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《■新规 · 变更》
New Revision

产 品 规 格 书
Product Specification

产品名 Product 70 inch Open-Cell Panel

机种名 Model CC700PV2D**

Customer's Approve	CCPD
	Approved by Project Director： Name： Date： Signature:
	Reviewed by Project manager: Name： Date： Signature:
	Prepared by Project Leader: Name： Date： Signature:

※ 本基准书由封面、附件等全 16 页构成。如果对该规格书有异议，请在下订单前提出。
※ This Product Specification have 16 pages including the coversheet and Appendices. Please negotiate the objection point before purchase order.

中电熊猫集团
成都中电熊猫显示科技有限公司
CEC PANDA GROUP
CHENGDU CEC PANDA DISPLAY TECHNOLOGY CO., LTD.

RECORDS OF REVISION

DATE	Spec NO.	REVISED No.	PAGE	SUMMARY	NOTE
2019/10/28	-	01	-	First Edition	Version1.0

1. Application

This technical literature applies to the color 70″ UHD TFT-LCD.

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*This Open-Cell is not designed to use in dusty environment and to prevent image retention caused by long-term display of fixed pattern. So please consider items mentioned above before use and design equipment.

*In case of using the device for applications such as control and safety equipment for transportation (aircraft, trains, automobiles, etc.), rescue and security equipment and various safety related equipment which require higher reliability and safety, take into consideration that appropriate measures such as fail-safe functions and redundant system design should be taken.

*Do not use the device for equipment that requires an extreme level of reliability, such as aerospace applications, telecommunication equipment (trunk lines), nuclear power control equipment and medical or other equipment for life support.

*CCPD assumes no responsibility for any damage resulting from the use of the device that does not comply with the instructions and the precautions specified in these technical literature.

*Contact and consult with a CCPD sales representative for any questions about this device.

2. Overview

This Open-Cell is color active matrix LCD Open-Cell. It is composed of a color TFT-LCD panel, driver ICs, etc. Graphics and texts can be displayed on a 3840×RGB×2160 dots panel with about 1.07 Billon colors (R/G/B 8 bit in each color +FRC).

3. General specifications.

Parameter	Specification	Unit	Note
Display size	1765.7 (Diagonal)	mm	
	69.5 (Diagonal)	inch	
Active area	1549.44 (H) × 846.72 (V)	mm	
Pixel Format	3840 (H) × 2160 (V) (1pixel = R + G + B dot)	pixel	
Pixel pitch	403.5 (H) × 392.0 (V)	μm	
Pixel configuration	R, G, B vertical stripe	-	
Color Depth	8 bit+ FRC, 1.07 Billion colors	-	
Display mode	Normally black	-	
Driving scheme	IGZO TFT Active Matrix	-	
Glass Thickness	0.5 + 0.5	mm	
Life time	30000	hr	Black Fog
Surface treatment of front polarizer	2.3±2.1% Haze, Anti Glare Hard Coating: 3H and more, peeling force：2-20gf/25mm Protect film resistance：≤9.9x10^9	-	
Surface treatment of behind polarizer	peeling force：2~20gf/25mm Protect film resistance：≤9.9x10^9	-	
Spacer Resistance	10ˆ6~ 10ˆ9	Ω/□	
Box Resistance	10ˆ6~ 10ˆ9	Ω/□	

Outline dimensions

Parameter		Typ.	Unit	Remark
Unit outline dimensions [Note 3.1,3.2]	Width	1561.44	mm	
	Height	903.42	mm	
	Depth	1.365	mm	
Mass		3970	g	

[Note 3.1] This specification is without the protection film.

[Note 3.2] Outline dimensions are not included in C-PWB and FFC.

4. Pixel Array and Member Location

Pixel array and member located as below.
There are 12 Source Drivers on this panel.

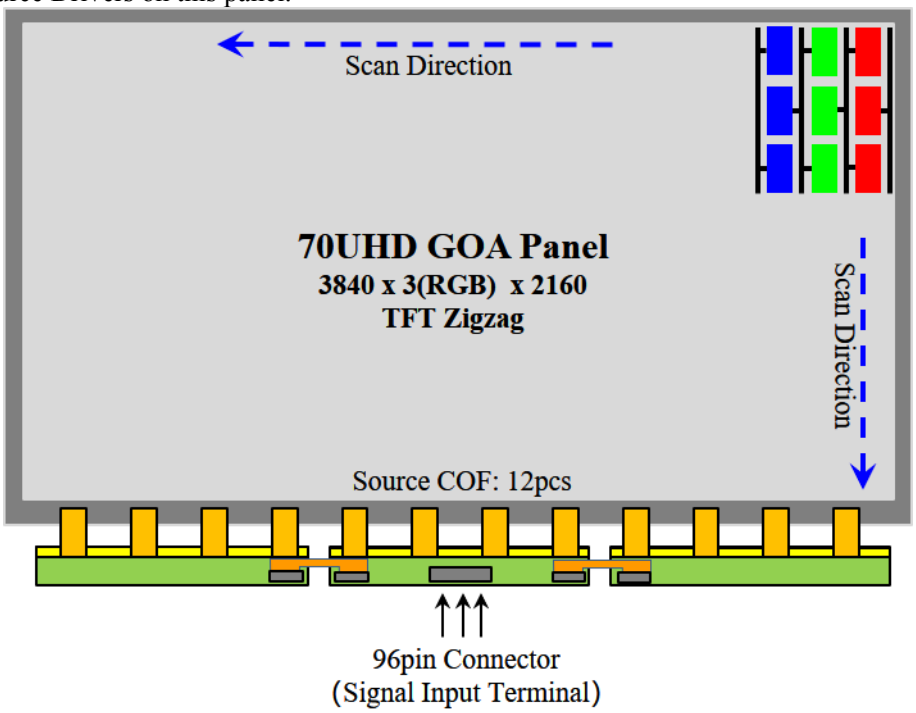


Fig 4.1 Pixel array member location and scan direction
(The case of setting S-PWBs to the bottom side.)

5. Input Terminals

5-1 Driving interface of PWB

The input terminals pin map is shown in below table.

Pin No.	Pin Name	Pin No.	Pin Name	Pin No.	Pin Name	Pin No.	Pin Name
1	FB5	25	LC2	49	GND	73	GND
2	GND	26	NC7	50	S3P	74	S11P
3	VCOM_FB	27	NC8	51	S3N	75	S11N
4	NC1	28	VGH2	52	GND	76	GND
5	VCOM	29	XON	53	S4P	77	S12P
6	VCOM	30	VCC3.3	54	S4N	78	S12N
7	NC2	31	WP	55	GND	79	GND
8	NC3	32	DO	56	S5P	80	SFC
9	NC4	33	DI	57	S5N	81	GND
10	STV	34	CS	58	GND	82	FB_6
11	CLR	35	SCK	59	S6P	83	VL255
12	CK1	36	HOLD	60	S6N	84	VL0
13	CK2	37	VCC1.9	61	GND	85	HAVDD
14	CK3	38	VCC1.9	62	S7P	86	HAVDD
15	CK4	39	VCC1.8	63	S7N	87	VH0
16	CK5	40	VCC1.8	64	GND	88	VH255
17	CK6	41	NC10	65	S8P	89	AVDD
18	CK7	42	SRF	66	S8N	90	AVDD
19	CK8	43	GND	67	GND	91	AVDD
20	NC5	44	S1P	68	S9P	92	AVDD
21	NC6	45	S1N	69	S9N	93	AVDD
22	VGH	46	GND	70	GND	94	AVDD
23	VSS	47	S2P	71	S10P	95	AVDD
24	LC1	48	S2N	72	S10N	96	AVDD

5-2 Pin Description

*1 P: POWER; I: Input; O: Output.

Pin Name	I/O	Function
AVDD	P	Power supply for source driver output circuits.
VH255 VH0 VL255 VL0	P	External gamma reference voltage inputs.
VCC1.8	P	Power supply for source driver logic circuits. (No. 5~8)
VCC1.9	P	Power supply for source driver logic circuits. (No. 1~4, No. 9~12)
SRF	O	Output pin for the Source Driver Ready Feedback (SRF).
PORTNUM	I	Should be tied to High level on customer's PCB.
SFC	I	Shared Forward Channel(SFC) control input for source drivers.
Sx_P0 Sx_N0	I	x represents 1~12. USI-T differential signal inputs.
XON	I	Input pin for the output global on control for source driver and GOA units.
STV	I	Start pulse input/output for GOA units. (CMOS signals)
CLK1~CLK8	I	Shift clock input for GOA units
CLR	I	clock signal
LC1~LC2	I	clock signal
VGH	P	The most positive power supply for GOA units.
VSS	P	The most negative power supply for GOA units.
VCOM	P	Power supply for VCOM.
VCC3.3	P	Power supply for demura flash IC.
FBx	I/O	x represents 1~10. Used for Tcon(SOC)-FFC-SPWB connection detecting.

6. Electrical Characteristics

6-1 Absolute Maximum Ratings

Parameter	Symbol	Ratings		Unit	Remark
		Min.	Max.		
Power supply for source drivers	AVDD	-0.3	20.4	V	
	HAVDD	-0.3	11.3	V	
	VCOM			V	
	VCC1.8	-0.3	2.2	V	
	VCC1.9				
	VH255 to VH0	AVDD-11.3	AVDD+0.3	V	
	VL255 to VL0	-0.3	11.3	V	
Power supply for GOA units	VGH	0	30	V	
	VSS	-10	0	V	
Demura flash IC power supply	VCC3.3	-0.3	5.5	V	
Storage Temperature	T_{stg}	-20	65	℃	[Note 6.1]
Surface Temperature	T_{sur}	-20	65	℃	
Operation Temperature	T_{opr}	0	50	℃	

(*) "*Absolute Maximum Ratings*" is regulations that do not exceed it even momentarily.

(*) Stress beyond those listed under "*Absolute Maximum Ratings*" may cause permanent damage to the device.

[Note 6.1] Humidity: 90%RH Max.(Ta≦39℃),

Maximum wet-bulb temperature at 39℃ or less (Ta＞39℃), No condensation.

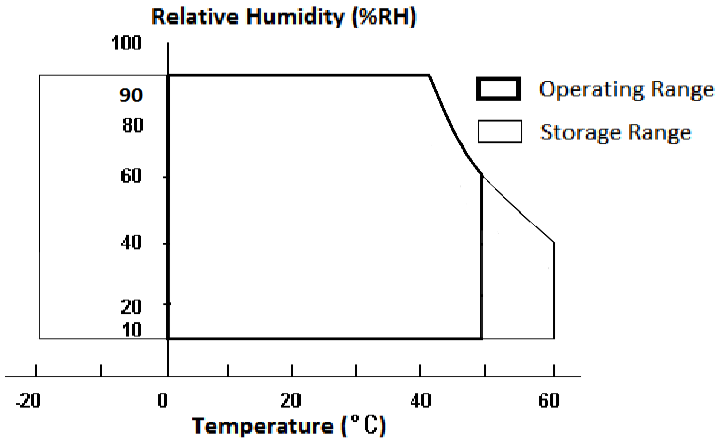


Fig 6.1 Storage and operation temperature

6-2 Recommended Operation Conditions

Parameter	Symbol	Typ	Tol.V	Ripple	Condition
Source driver power supply	AVDD	17.0V	±0.25	<5%	Ta=25℃
	HAVDD	8.89V	±0.15	<5%	
	VCC1.8	1.8V	±0.03	<5%	
	VCC1.9	1.9V	±0.03	<5%	
GOA signal power supply	VGH	25V	±0.65	<5%	
	VSS	-6V	±0.15	<5%	
Demura flash IC power supply	VCC3.3	3.3V	±0.15	<5%	

6-3 USIT Eye diagram (Eye mask)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Input offset voltage	V_{ICM}	VCC =1.62V~1.98V	0.3	0.45	0.6	V
Differential input data voltage	V_{ID}		100	-	600	mV
Differential input data peak-peak valtage	$V_{ID\_DIFF\_P-P}$		200	-	1200	

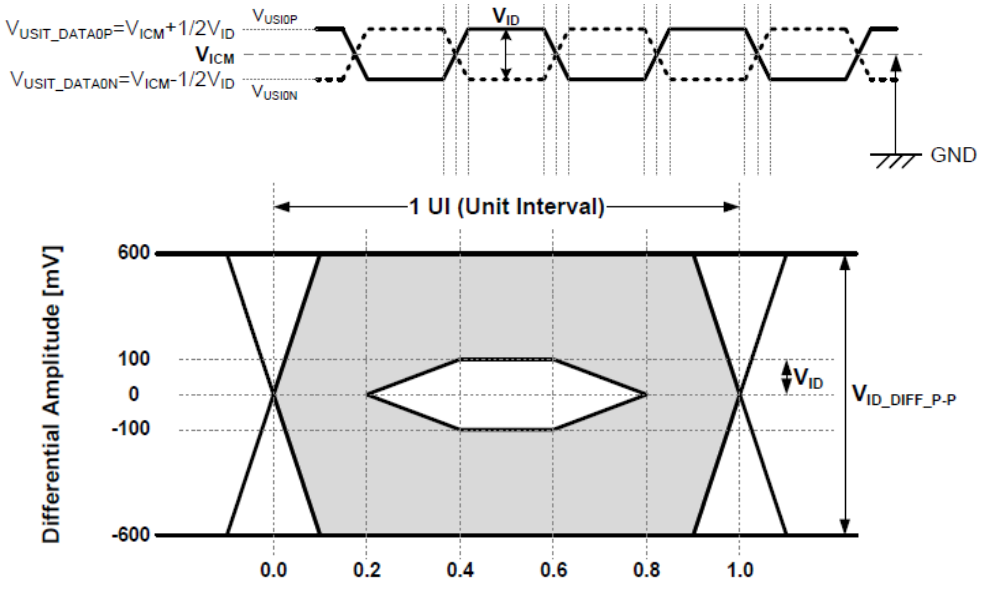


Fig 6.2 USIT Eye Diagram(Without Driver IC)

7. Power Sequence

Recommended power on/off [Note 7.1] sequence is shown in below figure.

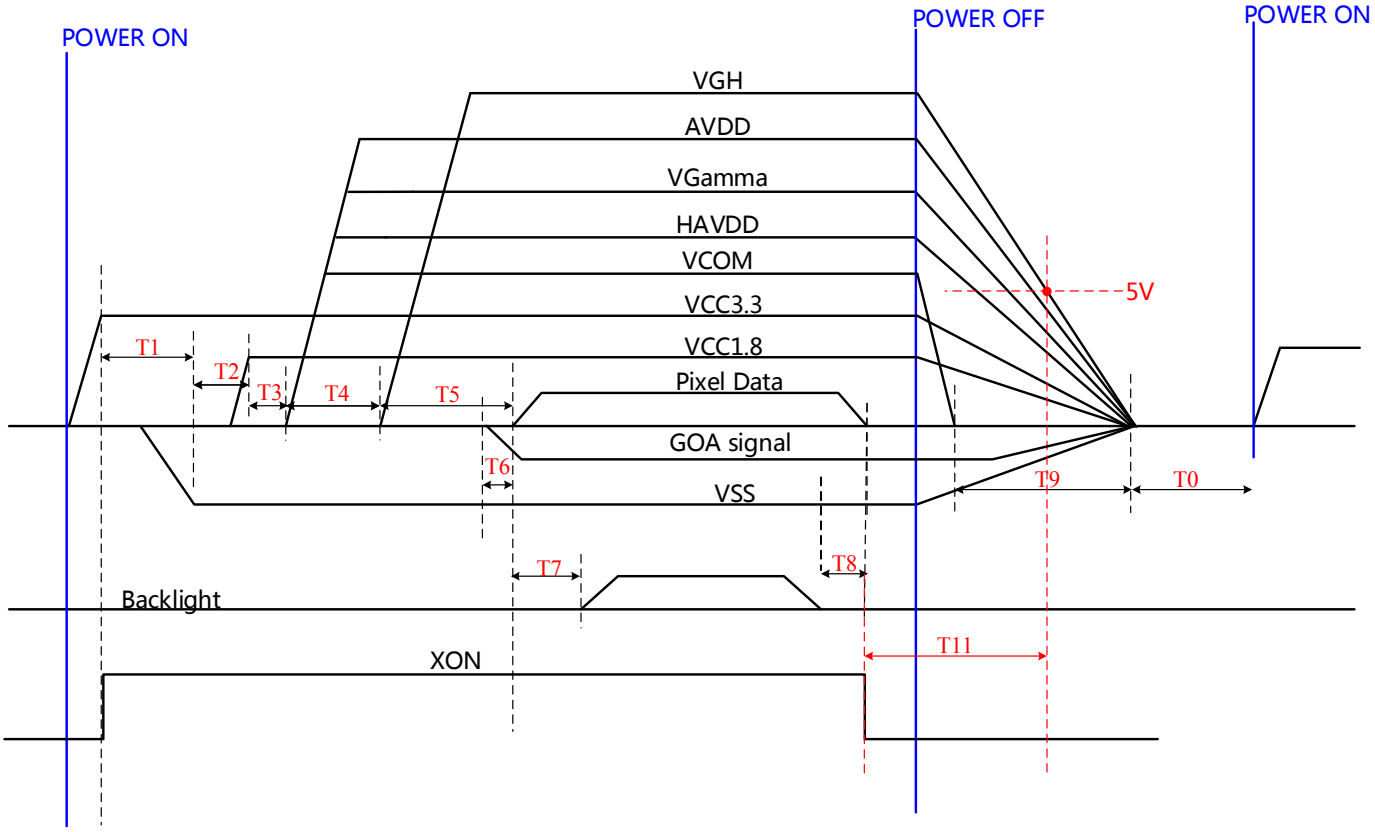


Fig 7.1 Recommended power sequence

Item	Min	Typ	Max	Unit	Remark
T1	1	—	—	ms	AVDD must be higher than VGM all the time
T2	0	—	—	ms	
T3	0	—	—	ms	
T4	0	—	—	ms	
T5	0	—	—	ms	
T6	45	—	—	us	
T7	1000	—	—	ms	
T8	100	—	—	ms	
T9	0	—	—	ms	
T10	1000				
T11	1	—	—	ms	[Note 7.2]

[Note 7.1] Any operations which will cause open cell power on/off should follow this power on/off sequence, including “AC Off Mode”, “Standby Mode” etc.
[Note 7.2] When XON is pulled to low level, all TFT source will be connected to VCOM & GND, and all TFT gate will be pulled to VGH level.

8. Timing Characteristics of Input Signals

Timing diagrams of input signal are shown in below figure.

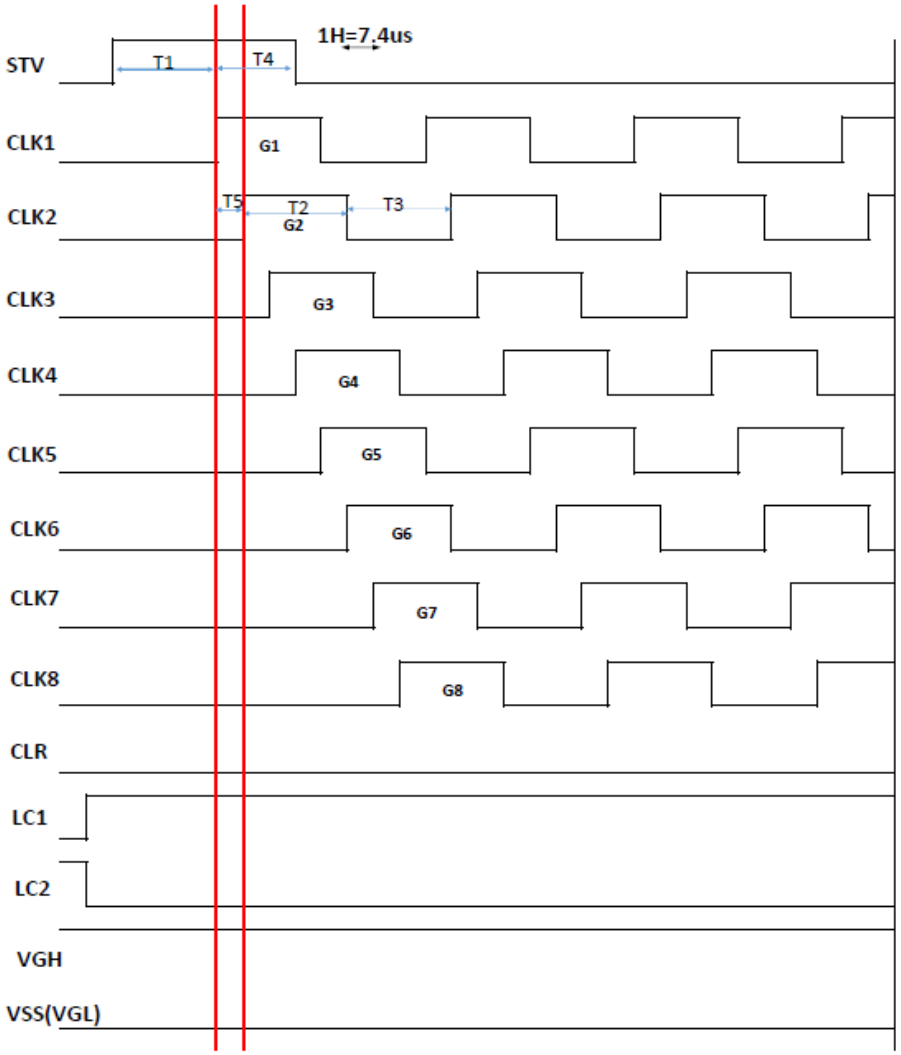


Fig 8.1 Recommended input timing

Item	Min	Typ	Max	Description
T1	—	33.4us	—	STV Rising to ck1 Rising
T2	—	22.2us	—	Clk High pulse Width
T3	—	37us	—	Clk Low pulse Width
T4	—	13.9us	—	Clk Rising to STV falling
T5	—	7.4us	—	Clkn Rising to Clkn+1 Rising

9. Flicker Pattern

Bright Sub-Pixel Gray Level: V511

Dark Sub-Pixel Gray Level: V0

The pattern shown in Fig 9.1 is the minimum unit of flicker pattern. This unit should be placed adjacent to each other, and the placement should start at the top left corner of panel.

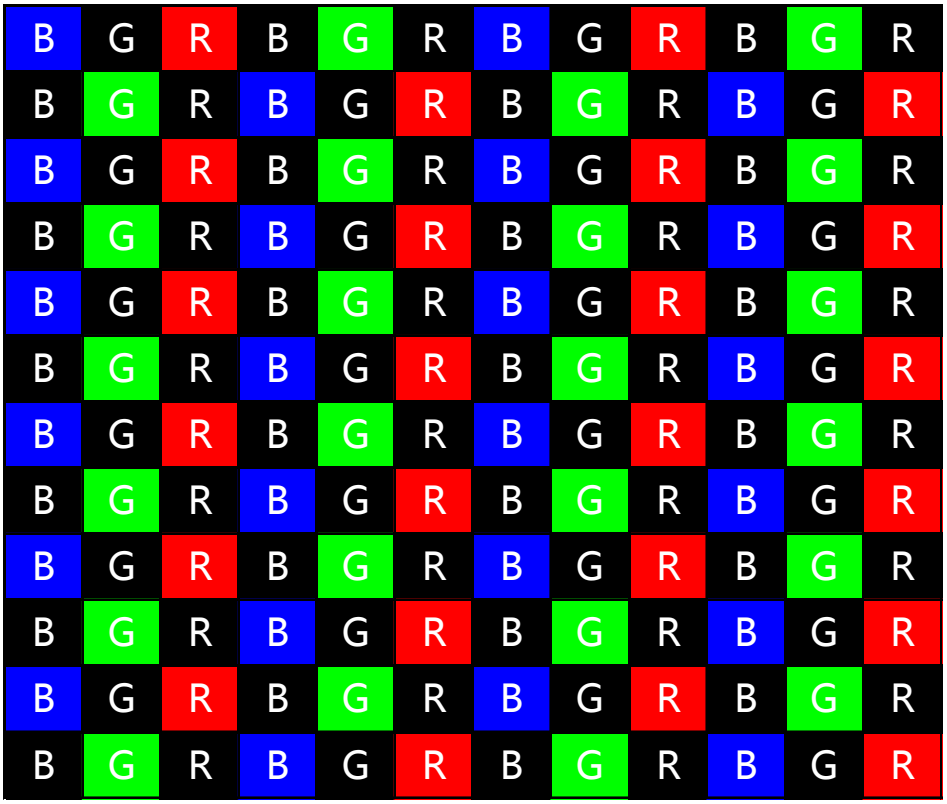


Fig 9.1 Flicker Pattern

10. Optical characteristics

Ta=25°C

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing angle range	Horizontal	θ21	CR＞10	80	89	-	Deg.	[Note 10.1,10.2,10.3,10.5]
		θ22		80	89	-		
	Vertical	θ11		80	89	-		
		θ12		80	89	-		
Contrast ratio		CR	θ=0 deg.	5000	6000	-	-	[Note 10.1,10.2,10.3,10.5]
Response time		τDRV		-	8	-	ms	[Note 10.1,10.4,10.5,10.6]
Chromaticity of white		x		Typ. -0.03	0.283	Typ. +0.03	-	[Note 10.1,10.5, 10.6] Normal operation (PWM Duty=100%)
		y			0.285		-	
Chromaticity of red		x			0.644		-	
		y			0.324		-	
Chromaticity of green		x			0.316		-	
		y			0.590		-	
Chromaticity of blue		x			0.152		-	
		y			0.062		-	
Cell Transmittance		Tr		4.6	5.1	-	%	[Note 10.1,10.5,10.6]
Gamma				2.0	2.2	2.4	-	[Note 10.1,10.5,10.6]
White variation		δW		-	-	1.3		[Note 10.7]
Crosstalk		CT		-	2	-	%	[Note 10.8]

[Note10.1]

-The measurement shall be executed 60 minutes after lighting at rating.

--These values are measured with CCPD back light..

-The optical characteristics are measured using the following equipment.

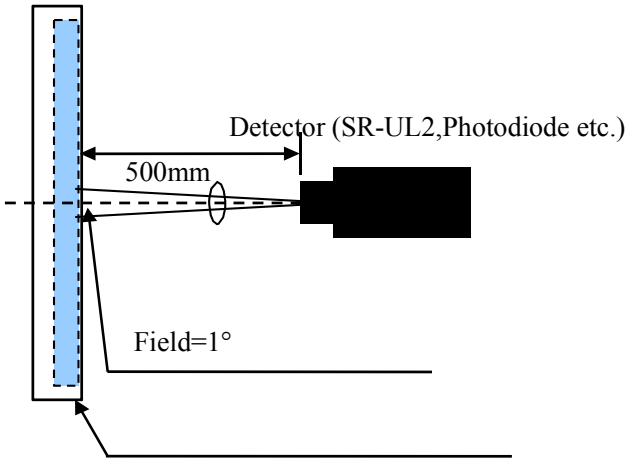


Fig 10.1 Measurement of Contrast, Luminance, Chromaticity, White variation, Crosstalk, Gamma, Color temperature variation and Response time. (Response time: Photodiode)

[Note 10.2] Definitions of viewing angle range:

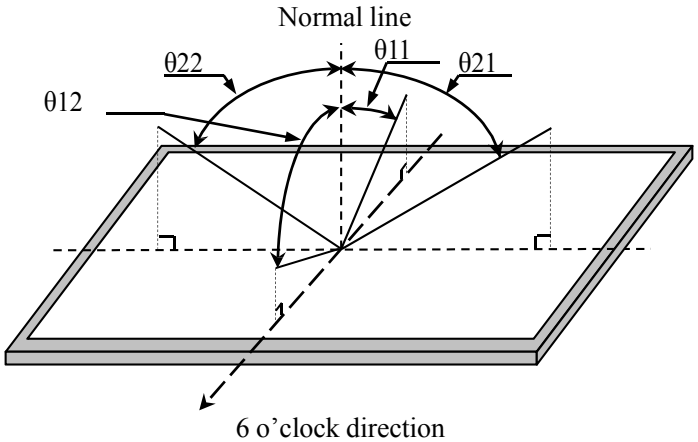


Fig 10.2 Viewing angle

[Note 10.3] Definition of contrast ratio:

The contrast ratio is defined as the following.

$$\text{Contrast Ratio} = \frac{\text{Luminance(Brightness) with all pixels white}}{\text{Luminance(Brightness) with all pixels Black}}$$

[Note 10.4] Definition of response time

The response time (τ_{DRV}) is defined as the following figure and shall be measured by switching the input signal for any level of gray (0%, 25%, 50%, 75% and 100%) and any level of gray (0%, 25%, 50%, 75% and 100%).

	0%	25%	50%	75%	100%
0%		τ_r:0%–25%	τ_r:0%–50%	τ_r:0%–75%	τ_r:0%–100%
25%	τ_d:25%–0%		τ_r:25%–50%	τ_r:25%–75%	τ_r:25%–100%
50%	τ_d:50%–0%	τ_d:50%–25%		τ_r:50%–75%	τ_r:50%–100%
75%	τ_d:75%–0%	τ_d:75%–25%	τ_d:75%–50%		τ_r:75%–100%
100%	τ_d:100%–0%	τ_d:100%–25%	τ_d:100%–50%	τ_d:100%–75%	

τ*:x-y... response time from level of gray(x) to level of gray(y)
$\tau_{DRV} = \Sigma\ (\tau^*:x\text{-}y)/20$

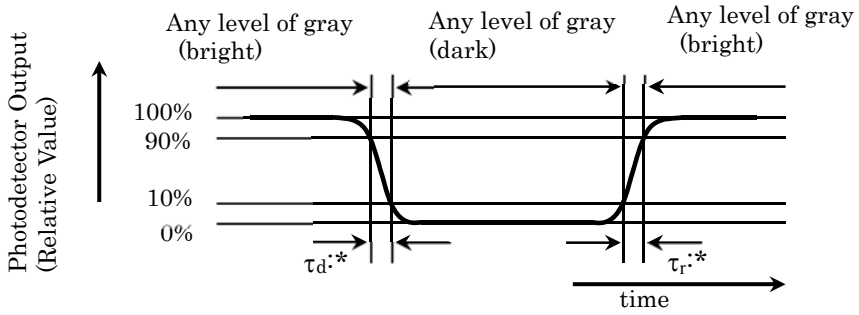


Fig.10.3 Response time

[Note 10.5] This shall be measured one point at center of the screen.

[Note 10.6] This value is valid when O/S driving is used at typical input time value

[Note 10.7] Definition of white variation:

White variation is defined as the following with five measurements. (①～⑤)

$$\delta w = \frac{\text{Maximum luminance of five points (brightness)}}{\text{Minimum luminance of five points (brightness)}}$$

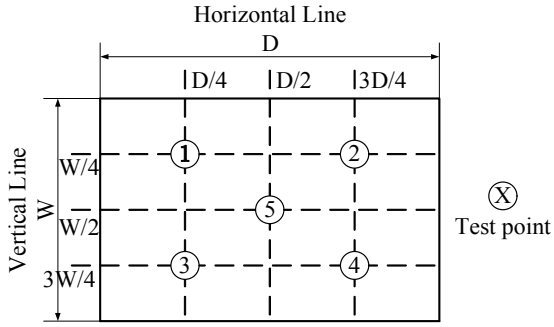


Fig.10.4 measurement locations of white variation

[Note10.8] Definition of Crosstalk(CT):

$CT = |Y_B - Y_A| / Y_A \times 100(\%)$
Where:
Y_A=Luminance of measured location without gray level 100% pattern (cd/m^2)
Y_B=Luminance of measured location with gray level 100% pattern (cd/m^2)

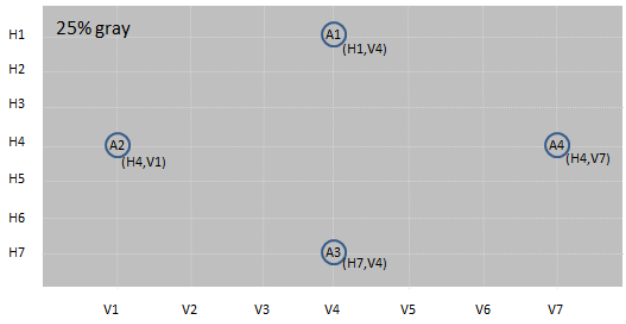


Fig.10.5 measurement locations of Y_A

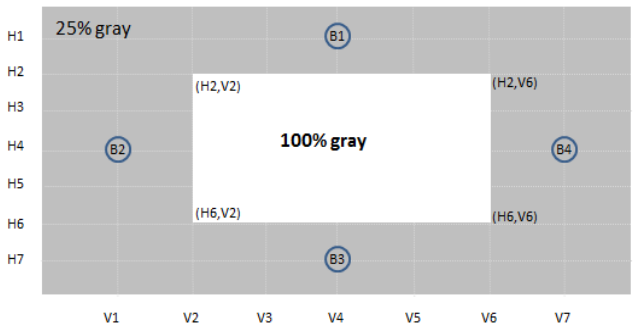


Fig.10.6 measurement locations of Y_B

11. Reliability Test Items

No	Test item	Condition
1	High temperature storage test	Ta= 70°C 240h
2	Low temperature storage test	Ta=-30°C 96h
3	High temperature and high humidity operation test	Ta= 50°C; 80%RH 300h No condensation
4	High temperature operation test	Ta= 60°C 500h
5	Low temperature operation test	Ta= -5°C 500h
6	ESD	Input :~±7kV customer standard Output:~±4kVcustomer standard

[Result evaluation criteria]

Under the display quality test condition with normal operation state, there shall be no change, which may affect practical display function.

12. Packaging Condition

No	Items	Specification			Packing Remark
		Qty.	Dimension	Weight (Appr.)	
1	Packing Box	11 Pcs/Box	1764(L) x 1110(W) x 165(H)mm	53.1Kg	
2	Pallet	1 Pcs	1794(L) x 1130(W) x 145(H)mm	19.0Kg	
3	Boxes per Pallet	7 Boxes/Pallet			Fig 12.1
4	Panels per Pallet	77 Pcs/Pallet			
5	Pallet after Packing	-	1794(L) x1130(W) x 1070(H)mm	380.3Kg	

*Please refer to Fig 12.1

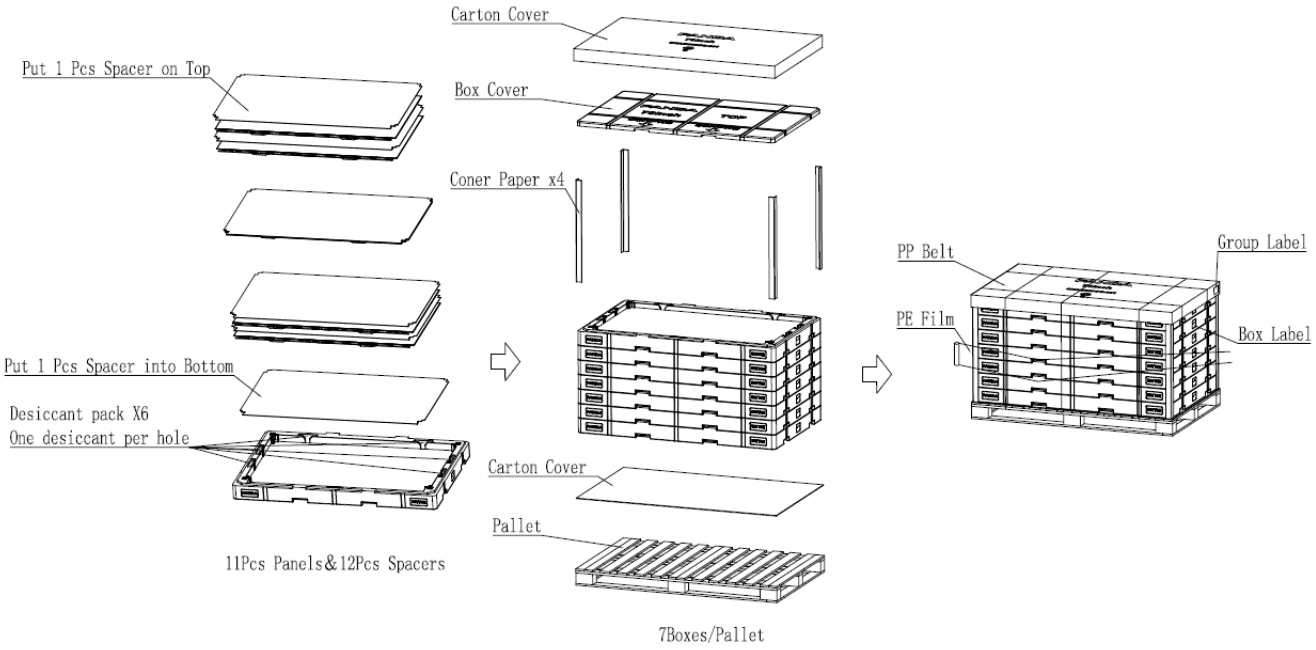


Fig 12.1 Packing condition

13. Label

13-1. Open-Cell QR code label

①QR code (Serial number)
②Serial number
③Model No.
④SEC BN code number

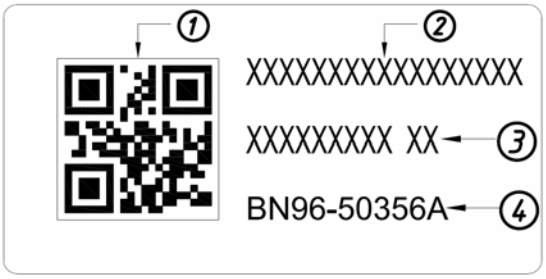


Fig 13.1 Open Cell QR code label

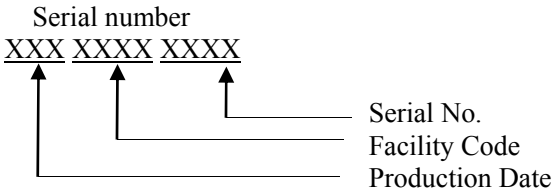
Serial number
XXXX X XXXXXX X XXXXX

- Serial No.
- Facility Code
- Production Date
- Version No.
- Model No

13-2. Packing bar code label

①Quantity
②Model No.
③Serial number
④Barcode (Serial number).
⑤SEC BN Code number
⑥Date

Fig 13.2 Carton Label



14. Carton Storage Condition

Temperature: 0°C to 39°C
Humidity: 90% RH or less
Reference condition: 20°C to 35°C, 85%RH or less (summer)
5°C to 15°C, 85%RH or less (winter)
Sunlight: Be sure to shelter a product from the direct sunlight.
Atmosphere Harmful gas, such as acid and alkali which bites electronic components and/or wires must not be detected.

*: Be sure to put cartons on palette or base, don't put it on floor, and store them with removing from wall. Please take care of ventilation in storehouse and around cartons, and control changing temperature is within limits of natural environment.

15. Precautions

a) Because the Open-Cell is too weak to destroy by static electricity, please don't touch the terminal with bare hands.
b) Front polarizer can easily be damaged. Pay attention on it.
c) Since long contact with drops of water may cause discoloration or spots, please wipe off them as soon as possible.
d) When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.
e) The Panel will be broken or chipped when it is dropped or bumped against a hard substance.
f) Precautions of peeling off the Protection film:
- Be sure to peel off slowly (recommended more than8 sec.) and constant speed.
- Be sure to ground person with adequate methods such as the anti-static wrist band.
- Be sure to connect S-PWBs to GND while peeling off the protection film.
- Ionized air should be blown to the surface while peeling off the protection film.
- The protection film must not touch drivers and S-PWB.
- After the protection film has been peeled off, some adhesive may be remained
- on the polarizer. Please use isopropyl-alcohol to remove it.

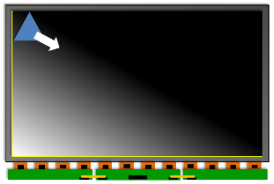
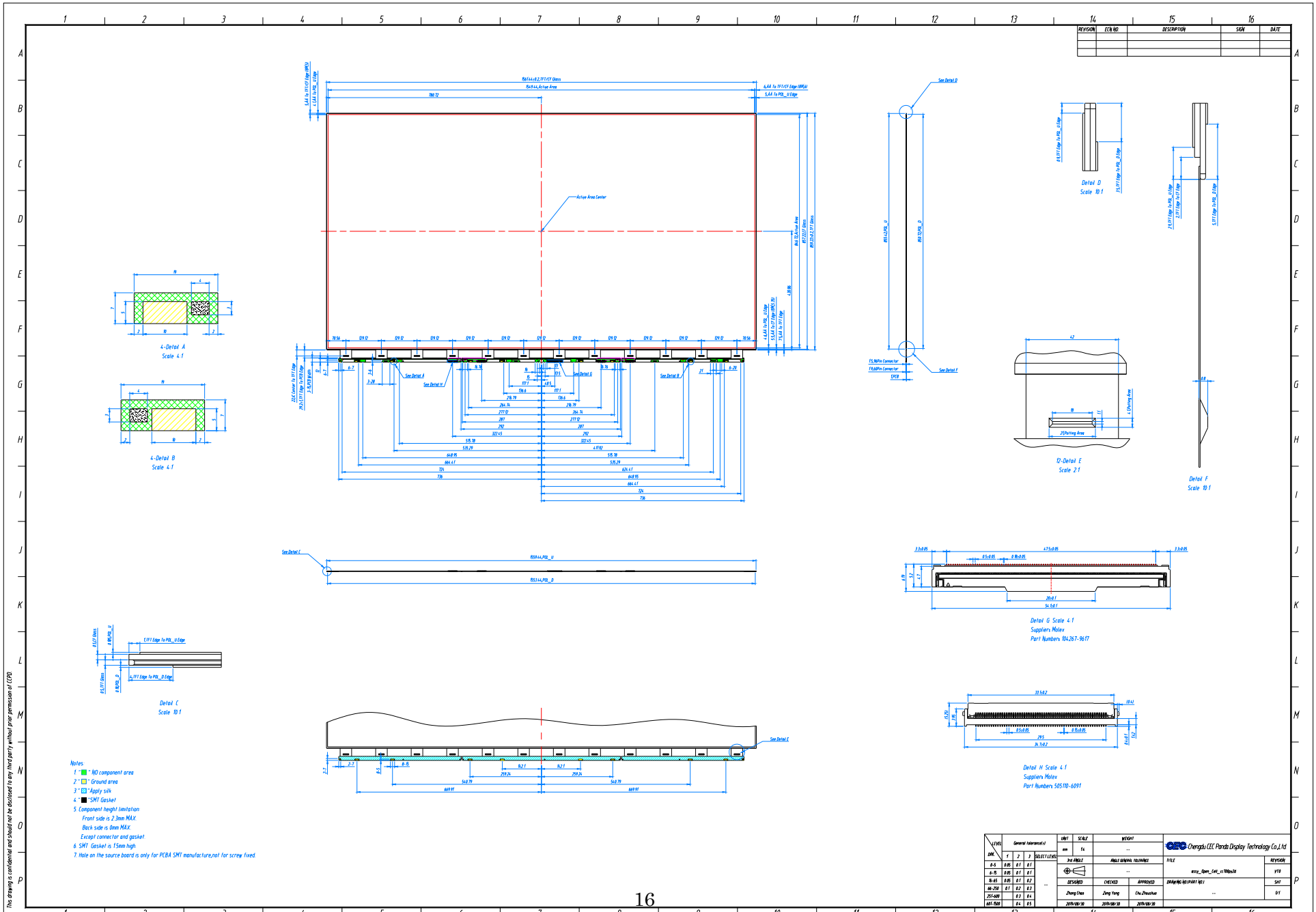


Fig 15.1 Direction of peeling off

g) Since the Open-Cell consists of TFT and electronic circuits with CMOS-ICs, which are very weak to electrostatic discharge, persons who are handling an Open-Cell should be grounded though adequate methods such as an anti-static wrist band. Connector pins should not be touched directly with bare hands.
Reference: Process control standard of CCPD.

No	Item	Management standard value and performance standard
1	Anti-static mat (shelf)	1to50 [Mega ohm]
2	Anti-static mat (floor, desk)	1to100 [Mega ohm]
3	Ionizer	Attenuate from ±1000V to ±100V within two seconds.
4	Anti-static wrist band	0.8 to 10 [Mega ohm]
5	Anti-static wrist band entry and ground resistance	Below 1000 [ohm]
6	Temperature	22 to 26 [℃]
7	Humidity	60 to 70 [%]

h) Since the Open-Cell has some PWBs, please take care to keep them off any stress or pressure when handling or installing the Open-Cell, otherwise some of electronic parts on them may be damaged.
i) Be sure to turn off the power supply when inserting or disconnecting the cable.
j) Be sure to design the module and cabinet so that the Open-Cell van is installed without any extra stress such as warp or twist.
k) When handling and assembling Open-Cell into module, please be noted that long-term storage in the environment of oxidization or deoxidization gas and the use of materials such as reagent, solvent, adhesive, resin, etc. which generate these gasses, may cause corrosion and discoloration of the Open-Cell.
l) Applying too much force and stress to PWBs and drivers may cause a malfunction electrically and mechanically.
m) The Open-Cell has high frequency circuits. Sufficient suppression to EMI should be done by system anufactures.
n) Please be careful since image retention may occur when a fixed pattern is displayed for a long time.
o) Please use this Open cell for TV or monitor. In case of using for high-luminance information display, please valuate and check the panel electrical property and panel temperature.
p) The chemical compound, which causes the destruction of ozone layer, is not being used.
q) This Open-Cell is corresponded to RoHS.
r) When any question or issue occurs, it shall be solved by mutual discussion.


REVISION
ECN NO.
DESCRIPTION
SIGN
DATE
Active Area Center
See Detail A
See Detail B
See Detail C
See Detail D
See Detail E
See Detail F
See Detail G
See Detail H
4-Detal A
Scale 4:1
4-Detal B
Scale 4:1
Detal C
Scale 10:1
Detal D
Scale 10:1
12-Detal E
Scale 2:1
Detal F
Scale 10:1
Detal G Scale 4:1
Suppliers Molex
Part Numbers 104267-9617
Detal H Scale 4:1
Suppliers Molex
Part Numbers 505110-6091
Notes:
1. "" NO component area
2. "" Ground area
3. "" Apply silk
4. "" SMT Gasket
5. Component height limitation:
Front side is 2.3mm MAX.
Back side is 6mm MAX.
Except connector and gasket.
6. SMT Gasket is 1.5mm high.
7. Hole on the source board is only for PCBA SMT manufacture,not for screw fixed.
This drawing is confidential and should not be disclosed to any third party without prior permission of CEPD
Chengdu CEC Panda Display Technology Co.,Ltd
DRAWING NO.(PART NO.)
REVISION
V1.0
SHT
1/1