

TFT LCD Approval Specification

MODEL NO.: V420H1-P07

Customer: _____

Approved by: _____

Note: _____

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REVISION HISTORY

Version	Date	Page	Section	Description
Ver 2.0	July,12, 2007	All	All	Approval Specification was first issued.

1. GENERAL DESCRIPTION

1.1 OVERVIEW

V420H1- P07 is a 42" TFT Liquid Crystal Display module. This module supports 1920 x 1080 FHD format and can display true 16.7M colors (8-bit colors).

1.2 CHARACTERISTICS

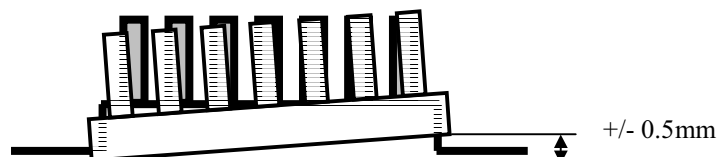
CHARACTERISTICS ITEMS	SPECIFICATIONS
Screen Diagonal [in]	42.02
Pixels [lines]	1920×1080
Active Area [mm]	930.24(H) x 523.26 (V) (42.02" diagonal)
Sub -Pixel Pitch [mm]	0.1615 (H) x 0.4845 (V)
Pixel Arrangement	RGB vertical stripe
Weight [g]	TYP. 2100
Physical Size [mm]	955.04(W) x 545.66(H) x 2.00(D) Typ.
Display Mode	Transmissive mode / Normally black
Contrast Ratio	2000:1 Typ. (Typical value measured at CMO's module)
Glass thickness (Array/CF) [mm]	0.7 / 0.7
Viewing Angle (CR>20)	+88/-88(H),+88/-88(V) Typ.(CR ≥ 20) (Typical value measured at CMO's module)
Color Chromaticity	R=(0.641, 0.355) G=(0.269, 0.591) B=(0.132, 0.119) W=(0.298, 0.355) *Please refer to "color chromaticity" on p.14
Cell Transparency [%]	4.1%Typ. (Typical value measured at CMO's module)
Polarizer Surface Treatment	Anti-Glare coating (Haze 25%), Hard coating (3H)

1.3 MECHANICAL SPECIFICATIONS

Item	Min.	Typ.	Max.	Unit	Note
Weight	2100	2150	2200	g	-
I/F connector mounting position	The mounting inclination of the connector makes the screen center within ±0.5mm as the horizontal.				(2)

Note (1) Please refer to the attached drawings for more information of front and back outline dimensions.

(2) Connector mounting position



2. ABSOLUTE MAXIMUM RATINGS

2.1 ABSOLUTE RATINGS OF ENVIRONMENT (BASED ON CMO MODULE V420H1-L07)

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T _{ST}	-20	+60	°C	(1)
Operating Ambient Temperature	T _{OP}	0	50	°C	(1), (2)
Shock (Non-Operating)	S _{NOP}	-	50	G	(3), (5)
Vibration (Non-Operating)	V _{NOP}	-	1.0	G	(4), (5)

Note (1) Temperature and relative humidity range is shown in the figure below.

(a) 90 %RH Max. ($T_a \leq 40$ °C).

(b) Wet-bulb temperature should be 39 °C Max. ($T_a > 40$ °C).

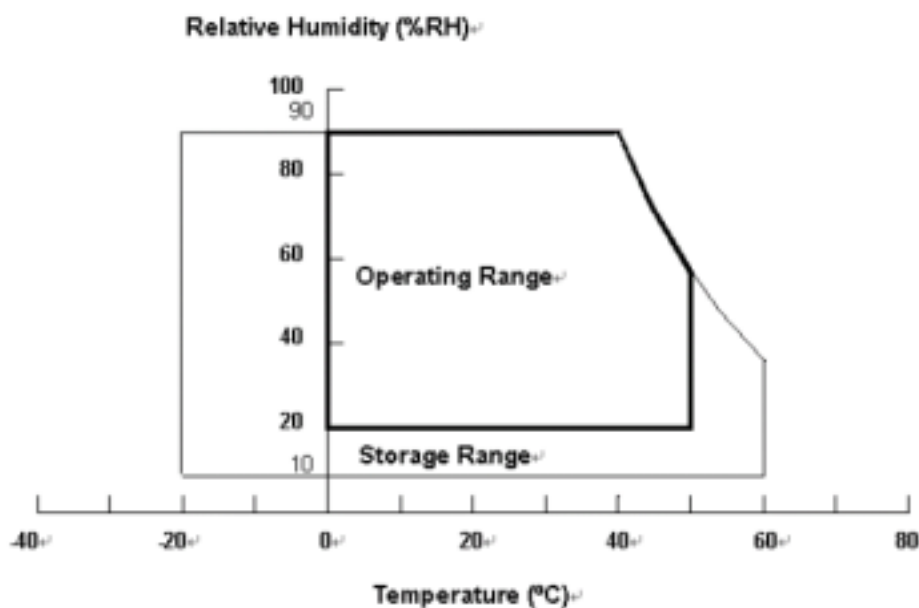
(c) No condensation.

Note (2) The maximum operating temperature is based on the test condition that the surface temperature of display area is less than or equal to 65 °C with LCD module alone in a temperature controlled chamber. Thermal management should be considered in final product design to prevent the surface temperature of display area from being over 65 °C. The range of operating temperature may degrade in case of improper thermal management in final product design.

Note (3) 11 ms, half sine wave, 1 time for $\pm X$, $\pm Y$, $\pm Z$.

Note (4) 10 ~ 200 Hz, 10 min, 1 time each X, Y, Z.

Note (5) At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture.



2.2 ABSOLUTE RATINGS OF ENVIRONMENT (OPEN CELL)

Storage Condition : With shipping package.

Storage temperature range : 25 ± 5 °C

Storage humidity range : $50\pm 10\%$ RH

Shelf life : a month

2.3 ELECTRICAL ABSOLUTE RATINGS

2.3.1 ELECTRICAL ABSOLUTE RATINGS (OPEN CELL)

Item	Symbol	Value		Unit	Note
		Min	Max		
Power Supply Voltage	VAA	-0.3	+14.0	V	(1)
	VGH	-0.3	+30.0	V	
	VGL	-10.0	-0.3	V	
Logic Input Voltage	V _{IN}	-0.3	3.6	V	

Note (1) Permanent damage to the device may occur if maximum values are exceeded. Function operation should be restricted to the conditions described under Normal Operating Conditions.

3. ELECTRICAL CHARACTERISTICS

3.1 TFT LCD MODULE

Ta = 25 ± 2 °C

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Voltage		VGH	17.9	18.4	18.9	V	
		VGL	-6.0	-5.5	-5.0	V	
		VAA	13.25	13.75	14.25	V	
		V33V	3.2	3.3	3.4	V	
		VREF	12.85	13.1	13.35	V	
Power Supply Current		IGH	-	20	-	mA	
		IGL	-	20	-	mA	
		IAA	-	800	-	mA	
		I3.3V	-	1000	-	mA	
CMOS interface	Input High Threshold Voltage	V _{IH}	2.7	-	3.3	V	
	Input Low Threshold Voltage	V _{IL}	0	-	0.7	V	

3.2 RSDS CHARACTERISTICS

Ta = -10~+85 °C

Item	Symbol	Condition	Value			Unit
			Min	Typ	Max	
RSDS high input Voltage	V _{DIFFRSDS}	V _{CMRSDS} = +1.2 V (1)	100	200	-	mV
RSDS low input Voltage	V _{DIFFRSDS}	V _{CMRSDS} = +1.2 V (1)	-	-200	-100	mV
RSDS common mode input voltage range	V _{CMRSDS}	V _{DIFFRSDS} = 200 mV (2)	VSSD+0.1	Note(3)	VSSD+1.2	V
RSDS Input leakage current	I _{DL}	D _{xx} P, D _{xx} N, CLKO, CLPN	-10	-	10	μA

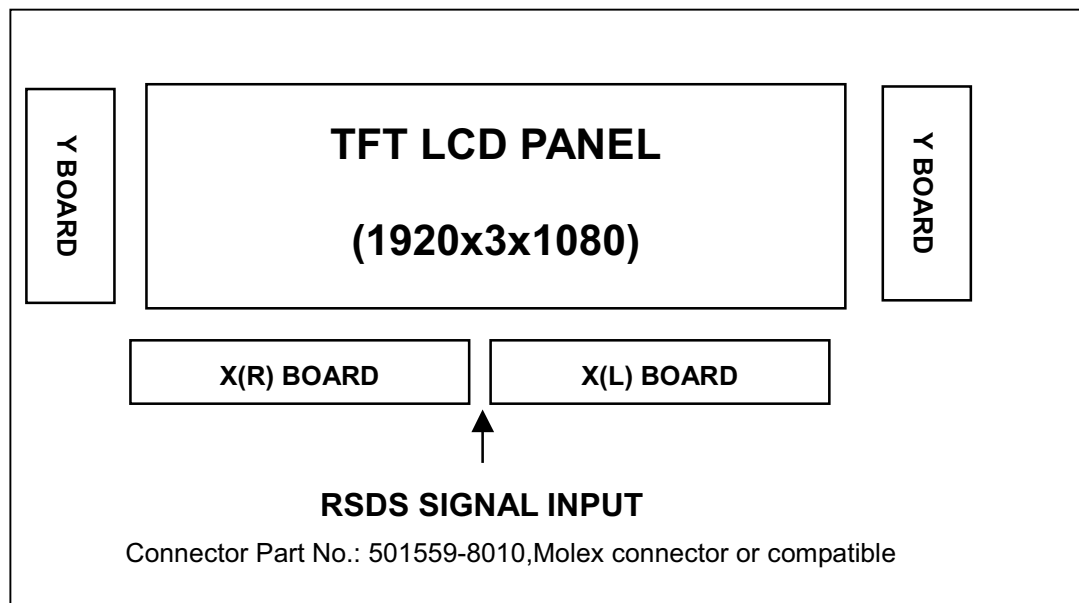
Note (1) $V_{CMRSDS} = (V_{CLKP} + V_{CLKN})/2$ or $V_{CMRSDS} = (V_{D_{xx}P} + V_{D_{xx}N})/2$

Note (2) $V_{DIFFRSDS} = V_{CLKP} - V_{CLKN}$ or $V_{DIFFRSDS} = V_{D_{xx}P} - V_{D_{xx}N}$

Note (3) $V_{CMRSDS} = 1.2V(V_{DDD} = 3.3V)$

4. BLOCK DIAGRAM

4.1 TFT LCD MODULE



5. INPUT TERMINAL PIN ASSIGNMENT

5.1 TFT LCD MODULE

Pin assignment

CN1(XL) Connector Pin Assignment

Pin	Symbol	Description	Pin	Symbol	Description
1	GM18	Gamma Power supply	41	ATP1	A-Path RSDS data latch
2	GM17	Gamma Power supply	42	POL	polarity invert
3	GM16	Gamma Power supply	43	CKV	Scan driver clock
4	GM15	Gamma Power supply	44	STV	Scan driver start pulse1
5	GM14	Gamma Power supply	45	STV_R	Scan driver start pulse2
6	GM13	Gamma Power supply	46	OE	Scan driver output enable
7	GM12	Gamma Power supply	47	DRL1	Control the direction of start pulse for data
8	GM11	Gamma Power supply	48	GRL1	Control the direction of start pulse for scan
9	GM10	Gamma Power supply	49	GND	Ground
10	A_B3P	A-Path RSDS data signal (Blue3)	50	SIN1	Synchronization pin
11	A_B3M	A-Path RSDS data signal (Blue3)	51	SIN2	Synchronization pin
12	A_B2P	A-Path RSDS data signal (Blue2)	52	GND	Ground
13	A_B2M	A-Path RSDS data signal (Blue2)	53	VDD	Logic Power supply
14	A_B1P	A-Path RSDS data signal (Blue1)	54	VDD	Logic Power supply
15	A_B1M	A-Path RSDS data signal (Blue1)	55	GM9	Gamma Power supply
16	A_B0P	A-Path RSDS data signal (Blue0)	56	GM8	Gamma Power supply
17	A_B0M	A-Path RSDS data signal (Blue0)	57	GM7	Gamma Power supply
18	A_G3P	A-Path RSDS data signal	58	GM6	Gamma Power supply
19	A_G3M	A-Path RSDS data signal	59	GM6	Gamma Power supply
20	A_G2P	A-Path RSDS data signal (Green2)	60	GM4	Gamma Power supply
21	A_G2M	A-Path RSDS data signal	61	GM3	Gamma Power supply
22	A_G1P	A-Path RSDS data signal (Green)	62	GM2	Gamma Power supply
23	A_G1M	A-Path RSDS data signal	63	GM1	Gamma Power supply
24	A_G0P	A-Path RSDS data signal	64	GND	Ground
25	A_G0M	A-Path RSDS data signal	65	VAA	Driver Power supply
26	GND	Ground	66	VAA	Driver Power supply
27	A_CLKP	Data driver clock	67	GND	Ground
28	A_CLKM	Data driver clock	68	VCM	VCM Power supply
29	GND	Ground	69	VCM	VCM Power supply
30	A_R3P	A-Path RSDS data signal (Red3)	70	GND	Ground
31	A_R3M	A-Path RSDS data signal (Red3)	71	VST	VST Power supply
32	A_R2P	A-Path RSDS data signal (Red2)	72	VST	VST Power supply
33	A_R2M	A-Path RSDS data signal (Red2)	73	GND	Ground
34	A_R1P	A-Path RSDS data signal (Red1)	74	VGH	Driver Power supply
35	A_R1M	A-Path RSDS data signal (Red1)	75	VGH	Driver Power supply
36	A_R0P	A-Path RSDS data signal (Red0)	76	GND	Ground
37	A_R0M	A-Path RSDS data signal (Red0)	77	VGL	Driver Power supply
38	GND	Ground	78	VGL	Driver Power supply
39	ASTH	A-Path source driver start pulse1	79	GND	Ground
40	ASTH_R	A-Path source driver start pulse2	80	GND	Ground

CN2(XR) Connector Pin Assignment

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	VSCM	VSCM Power supply	41	BSTH_R	B-Path source driver start pulse2
2	GND	Ground	42	BSTH	B-Path source driver start pulse1
3	VGL	Driver Power supply	43	GND	Ground
4	VGL	Driver Power supply	44	B_B3P	B-Path RSDS data signal (Blue3)
5	GND	Ground	45	B_B3M	B-Path RSDS data signal (Blue3)
6	VGH	Driver Power supply	46	B_B2P	B-Path RSDS data signal (Blue2)
7	VGH	Driver Power supply	47	B_B2M	B-Path RSDS data signal (Blue2)
8	GND	Ground	48	B_B1P	B-Path RSDS data signal (Blue1)
9	VST	VST Power supply	49	B_B1M	B-Path RSDS data signal (Blue1)
10	VST	VST Power supply	50	B_B0P	B-Path RSDS data signal (Blue0)
11	GND	Ground	51	B_B0M	B-Path RSDS data signal (Blue0)
12	VCM	VCM Power supply	52	B_G3P	B-Path RSDS data signal (Green3)
13	VCM	VCM Power supply	53	B_G3M	B-Path RSDS data signal (Green3)
14	GND	Ground	54	B_G2P	B-Path RSDS data signal (Green2)
15	VAA	Driver Power supply	55	B_G2M	B-Path RSDS data signal (Green2)
16	VAA	Driver Power supply	56	B_G1P	B-Path RSDS data signal (Green)
17	GND	Ground	57	B_G1M	B-Path RSDS data signal (Green1)
18	GM18	Gamma Power supply	58	B_G0P	B-Path RSDS data signal (Green0)
19	GM17	Gamma Power supply	59	B_G0M	B-Path RSDS data signal (Green0)
20	GM16	Gamma Power supply	60	GND	Ground
21	GM15	Gamma Power supply	61	B_CLKP	Data driver clock
22	GM14	Gamma Power supply	62	B_CLKM	Data driver clock
23	GM13	Gamma Power supply	63	GND	Ground
24	GM12	Gamma Power supply	64	B_R3P	B-Path RSDS data signal (Red3)
25	GM11	Gamma Power supply	65	B_R3M	B-Path RSDS data signal (Red3)
26	GM10	Gamma Power supply	66	B_R2P	B-Path RSDS data signal (Red2)
27	VDD	Logic Power supply	67	B_R2M	B-Path RSDS data signal (Red2)
28	VDD	Logic Power supply	68	B_R1P	B-Path RSDS data signal (Red1)
29	GND	Ground	69	B_R1M	B-Path RSDS data signal (Red1)
30	SIN2	Synchronization pin	70	B_R0P	B-Path RSDS data signal (Red0)
31	SIN1	Synchronization pin	71	B_R0M	B-Path RSDS data signal (Red0)
32	GND	Ground	72	GM9	Gamma Power supply
33	GRL1	Control the direction of start pulse	73	GM8	Gamma Power supply
34	DRL1	Control the direction of start pulse	74	GM7	Gamma Power supply
35	OE	Scan driver output enable	75	GM6	Gamma Power supply
36	STV_R	Scan driver start pulse2	76	GM6	Gamma Power supply
37	STV	Scan driver start pulse1	77	GM4	Gamma Power supply
38	CKV	Scan driver clock	78	GM3	Gamma Power supply
39	POL	polarity invert	79	GM2	Gamma Power supply
40	BTP1	B-Path RSDS data latch	80	GM1	Gamma Power supply

Note (1) CN1、2 Connector Part No.: 501559-8010, Molex connector or equal.

5.2 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 8-bit gray scale data input for the color. The higher the binary input, the brighter the color. The table below provides the assignment of color versus data input.

Color		Data Signal																							
		Red								Green								Blue							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
Basic Colors	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	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	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	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
Gray Scale Of Red	Red (0) / Dark	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	
	Red (2)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	
	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	
	Red (253)	1	1	1	1	1	1	0	1	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
Gray Scale Of Green	Green (0) / Dark	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 (253)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	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
Gray Scale Of Blue	Blue (0) / Dark	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 (253)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	1
	Blue (254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	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	1	1	1	1	1	1	1	1	1

Note (1) 0: Low Level Voltage, 1: High Level Voltage

6. INTERFACE TIMING

6.1 INPUT SIGNAL TIMING SPECIFICATIONS

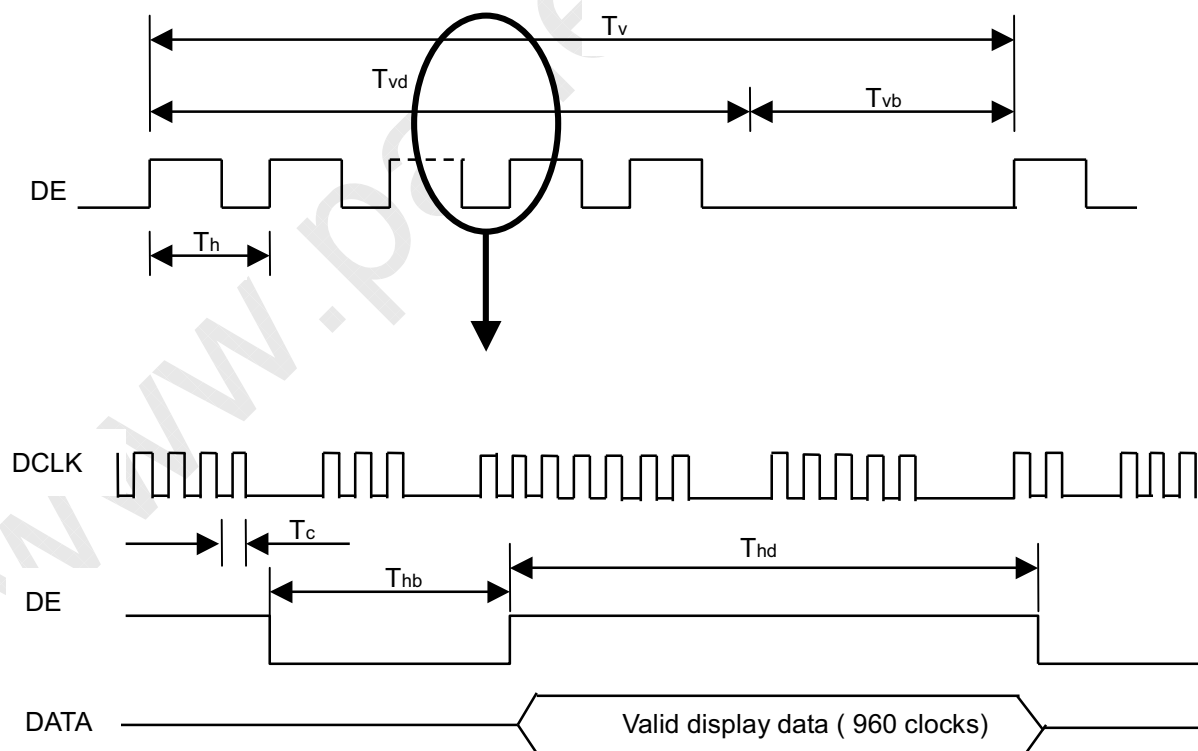
The input signal timing specifications are shown as the following table and timing diagram.

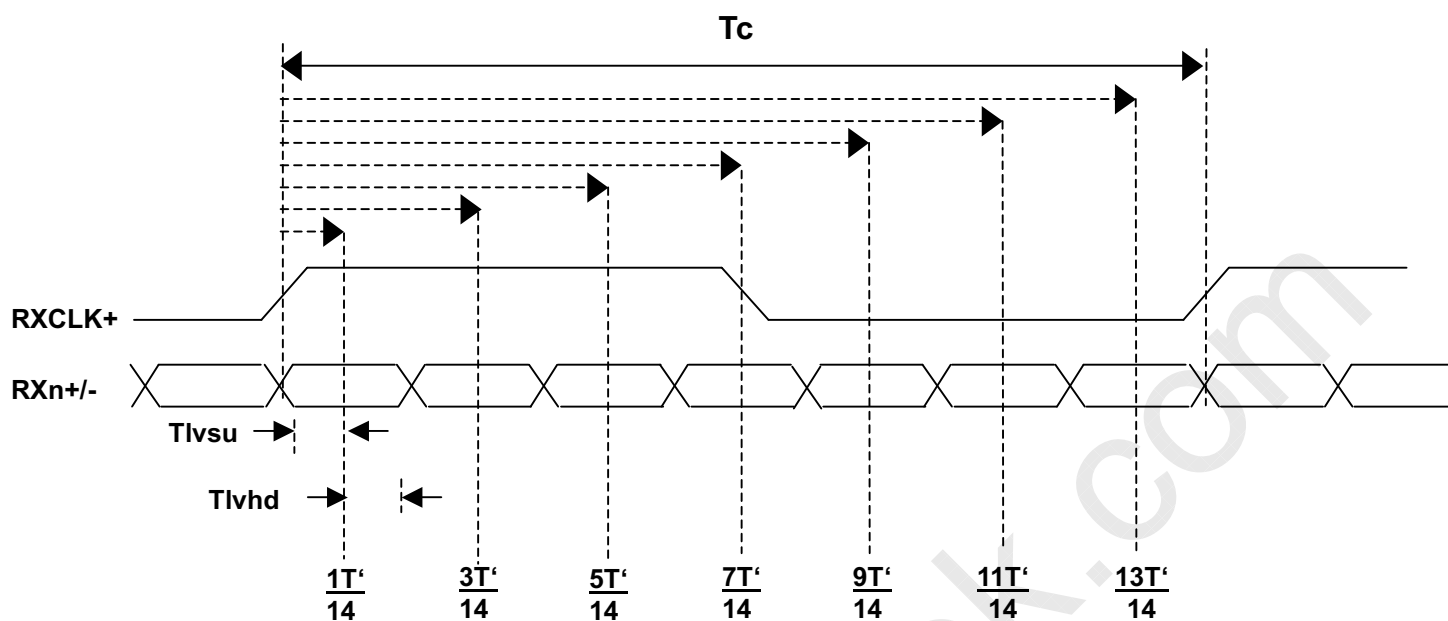
Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
LVDS Receiver Clock	Frequency	1/Tc	60	74	80	MHZ	-
	Input cycle to cycle jitter	Trcl	-	-	200	ps	-
LVDS Receiver Data	Setup Time	Tlvsu	600	-	-	ps	-
	Hold Time	Tlvhd	600	-	-	ps	-
Vertical Active Display Term	Frame Rate	Fr5	47	50	53	Hz	(1)
		Fr6	57	60	63	Hz	(1)
	Total	Tv	1115	1125	1135	Th	Tv=Tvd+Tvb
	Display	Tvd	1080	1080	1080	Th	-
	Blank	Tvb	35	45	55	Th	-
Horizontal Active Display Term	Total	Th	2100	2200	2300	Tc	Th=Thd+Thb
	Display	Thd	1920	1920	1920	Tc	-
	Blank	Thb	180	280	380	Tc	-

Note (1) (ODSEL) = (H) , (L). Please refer to 5.1 for detail information.

Note (2) Since the module is operated in DE only mode, Hsync and Vsync input signals should be set to low logic level. Otherwise, this module would operate abnormally.

INPUT SIGNAL TIMING DIAGRAM

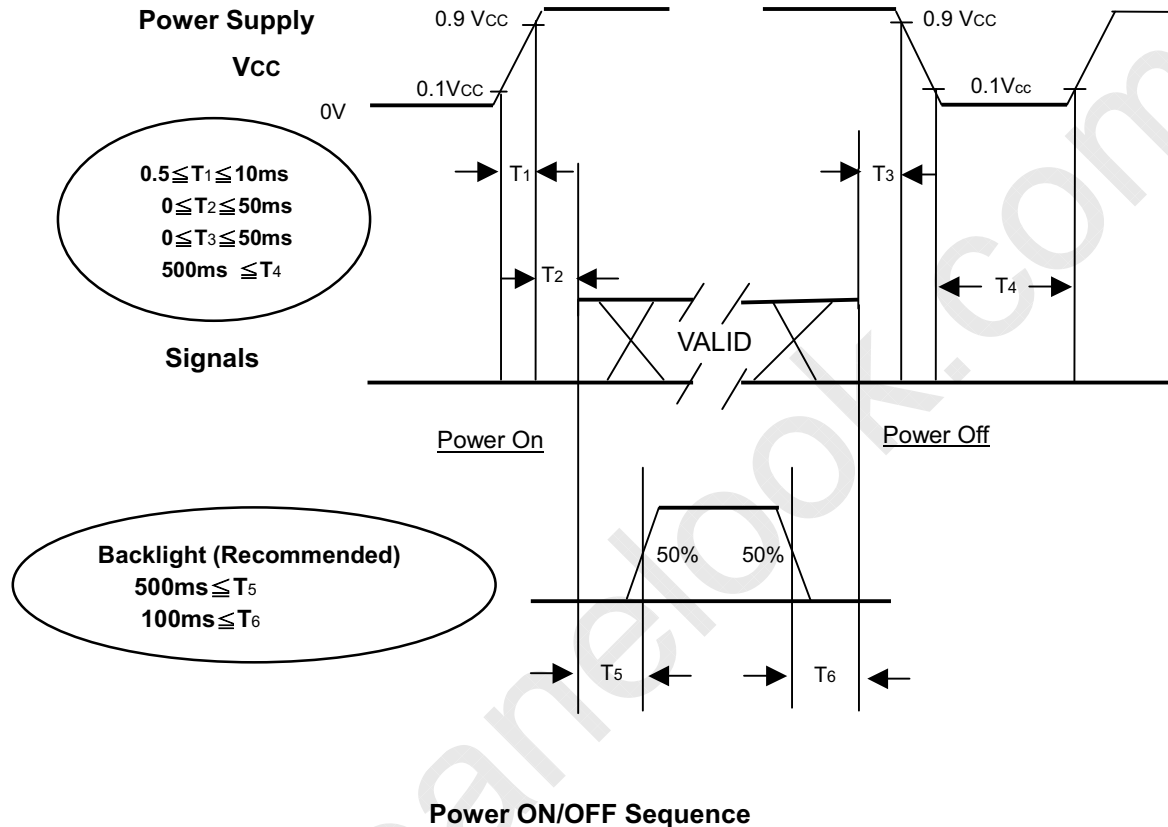


LVDS INPUT INTERFACE TIMING DIAGRAM

6.2 POWER ON/OFF SEQUENCE

To prevent a latch-up or DC operation of LCD module, the power on/off sequence should follow the conditions shown in the following diagram.

To prevent a latch-up or DC operation of LCD module, the power on/off sequence should follow the diagram below.



Note.

- (1) The supply voltage of the external system for the module input should follow the definition of V_{CC}.
- (2) Apply the lamp voltage within the LCD operation range. When the backlight turns on before the LCD operation or the LCD turns off before the backlight turns off, the display may momentarily become abnormal screen.
- (3) In case of V_{CC} is in off level, please keep the level of input signals on the low or high impedance.
- (4) T₄ should be measured after the module has been fully discharged between power off and on period.
- (5) Interface signal shall not be kept at high impedance when the power is on.

7. OPTICAL CHARACTERISTICS

7.1 TEST CONDITIONS

Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	°C
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	V _{CC}	12	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
Lamp Current	I _L	5.8±0.5	mA
Oscillating Frequency (Inverter)	F _W	50±3	KHz
Vertical Frame Rate	Fr	60	Hz

7.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown as below. The following items should be measured under the test conditions described in 7.1 and stable environment shown in Note (6).

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Color Chromaticity	Red	$\theta_x=0^\circ, \theta_y=0^\circ$ Viewing Angle at Normal Directon Standard light source "C"	-	0.641	-	-	(0),(5)
				0.327		-	
	Green			0.269		-	
				0.591		-	
	Blue			0.132		-	
				0.119		-	
	White			0.298		-	
				0.355		-	
Center Transmittance	T%	$\theta_x=0^\circ, \theta_y=0^\circ$ With CMO Module	-	4.1	-	%	(1), (7)
Contrast Ratio	CR		1800	2000	-	-	(1), (3)
Response Time	Gray to gray average	$\theta_x=0^\circ, \theta_y=0^\circ$ With CMO Module@60Hz	-	6.5	12	ms	(4)
White Variation	δW	$\theta_x=0^\circ, \theta_y=0^\circ$ With CMO Module	-	-	1.3	-	(1), (6)
Viewing Angle	Horizontal	CR≥20 With CMO Module	80	88	-	Deg.	(1), (2)
				88			
	Vertical			88			
				88			

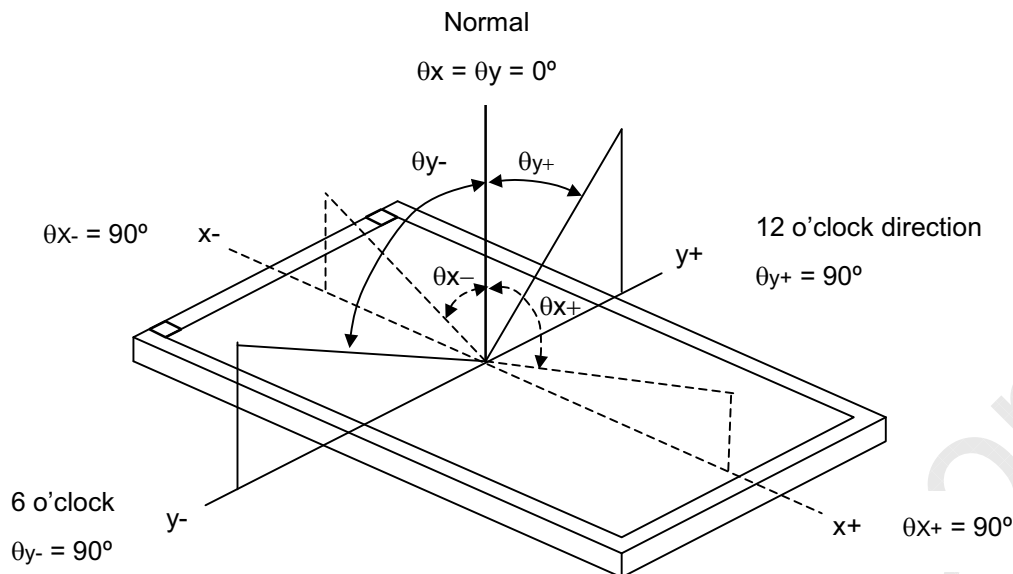
Note (0) Light source is the standard light source "C" which is defined by CIE and driving voltages are based on suitable gamma voltages. The calculating method is as following :

1. Measure Module's and BLU's spectrums. W, R, G, B are with signal input , BLU(for V420H1-L07) is supplied by CMO.
2. Calculate cell's spectrum.
3. Calculate cell's chromaticity by using the spectrum of standard light source "C"

Note (1) Light source is the BLU which is supplied by CMO and driving voltages are based on suitable gamma voltages.

Note (2) Definition of Viewing Angle (θ_x, θ_y):

Viewing angles are measured by EZ-Contrast 160R (Eldim)



Note (3) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

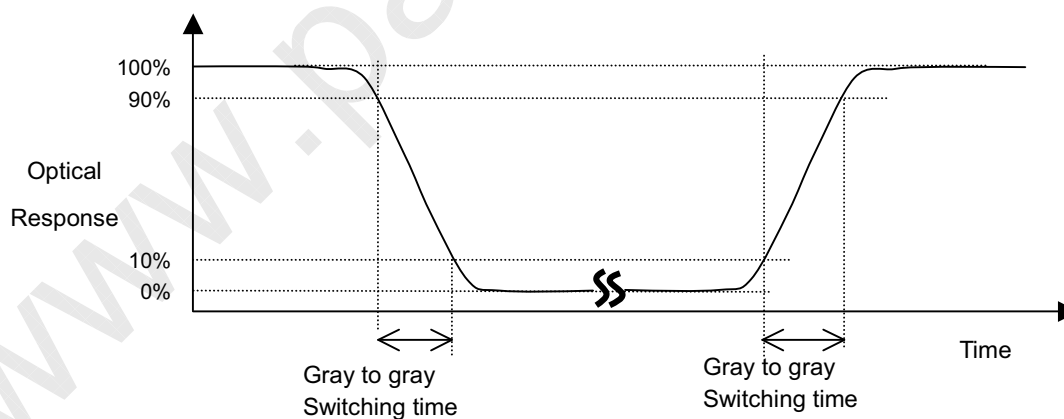
$$\text{Contrast Ratio (CR)} = L_{255} / L_0$$

L255: Luminance of gray level 255

L 0: Luminance of gray level 0

CR = CR (1) ,where CR (X) is corresponding to the Contrast Ratio of the point X at the figure in Note (6).

Note (4) Definition of Gray-to-Gray Switching Time:

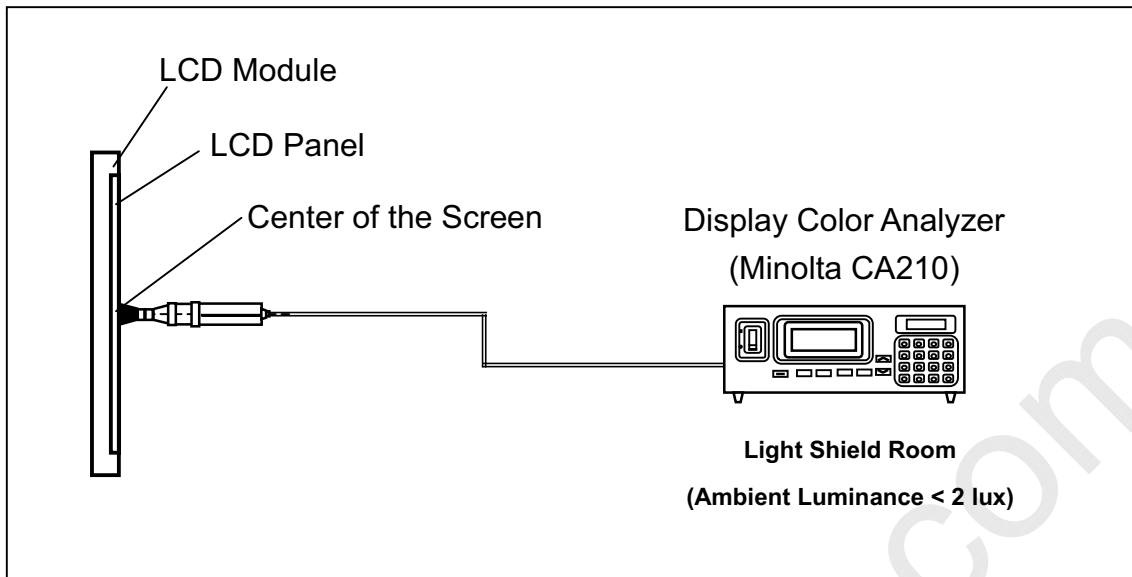


The driving signal means the signal of gray level 0, 63, 127, 191, and 255.

Gray to gray average time means the average switching time of gray level 0, 63, 127, 191, 255 to each other.

Note (5) Measurement Setup:

The LCD module should be stabilized at given temperature for 60 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 60 minutes in a windless room.

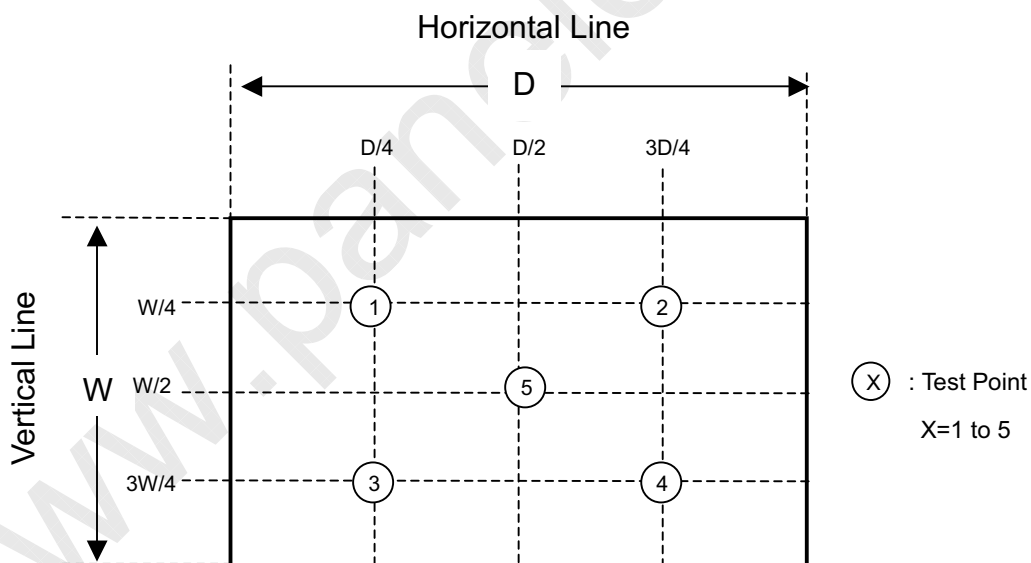


Note (6) Definition of White Variation (δW):

Measure the luminance of gray level 255 at 5 points

$$\delta W = \text{Maximum} [L(1), L(2), L(3), L(4), L(5)] / \text{Minimum} [L(1), L(2), L(3), L(4), L(5)]$$

where L (X) is corresponding to the luminance of the point X at the figure below.



Note (7) Definition of Transmittance(T%): Active Area
Module is without signal input.

$$\text{Transmittance} = \frac{\text{Luminance of LCD module}}{\text{Luminance of backlight}} * 100\%$$

8. PRECAUTIONS

8.1 ASSEMBLY AND HANDLING PRECAUTIONS

- (1) Do not apply rough force such as bending or twisting to the product during assembly.
- (2) To assemble backlight or install module into user's system can be only in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.
- (3) It's not permitted to have pressure or impulse on the module because the LCD panel will be damaged.
- (4) Always follow the correct power sequence when the product is connecting and operating. This can prevent damage to the CMOS LSI chips during latch-up.
- (5) Do not pull the I/F connector in or out while the module is operating.
- (6) Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.
- (7) It is dangerous that moisture come into or contacted the product, because moisture may damage the product when it is operating.
- (8) When storing modules as spares for a long time, the following precaution is necessary.
 - a. Do not leave the module in high temperature, and high humidity for a long time. It is highly recommended to store the module with temperature from 0 to 35°C at normal humidity without condensation.
 - b. The module shall be stored in dark place. Do not store the TFT-LCD module in direct sunlight or fluorescent light.
- (9) High temperature or humidity may reduce the performance of module. Please store this product within the specified storage conditions.
- (10) When ambient temperature is lower than 10°C may reduce the display quality. For example, the response time will become slowly.

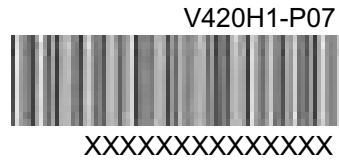
8.2 SAFETY PRECAUTIONS

- (1) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.
- (2) After the product's end of life, it is not harmful in case of normal operation and storage.

9. DEFINITION OF LABELS

9.1 OPEN CELL LABEL

The barcode nameplate is pasted on each open cell as illustration for CMO internal control.



9.2 CARTON LABEL

The barcode nameplate is pasted on each box as illustration, and its definitions are as following explanation

P.O. NO.	_____	
Parts ID.	_____	
Carton ID.	 XXXXXXXXXXXXXXXXXXXX	Quantities <u> 8 </u>
Made in Taiwan		

- (a) Model Name: V420H1- P07
- (b) Carton ID: CMO internal control
- (c) Quantities: 8

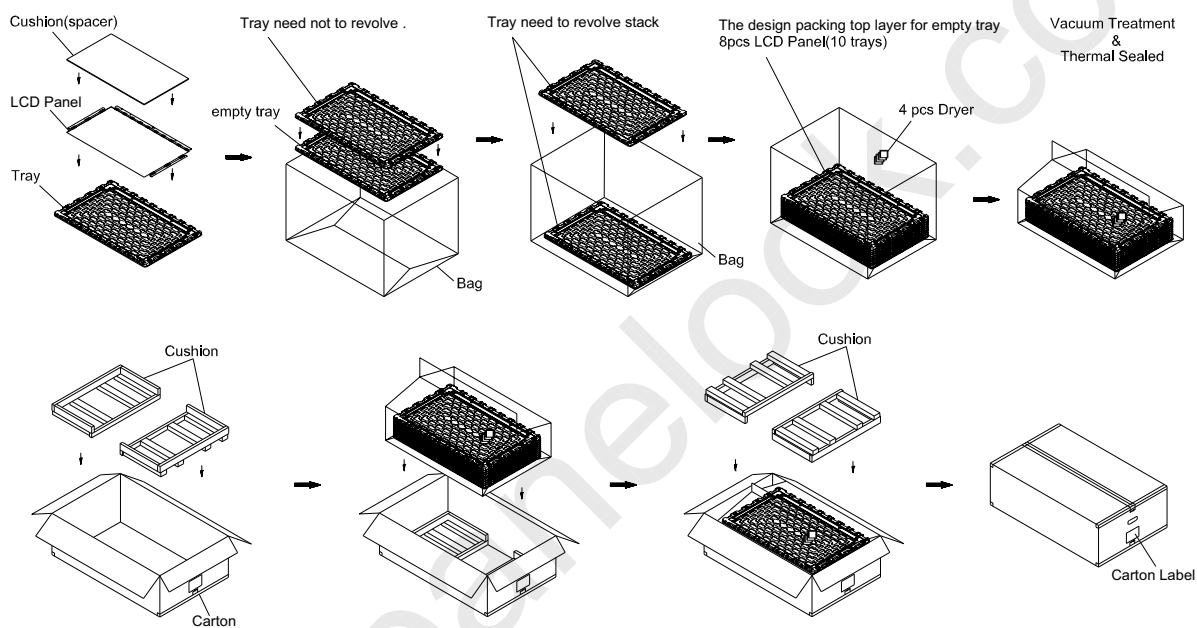
10. PACKAGING

10.1 PACKING SPECIFICATIONS

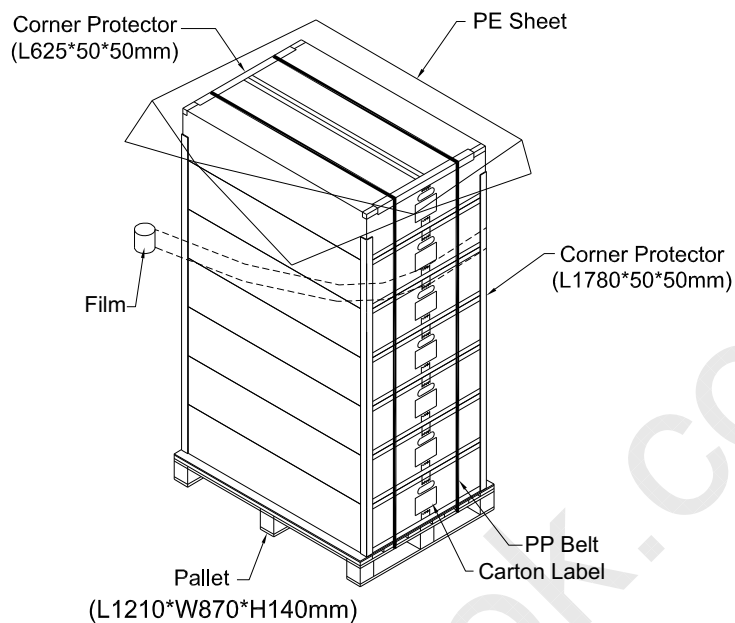
- (1) 8 LCD TV Panels / 1 Box
- (2) Box dimensions : 1196 (L) X 772 (W) X 275 (H)
Weight : approximately 35.5Kg (8 panels per box)

10.2 PACKING METHOD

Figures 8-1 and 8-2 are the packing method



Sea/Land Transportation



Air Transportation

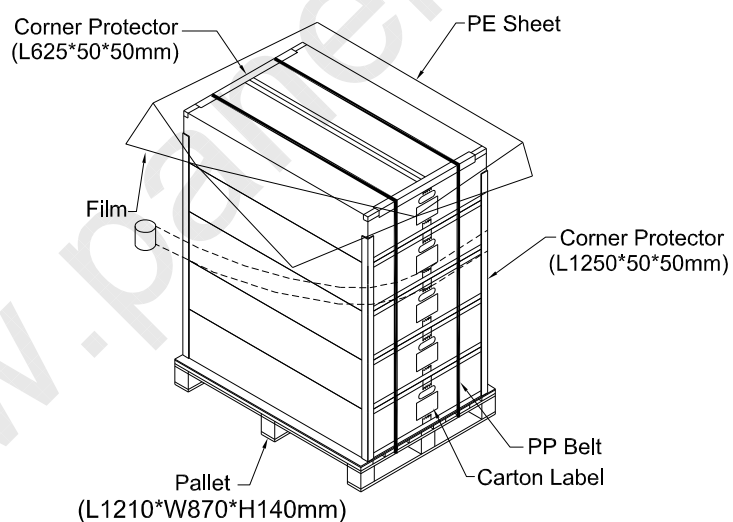


Figure.8-2 packing method

11. Mechanical Drawing

