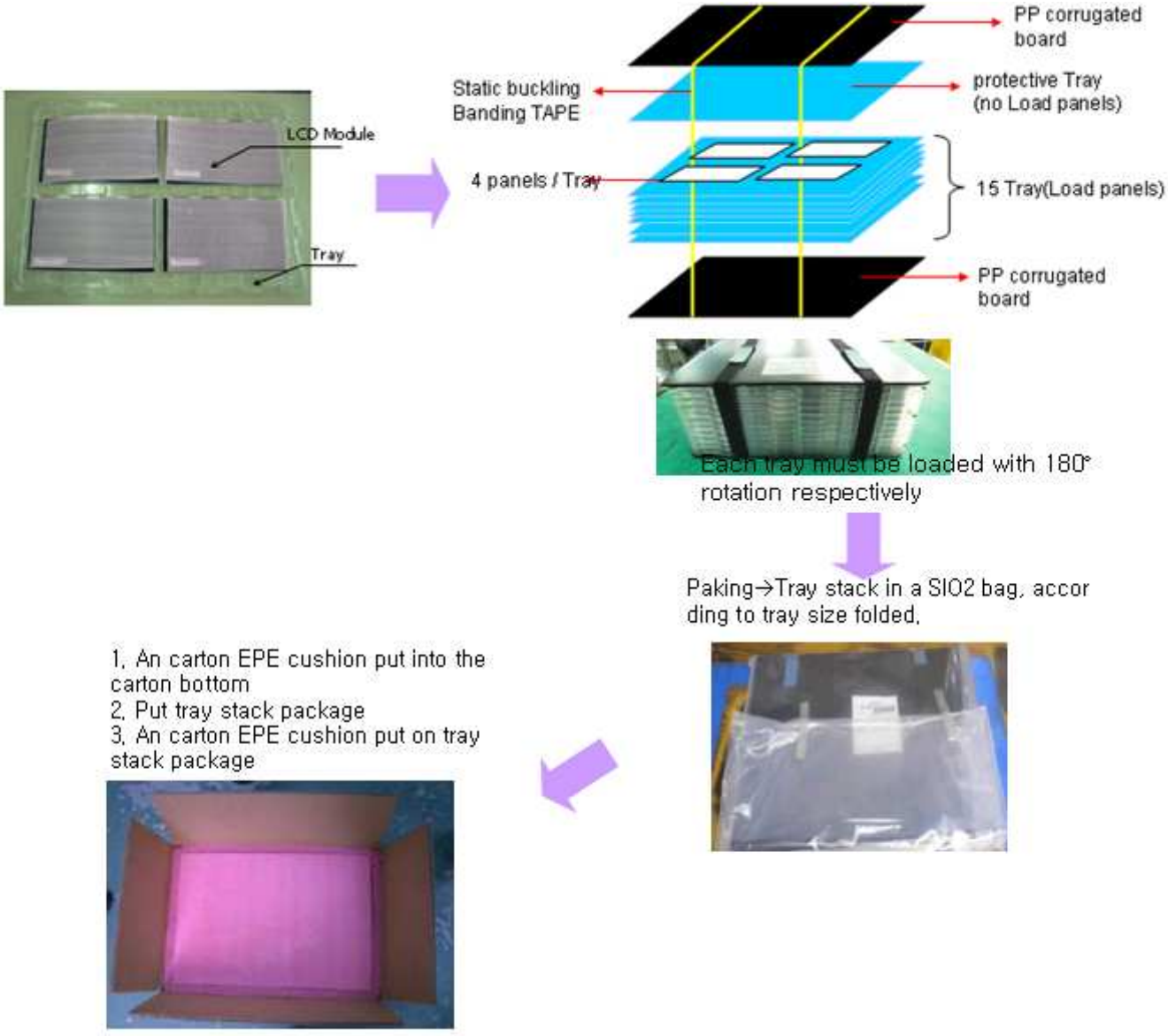


Figure2-1 packing method

Notes : 1. Box Dimension: 570mm(L) X 430mm(W) X 220mm(H)
2. Package Quantity in one Box : 60pcs
3. Tray Size : 540mm(L) X 400mm(W) X 0.8mm(H)

(2) Pallet Packing

PALLET specification

(1) 12 box (max.) / 1 pallet
(2) Pallet: 1150(L) X 900(W) X 130(H) mm
(3) Pallet stack: 1150(L) X 900(W) X920(H) mm
(4) Angle boards: L 790 X 50 X 50mm
(5) Gross Weight: 156Kg

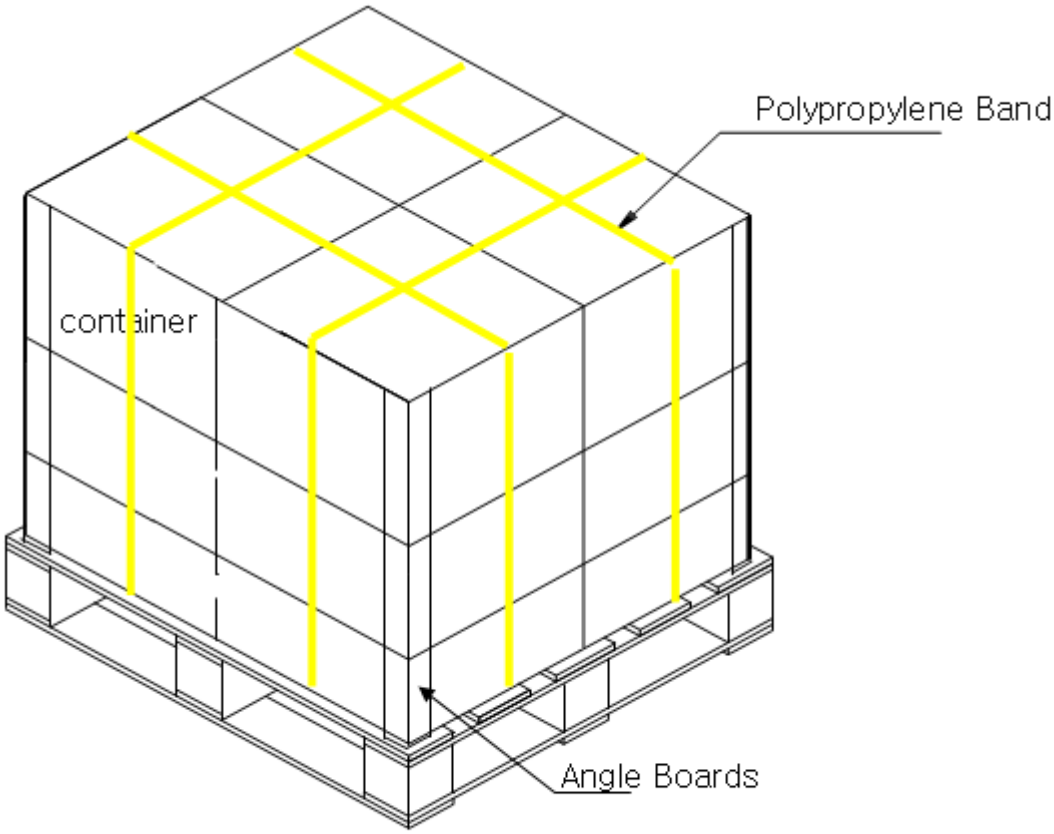


Figure2-2 packing method