TFT LCD Approval Specification

MODEL NO.: V420H1 – P13

Customer: _____

Approved by: _____

Note:

Approved By	TV Head Division.
	LY Chen

Reviewed By	QA Dept.	Product Development Div.
	Kc_Ko	WT Lin

Prepared By	LCD TV Marketing and Product Management Div.	
	Wang-Yang Li	Trina Lee

- CONTENTS -

REVISION HISTORY

Version	Date	Page	Section	Description
Ver. 1.0	Jun. 20, 2008	All	All	The Preliminary specification was first issued.
Ver. 2.0	Oct. 28, 2008	4	1.2	Updated Cell Transparency
Ver. 2.0	Oct. 28, 2008	19	9.2	Updated Carton Label
Ver. 2.0	Oct. 28, 2008	20-21	10	Updated Packing

1. GENERAL DESCRIPTION

1.1 OVERVIEW

V420H1-P13 is a 42" TFT Liquid Crystal Display cell with driver ICs and 2ch-LVDS interface. This product supports 1920 x 1080 HDTV format and can display true 16.7M colors (8-bit/color). The backlight unit is not built-in.

1.2 FEATURES

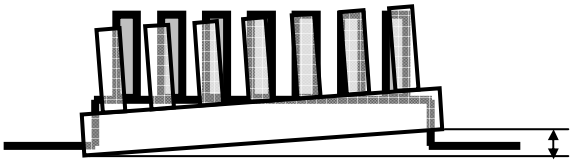
CHARACTERISTICS ITEMS	SPECIFICATIONS
Screen Diagonal [in]	42.02
Pixels [lines]	1920 × 1080
Active Area [mm]	930.24(H) × 523.26(V) (42.02" diagonal)
Sub-Pixel Pitch [mm]	0.1615(H) × 0.4845(V)
Pixel Arrangement	RGB vertical stripe
Weight [g]	TYP. 2150
Physical Size [mm]	955.04(W) × 545.66(H) × 2.00(D) Typ.
Display Mode	Transmissive mode / Normallly black
Contrast Ratio	4000:1 Typ. (Typical value measure 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 measure at CMO's module)
Color Chromaticity	R = (0.652, 0.327) G = (0.274, 0.588) B = (0.150, 0.086) W= (0.307, 0.318) * Please refer to "color chromaticity" on p.14
Cell Transparency [%]	3.9% Typ. (Typical value was 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.

Note (2) Connector mounting position



2. ABSOLUTE MAXIMUM RATINGS

2.1 ABSOLUTE RATINGS OF ENVIRONMENT (BASE ON CMO MODULE V420H1-L13)

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T_{ST}	-20	+60	ºC	(1)
Operating Ambient Temperature	T_{OP}	0	50	ºC	(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. (Ta ≦ 40 ºC).

(b) Wet-bulb temperature should be 39 ºC Max. (Ta > 40 ºC).

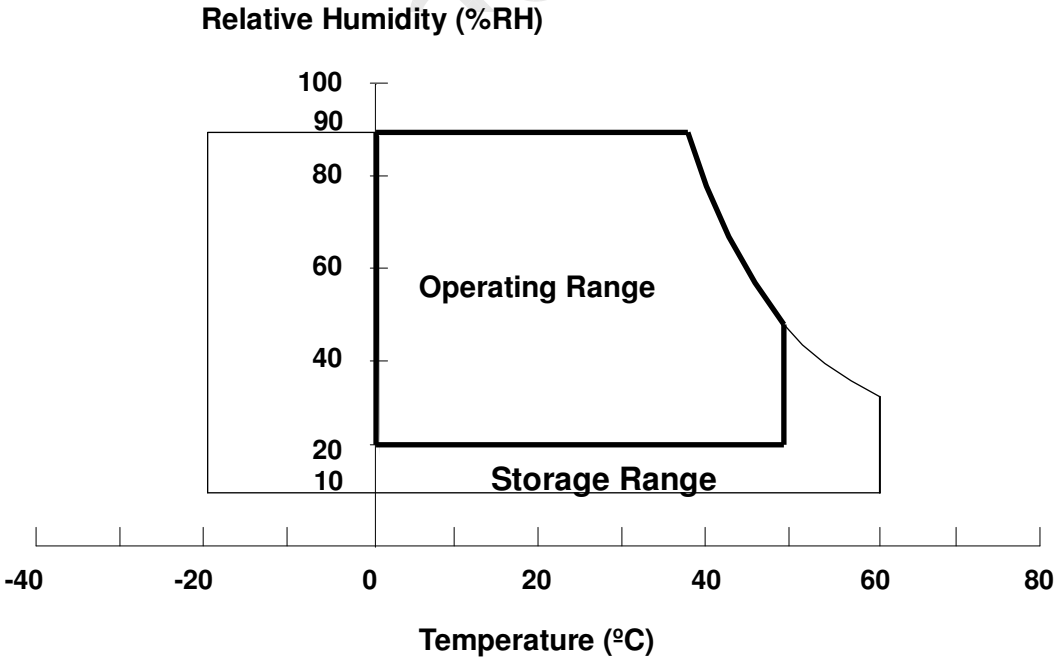
(c) No condensation.

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 ºC 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 ºC. 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 ± X, ± Y, ± 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 rang: 25±5℃

Storage humidity range: 50±10%RH

Shelf life: a month

2.3ELECTRICAL ABSOLUTE RATINGS

2.3.1 ELECTRICAL ABSOLUTE RATINGS (OPEN CELL)

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	V_{AA}	-0.3	17.5	V	(1)
	V_{GH}	-0.3	34	V	
	V_{GL}	-34	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 ºC)

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Voltage		V_{GH}	19.7	20.2	20.7	V	
		V_{GL}	-5.8	-5.5	-5.2	V	
		V_{AA}	15.5	16.0	16.5	V	
		V_{33V}	3.2	3.3	3.4	V	
Power Supply Current		I_{GH}		0.02		A	
		I_{GL}		0.05		A	
		I_{AA}		0.9		A	
		I_{33V}		0.45		A	
CMOS interface	Input High Threshold Voltage	V_{IH}	2.7		3.3	V	
	Input Low Threshold Voltage	V_{IL}	0		0.7	V	

Note (1) The module should be always operated within the above ranges.

3.2 RSDS CHARACTERISTICS (Ta = -10 ± 85 ºC)

Item	Symbol	Condition	Value			Unit
			Min.	Typ.	Max.	
RSDS high input Voltage	$V_{DIFFRSDS}$	V_{CMRSDS} = +1.2V(1)	100	200		mV
RSDS low input Voltage	$V_{DIFFRSDS}$	V_{CMRSDS} = +1.2V(1)		-200	-100	mV
RSDS common mode input voltage range	V_{CMRSDS}	$V_{DIFFRSDS}$ = 200mV (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

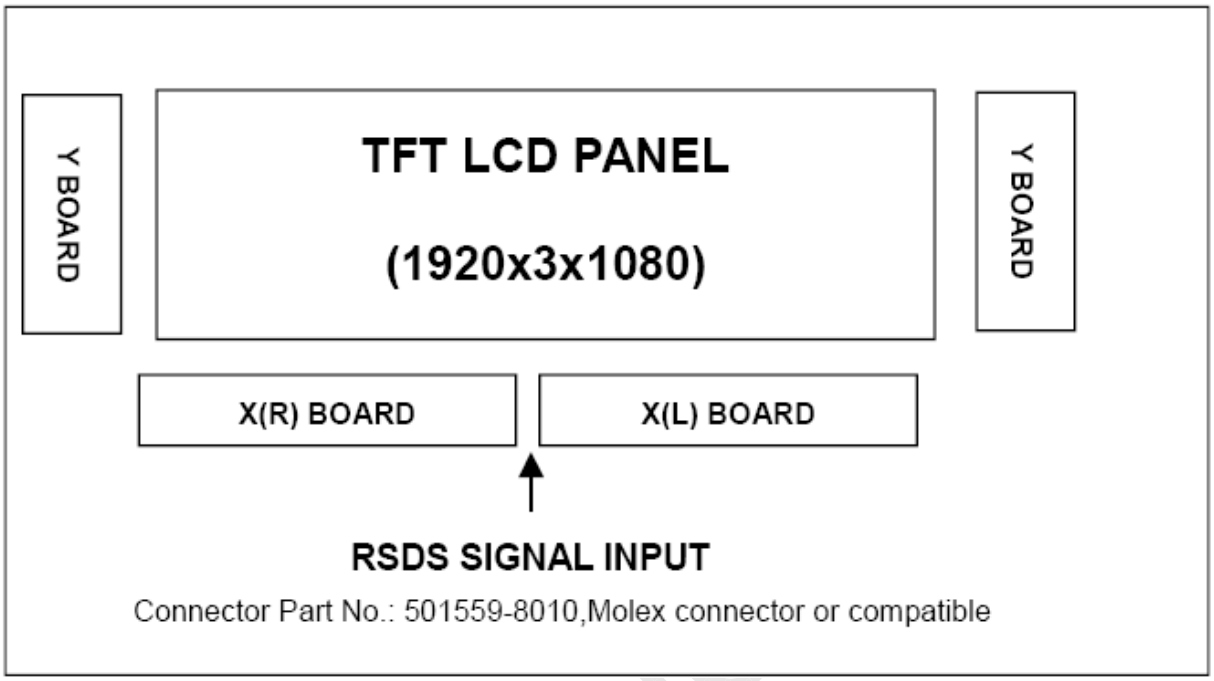
Note (1) V_{CMRSDS} = (VCLKP + VCLKN)/2 or V_{CMRSDS} = ($VD_{XX}P$ + $VD_{XX}N$)/2

Note (2) $V_{DIFFRSDS}$ = VCLKP - VCLKN or $V_{DIFFRSDS}$ = $VD_{XX}P$ - $VD_{XX}N$

Note (3) V_{CMRSDS} = +1.2V(VDDD = 3.3V)

4. BLOCK DIAGRAM

4.1 TFT LCD OPEN CELL



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 (Green3)	58	GM6	Gamma Power supply
19	A_G3M	A-Path RSDS data signal (Green3)	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 (Green2)	61	GM3	Gamma Power supply
22	A_G1P	A-Path RSDS data signal (Green1)	62	GM2	Gamma Power supply
23	A_G1M	A-Path RSDS data signal (Green1)	63	GM1	Gamma Power supply
24	A_G0P	A-Path RSDS data signal (Green0)	64	GND	Ground
25	A_G0M	A-Path RSDS data signal (Green0)	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

CN1(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 1)
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 the 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	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 (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	0	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	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) 0: Low Level Voltage, 1: High Level Voltage

6. INTERFACE TIMING

6.1 INPUT SIGNAL TIMING SPECIFICATIONS

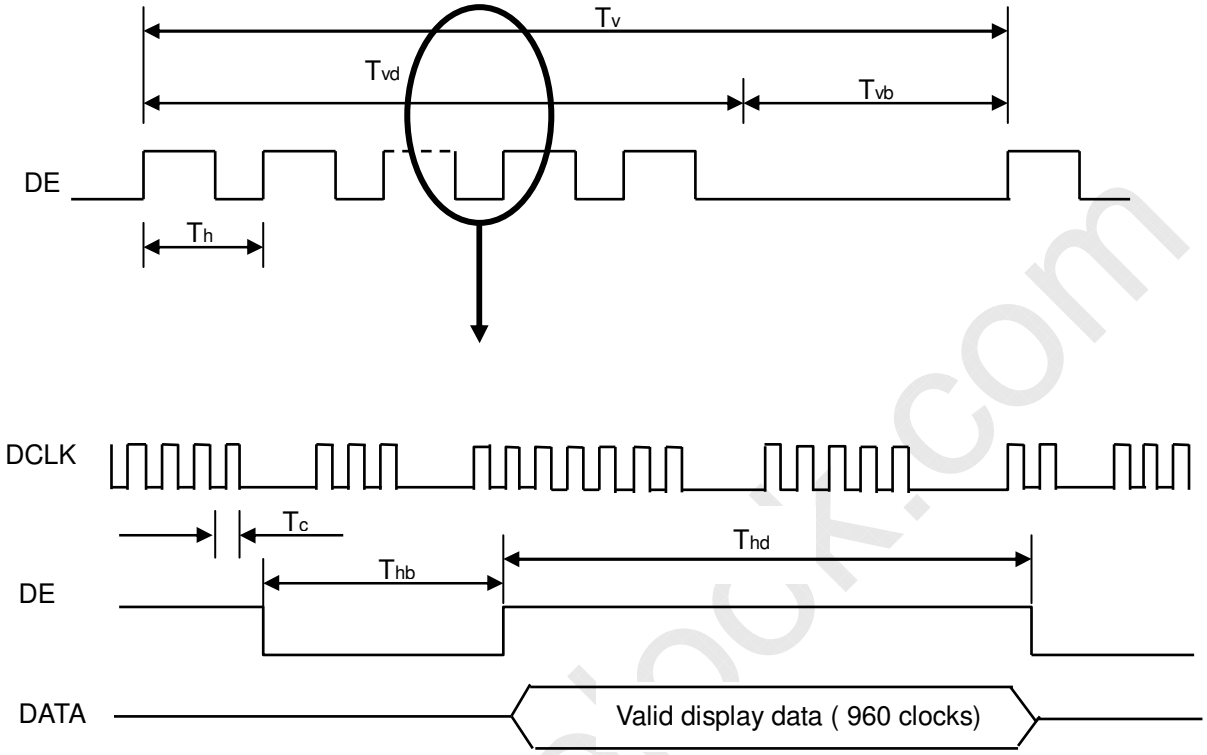
The input signal timing specifications are shown as the following table and timing diagram.

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	1050	1100	1150	Tc	Th=Thd+Thb
	Display	Thd	960	960	960	Tc	-
	Blank	Thb	90	140	190	Tc	-

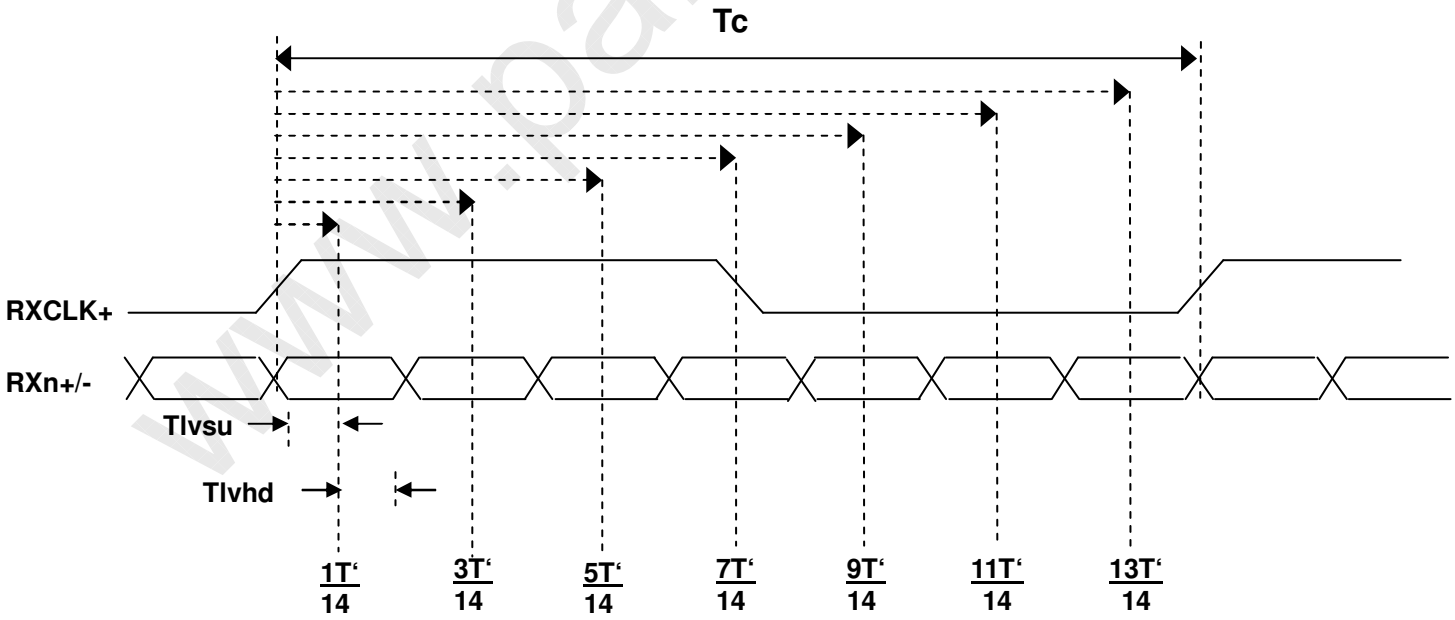
Note (1) (ODSEL) = (H) , (L). Please refer to 5.1 for detail information.

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

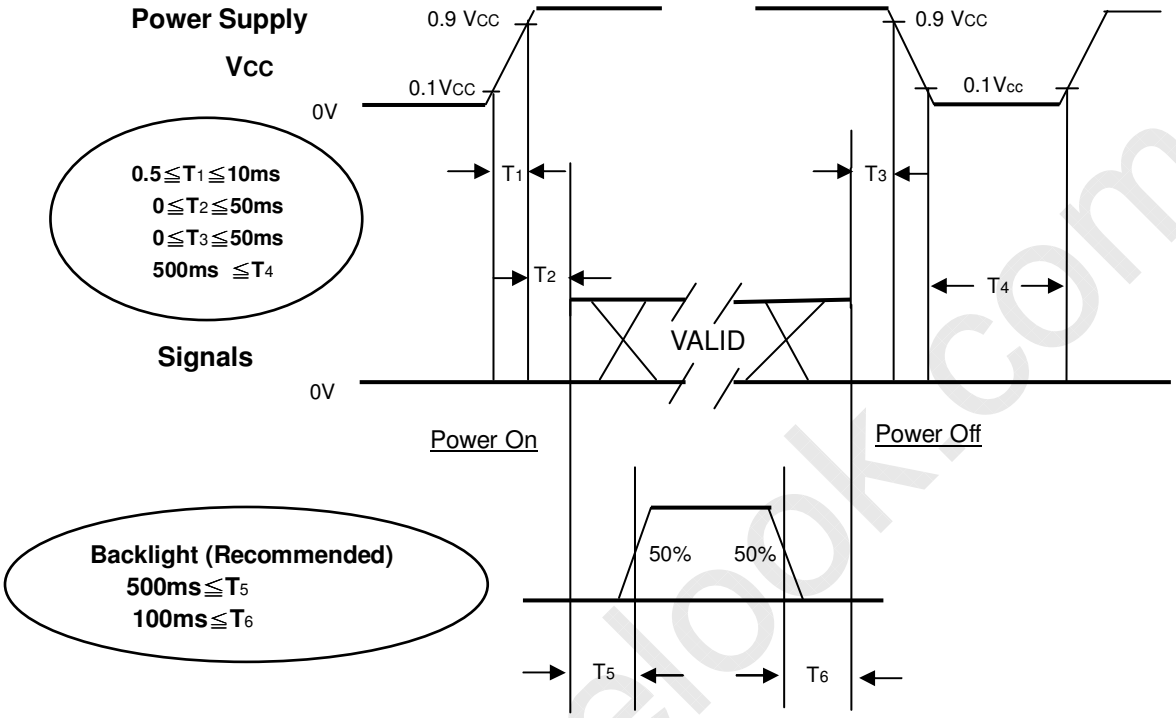


LVDS INPUT INTERFACE TIMING DIAGRAM



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 diagram below.



Power ON/OFF Sequence

Note (1) The supply voltage of the external system for the module input should follow the definition of Vcc.

Note (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.

Note (3) In case of VCC is in off level, please keep the level of input signals on the low or high impedance.

Note (4) T4 should be measured after the module has been fully discharged between power off and on period.

Note (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	9.5±0.5	mA
Oscillating Frequency (Inverter)	F_W	42.5±3	KHz
Vertical Frame Rate	Fr	60	Hz

7.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown in 7.2. 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	Rcx	θ_x=0°, θ_Y =0° CS-1000T Standard light source "C"	Typ - 0.03	0.652	Typ + 0.03	-	(0),(5)
		Rcy			0.327		-	
	Green	Gcx			0.274		-	
		Gcy			0.588		-	
	Blue	Bcx			0.150		-	
		Bcy			0.086		-	
	White	Wcx			0.307		-	
		Wcy			0.318		-	
Center Transmittance		T%	θ_x=0°, θ_Y =0° With CMO Module	-	4.1	-	%	(1), (7)
Contrast Ratio		CR		3000	4000	-	-	(1), (3)
Response Time		Gray to gray	θ_x=0°, θ_Y =0° With CMO Module @60Hz	-	6.5	12	ms	(4)
White Variation		δW	θ_x=0°, θ_Y =0° With CMO Module	-	-	1.3	-	(1), (6)
Viewing Angle	Horizontal	θ_x+	CR≥20 With CMO Module	80	88	-	Deg.	(1), (2)
		θ_x-		80	88	-		
	Vertical	θ_Y+		80	88	-		
		θ_Y-		80	88	-		

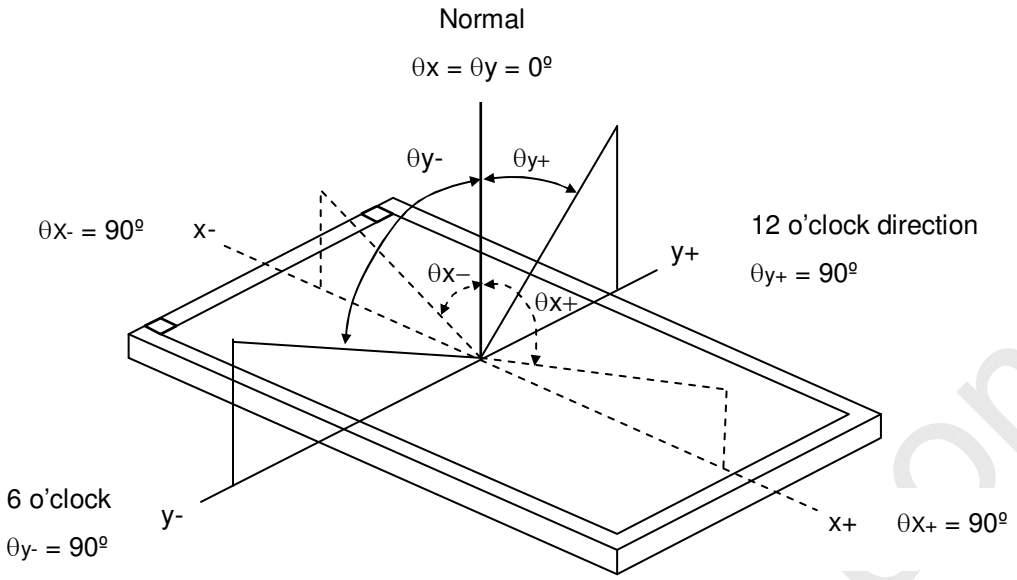
Note (0) Light source is the standard light source "C" which is defined by CIE and driving voltages are based on suitable gamma voltages. The calculating method is as following：

1. Measure Module's and BLU's spectrums. W, R, G, B are with signal input. BLU(for V420H1-L13) 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 (θx, θy):

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.

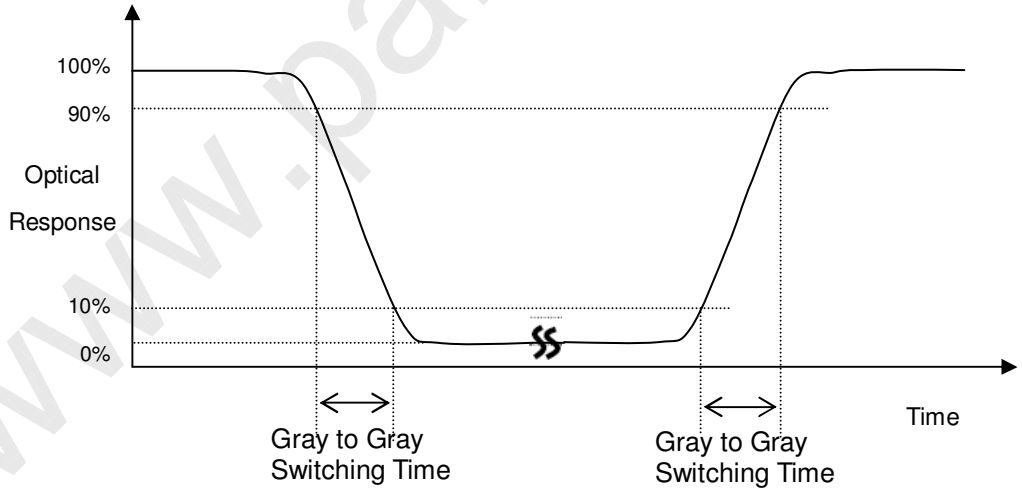
Contrast Ratio (CR) = L255 / L0

L255: Luminance of gray level 255

L 0: Luminance of gray level 0

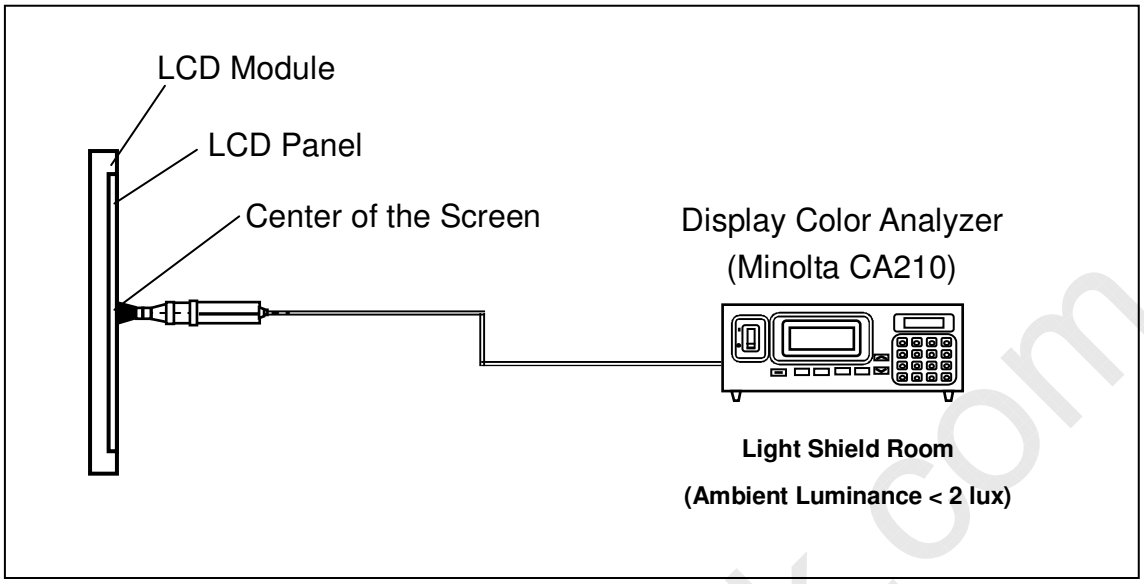
CR = CR (1), where CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (7).

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



Note (5) Measurement Setup:

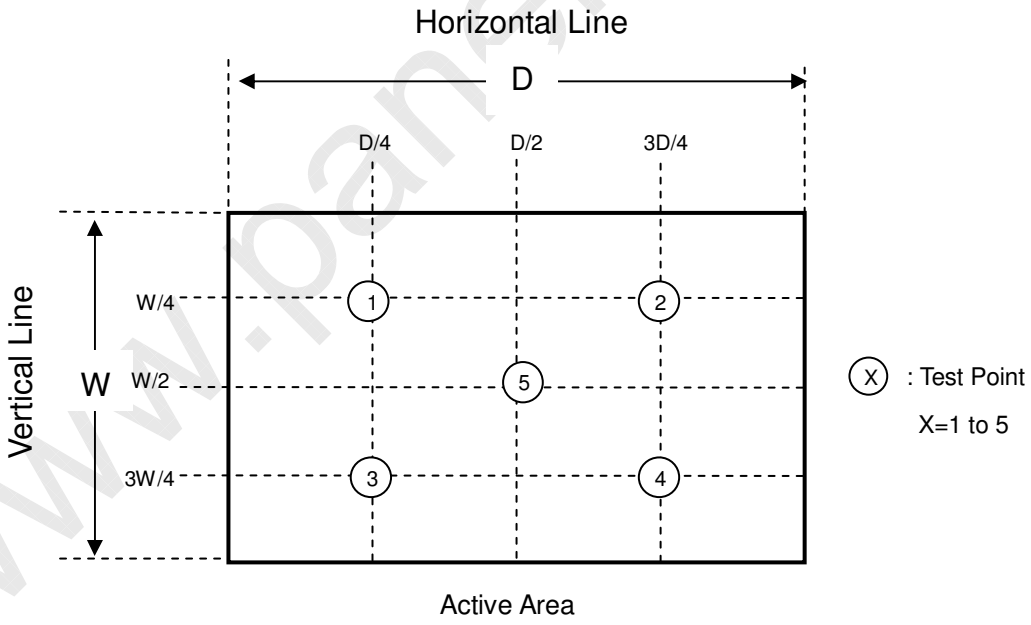
The LCD module should be stabilized at given temperature for 1 hour to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 1 hour in a windless room.



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

Measure the luminance of gray level 255 at 5 points

δW = Maximum [L (1), L (2), L (3), L (4), L (5)] / Minimum [L (1), L (2), L (3), L (4), L (5)]



Note (7) Definition of Transmittance (T%):

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 the user's system cab be only in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.

(3) Do not apply pressure or impulse to the module to prevent the damage of LCD panel.

(4) Always follow the correct power sequence when the product is connecting and operating. This can prevent the damage and latch-up of the CMOS LSI chips.

(5) Do not plug in or pull out the I/F connector while the module is in operation.

(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 came into or contacted the product, because moisture may damage the product when it is operation.

(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℃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 10ºC, the display quality might be reduced. For example, the response time will become slowly.

8.2 SAFETY PRECAUTIONS

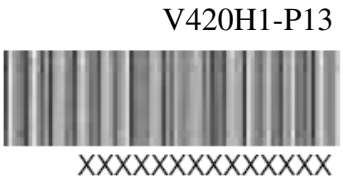
(1) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.

(2) After the product's end of life, it is not harmful in case of normal operation and storage.

9. DEFINITION OF LABELS

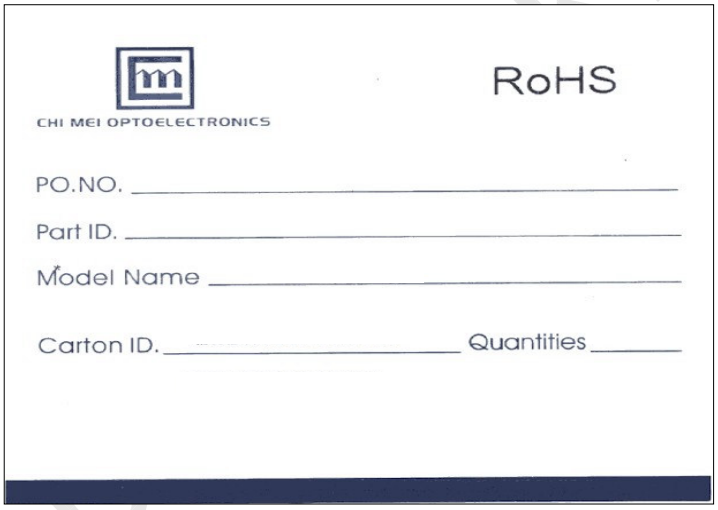
9.1 OPEN CELL LABEL

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.



(a) Model Name: V420H1-P13

(b) Carton ID: CMO internal control

(c) Quantities: 9 pcs

10. PACKAGING

10.1 PACKING SPECIFICATIONS

(1) 9 PCS LCD TV Panels / 1 Box

(2) Box dimensions : 1204 (L) X 796 (W) X 194 (H)

(3) Weight : approximately 33 Kg

10.2 PACKING METHOD

Figures 10-1 and 10-2 are the packing method

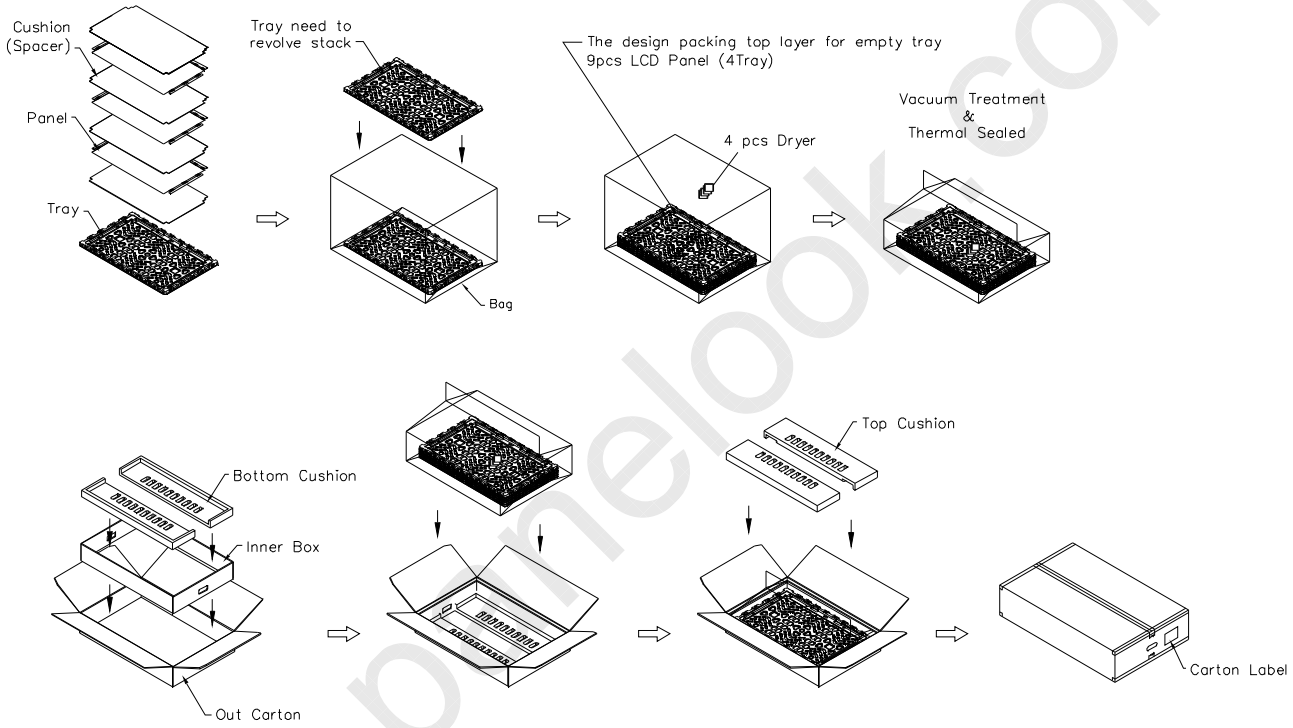
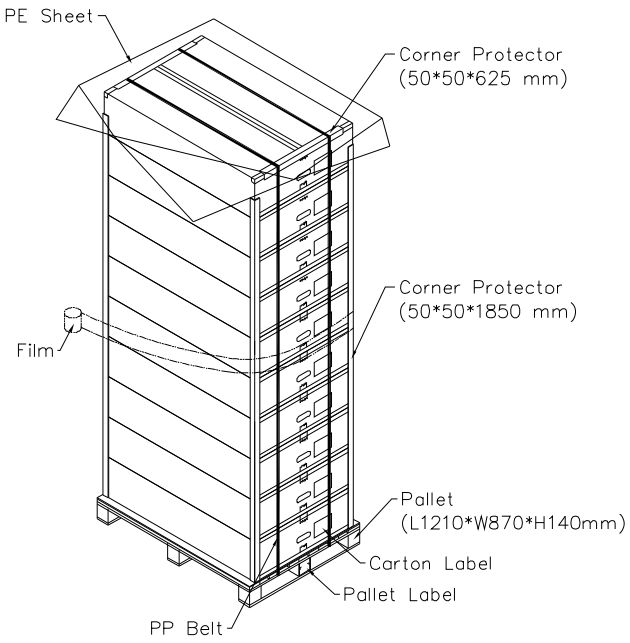


Figure.10-1 packing method

Sea & Land Transportation



Air Transportation

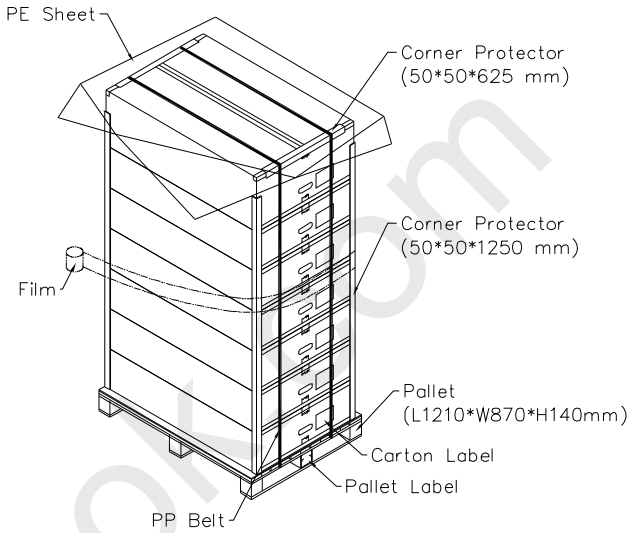


Figure.10-2 packing method

11. MECHANICAL CHARACTERISTICS