CUSTOMER APPROVAL SHEET

Company Name	
MODEL	**A070VW05 V0**
CUSTOMER APPROVED	Title : Name :

- ☐ **APPROVAL FOR SPECIFICATIONS ONLY (Spec. Ver.____)**
- ☐ **APPROVAL FOR SPECIFICATIONS AND ES SAMPLE (Spec. Ver.____)**
- ☐ **APPROVAL FOR SPECIFICATIONS AND CS SAMPLE (Spec. Ver.____)**
- ☐ **CUSTOMER REMARK :**

AUO PM :

P/N : _____

Comment :

Doc. version :	0.2
Total pages :	24
Date :	2008/09/25

Product Specification

7.0" COLOR TFT-LCD MODULE/PANEL

Model Name： **A070VW05 V0**

Planned Lifetime:	From 2008/Sep To 2010/Dec
Phase-out Control:	From 2010/Jul To 2010/Dec
EOL Schedule:	2010/Dec

< □ >Preliminary Specification
< >Final Specification

Note: The content of this specification is subject to change.

Record of Revision

Version	Revise Date	Page	Content
0.0	2008/08/07		First Draft
0.1	2008/09/17	3 6 6-9 8-10 10 11-12 18 22	Correct “A. General Information”. Delete recommonded connector. Change panel pin definition of GND. Modify Max capability and driving condition of VLED and LEDPWM. Correct symbol of “t_{est}” and “T_{ehd}”. Update input timing. Update ESD driving condition. Add item 22 of “H. Precautions”.
0.2	2008/9/25	4-5 10	Update Clear drawing. Correct “LEDPWM frequency”.

Contents

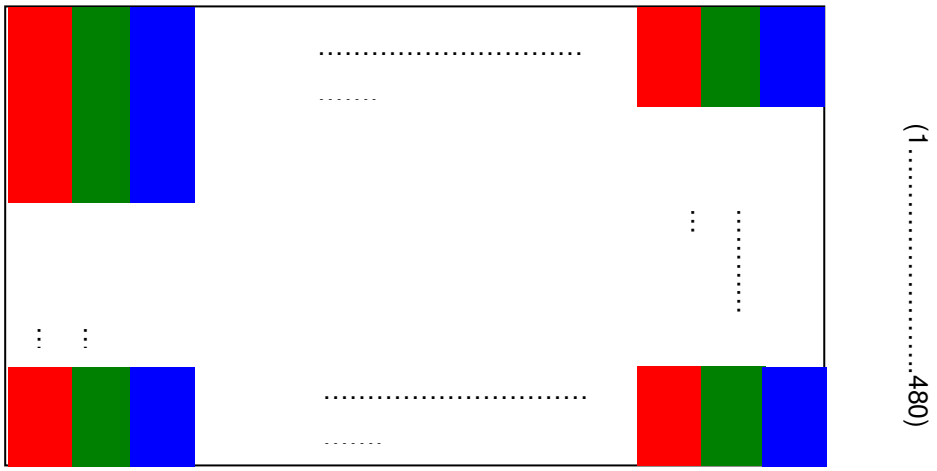
A. General Information

A070VW05 V0 is an a-Si type Thin Film Transistor Liquid crystal Display (TFT-LCD). This model is composed of a TFT-LCD, driver IC, FPC (flexible printed circuit), PCB with LCD driving circuit, and a backlight unit. This product is mainly for car after-market, and other suitable application.

NO.	Item	Unit	Specification	Remark
1	Screen Size	inch	7.0(Diagonal)	
2	Display Resolution	dot	800RGB(H)×480(V)	
3	Overall Dimension	mm	165(H) × 104(V) × 5.465(T)	Note 1
4	Active Area	mm	152.40(H)×91.44(V)	
5	Pixel Pitch	mm	0.1905(H)×0.1905(V)	
6	Color Configuration	--	R. G. B. Stripe	Note 2
7	Color Depth	--	16.7M Colors	Note 3
8	NTSC Ratio	%	50	
9	Display Mode	--	Normally White	
10	Panel surface Treatment	--	Anti-Glare, 3H	
11	Weight	g	TBD	
12	Power Consumption	W	TBD	Note 4
13	Viewing direction		6 o'clock (gray inversion)	

Note 1: Not include FPC and protect film. Refer next page to get further information.

Note 2: Below figure shows dot stripe arrangement.



(1 2 3……2398 2399 2400)

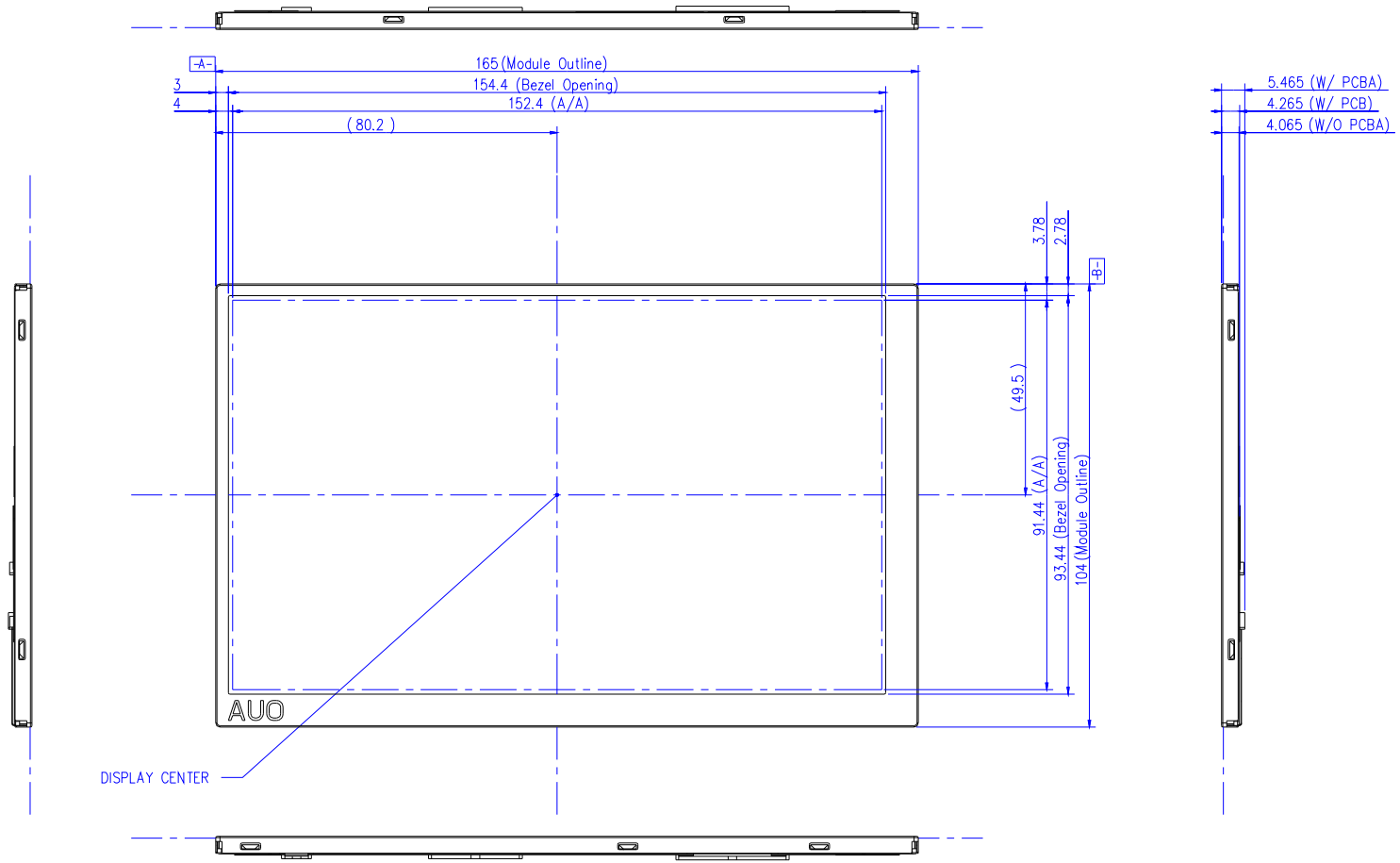
Note 3: The full color display depends on 24-bit data signal (pin 5~28).

Note 4: Please refer to Electrical Characteristics chapter.

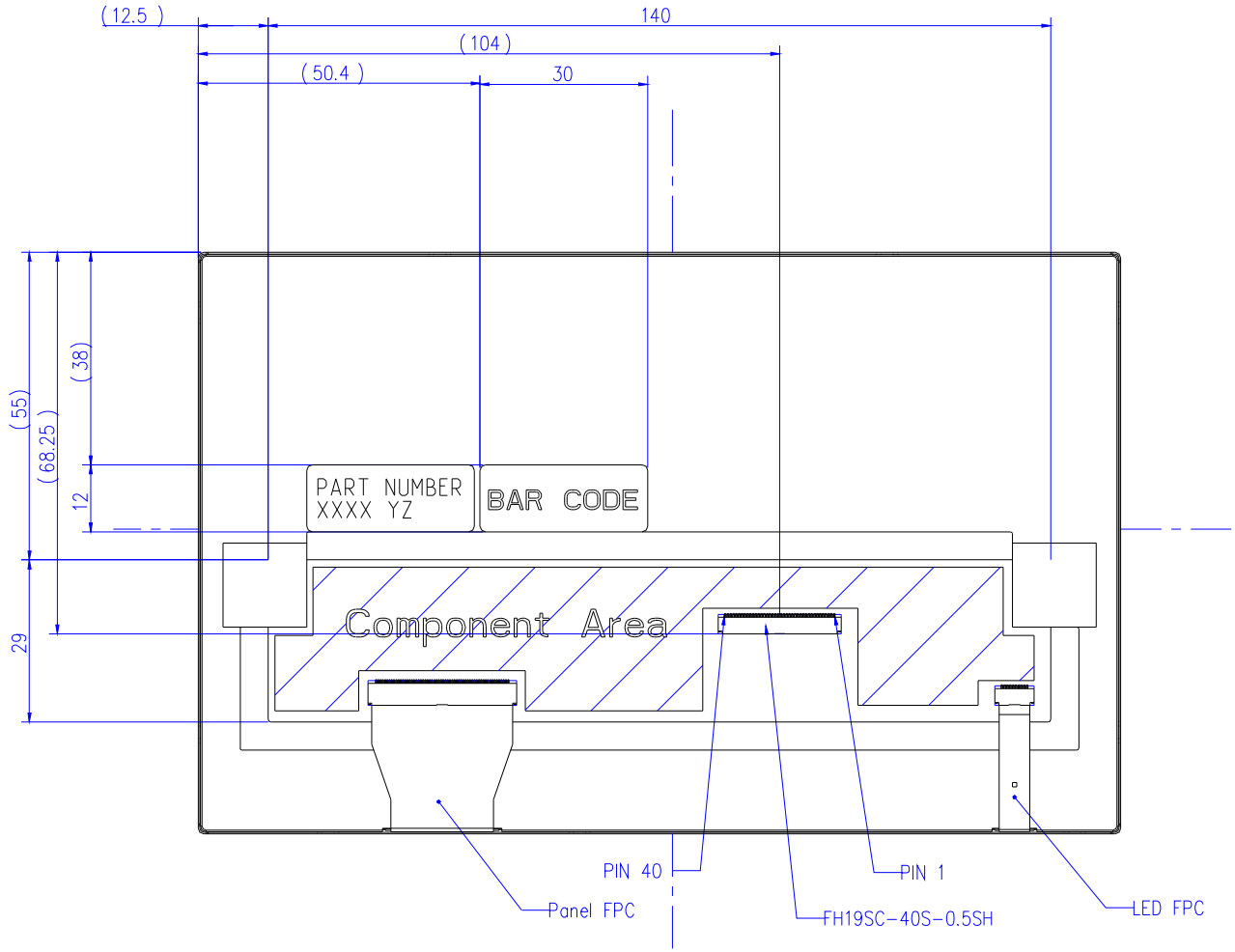
B. Outline Dimension

1. TFT-LCD Module – Front View

Notes:
1.General tolerance is +/− 0.3
2.The bending radius of FPC should be large than 0.6
3.Unit: mm



2. TFT-LCD Module – Rear View



C. Electrical Specifications

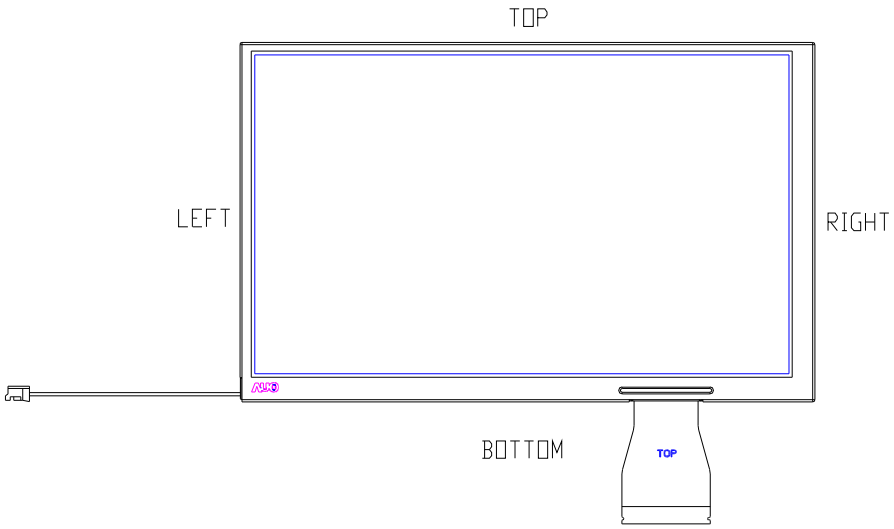
1. TFT LCD Panel Pin Assignment

Pin no	Symbol	I/O	Description	Remark
1	GND	P	System Ground	Note 1
2	GND	P	System Ground	Note 1
3	VCC	P	System Power Supply	
4	VCC	P	System Power Supply	
5	DR0	I	Graphic Data R0 (LSB)	
6	DR1	I	Graphic Data R1	
7	DR2	I	Graphic Data R2	
8	DR3	I	Graphic Data R3	
9	DR4	I	Graphic Data R4	
10	DR5	I	Graphic Data R5	
11	DR6	I	Graphic Data R6	
12	DR7	I	Graphic Data R7 (MSB)	
13	DG0	I	Graphic Data G0 (LSB)	
14	DG1	I	Graphic Data G1	
15	DG2	I	Graphic Data G2	
16	DG3	I	Graphic Data G3	
17	DG4	I	Graphic Data G4	
18	DG5	I	Graphic Data G5	
19	DG6	I	Graphic Data G6	
20	DG7	I	Graphic Data G7 (MSB)	
21	DB0	I	Graphic Data B0 (LSB)	
22	DB1	I	Graphic Data B1	
23	DB2	I	Graphic Data B2	
24	DB3	I	Graphic Data B3	
25	DB4	I	Graphic Data B4	
26	DB5	I	Graphic Data B5	
27	DB6	I	Graphic Data B6	
28	DB7	I	Graphic Data B7 (MSB)	
29	GND	P	System Ground	Note 1
30	DCLK	I	Data clock Input	
31	NC	-	No connection. Please leave it open	
32	HSYNC	I	Horizontal sync input	
33	VSYNC	I	Vertical sync input	
34	DE	I	Data enable Input (Low active)	

35	VLED	P	LED Cirucit power supply	
36	VLED	P	LED Cirucit power supply	
37	GND	P	System Ground	Note 1
38	GND	P	System Ground	Note 1
39	LEDPWM	I	LED system PWM signal	
40	GNDLED	P	GND for LED Circuit	Note 1

I: Input pin; P: Power pin; G: Ground pin;

Note 1. GND iand GNDLED are connected together in AUO module.



2. Absolute Maximum Ratings

Item	Symbol	Condition	Min.	Max.	Unit	Remark
Power voltage	VCC	GND=0	-0.5	5.0	V	System Power Supply
	VLED	LEDGND	-0.5	6.0	V	LED Circuit Power Supply
Input signal voltage	Data	GND=0	-0.3	3.6	V	Digital Signals

Note 1: Functional operation should be restricted under ambient temperature (25℃).

Note2: Maximum ratings are those values beyond which damages to the device may occur. Functional operation should be restricted to the limits in the Electrical Characteristics chapter.

3. Electrical DC Characteristics

a. Typical Operation Condition (GND = GNDLED = 0V)

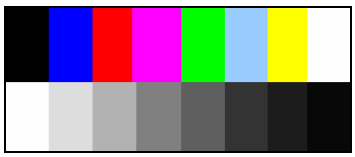
Item		Symbol	Min.	Typ.	Max.	Unit	Remark
Power Voltage		VCC	3.0	3.3	3.6	V	System Power Supply
		VLED	4.5	5.0	5.5	V	LED Cirucit Power Supply
Input Signal Voltage	H Level	VIH	0.7xVCC	--	VCC	V	
	L Level	VIL	GND	--	0.3xVCC	V	

b. Current Consumption (LEDGND=GND=0V)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Input Current for VCC	Ivcc	VCC = 3.3V	-	TBD	TBD	mA	Note 1, 2
Input Current for VLED	I_{VLED}	VLED = 5.0V	-	TBD	TBD	mA	Note 1, 2

Note 1:Test Condition is under typical Eletrical DC and AC characteristics.

Note 2: Test pattern is the following picture.

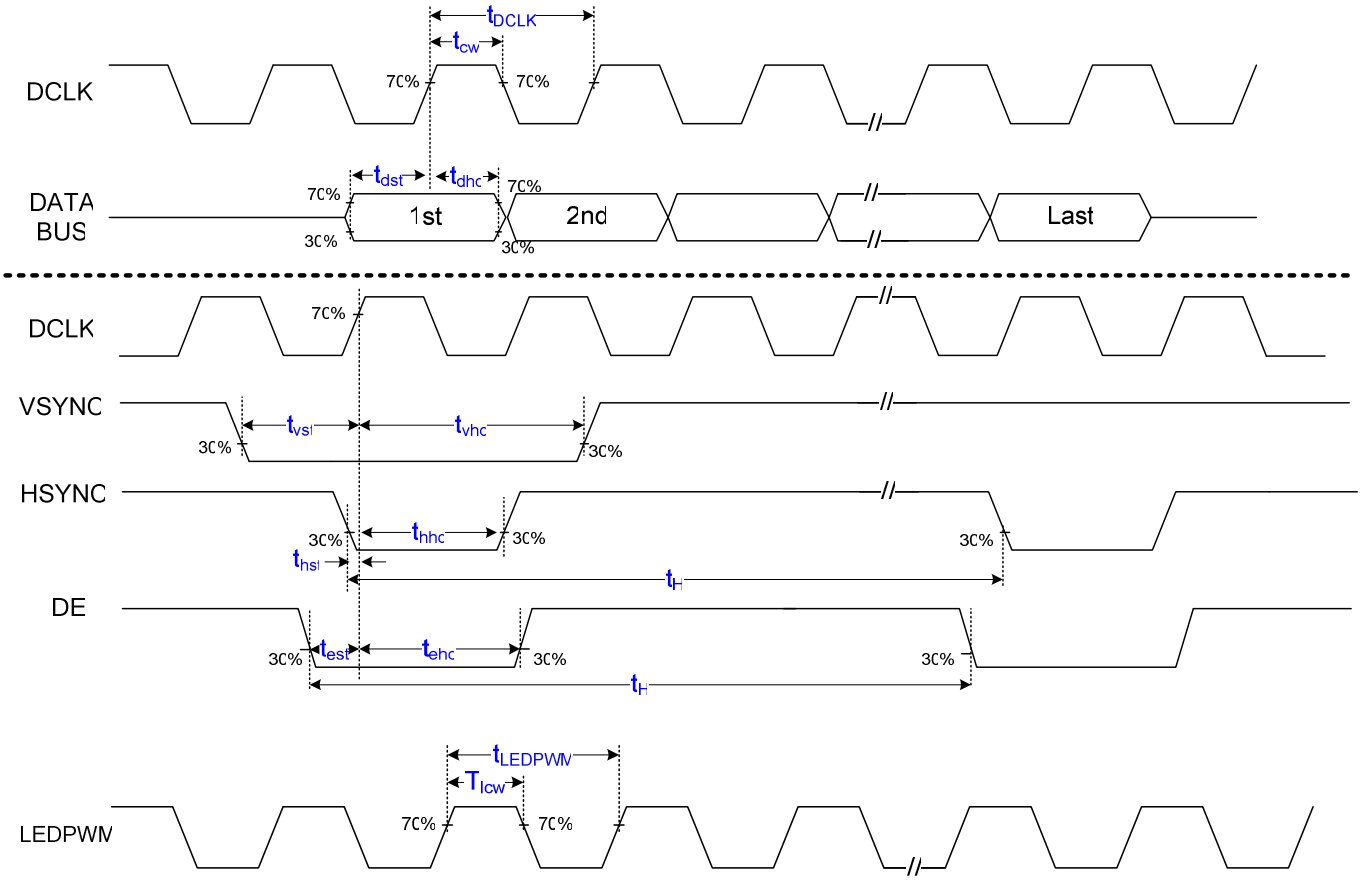


4. Electrical AC Characteristics

a. Signal AC Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK duty cycle	--	40	50	60	%	t_{cw} / t_{DCLK} x100%
VSYNC setup time	t_{vst}	0	--	--	ns	

VSYNC hold time	t_{vhd}	2	--	--	ns	
HSYNC setup time	t_{hst}	5	--	--	ns	
HSYNC hold time	t_{hhd}	10	--	--	ns	
Data Enable setup time	t_{est}	4			ns	
Data Enable hold time	T_{ehd}	2			ns	
Data setup time	t_{dst}	5	--	--	ns	
Data hold time	t_{dhd}	10	--	--	ns	
LEDPWM frequency	--	1	--	20	kHz	
LEDPWM duty cycle	--	10	--	--	%	t_{lcw} / t_{LEDPWM} x100%

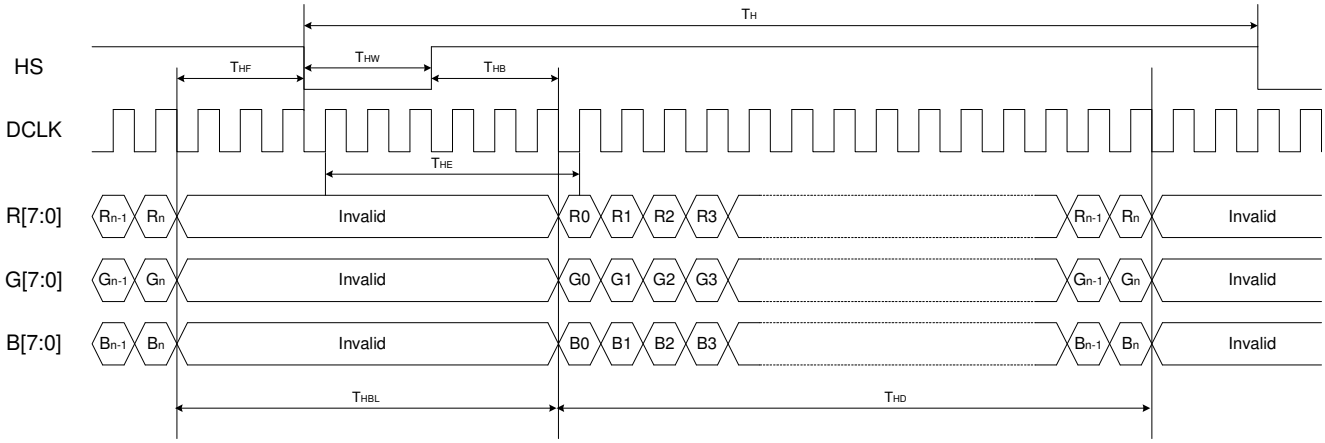


t_H: HSYNC period

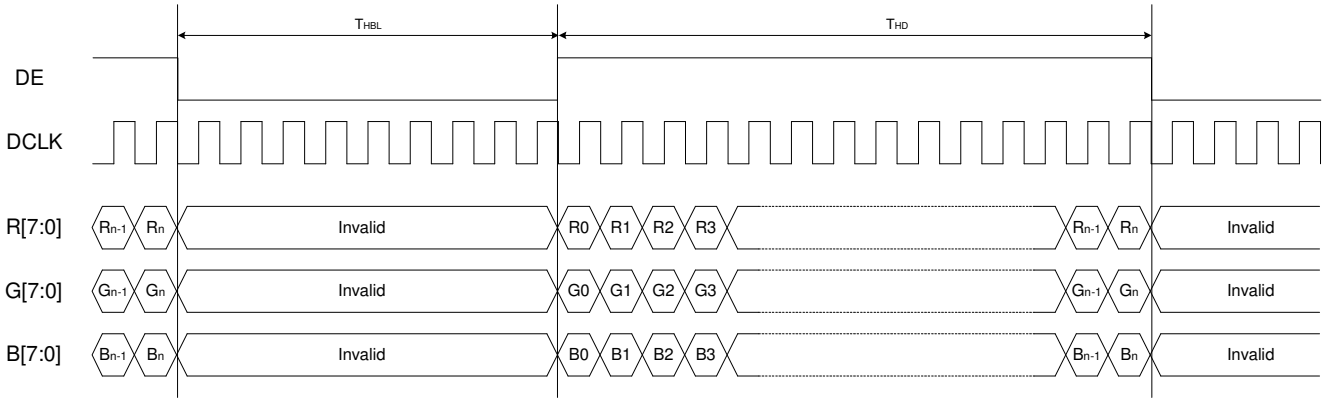
t_{DCLK}: DCLK period

t_{cw}: the width of DCLK high

b. Input Timing



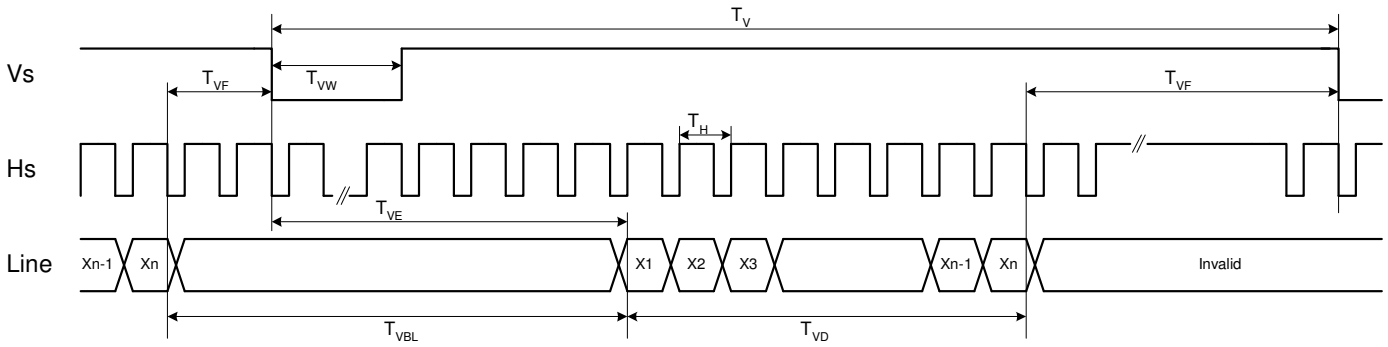
Horizontal input timing. (HV mode)



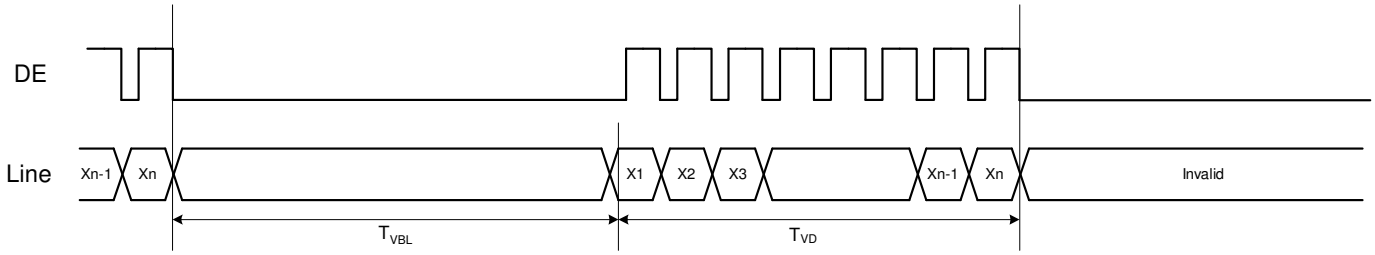
Horizontal input timing. (DE mode)

Horizontal Input Timing

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK frequency	FDCLK	25	33	40	MHz	
DCLK period	TDCLK	25	30.3	40	ns	
Hsync Period (=THD+THBL)	TH	TBD	1056	1088	DCLK	
Active Area	THD	--	800	--	DCLK	
Horizontal Blanking	THBL	TBD	256	288	DCLK	
Hsync Front Porch	THF	TBD	40	72	DCLK	
Delay from Hsync to 1st data	THE	--	216	--	DCLK	
Hsync Pulse Width	THW	1	128	136	DCLK	
Hsync Back Porch	THB	80	88	215	DCLK	



Vertical timing. (HV mode)



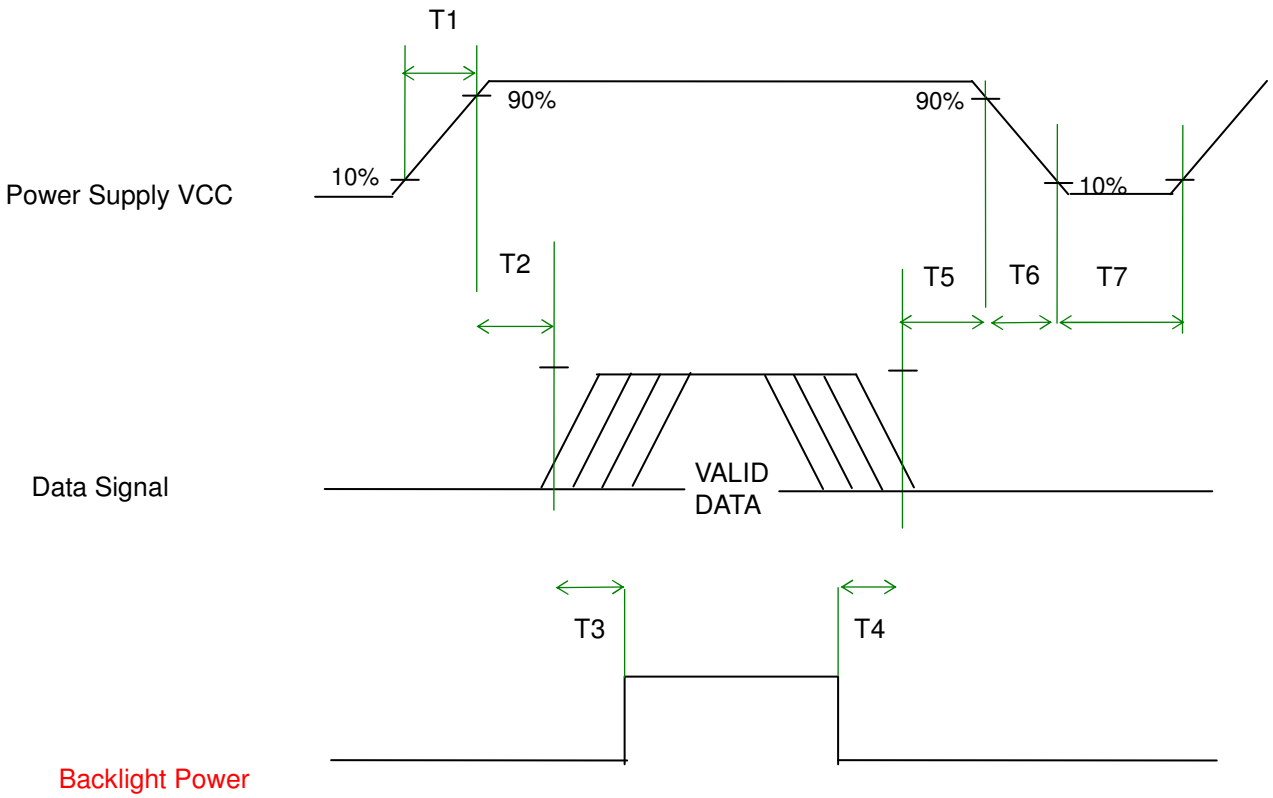
Vertical timing. (DE mode)

Vertical Input Timing

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Vsync Period (=TVD+TVBL)	TV	--	505	525	Th	
Active lines	TVD	--	480	--	Th	
Vertical blanking (=TVF+TVE)	TVBL	--	25	45	Th	
Vsync Front Porch	TVF	--	1	21	Th	
GD Start Pulse Delay	TVE	--	24	--	HS	
Vsync Pulse Width	TVW	1	3	16	Th	
Hsync/Vsync Phase Shift	TVPD	2	320	--	DCLK	

6. Power On/Off Characteristics

Vcc power and LED on/off sequence is as follows. Interface signals are also shown in the chart. Signals from any system shall be Hi-Z state or low level when Vcc is off.



Power Sequence Timing

Parameter	Value			Unit
	Min.	Typ.	Max.	
T1	0.5	-	10	[ms]
T2	30	40	50	[ms]
T3	200	-	-	[ms]
T4	100	-	-	[ms]
T5	0	16	50	[ms]
T6	-	-	10	[ms]
T7	1000	-	-	[ms]

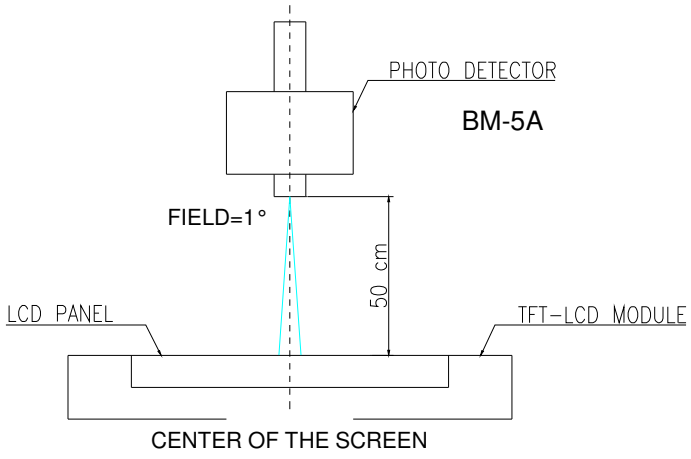
D. Optical Specification

All optical specification is measured under typical condition (Note 1, 2)

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Response Time Rise Fall		 Tr Tf	θ=0°	 -- --	 12 18	 20 30	 ms ms	Note 3
Contrast ratio		CR	At optimized viewing angle	250	350	--		Note 4
Viewing Angle	Top		CR≧10	35	45	--	deg.	Note 5
	Bottom			55	65	--		
	Left			55	65	--		
	Right			55	65	--		
Brightness		Y_L	θ=0°	300	375	--	cd/m^2	Note 6
Chromaticity	White	X	θ=0°	0.26	0.31	0.36		
		Y	θ=0°	0.28	0.33	0.38		
	Red	X	θ=0°	TBD	TBD	TBD		
		Y	θ=0°	TBD	TBD	TBD		
	Green	X	θ=0°	TBD	TBD	TBD		
		Y	θ=0°	TBD	TBD	TBD		
	Blue	X	θ=0°	TBD	TBD	TBD		
		Y	θ=0°	TBD	TBD	TBD		
Uniformity		ΔY_L	%	70	75	--	%	Note 7

Note 1: Ambient temperature =25℃, and LED lightbar voltage VL = 12 V. To be measured in the dark room.

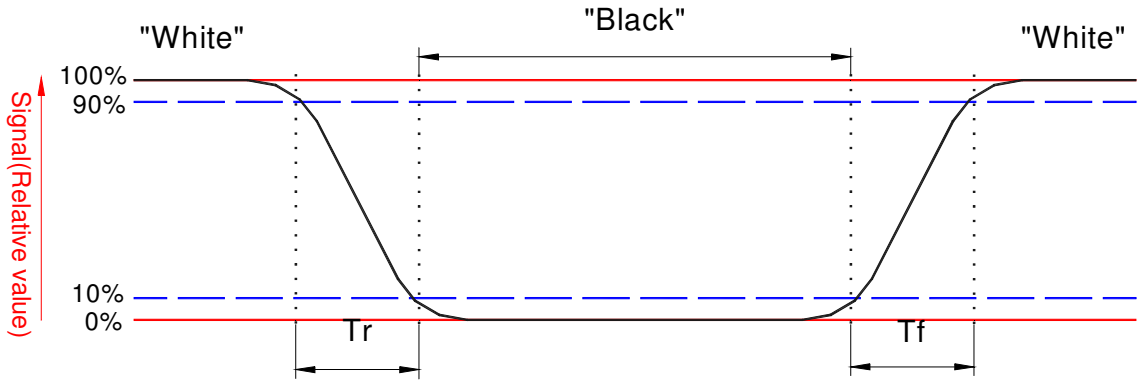
Note 2: To be measured on the center area of panel with a viewing cone of 1° by Topcon luminance meter BM-5A, after 15 minutes operation.



Note 3: Definition of response time:

The output signals of photo detector are measured when the input signals are changed from “black” to “white”(falling time) and from “white” to “black”(rising time), respectively.

The response time is defined as the time interval between the 10% and 90% of amplitudes. Refer to figure as below.

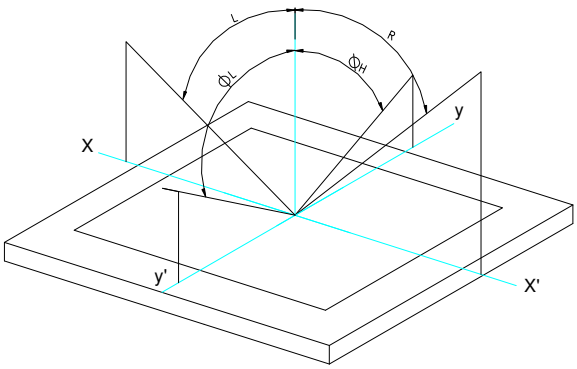


Note 4.Definition of contrast ratio:

Contrast ratio is calculated with the following formula.

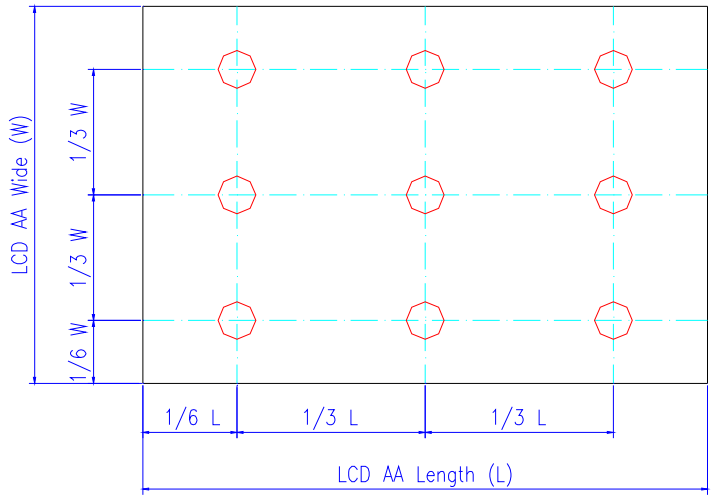
$$\text{Contrast ratio (CR)} = \frac{\text{Photo detector output when LCD is at "White" status}}{\text{Photo detector output when LCD is at "Black" status}}$$

Note 5. Definition of viewing angle, θ, Refer to figure as below.



Note 6. Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

Note 7: Luminance Uniformity of these 9 points is defined as below:



$$\text{Uniformity} = \frac{\text{minimum luminance in 9 points (1-9)}}{\text{maximum luminance in 9 points (1-9)}}$$

E. Reliability Test Items

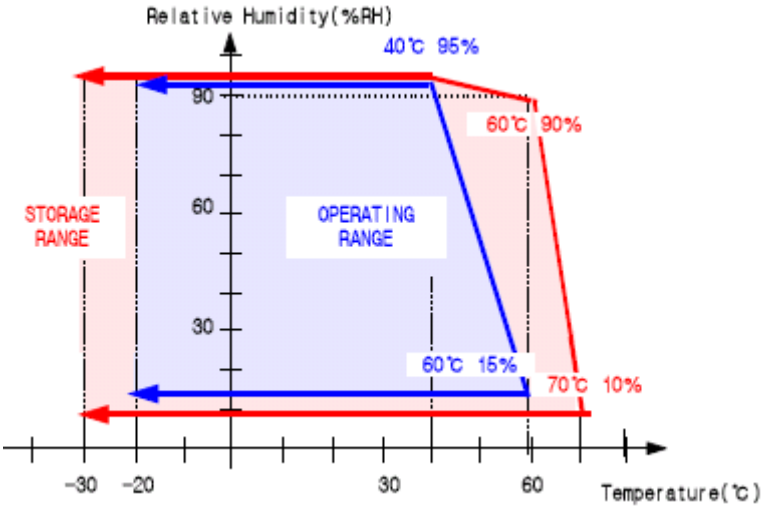
No.	Test items	Conditions	Remark
1	High Temperature Storage	Ta= 80□ 240Hrs	
2	Low Temperature Storage	Ta= -30□ 240Hrs	
3	High Ttemperature Operation	Tp= 70□ 240Hrs	
4	Low Temperature Operation	Ta= -20□ 240Hrs	
5	High Temperature & High Humidity	Tp= 50□. 80% RH 240Hrs	Operation
6	Heat Shock	-20□~70□, 50 cycle, 2Hrs/cycle	Non-operation
7	Electrostatic Discharge	Contact = ± 4 kV, class B Air = ± 8 kV, class B	Note 5
8	Image Sticking	25□, 4hrs	Note 6
9	Vibration	Frequency range : 8~33.3Hz Stoke : 1.3mm Sweep : 2.9G ,33.3~400Hz 2 hours for each direction of X,Y,Z 4 hours for Y direction	Non-operation JIS C7021, A-10 condition A : 15 minutes
10	Mechanical Shock	100G . 6ms, ±X,±Y,±Z 3 times for each direction	Non-operation JIS C7021, A-7 condition C
11	Vibration (With Carton)	Random vibration: $0.015G^2$/Hz from 5~200Hz –6dB/Octave from 200~500Hz	IEC 68-34
12	Drop (With Carton)	Height: 60cm 1 corner, 3 edges, 6 surfaces	
13	Pressure	5kg, 5sec	Note 7

Note 1: Ta: Ambient Temperature. Tp: Panel Surface Temperature

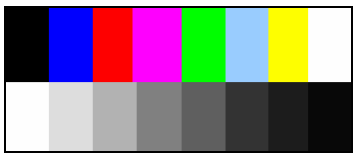
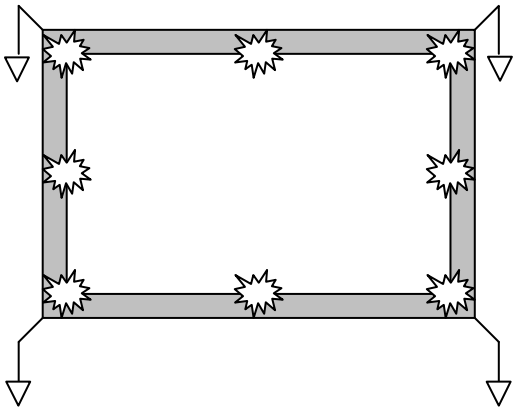
Note 2: In the standard conditions, there is not display function NG issue occurred. All the cosmetic specification is judged before the reliability stress.

Note 3: All the cosmetic specification is judged before the reliability stress.

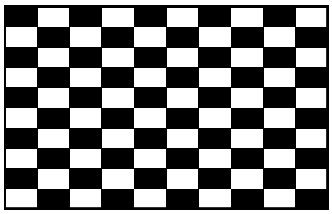
Note 4: temperature and relative umidity range is shown in the figure below



Note5 : All test techniques follow IEC6100-4-2 standard.

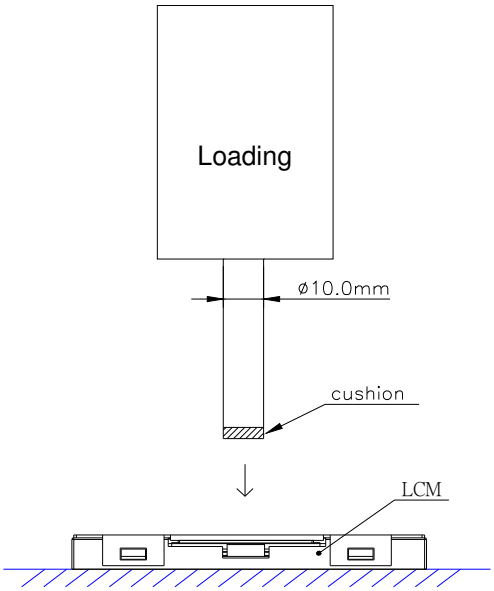
Test Condition		Note
Pattern		
Procedure And Set-up	Contact Discharge：330Ω, 150pF, 1sec, 8 point, 10times/point Air Discharge：330Ω, 150pF, 1sec, 8 point, 10times/point 	
Criteria	B – Some performance degradation allowed. No data lost. Self-recoverable hardware failure.	

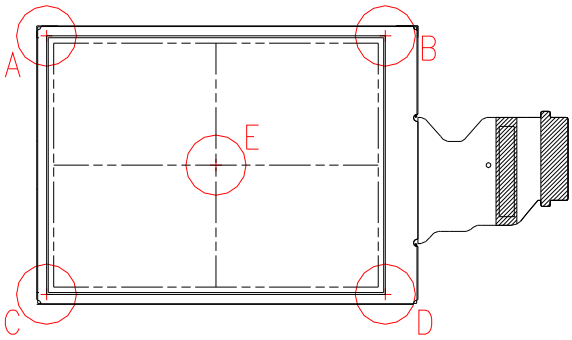
Note 6: Operate with chess board pattern as figure and lasting time and temperature as the conditions. Then judge with 50% gray level, the mura is not worse than AUO defined limited sample.

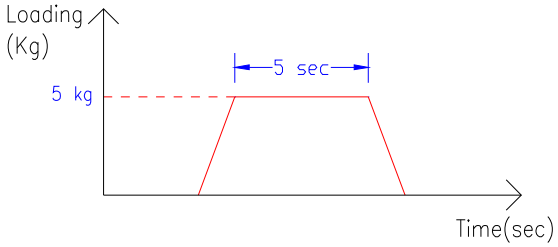


Note 7: The panel is tested as figure. The jig is ϕ 10 mm made by Cu with rubber and the loading speed is 3mm/min on position A~E. After the condition, no glass crack will be found and panel

function check is OK.(no guarantee LC mura、LC bubble)

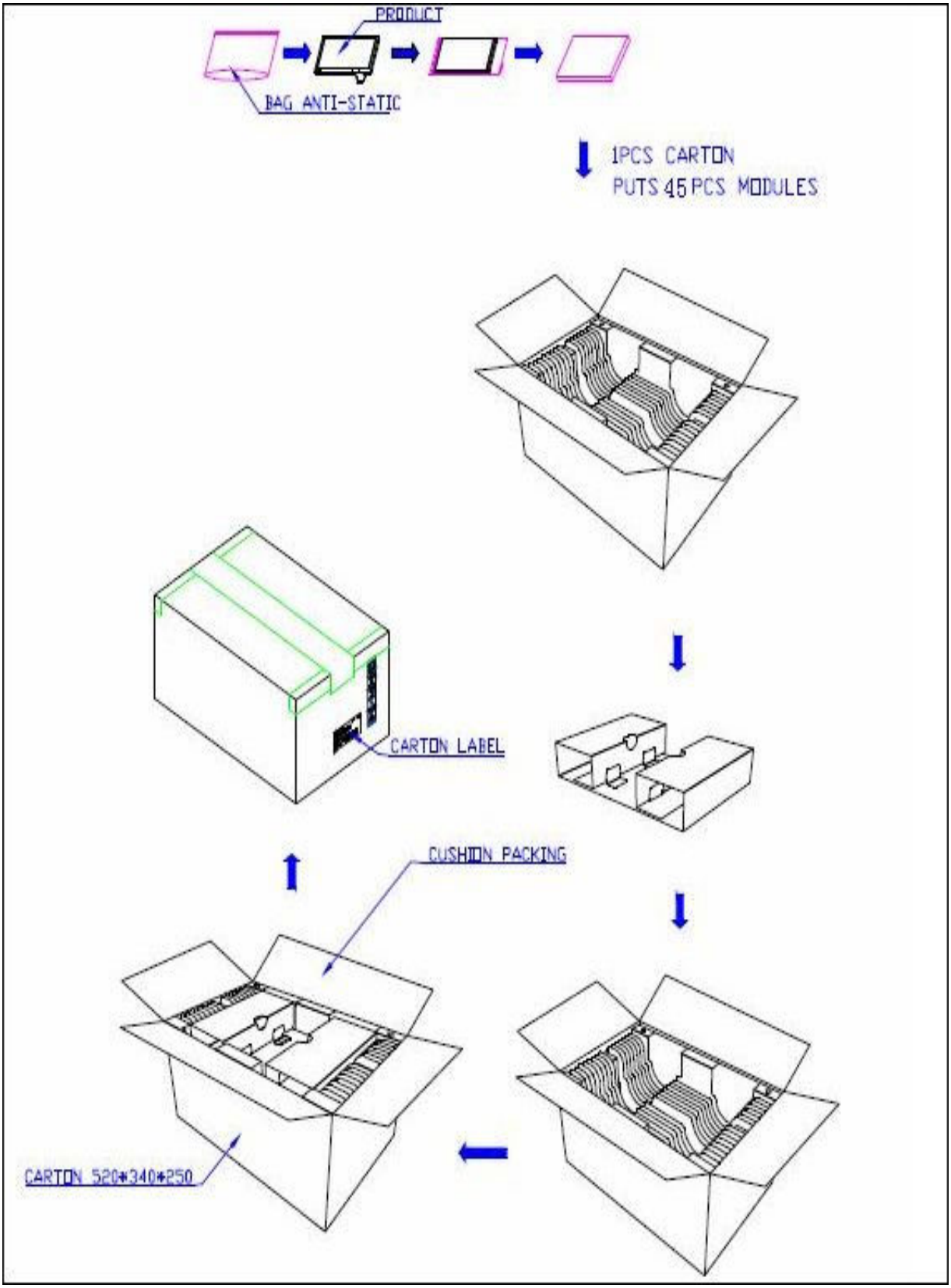






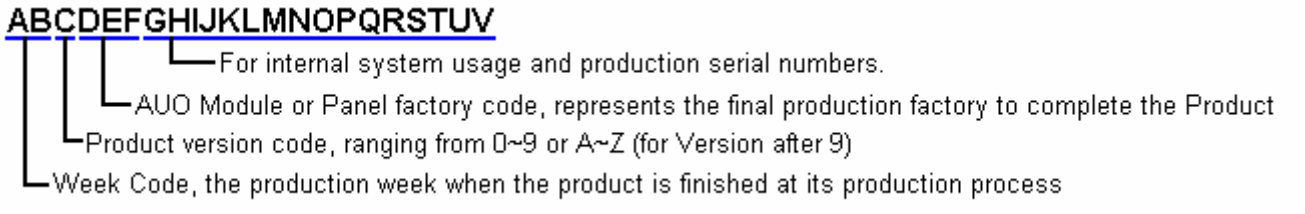
F. Packing and Marking

1. Packing Form



2. Module/Panel Label Information

The module/panel (collectively called as the “Product”) will be attached with a label of Shipping Number which represents the identification of the Product at a specific location. Refer to the Product outline drawing for detailed location and size of the label. The label is composed of a 22-digit serial number with the following definition:



Example:

501M06ZL06123456781Z05:

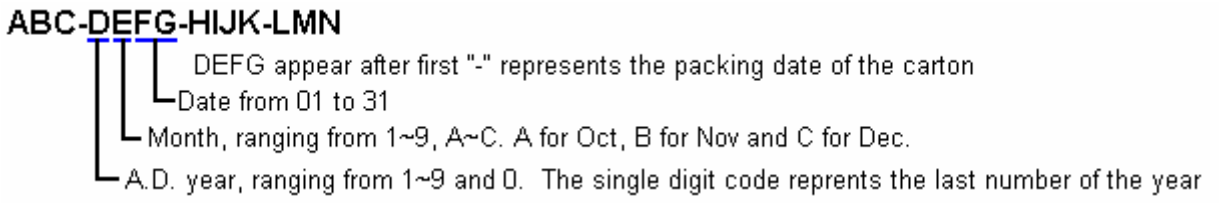
Product Manufacturing Week Code: WK50

Product Version: Version 1

Product Manufactuing Factory: M06

3. Carton Label Information

The packing carton will be attached with a carton label where packing Q’ty, AUO Model Name, AUO Part Number, Customer Part Number (Optional) and a series of Carton Number in 13 or 14 digits are printed. The Carton Number is apparing in the following format:



Refer to the drawing of packing format for the location and size of the carton label.

G. Application Note

1. Application Circuit

2. System block

H. Precautions

1. Do not twist or bend the module and prevent the unsuitable external force for display module during assembly.
2. Adopt measures for good heat radiation. Be sure to use the module with in the specified temperature.
3. Avoid dust or oil mist during assembly.
4. Follow the correct power sequence while operating. Do not apply the invalid signal, otherwise, it will cause improper shut down and damage the module.
5. Less EMI: it will be more safety and less noise.
6. Please operate module in suitable temperature. The response time & brightness will drift by different temperature.
7. Avoid to display the fixed pattern (exclude the white pattern) in a long period, otherwise, it will cause image sticking.
8. Be sure to turn off the power when connecting or disconnecting the circuit.
9. Polarizer scratches easily, please handle it carefully.
10. Display surface never likes dirt or stains.
11. A dewdrop may lead to destruction. Please wipe off any moisture before using module.
12. Sudden temperature changes cause condensation, and it will cause polarizer damaged.
13. High temperature and humidity may degrade performance. Please do not expose the module to the direct sunlight and so on.
14. Acetic acid or chlorine compounds are not friends with TFT display module.
15. Static electricity will damage the module, please do not touch the module without any grounded device.
16. Do not disassemble and reassemble the module by self.
17. Be careful do not touch the rear side directly.
18. No strong vibration or shock. It will cause module broken.
19. Storage the modules in suitable environment with regular packing.
20. Be careful of injury from a broken display module.
21. Please avoid the pressure adding to the surface (front or rear side) of modules, because it will cause the display non-uniformity or other function issue.
22. Please use SSCG(Spread Spectrum Clock Generator) at system for EMI reduction.