□ Tentative Specification
□ Preliminary Specification
■ Approval Specification

MODEL NO.: S350AJ1

SUFFIX: LE1

Revision : C1
Customer :

APPROVED BY SIGNATURE

Name / Title _____ _____
Note

Please return 1 copy for your confirmation with your signature and comments.

Approved By	Checked By	Prepared By
ChihFan Ting	ChihFan Ting	WJ Chang

CONTENTS

REVISION HISTORY

Version	Date	Page (New)	Section	Description
Ver. 0.0	Dec.20,2018	All	All	Tentative Specification was first issued.
Ver. 1.0	Jan.22.2019	All	All	Preliminary Specification was first issued.
Ver. 2.0	Jun.20.2019	All	All	Approval Specification was first issued.

1. GENERAL DESCRIPTION

1.1 OVERVIEW

S350AJ1-LE1 is a 35″ TFT Liquid Crystal Display PID module with LED Backlight unit and 8 Lane V-by-one interface. This module supports 2880 x 158 HDTV format and can display true 1.07G colors (8-bit+FRC). The converter module for backlight is bult-in.

1.2 FEATURES

- High brightness (400 nits)
- High contrast ratio (3000:1)
- Fast response time (Gray to Gray typical : 9.5 ms)
- High color saturation (NTSC 72%)
- HDTV (2880 x 158 pixels) resolution
- V-by-One interface
- Optimized response time for 60Hz frame rate
- Viewing Angle : 178(H)/178(V) (CR>10) VA Technology
- Ultra wide viewing angle : Super MVA technology
- RoHs compliance
- T-con input frame rate : 60Hz, Output frame rate: 60Hz

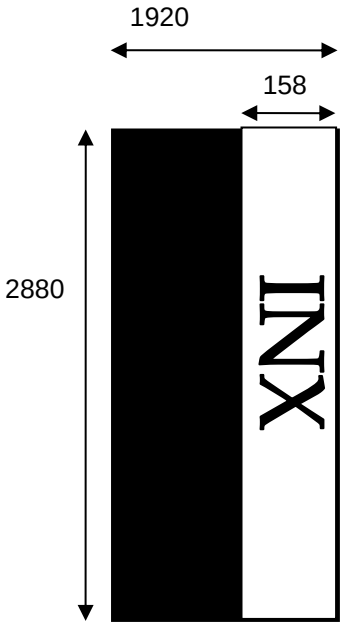
1.3 GENERAL SPECIFICATI0NS

Item	Specification	Unit	Note
Active Area	878.4(H) x 48.19(V) (35″ diagonal)	mm	(1)
Bezel Opening Area	880.4(H) x 50(V)	mm	
Driver Element	a-si TFT active matrix	-	-
Pixel Number	158 x R.G.B. x 2880	pixel	-
Pixel Pitch (Sub Pixel)	0.101667(H)x0.305(V)	mm	-
Pixel Arrangement	RGB vertical stripe	-	-
Display Colors	1.07G colors (8-bit+FRC)	color	-
Display Operation Mode	Transmissive mode / Normally black	-	-
Surface Treatment	AG ~40% / Hardness 2H	-	(2)
Rotation Function	Unachievable		(3)
Display Orientation	Signal input with “INX”		(3)

Note (1) Please refer to the attached drawings in chapter 11 for more information about the front and back outlines.

Note (2) The spec of the surface treatment is temporarily for this phase. INX reserves the rights to change this feature.

Note (3) V-by-One signal input :



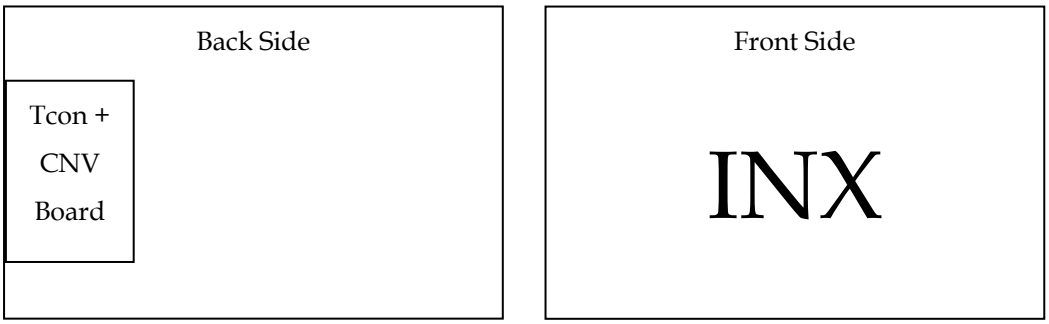
H active_AA = 158

H active_Tcon receive = 1920

(159 ~ 1920 dummy, recommend black data)

V active_AA = V active_Tcon receive = 2880

Display :



1.4 MECHANICAL SPECIFICATIONS

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal (H)	890.6	891.6	892.6	mm	(1),(2)
	Vertical (V)	59.4	60.4	61.4	mm	(1),(2)
	Depth (D)	7.1	8.1	9.1	mm	To Rear RIB
		13.5	14.5	15.5	mm	To PCB cover
Weight			720		g	

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

Note (2) Module Depth does not include connectors.

2. ABSOLUTE MAXIMUM RATINGS

2.1 ABSOLUTE RATINGS OF ENVIRONMENT

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T_{ST}	-20	+60	°C	(1)
Operating Ambient Temperature	T_{OP}	0	45	°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. (Ta ≦ 40 °C).

(b) Wet-bulb temperature should be 39 °C Max.

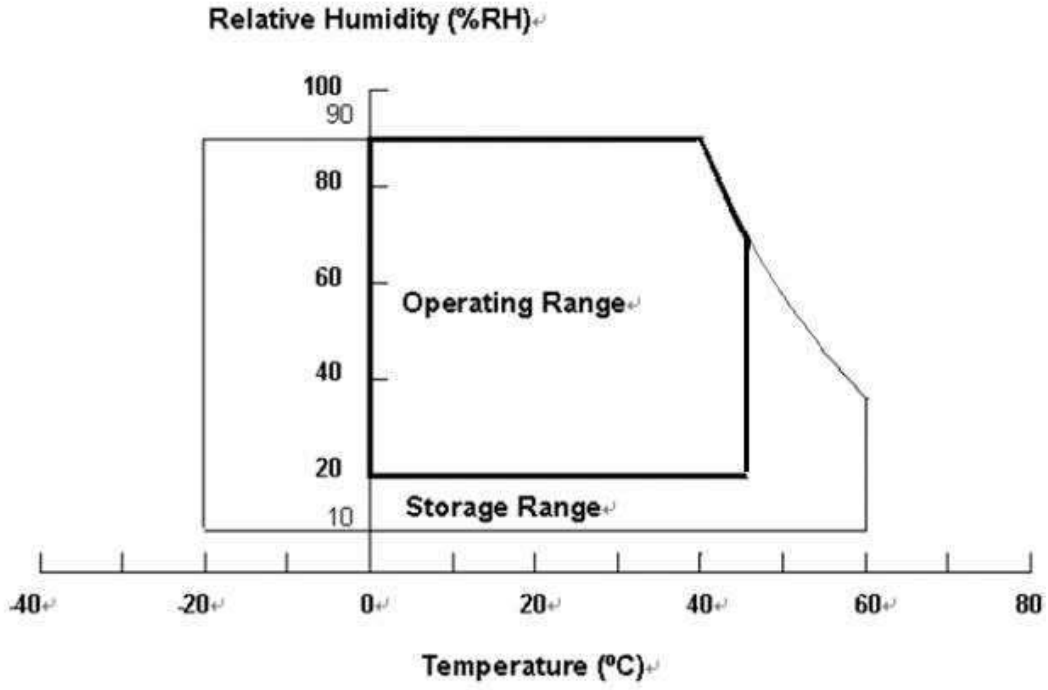
(c) No condensation.

Note (2) 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 ± X, ± Y, ± Z.

Note (4) 10 ~ 200 Hz, 30 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 PACKAGE STORAGE

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.

2.3 ELECTRICAL ABSOLUTE RATINGS

2.3.1 TFT LCD MODULE

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	V_{CC}	-0.3	13.5	V	(1)
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

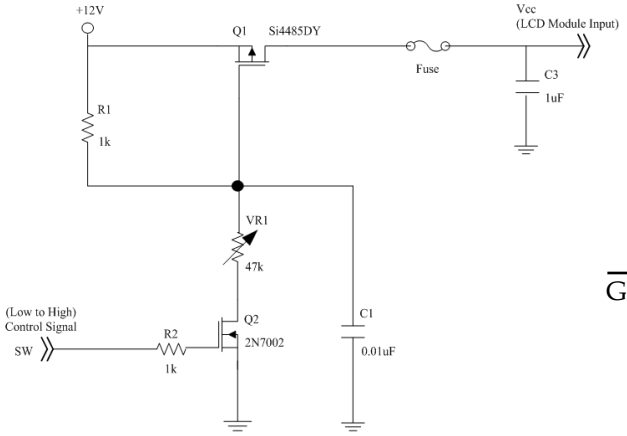
3.1 TFT LCD MODULE

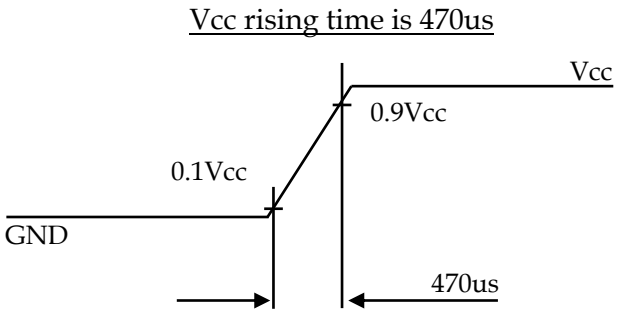
(Ta = 25 ± 2 °C)

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Voltage		V_{CC}	10.8	12	13.2	V	(1)
Rush Current		I_{RUSH}	—	—	2.3	A	(2)
Power Consumption	White Pattern	P_T	—	11.6	12.8	W	(3)
	Heavy Loading pattern	P_T	—	12.5	13.7	W	
	Black Pattern	P_T	—	11.6	12.7	W	
Power Supply Current	White Pattern	—	—	1	1.2	A	(3)
	Heavy Loading pattern	—	—	1.1	1.3	A	
	Black Pattern	—	—	1	1.2	A	
VbyOne HS	Differential Input High Threshold Voltage	VLVTH			+50	mV	(4)
	Differential Input Low Threshold Voltage	VLVTL	-50			mV	
	Differential Input Resistor	RRIN	80	100	120	ohm	
CMOS interface	Input High Threshold Voltage	VIH	2.7		3.6	V	
	Input Low Threshold Voltage	VIL	0		0.7	V	

Note (1) The module should be always operated within the above ranges. The ripple voltage should be controlled under 10% of Vcc (Typ.)

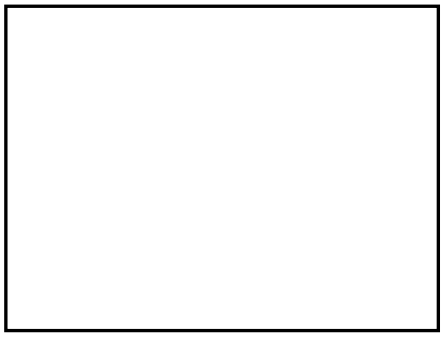
Note (2) Measurement condition :





Note (3) The specified power supply current is under the conditions at Vcc = 12 V, Ta = 25 ± 2 °C, fv = 60 Hz, whereas a power dissipation check pattern below is displayed

a. White Pattern

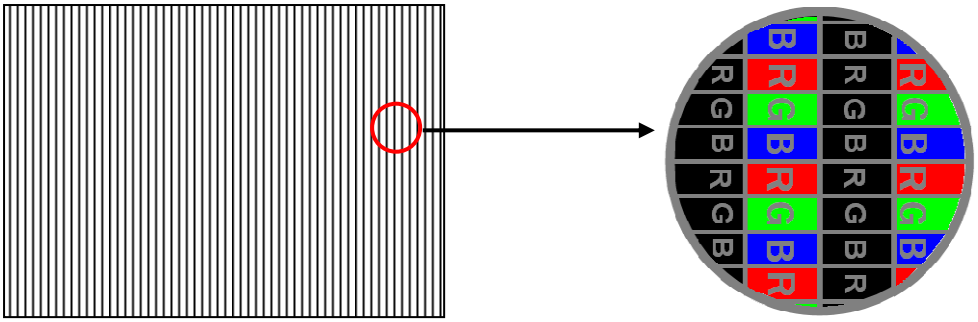


Active Area

b. Black Pattern

Active Area

c. Heavy Loading pattern



3.2 BACKLIGHT UNIT

3.2.1 CONVERTER CHARACTERISTICS

The backlight unit contains 2 pcs LED light bar, and each light bar has 2 string LED. (Ta = 25 ± 2 °C)

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
One String Current	I_L	38	40	42	mA	(1)
One String Voltage	V_W	25.65	—	28.35	V_{DC}	(2)I_L =40mA
One String Voltage Variation	△Vw			2	V_{DC}	
Power Consumption	P_{BL}		4.32		W	(3)I_L =40mA
Dimming Frequency	FB	150	160	170	Hz	(5)
Dimming Duty Ratio	DDR	5		100	%	(5)
Life time	—	30,000	—	—	Hrs	(4)

Note (1) Dimming Ratio=100%

Note (2) The maximum one string voltage is defined at Ta = -25℃

Note (3) The power consumption is only calculate the power of light bar.

Note (4) The lifetime is defined as the time which luminance of the LED decays to 50% compared to the initial value, Operating condition: Continuous operating at Ta = 25±2℃, IL =40 mA.

Note (5) EPWM signal have to input available duty range. Between 97% and 100% duty (DDR) have to be avoided. (97% < DDR < 100%) But 100% duty (DDR) is possible. 5% duty (DDR) is only valid for electrical operation.

3.2.2 CONVERTER INTERFACE CHARACTERISTICS

Parameter		Symbol	Test Condition	Value			Unit	Note	
				Min.	Typ.	Max.			
On/Off Control Voltage	ON	VBLON	—	2.0	—	5.0	V		
	OFF		—	0	—	0.8	V		
External PWM Control Voltage	HI	VEPWM	—	2.0	—	5.0	V	Duty on	(5)
	LO		—	0	—	0.8	V	Duty off	
VBL Rising Time		Tr1	—	20	—	—	ms	10%-90%V_{BL}	
Control Signal Rising Time		Tr	—	—	—	100	ms		
Control Signal Falling Time		Tf	—	—	—	100	ms		
PWM Signal Rising Time		TPWMR	—	—	—	50	us		
PWM Signal Falling Time		TPWMF	—	—	—	50	us		
Input Impedance		Rin	—	1	—	—	MΩ		
PWM Delay Time		TPWM	—	100	—	—	ms		
BLON Delay Time		T_{on}	—	300	—	—	ms		
		T_{on1}	—	300	—	—	ms		
BLON Off Time		Toff	—	300	—	—	ms		

Note (1) The Dimming signal should be valid before backlight turns on by BLON signal. It is inhibited to change the external PWM signal during backlight turn on period.

Note (2) The power sequence and control signal timing are shown in the Fig.1. For a certain reason, the converter has a possibility to be damaged with wrong power sequence and control signal timing.

Note (3) While system is turned ON or OFF, the power sequences must follow as below descriptions:

Turn ON sequence: VBL → PWM signal → BLON

Turn OFF sequence: BLOFF → PWM signal → VBL

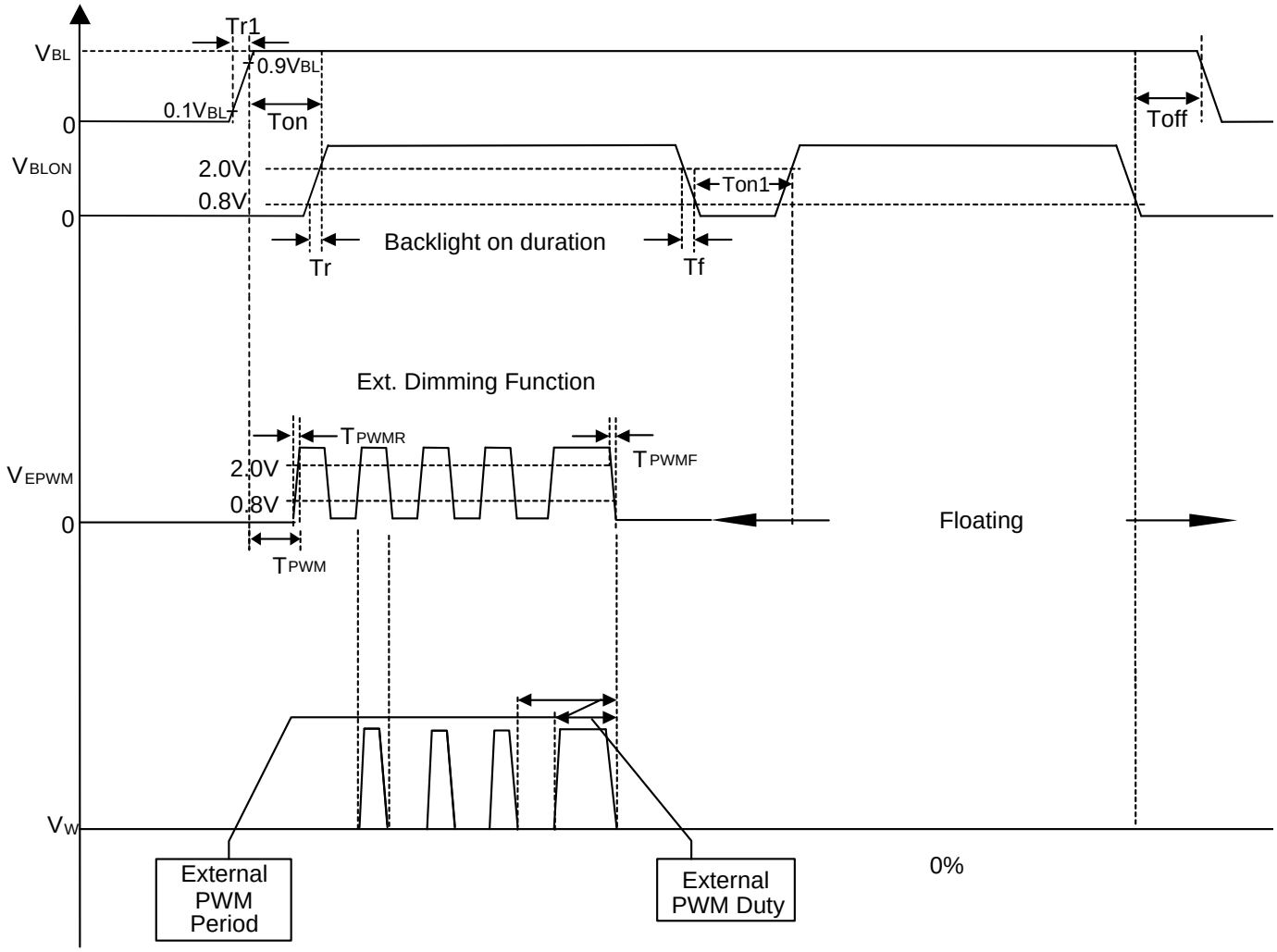


Fig. 1

4. INPUT TERMINAL PIN ASSIGNMENT

4.1 TFT LCD MODULE

CNC02 Connector Pin Assignment: [FF01-41T-5131 (FCN)]

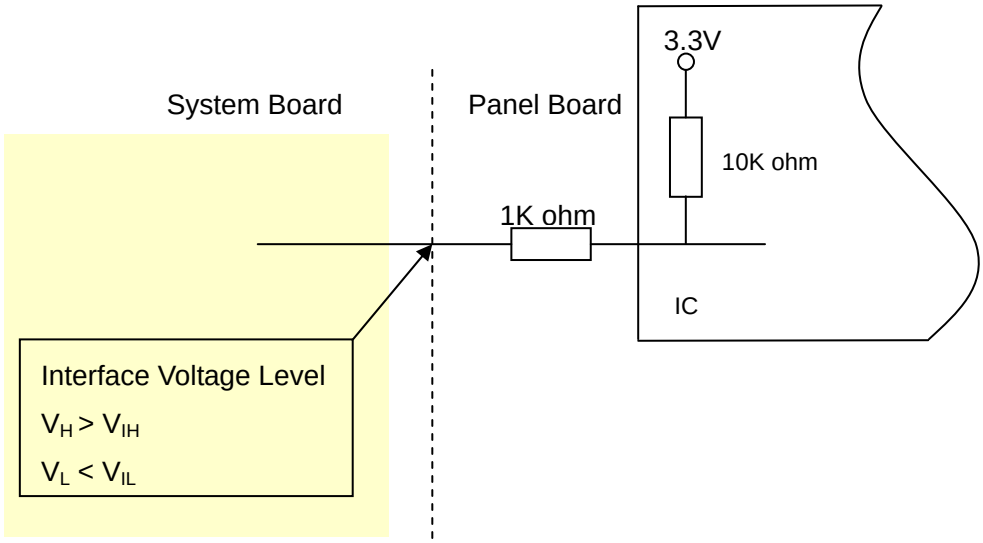
Pin	Name	Description	Note
1	Vin	Power input (+12V)	(5)
2	Vin	Power input (+12V)	
3	Vin	Power input (+12V)	
4	Vin	Power input (+12V)	
5	Vin	Power input (+12V)	
6	Vin	Power input (+12V)	
7	Vin	Power input (+12V)	
8	Vin	Power input (+12V)	
9	N.C.	No Connection	(4)
10	GND	Ground	
11	GND	Ground	
12	GND	Ground	
13	GND	Ground	
14	GND	Ground	
15	E_PWM	External PWM Control	(7)
16	BLON	BL ON/OFF	(7)
17	N.C.	No Connection	(4)
18	N.C.	No Connection	(4)
19	N.C.	No Connection	(4)
20	N.C.	No Connection	(4)
21	N.C.	No Connection	(4)
22	N.C.	No Connection	(4)
23	N.C.	No Connection	(4)
24	N.C.	No Connection	(4)
25	HTPDN	Hot plug detect output. (Optional)	(6)
26	LOCKN	Lock detect output, Open drain.	(2)
27	GND	Ground	
28	RX0N	1ST Pixel Negative VbyOne differential data input in area A. Lan 0	(1)

29	RX0P	1ST Pixel Positive VbyOne differential data input in area A. Lan 0	(1)
30	GND	Ground	
31	RX1N	2ND Pixel Negative VbyOne differential data input in area A. Lan 1	(1)
32	RX1P	2ND Pixel Positive VbyOne differential data input in area A. Lan 1	
33	GND	Ground	
34	RX2N	3RD Pixel Negative VbyOne differential data input in area A. Lan 2	(1)
35	RX2P	3RD Pixel Positive VbyOne differential data input in area A. Lan 2	
36	GND	Ground	
37	RX3N	4TH Pixel Negative VbyOne differential data input in area A. Lan 3	(1)
38	RX3P	4TH Pixel Positive VbyOne differential data input in area A. Lan 3	
39	GND	Ground	
40	RX4N	5TH Pixel Negative VbyOne differential data input in area A. Lan 4	(1)
41	RX4P	5TH Pixel Positive VbyOne differential data input in area A. Lan 4	
42	GND	Ground	
43	RX5N	6TH Pixel Negative VbyOne differential data input in area A. Lan 5	(1)
44	RX5P	6TH Pixel Positive VbyOne differential data input in area A. Lan 5	
45	GND	Ground	
46	RX6N	7TH Pixel Negative VbyOne differential data input in area A. Lan 6	(1)
47	RX6P	7TH Pixel Positive VbyOne differential data input in area A. Lan 6	
48	GND	Ground	
49	RX7N	8TH Pixel Negative VbyOne differential data input in area A. Lan 7	(1)
50	RX7P	8TH Pixel Positive VbyOne differential data input in area A. Lan 7	
51	GND	Ground	

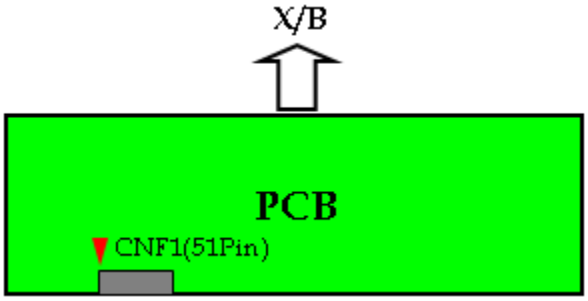
Note (1) V-by-One HS Data Mapping

Area	Lane	Data Stream
A	Lane 0	1, 9, 17, ..., 1905, 1913
	Lane 1	2, 10, 18, ..., 1906, 1914
	Lane 2	3, 11, 19, ..., 1907, 1915
	Lane 3	4, 12, 20, ..., 1908, 1916
	Lane 4	5, 13, 21, ..., 1909, 1917
	Lane 5	6, 14, 22, ..., 1910, 1918
	Lane 6	7, 15, 23, ..., 1911, 1919
	Lane7	8, 16, 24, ..., 1912, 1920

Note (2) Interface optional pin has internal scheme as following diagram. Customer should keep the interface voltage level requirement which including panel board loading as below.



Note (3) VbyOne HS connector pin order defined as follows



Note (4) Reserved for internal use. Please leave it open.

Note (5) Power input (+12V), Please check the current rating of FFC cable to meet the power consumption requirement.

Note (6) This pin connect to ground internal, but it could be open.

Note (7) Please refer 3.2.2 CONVERTER INTERFACE CHARACTERISTICS.

4.2 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 10-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									
		R9	R8	R7	R6	R5	R4	R3	R2	R1	R0	G9	G8	G7	G6	G5	G4	G3	G2	G1	G0	B9	B8	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	0	0	0	0	0	0
	Red	1	1	1	1	1	1	1	1	1	1	0	0	0	0	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	0	0	1	1	1	1	1	1	1	1	1	1	0	0	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	0	0	0	0	1	1	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	0	0	1	1	1	1	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	1	1	0	0	0	0	0	0	0	0	0	0	1	1	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	1	1	1	1	0	0	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	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	0	0	0	0	0	0
	Red (1)	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red (2)	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	Red (1021)	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red (1022)	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red (1023)	1	1	1	1	1	1	1	1	1	1	0	0	0	0	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	0	0	0	0	0	0
	Green (1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	Green (2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
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	Green (1021)	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0
	Green (1022)	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
	Green (1023)	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	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	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	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	0	0	0	0	0	0	1	0
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	Blue (1021)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	1
	Blue (1022)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0
	Blue (1023)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1

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

5. INTERFACE TIMING

5.1 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
	Data Clock of FR=60Hz	1/Tc	45	51.67	55	MHz	
VbyOne Receiver	Intra-Pair skew		-0.3		0.3	UI	(2)
	Inter-Pair skew		- 5		5	UI	(3)
	Spread spectrum modulation range	F_{clkin_mod}	1/Tc-0.5%	—	1/Tc+0.5%	MHz	(4)
	Spread spectrum modulation frequency	F_{SSM}	—	—	30	KHz	

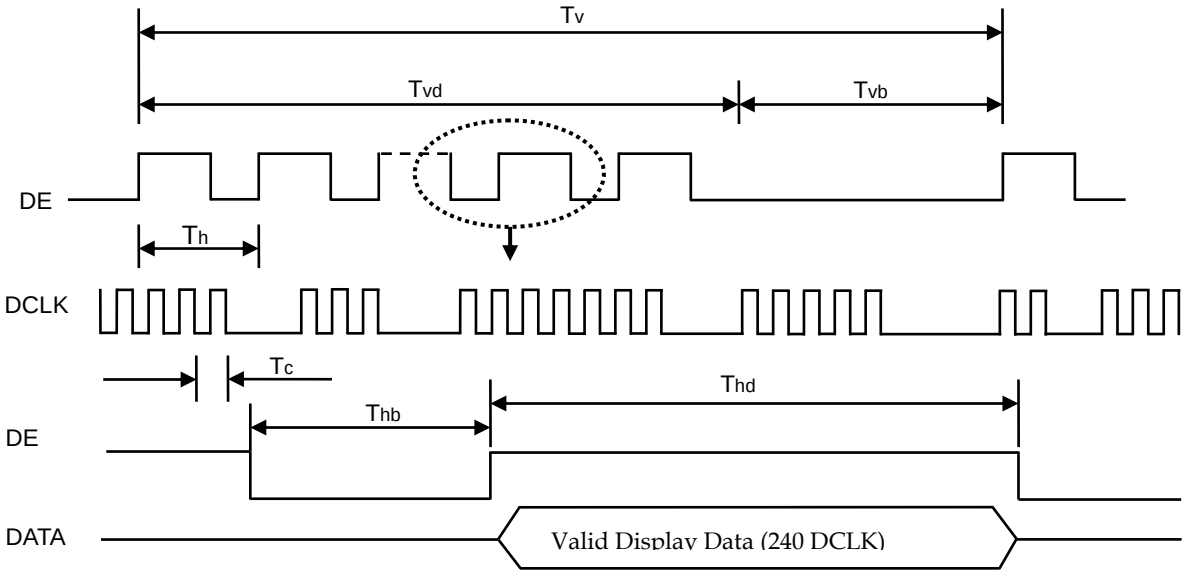
5.1.1 Input Timing Spec for PID, Frame Rate = 60Hz

Frame rate	2D mode		Fr6	59	60	61	Hz	
Vertical Active Display Term (8 Lan, 1920X2880)	2D Mode	Total	Tv	2920	2970	3070	Th	Tv=Tvd+Tvb
		Display	Tvd	2880	2880	2880	Th	—
		Blank	Tvb	40	90	190	Th	—
Horizontal Active Display Term (8 Lan, 1920X2880)	2D Mode	Total	Th	280	290	300	Tc	Th=Thd+Thb
		Display	Thd	240	240	240	Tc	—
		Blank	Thb	40	50	60	Tc	—

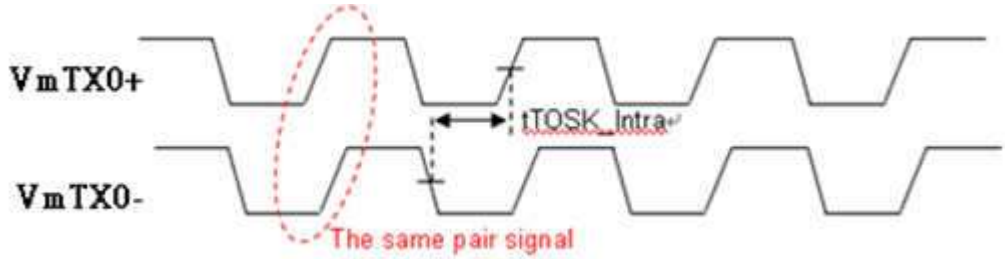
Note (1) Please make sure the range of pixel clock has follow the below equation：

Fclkin(max) ≧ Fr × Tv × Th

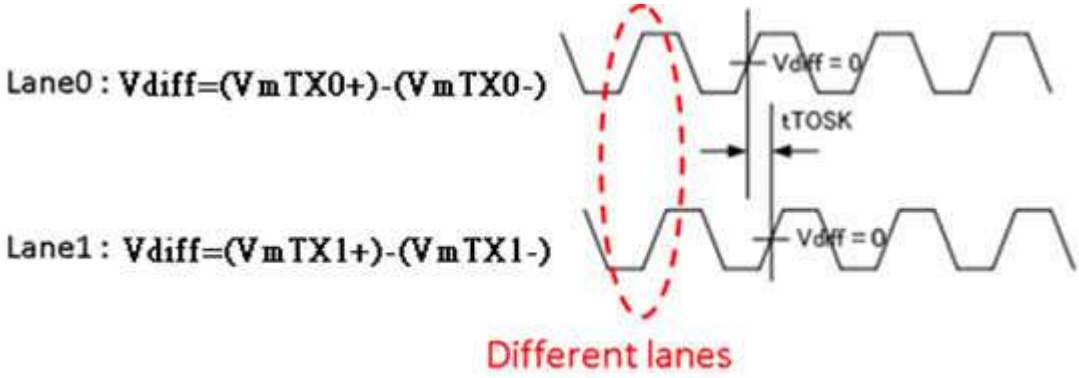
Fr × Tv × Th ≧ Fclkin (min)



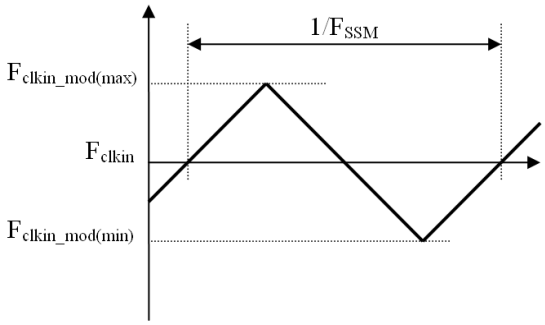
Note (2) VbyOne HS Intra-pair skew



Note (3) VbyOne HS Inter-pair skew



Note (4) The SSCG (Spread spectrum clock generator) is defined as below figures.



5.2 Timing Diagram

5.2.1 V by One Signal Timing Diagram

The eye diagram is measured by the oscilloscope and receiver CDR characteristic must be emulated.

PLL bandwidth : 15MHz

Damping factor : 1.4

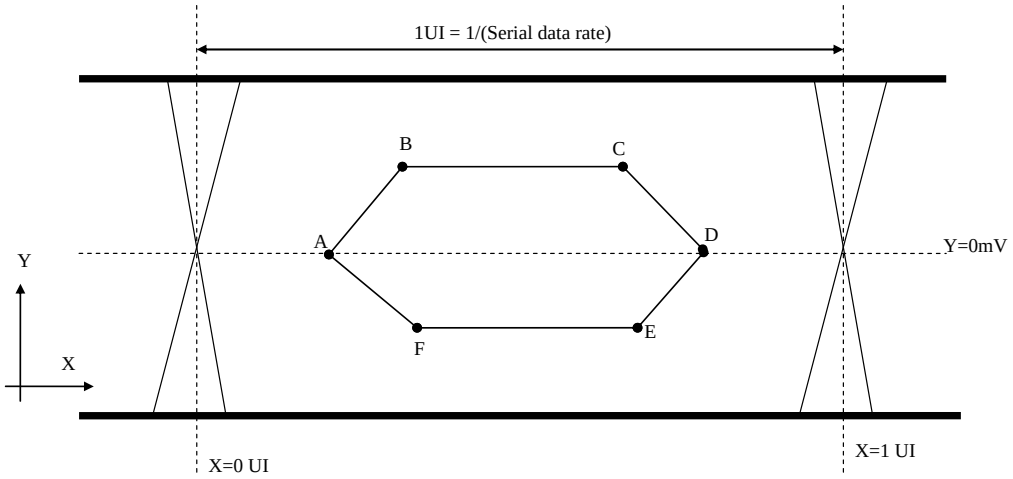


Table 1 Eye Mask Specification

	X [UI]	Y [mV]	Note
A	0.25	0	(1)
B	0.3	50	(1)
C	0.7	50	(1)
D	0.75	0	(1)
E	0.7	-50	(1)
F	0.3	-50	(1)

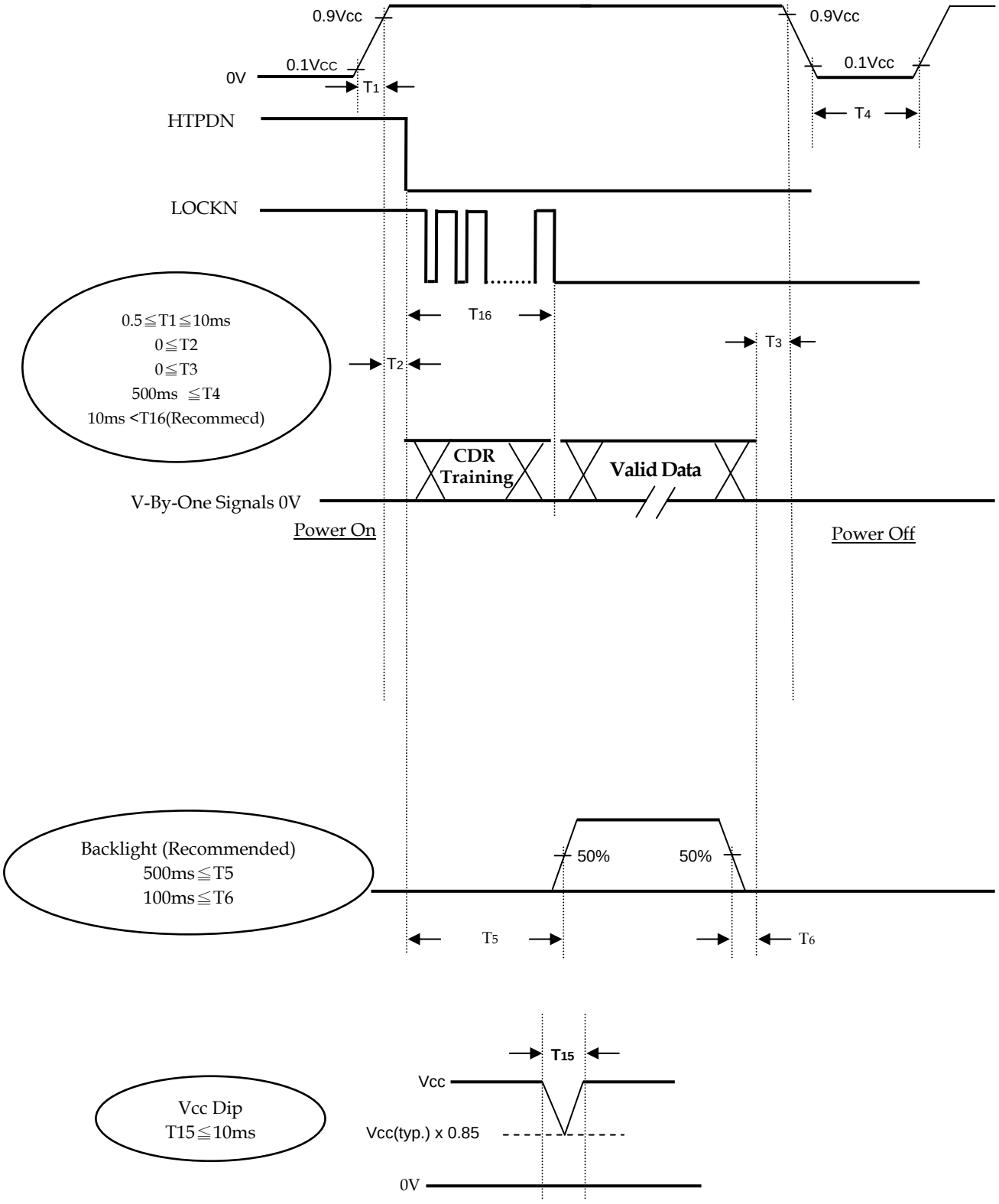
Note (1) Input levels of V-by-One HS signals are comes from "V-by-One HS Stander Ver.1.4"

5.3 Byte Length and Color mapping of V-by-One HS

Packer input & Unpacker output		30bpp RGB (10bit)
Byte 0	D[0]	R[2]
	D[1]	R[3]
	D[2]	R[4]
	D[3]	R[5]
	D[4]	R[6]
	D[5]	R[7]
	D[6]	R[8]
	D[7]	R[9]
Byte 1	D[8]	G[2]
	D[9]	G[3]
	D[10]	G[4]
	D[11]	G[5]
	D[12]	G[6]
	D[13]	G[7]
	D[14]	G[8]
	D[15]	G[9]
Byte 2	D[16]	B[2]
	D[17]	B[3]
	D[18]	B[4]
	D[19]	B[5]
	D[20]	B[6]
	D[21]	B[7]
	D[22]	B[8]
	D[23]	B[9]
Byte 3	D[24]	X
	D[25]	X
	D[26]	B[0]
	D[27]	B[1]
	D[28]	G[0]
	D[29]	G[1]
	D[30]	R[0]
	D[31]	R[1]

5.4 POWER ON/OFF SEQUENCE

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



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

Note (2) Apply the LED 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 besides HTPDN and LOCKN. If T2<0,that maybe cause electrical overstress failure.

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.

Note (6) Vcc must decay smoothly when power-off.

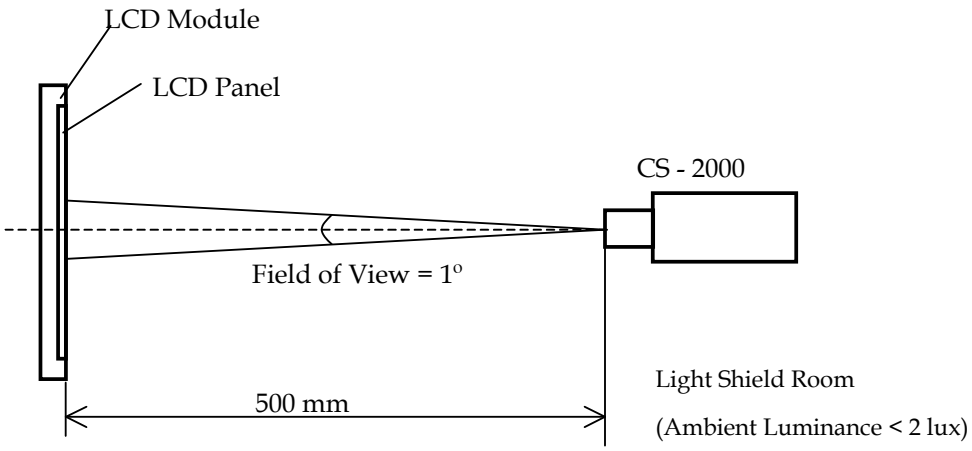
6. OPTICAL CHARACTERISTICS

6.1 TEST CONDITIONS

Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	°C
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	V_{CC}	12±1.2	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
Vertical Frame Rate	Fr	120	Hz

The LCD module should be stabilized at given temperature for 1 hour to avoid abrupt temperature change during measuring in a windless room.

Local Dimming Function should be Disable before testing to get the steady optical characteristics (According to 5.1 CNF1 Connector Pin Assignment, Pin no. "22")



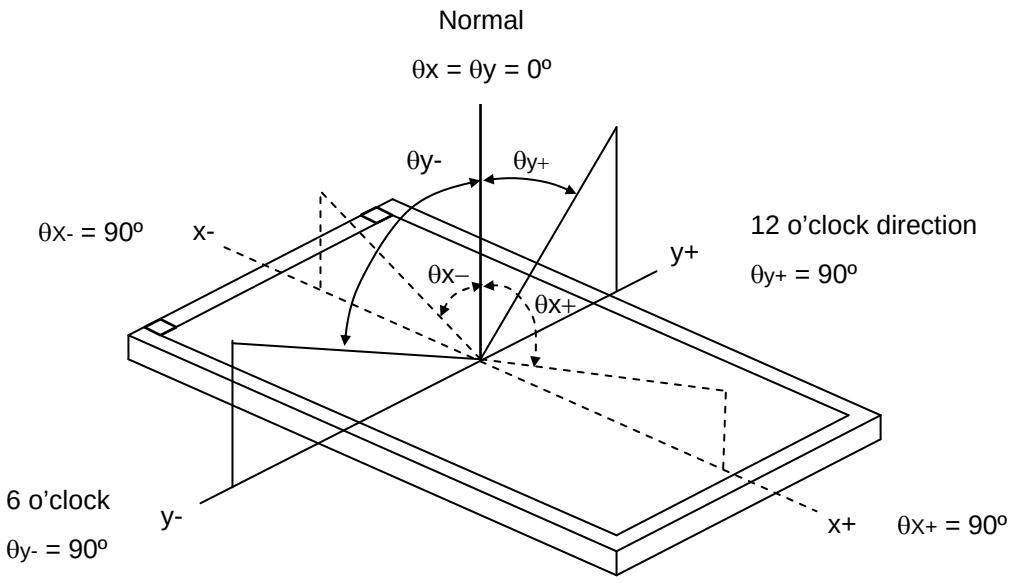
6.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown in 6.2. The following items should be measured under the test conditions described in 6.1 and stable environment shown in 6.1.

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	θ_x=0°, θ_Y =0° Viewing angle at normal direction	2100	3000		-	Note (2)
Response Time		Gray to gray			9.5	19	ms	Note (3)
Center Luminance of White		L_C 2D		320	400		cd/m²	Note (4)
White Variation		δW		75			%	Note (5)
Color Chromaticity	Red	Rx		Typ.-0.03	0.647	Typ.+0.03	-	
		Ry			0.336		-	
	Green	Gx			0.314		-	
		Gy			0.622		-	
	Blue	Bx			0.151		-	
		By			0.052		-	
	White	Wx			0.309		-	
		Wy			0.338		-	
	Correlated color temperature				6500		K	
	Color Gamut	C.G.		-	72	-	%	NTSC
Viewing Angle	Horizontal	θ_x+	CR≥10	80	89	-	Deg.	(1)
		θ_x-		80	89	-		
	Vertical	θ_Y+		80	89	-		
		θ_Y-		80	89	-		

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

Viewing angles are measured by Autronic Conoscope Cono-80 (or Eldim EZ-Contrast 160R).



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

The contrast ratio can be calculated by the following expression.

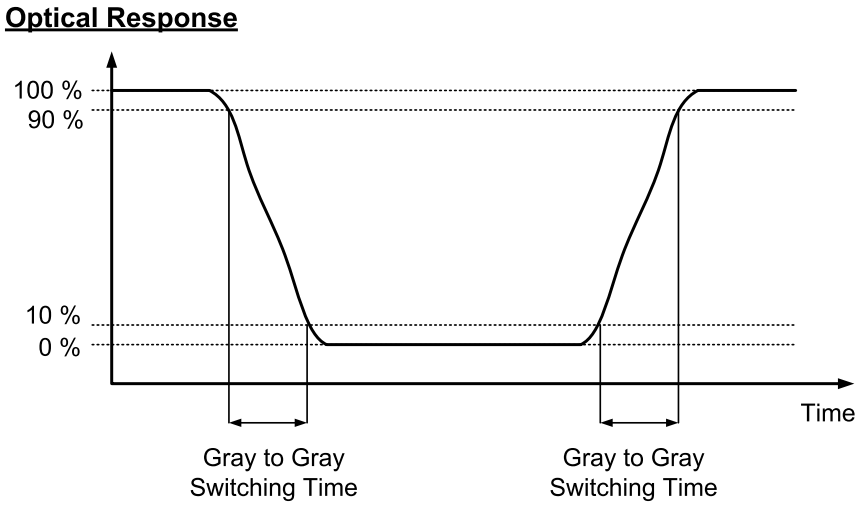
$$\text{Contrast Ratio (CR)} = \frac{\text{Surface Luminance of L1023}}{\text{Surface Luminance of L0}}$$

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 (6).

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



The driving signal means the signal of gray level 0, 124, 252, 380, 508, 636, 764, 892 and 1023.

Gray to gray average time means the average switching time of gray level 0, 124, 252, 380, 508, 636, 764, 892 and 1023 to each other.

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

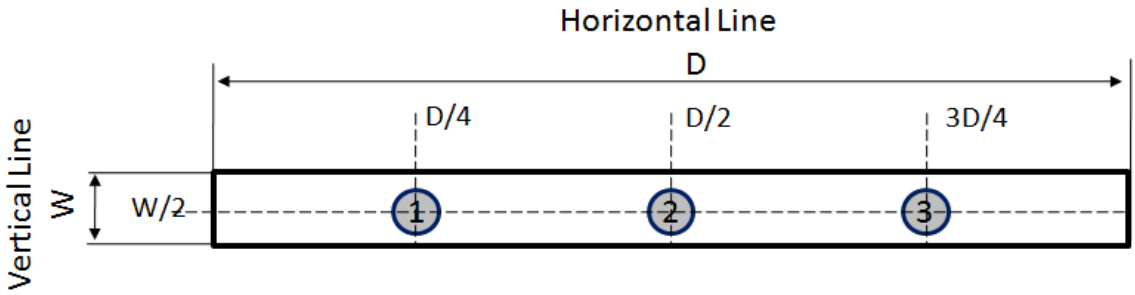
Measure the luminance of gray level 1023 at center point.

L_C = L (5), where L (x) is corresponding to the luminance of the point X at the figure in Note (6).

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

Measure the luminance of gray level 255 at 3 points

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



7. PRECAUTIONS

7.1 ASSEMBLY AND HANDLING PRECAUTIONS

[1] Do not apply rough force such as bending or twisting to the module during assembly.

[2] Do not apply pressure or impulse to the module to prevent the damage of LCD panel and Backlight.

[3] Bezel of Set can not press or touch the panel surface. It will make light leakage or scrape.

[4] It should be attached to the system firmly using all mounting holes.

[5] It is recommended to assemble or to install a module into the user's system in clean working areas. The dust and oil may cause electrical short or worsen the polarizer, do not press or scratch the surface harder than a HB pencil lead.

[6] Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.

[7] Protection film for polarizer on the module should be slowly peeled off just before use so that the electrostatic charge can be minimized.

[8] Do not disassemble the module.

[9] Always follow the correct power-on sequence when the LCD module is turned on. This can prevent the damage and latch-up of the CMOS LSI chips.

[10] Do not plug in or pull out the I/F connector while the module is in operation, pins of I/F connector should not be touched directly with bare hands. Do not adjust the variable resistor located on the module.

[11] Moisture can easily penetrate into LCD module and may cause the damage during operation.

[12] When storing modules as spares for a long time, the following precaution is necessary.

[12.1] 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 (under 70%) without condensation.

[12.2] The module shall be stored in dark place. Do not store the TFT-LCD module in direct sunlight or fluorescent light.

[13] When ambient temperature is lower than 10ºC, the display quality might be reduced. For example, the response time will become slow, and the starting voltage of LED will be higher than that of room temperature.

7.2 SAFETY PRECAUTIONS

To optimize PID module's lifetime and functions, operating conditions should be followed as below

[1] Normal operating condition

[1.1] Temperature : 20±15℃

[1.2] Humidity : 55±20%

[1.3] Well-ventilated place is suggested to set up PID module and system.

[1.4] Display pattern : regular switched patterns or moving pictures.

[2] Operation usage to protect against image sticking due to long-term static display.

[2.1] Suitable operating time : under 24 hours a day.

(* The moving picture can be allowed for 24 hours a day)

[2.2]Liquid Crystal refresh time is required. Cycling display between 5 minutes' information (static) display and 10 seconds' moving image.

(* Information (static) display is request > 50% gray level background)

[2.3] Periodical display contents should be changed from static image to moving picture.

[2.3.1] Different background and image colors changed respectively, and changed colors periodically.

[2.3.2] Background and image with large different luminance displayed at the same time should be avoided.

[2.3.3] Periodical power-off the system for a while or screen saver is needed after long-term static display.

[2.3.4] Moving picture or black pattern is strongly recommended for screen saver.

[3] The startup voltage of a Backlight may cause an electrical shock while assembling with the converter. Do not disassemble the module or insert anything into the Backlight unit.

[4] Do not connect or disconnect the module in the "Power On" condition.

[5] Do not exceed the absolute maximum rating value. (supply voltage variation, input voltage variation, variation in part contents and environmental temperature…) Otherwise the module may be damaged.

[6] 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.

[7] Module should be turned clockwise (regular front view perspective) when used in portrait mode.

[8] Ultra-violet ray filter is necessary for outdoor operation.

[9] Only when PID module is operated under right operating conditions, lifetime in this spec can be guaranteed. After the module's end of life, it is not harmful in case of normal operation and storage.

7.3 SAFETY STANDARDS

The LCD module should be certified with safety regulations as follows:

Regulatory	Item	Standard
Information Technology equipment	UL	UL60950-1:2006 or Ed.2:2007
	cUL	CAN/CSA C22.2 No.60950-1-03 or 60950-1-07
	CB	IEC60950-1:2005 / EN60950-1:2006+ A11:2009
Audio/Video Apparatus	UL	UL60065 Ed.7:2007
	cUL	CAN/CSA C22.2 No.60065-03:2006 + A1:2006
	CB	IEC60065:2001+ A1:2005 / EN60065:2002 + A1:2006+ A11:2008

If the module displays the same pattern for a long period of time, the phenomenon of image sticking may be occurred.

8. DEFINITION OF LABELS

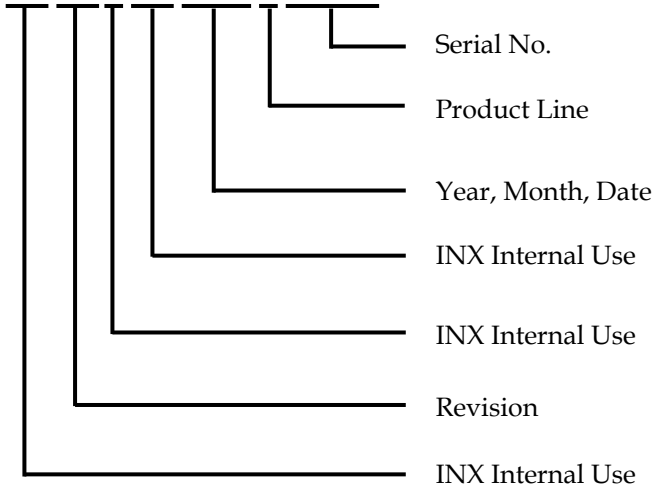
8.1 MODULE LABEL

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

Model Name : S350AJ1－LE1

Revision : Rev. XX, for example: A0, A1… B1, B2… or C1, C2…etc.

Serial ID : X X X X X X Y M D L N N N N



Serial ID includes the information as below :

Manufactured Date :

Year : 2001=1, 2002=2, 2003=3, 2004=4…2010=0, 2011=1, 2012=2…

Month: 1~9, A~C, for Jan. ~ Dec.

Day: 1~9, A~Y, for 1st to 31st, exclude I ,O, and U.

Revision Code : Cover all the change

Serial No. : Manufacturing sequence of product

Product Line : 1→Line1, 2→Line 2, …etc.

8.2 CARTON LABEL

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

P.O. NO._____

Parts ID._____

Model Name S350AJ1-LE1

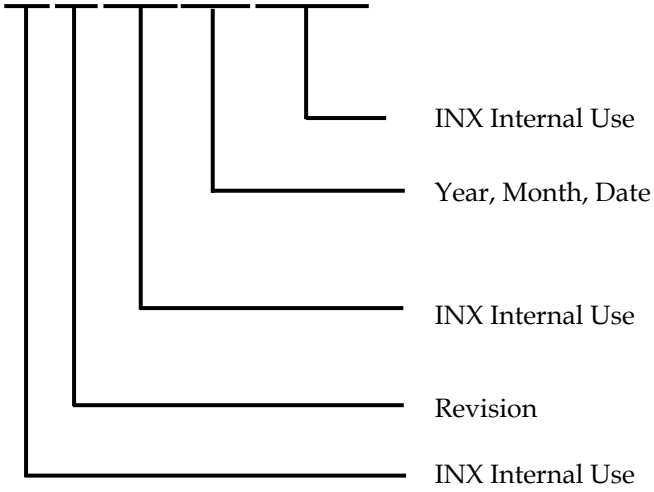
Carton ID._____ Quantities ___

XXXXXXXXXXXXX

Made In China

Model Name: S350AJ1–LE1

Carton ID: X X X X X X X Y M D X X X X



Serial ID includes the information as below :

Manufactured Date:

Year: 2010=0, 2011=1, 2012=2…etc.

Month: 1~9, A~C, for Jan. ~ Dec.

Day: 1~9, A~Y, for 1st to 31st, exclude I ,O, and U.

Revision Code: Cover all the change

9. PACKAGING

9.1 PACKAGING SPECIFICATIONS

Packaging Method of multi-boxes in a pallet

(1) 14 LCD TV modules / 1 Box

(2) Box dimensions : 970(L)x565(W)x161(H)mm

(3) Weight : approximately 24 kg (14 modules per box)

9.2 PACKAGING METHOD

Packaging method is shown in following figures.

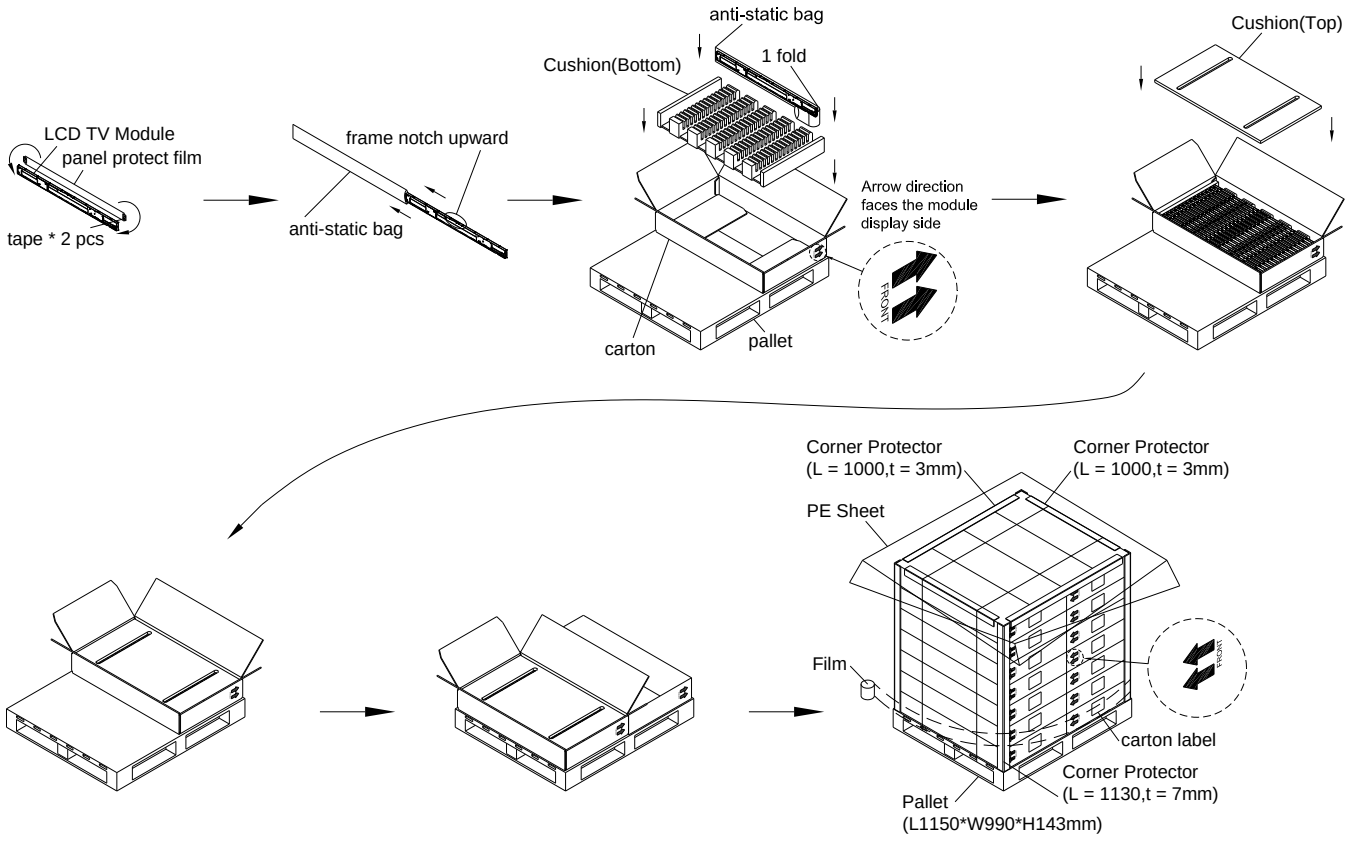
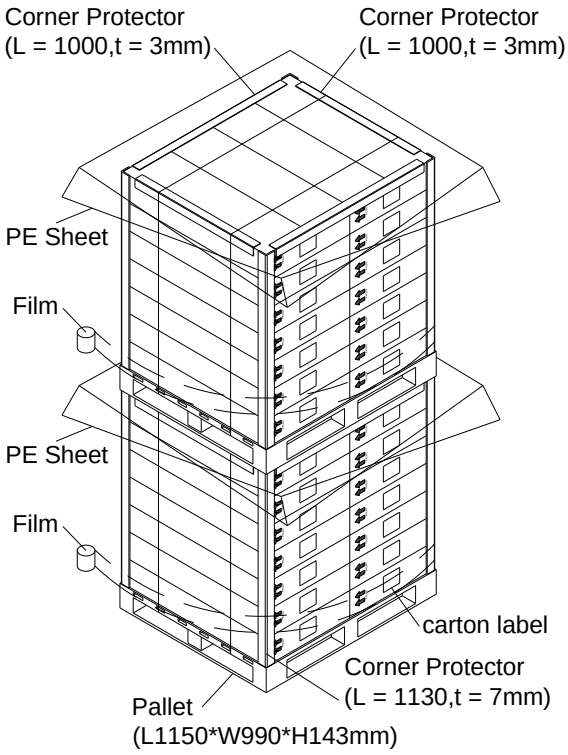


Figure 9-1 packing method

Sea / Land Transportation (40ft HQ Container) 1+1 Layer



Air Transportation 1 Layer

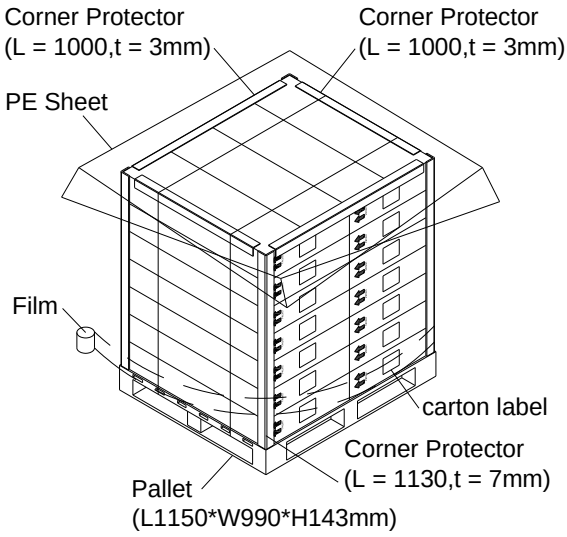


Figure 9-2 packing method

9.3 UN-PACKAGING METHOD

Un-packaging method is shown as following figures.

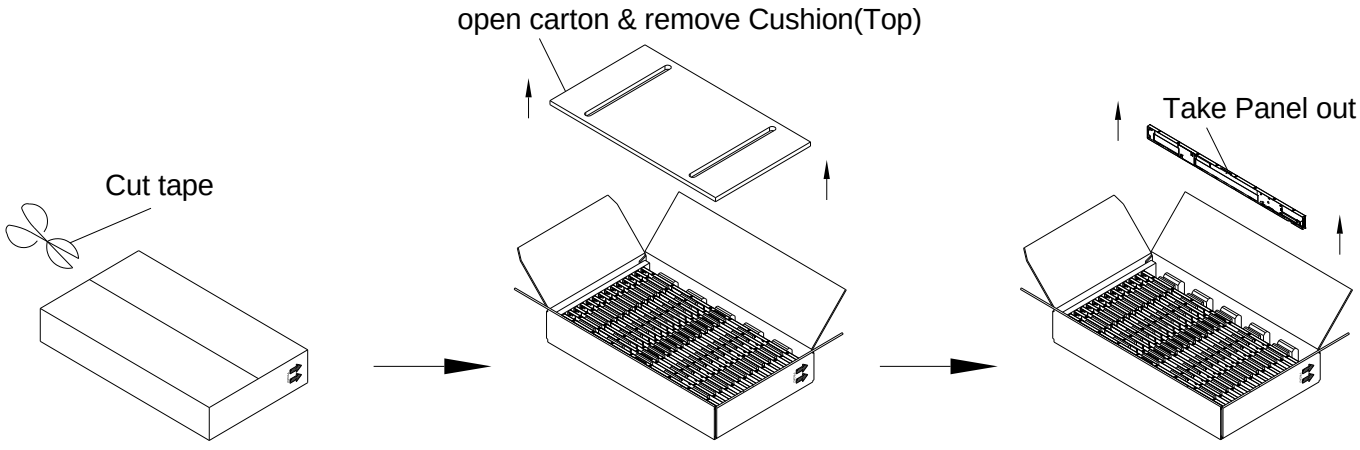


Figure 9-3 Un-packing method

10. MECHANICAL CHARACTERISTIC