TFT LCD Preliminary Specification

MODEL NO.:V460H1-PH5

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REVISION HISTORY

Version	Date	Page (New)	Section	Description
Ver 1.0	Jun.17, 2009	All	All	Preliminary Specification was first issued.

1. GENERAL DESCRIPTION

1.1 OVERVIEW

V460H1- PH5 is a 46" TFT Liquid Crystal Display module. This module supports 1920 x 1080 HDTV format and can display true 1.073G colors (10bit/color)..

1.2 CHARACTERISTICS

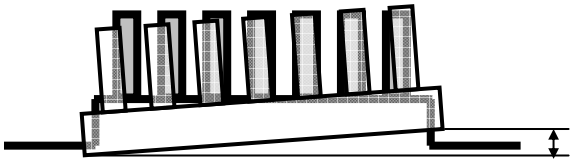
CHARACTERISTICS ITEMS	SPECIFICATIONS
Screen Diagonal [in]	46
Pixels [lines]	1920 x 1080
Active Area [mm]	1018.08(H) x 572.67(V) (46" diagonal)
Sub -Pixel Pitch [mm]	0.17675(H) x 0.53025(V)
Pixel Arrangement	RGB vertical stripe
Weight [g]	TYP. 2560
Physical Size [mm]	1056.38(W) x 628.52(H) x 2(D) Typ.
Display Mode	Transmissive mode / Normally black
Contrast Ratio	5000:1 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. (Typical value measured at CMO's module)
Color Chromaticity	R=(0.643, 0.323) G=(0.287, 0.602) B=(0.148, 0.056) W=(0.280, 0.290) (Typical value measured at CMO's module)
Cell Transparency [%]	4.4%Typ. (Typical value measured at CMO's module)
Polarizer (CF side)	Super Wide View Glare coating, 1030.18 (H) x 586.37(w).. Hardness: 3H
Polarizer (TFT side)	Super Wide View, 1030.18(H) x 586.37(w).

1.3 MECHANICAL SPECIFICATIONS

Item	Min.	Typ.	Max.	Unit	Note
Weight	-	2490	-	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



+/- 0.5mm

2. ABSOLUTE MAXIMUM RATINGS

2.1 ABSOLUTE RATINGS OF ENVIRONMENT (BASED ON CMO MODULE V460H1-PH1)

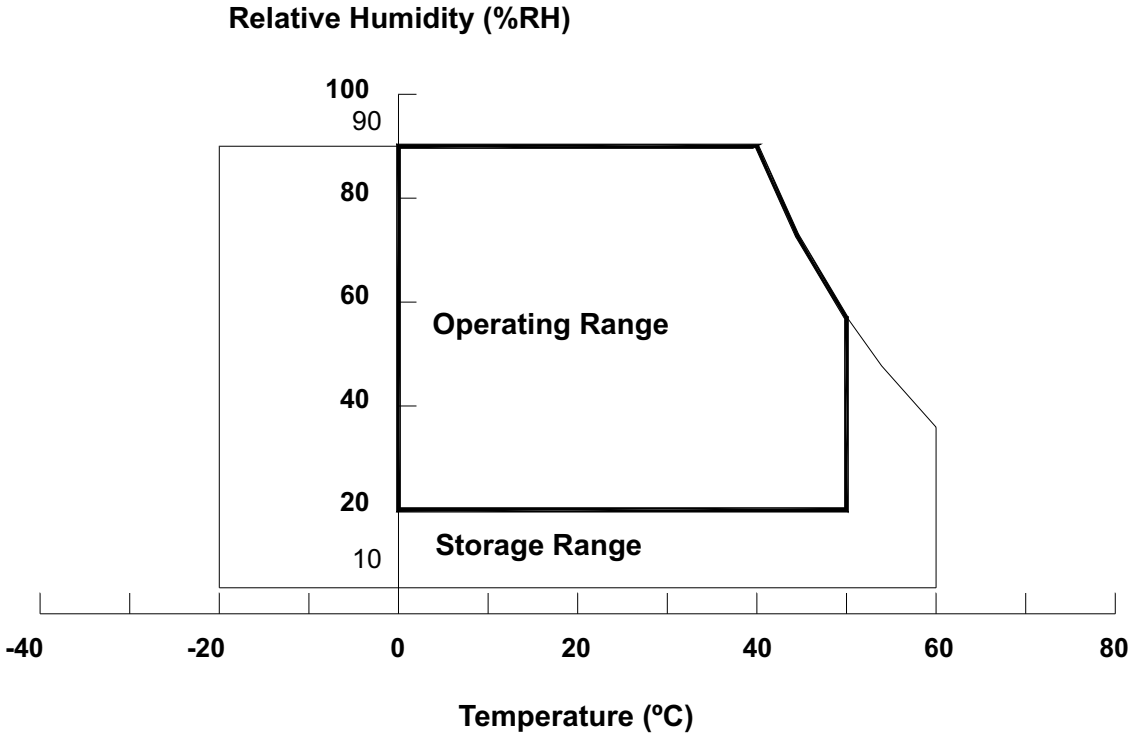
Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T_{ST}	-20	+60	ºC	(1), (3)
Operating Ambient Temperature	T_{OP}	0	50	ºC	(1), (2), (3)
Altitude Operating	A_{OP}	0	5000	M	(3)
Altitude Storage	A_{ST}	0	12000	M	(3)

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 your 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 your product design.

Note (3) The rating of environment is base on LCD module. Leave LCD cell alone, this environment condition can't be guaranteed. Except LCD cell, the customer has to consider the ability of other parts of LCD module and LCD module process.

2.2 ABSOLUTE RATINGS OF ENVIRONMENT (OPEN CELL)

Storage Condition : With shipping package.

Storage temperature range : 25±5 ℃

Storage humidity range : 50±10%RH

Shelf life : a month

2.3 ELECTRICAL ABSOLUTE RATINGS (OPEN CELL)

Item	Symbol	Value		Unit	Note
		Min	Max		
Power Supply Voltage	V_{AA}	-0.3	17.9	V	(1)
Power Supply Voltage	V_{GHP}	-0.3	32.3	V	
Power Supply Voltage	V_{GL}	-5.7	-0.3	V	
Logic Input Voltage	V_{DD}	-0.3	3.4	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		VGHP	31.3	31.8	32.3	V	
		VGL	-5.7	-5.5	-5.3	V	
		VAA	17.5	17.7	17.9	V	
		VDD	3.2	3.3	3.4	V	
Power Supply Current		IGH	-	-	50	mA	
		IGL	-	-	50	mA	
		IAA	-	-	1300	mA	
		I33V	-	-	2300	mA	
CMOS interface	Input High Threshold Voltage	VIH	2.7		3.3	V	
	Input Low Threshold Voltage	VIL	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	VDIFFRSDS	VCMRSDS = +1.2 V (1)	100	200	-	mV
RSDS low input Voltage	VDIFFRSDS	VCMRSDS = +1.2 V (1)	-	-200	-100	mV
RSDS common mode input voltage range	VCMRSDS	VDIFFRSDS = 200 mV (2)	VSSD+0.5	Note(3)	VSSD-1.2	V
RSDS Input leakage current	IDL	A/BDxxP, A/BDxxN, A/BCLKP, A/BCLKN	-10	-	10	μA

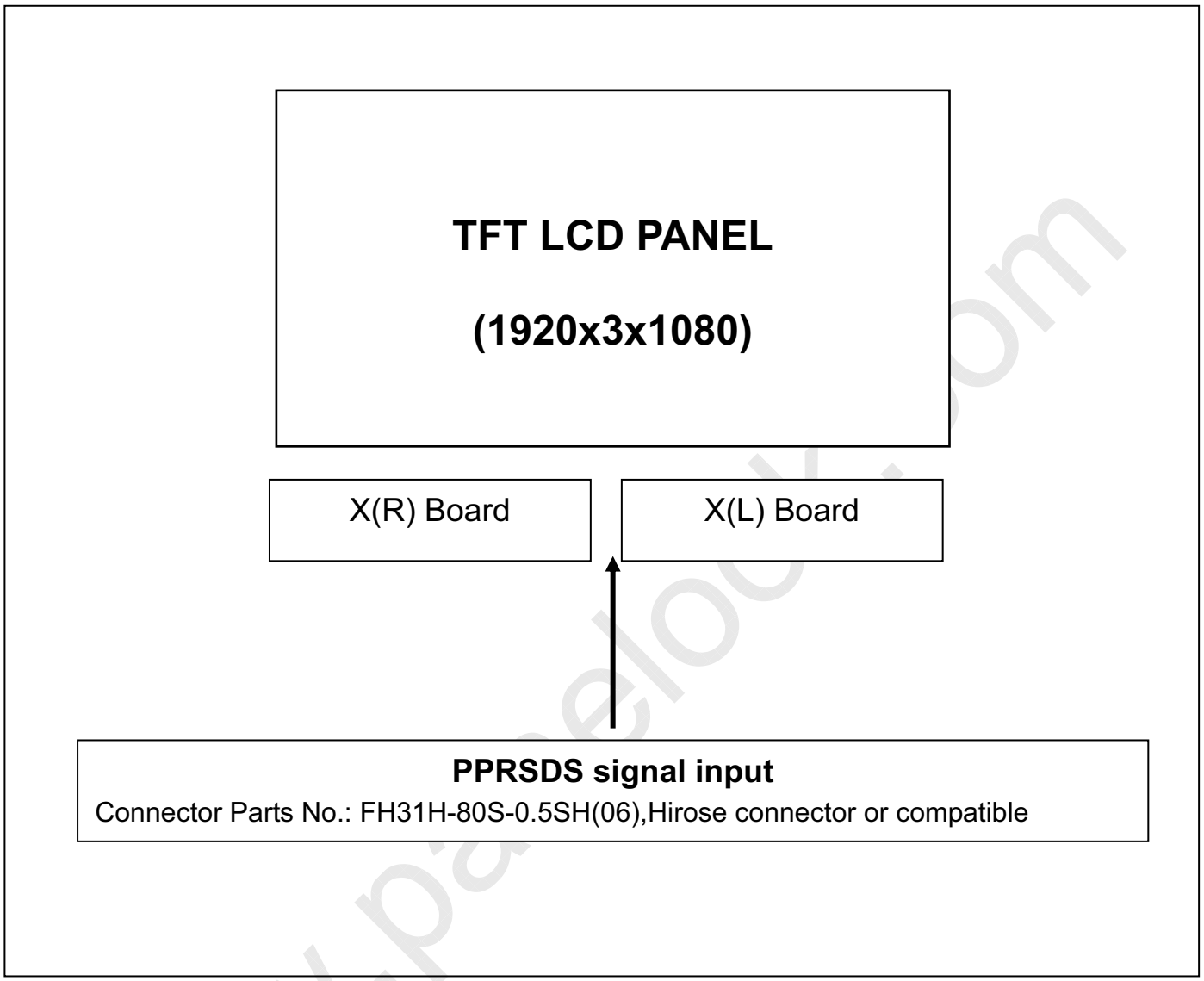
Note (1) VCMRSDS = (VCLKP + VCLKN)/2 or VCMRSDS = (VDXXP + VDXXN)/2

Note (2) VDIFFRSDS = VCLKP - VCLKN or VDIFFRSDS = VDXXP - VDXXN

Note (3) VCMRSDS = 1.2V(VDDD = 3.3V)

4. BLOCK DIAGRAM OF INTERFACE

4.1 TFT LCD OPEN CELL



5. INPUT TERMINAL PIN ASSIGNMENT

CN1(XL) Connector Pin Assignment

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	GND	Ground	41	AD0M_1	A-Path RSDS data signal
2	BD1P_4	B-Path RSDS data signal	42	GND	Ground
3	BD1M_4	B-Path RSDS data signal	43	GM20	Gamma Power supply
4	GND	Ground	44	GM19	Gamma Power supply
5	N.C.	No connection	45	GM18	Gamma Power supply
6	N.C.	No connection	46	GM17	Gamma Power supply
7	GND	Ground	47	GM16	Gamma Power supply
8	BD0P_4	B-Path RSDS data signal	48	GM15	Gamma Power supply
9	BD0M_4	B-Path RSDS data signal	49	GM14	Gamma Power supply
10	AD1P_4	A-Path RSDS data signal	50	GM13	Gamma Power supply
11	AD1M_4	A-Path RSDS data signal	51	GM12	Gamma Power supply
12	AD0P_4	A-Path RSDS data signal	52	GM11	Gamma Power supply
13	AD0M_4	A-Path RSDS data signal	53	GM10	Gamma Power supply
14	BD1P_3	B-Path RSDS data signal	54	GM9	Gamma Power supply
15	BD1M_3	B-Path RSDS data signal	55	GM8	Gamma Power supply
16	BD0P_3	B-Path RSDS data signal	56	GM7	Gamma Power supply
17	BD0M_3	B-Path RSDS data signal	57	GM6	Gamma Power supply
18	AD1P_3	A-Path RSDS data signal	58	GM5	Gamma Power supply
19	AD1M_3	A-Path RSDS data signal	59	GM4	Gamma Power supply
20	AD0P_3	A-Path RSDS data signal	60	GM3	Gamma Power supply
21	AD0M_3	A-Path RSDS data signal	61	GM2	Gamma Power supply
22	BD1P_2	B-Path RSDS data signal	62	GM1	Gamma Power supply
23	BD1M_2	B-Path RSDS data signal	63	GND	Ground
24	BD0P_2	B-Path RSDS data signal	64	TP1	RSDS data latch
25	BD0M_2	B-Path RSDS data signal	65	CKV	Scan driver clock
26	AD1P_2	A-Path RSDS data signal	66	OE1	Scan driver output enable 1
27	AD1M_2	A-Path RSDS data signal	67	OE2	Scan driver output enable 2
28	GND	Ground	68	STV	Scan driver start pulse
29	A_CLKP	Data driver clock	69	GND	Ground
30	A_CLKM	Data driver clock	70	VDD	Logic Power supply
31	GND	Ground	71	VDD	Logic Power supply
32	AD0P_2	A-Path RSDS data signal	72	VDDA	Driver Power supply
33	AD0M_2	A-Path RSDS data signal	73	VDDA	Driver Power supply
34	BD1P_1	B-Path RSDS data signal	74	VCM	VCM Power supply
35	BD1M_1	B-Path RSDS data signal	75	VCM	VCM Power supply
36	BD0P_1	B-Path RSDS data signal	76	VGL	Driver Power supply
37	BD0M_1	B-Path RSDS data signal	77	VGL	Driver Power supply
38	AD1P_1	A-Path RSDS data signal	78	VGH	Driver Power supply
39	AD1M_1	A-Path RSDS data signal	79	VGH	Driver Power supply
40	AD0P_1	A-Path RSDS data signal	80	GND	Ground

CN2(XR) Connector Pin Assignment

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	GND	Ground	41	BD1M_6	B-Path RSDS data signal
2	VGH	Driver Power supply	42	BD0P_6	B-Path RSDS data signal
3	VGH	Driver Power supply	43	BD0M_6	B-Path RSDS data signal
4	VGL	Driver Power supply	44	AD1P_6	A-Path RSDS data signal
5	VGL	Driver Power supply	45	AD1M_6	A-Path RSDS data signal
6	VCM	VCM Power supply	46	AD0P_6	A-Path RSDS data signal
7	VCM	VCM Power supply	47	AD0M_6	A-Path RSDS data signal
8	VDDA	Driver Power supply	48	BD1P_5	B-Path RSDS data signal
9	VDDA	Driver Power supply	49	BD1M_5	B-Path RSDS data signal
10	VDD	Logic Power supply	50	BD0P_5	B-Path RSDS data signal
11	VDD	Logic Power supply	51	BD0M_5	B-Path RSDS data signal
12	GND	Ground	52	GND	Ground
13	VSCM	VSCM Power supply	53	GM20	Gamma Power supply
14	TP1	RSDS data latch	54	GM19	Gamma Power supply
15	STV	Scan driver start pulse	55	GM18	Gamma Power supply
16	CKV	Scan driver clock	56	GM17	Gamma Power supply
17	OE2	Scan driver output enable 2	57	GM16	Gamma Power supply
18	OE1	Scan driver output enable 1	58	GM15	Gamma Power supply
19	GND	Ground	59	GM14	Gamma Power supply
20	BD1P_8	B-Path RSDS data signal	60	GM13	Gamma Power supply
21	BD1M_8	B-Path RSDS data signal	61	GM12	Gamma Power supply
22	BD0P_8	B-Path RSDS data signal	62	GM11	Gamma Power supply
23	BD0M_8	B-Path RSDS data signal	63	GM10	Gamma Power supply
24	AD1P_8	A-Path RSDS data signal	64	GM9	Gamma Power supply
25	AD1M_8	A-Path RSDS data signal	65	GM8	Gamma Power supply
26	AD0P_8	A-Path RSDS data signal	66	GM7	Gamma Power supply
27	AD0M_8	A-Path RSDS data signal	67	GM6	Gamma Power supply
28	GND	Ground	68	GM5	Gamma Power supply
29	C_CLKP	Data driver clock	69	GM4	Gamma Power supply
30	C_CLKM	Data driver clock	70	GM3	Gamma Power supply
31	GND	Ground	71	GM2	Gamma Power supply
32	BD1P_7	B-Path RSDS data signal	72	GM1	Gamma Power supply
33	BD1M_7	B-Path RSDS data signal	73	GND	Ground
34	BD0P_7	B-Path RSDS data signal	74	AD1P_5	A-Path RSDS data signal
35	BD0M_7	B-Path RSDS data signal	75	AD1M_5	A-Path RSDS data signal
36	AD1P_7	A-Path RSDS data signal	76	N.C.	No connection
37	AD1M_7	A-Path RSDS data signal	77	N.C.	No connection
38	AD0P_7	A-Path RSDS data signal	78	AD0P_5	A-Path RSDS data signal
39	AD0M_7	A-Path RSDS data signal	79	AD0M_5	A-Path RSDS data signal
40	BD1P_6	B-Path RSDS data signal	80	GND	Ground

Note (1) C_CN1、2 Connector Part No.: FH31H-80S-0.5SH(06),Hirose

6. OPTICAL CHARACTERISTICS

6.1 TEST CONDITIONS

Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	°C
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	V_{CC}	12V	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
Lamp Current	I_L	10.5±0.3	mA
Oscillating Frequency (Inverter)	F_W	46±3	KHz
Vertical Frame Rate	Fr	120	Hz

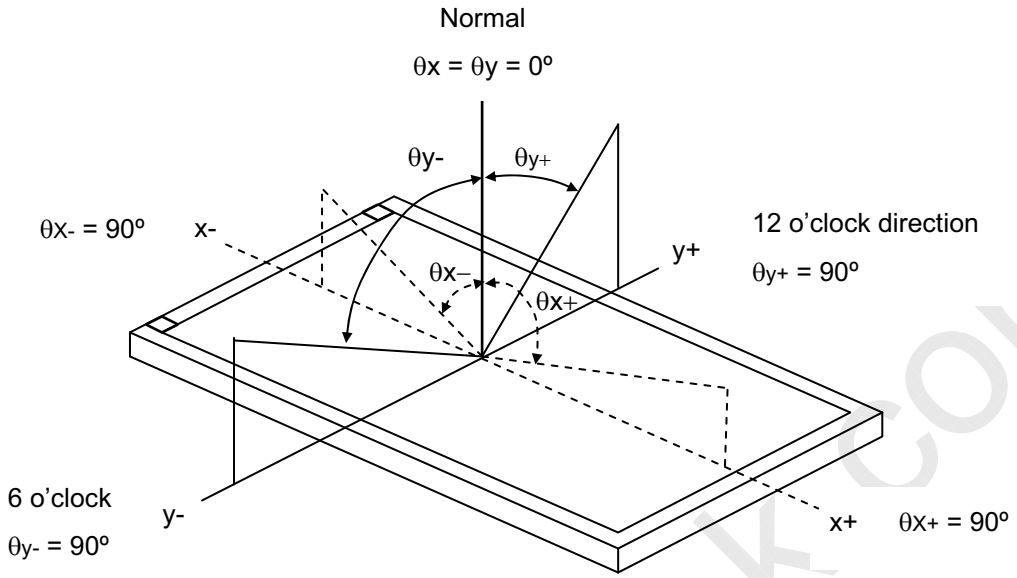
6.2 OPTICAL SPECIFICATIONS

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
Contrast Ratio		CR	θ_x=0°, θ_Y =0° Viewing angle at normal direction	3800	5000	-	-	Note (2)
Response Time		Gray to gray		-	4.5	8	ms	Note (3)
Center Luminance of White		L_C		450	500	-	cd/m^2	Note (4)
White Variation		δW		-	-	1.3	-	Note (7)
Cross Talk		CT		-	-	4	%	Note (5)
Color Chromaticity	Red	Rx		Typ.-0.03	0.634	Typ.+0.03	-	Note (6)
		Ry			0.323		-	
	Green	Gx			0.287		-	
		Gy			0.602		-	
	Blue	Bx			0.148		-	
		By			0.056		-	
	White	Wx			0.280		-	
		Wy			0.290		-	
	Color Gamut				72	-	%	NTSC
Viewing Angle	Horizontal	θ_x+	CR≥20	80	88	-	Deg.	Note (1)
		θ_x-		80	88	-		
	Vertical	θ_Y+		80	88	-		
		θ_Y-		80	88	-		

Note (1) Definition of Viewing Angle (θx, θy):

Viewing angles are measured by Eldim EZ-Contrast 160R



Note (2) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

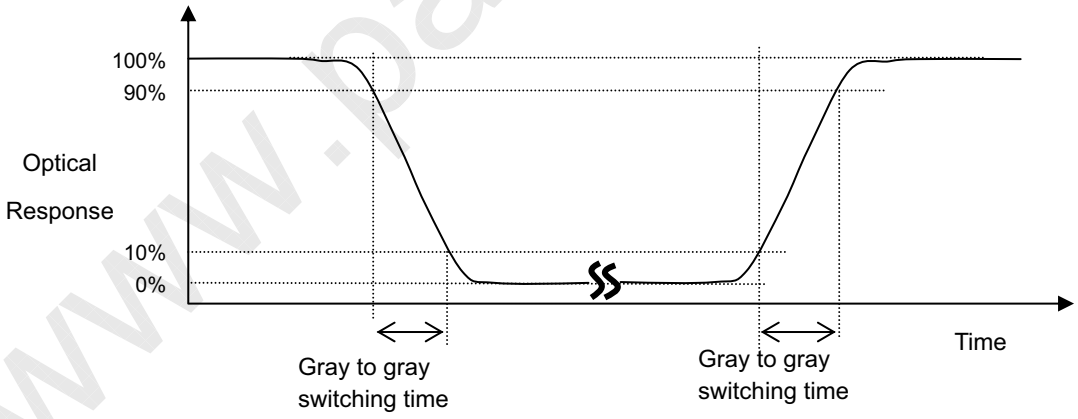
Contrast Ratio (CR) = L1023 / L0

L1023: Luminance of gray level 1023

L 0: Luminance of gray level 0

CR = CR (5), where CR (X) is corresponding to the Contrast Ratio of the point X at the figure in Note (7)

Note (3) Definition of Gray to Gray Switching Time :



The driving signal means the signal of luminance 0%, 20%, 40%, 60%, 80%, 100%.

Gray to gray average time means the average switching time of luminance 0%,20%, 40%, 60%, 80%, 100% to each other.

Note (4) Definition of Luminance of White (L_C):

Measure the luminance of gray level 1023 at center point.

L_C = L (5), where L (x) is corresponding to the luminance of the point X at the figure in Note (7).

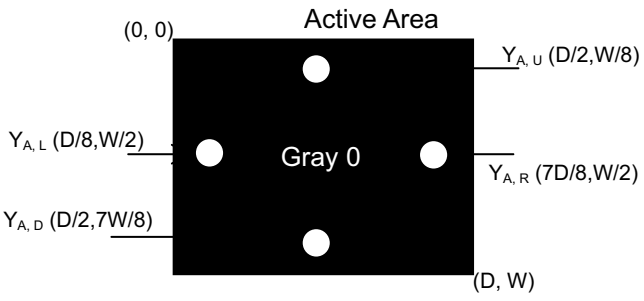
Note (5) Definition of Cross Talk (CT):

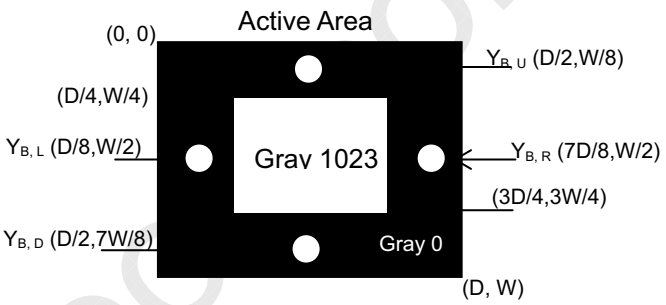
$CT = | Y_B - Y_A | / Y_A \times 100$ (%)

Where:

Y_A = Luminance of measured location without gray level 204 pattern (cd/m^2)

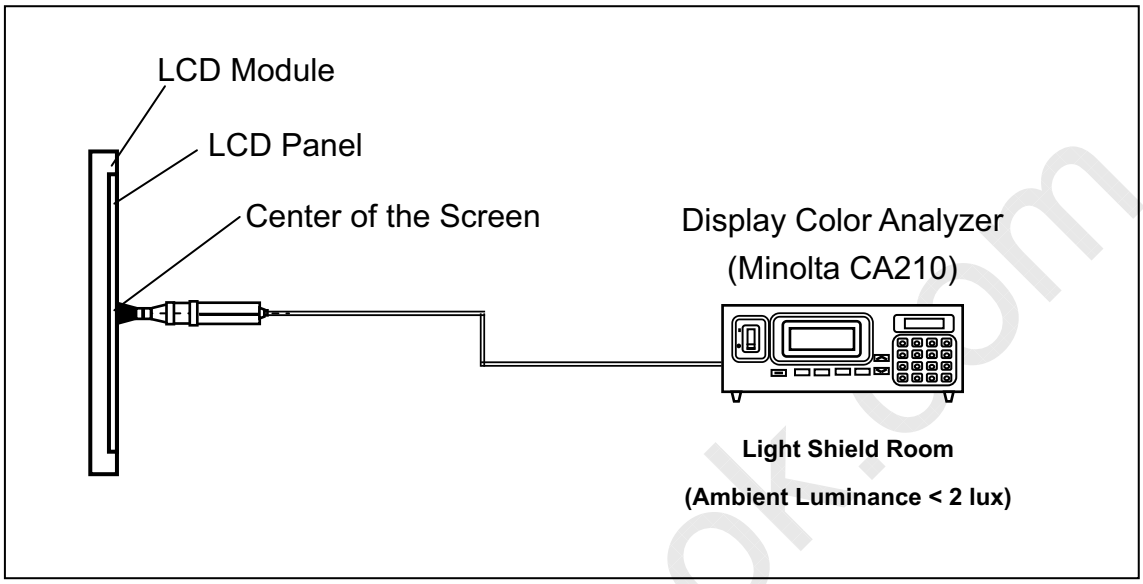
Y_B = Luminance of measured location with gray level 1023 pattern (cd/m^2)





Note (6) Measurement Setup:

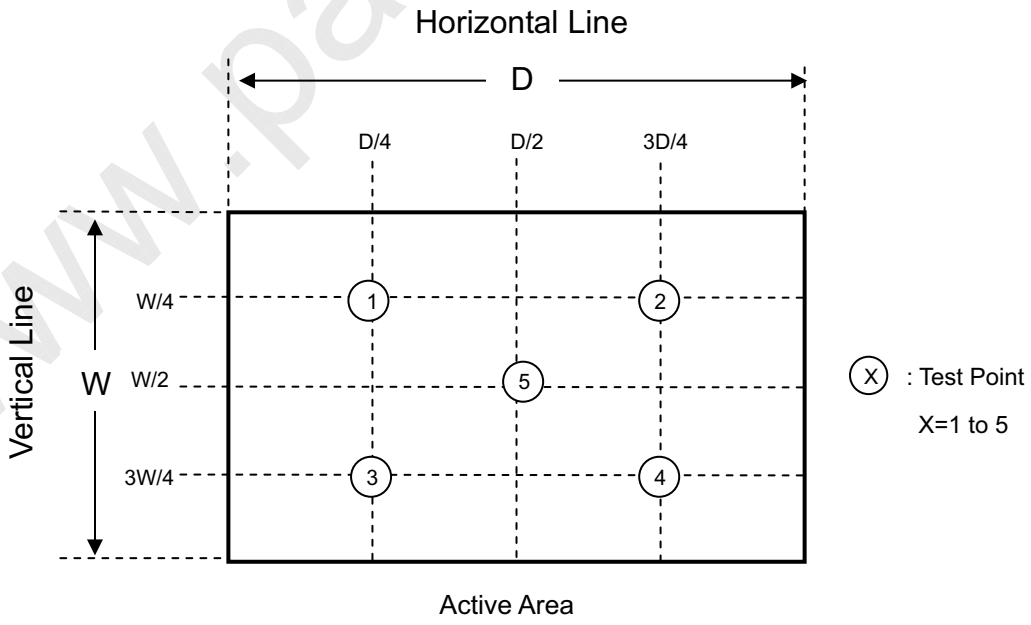
The LCD module should be stabilized at given temperature for 1 hour to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 1 hour in a windless room.



Note (7) Definition of White Variation (δW):

Measure the luminance of gray level 1023 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)]

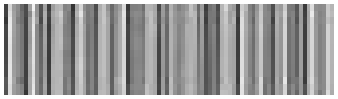


7. DEFINITION OF LABELS

7.1 OPEN CELL LABEL

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

V460H1-PH5



XXXXXXXXXXXXX

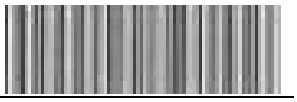
7.2 CARTON LABEL

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

P.O. NO._____

Parts ID._____

Carton ID._____ Quantities __8__



XXXXXXXXXXXXX

Made in Taiwan

(a) Model Name: V460H1– PH5

(b) Carton ID: CMO internal control

(c) Quantities: 8

8. PACKAGING

8.1 PACKING SPECIFICATIONS

(1) 8 LCD TV Panels / 1 Box

(2) Box dimensions :1238 (L) X 842 (W) X 240(H)

(3) Weight : approximately 38Kg (8 panels per box)

8.2 PACKING METHOD

Figures 9-1 and 9-2 are the packing method

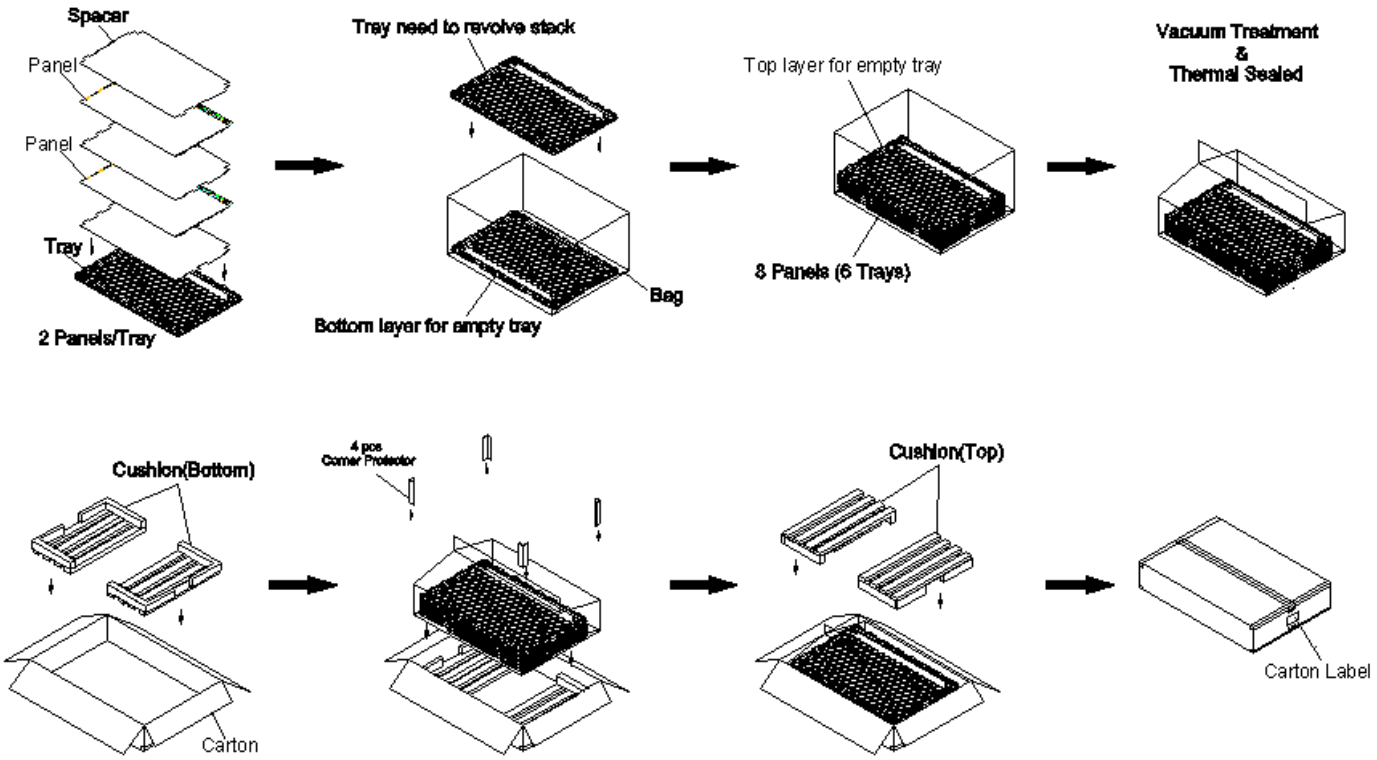
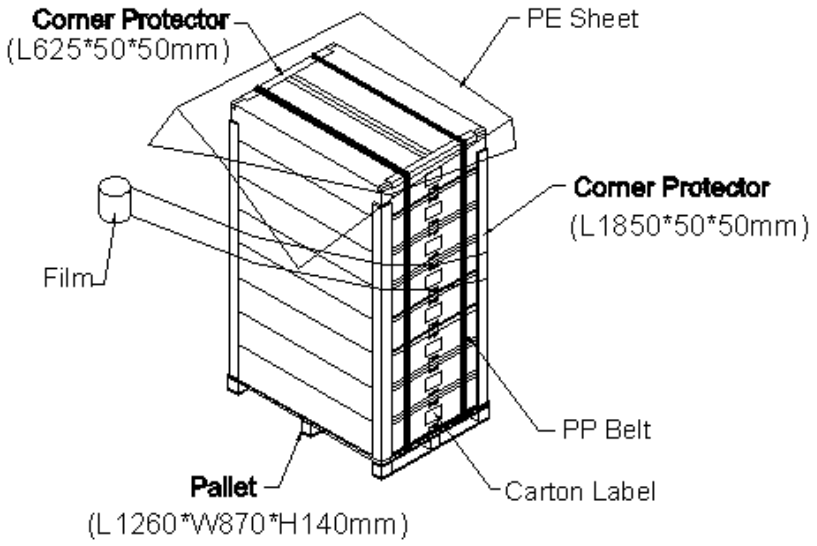


Figure.9-1 packing method

Sea & Land Transportation
Gross: 319kg



Air Transportation
Gross: 243kg

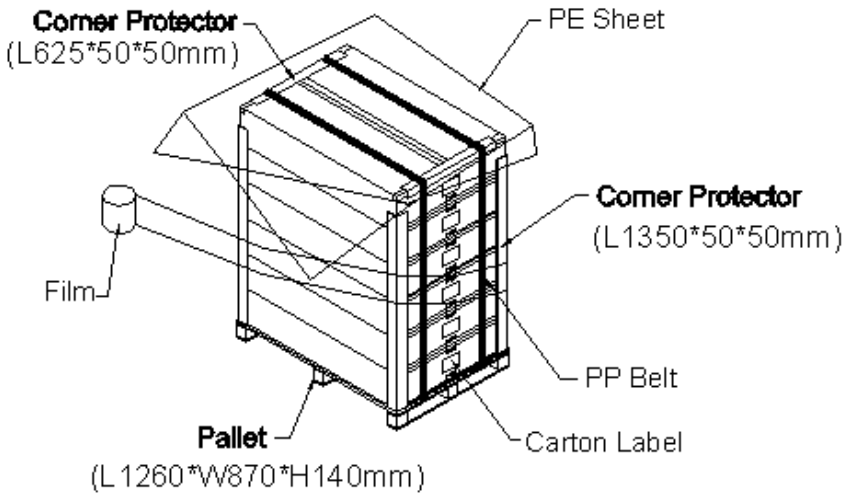


Figure.9-2 packing method

9. PRECAUTIONS

9.1 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) High temperature or humidity may reduce the performance of module. Please store this product within the specified storage conditions.

(9) When ambient temperature is lower than 10ºC may reduce the display quality. For example, the response time will become slowly.

9.2 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.

10. Mechanical Drawing