AUO

CUSTOMER APPROVAL SHEET

Company Name	
MODEL	**C123HAN06.0**
CUSTOMER APPROVED	Title : Name :

☐ **APPROVAL FOR SPECIFICATIONS ONLY (Spec. Ver. 0.8)**

☐ **APPROVAL FOR SPECIFICATIONS AND ES SAMPLE (Spec. Ver. 0.8)**

☐ **APPROVAL FOR SPECIFICATIONS AND CS SAMPLE (Spec. Ver. 0.8)**

☐ **CUSTOMER REMARK :**

Design change

1. 55.12C12.M01 Change 55.12C12M02

2. 59.12C12.001 Change 59.12C12.002

AUO PM :

P/N : _____

Comment :

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Product Specification

12.3" COLOR TFT-LCD MODULE

MODEL NAME: C123HAN06.0

< >Preliminary Specification

< ◆ >Final Specification

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

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Record of Revision

Version	Revise Date	Page	Content
0.0	2018/12/19	0	First draft.
0.1	2019/08/14	19	Update Chromaticity &Response time &Brightness
0.2	2019/09/02	7	Update outline dimension
0.3	2019/12/05	7,9	Update outline dimension &FPC dimension
0.4	2019/12/11	22	Update Packing form
0.5	2020/01/22	24~28	Update IIS Spec
0.6	2020/02/26	24~29	Update IIS Spec
0.7	2020/03/24	7~8	Update outline dimension
0.8	2020/04/13	7.27,28	Update LB Barcode Location Dimensions Update Foreign material : Linear Shape Update low temperature Mura, please help confirm and add description 「BL current value = 90mA/1ch」.

AUO-General

Contents

A. General Description

C123HAN06.0 is an a-Si & Tran missive type Thin Film Transistor Liquid crystal Display (TFT-LCD) with AHVA (Advanced Hyper View Angle) technology. This model is composed of a TFT-LCD, drivers, PCBA, and a backlight unit with BOSS mounting, and TCON (timing controller).

B. Features

- 12.3-inch (8:3) display
- 1920RGB x 720 resolution in RGB stripe dot arrangement
- High color: NTSC typ. 78%
- Interfaces: 2 port LVDS
- Advanced Hyper View Angle – Normal Black wide view technology
- RoHs compliance
- AG– surface treatment

C. Physical Specifications

NO.	Item	Unit	Specification	Remark
1	Display Resolution	dot	1920 (H) x 720 RGB (V)	
2	Active Area	mm	292.032 (H)x109.512 (V)	
3	Screen Size	inch	12.3" (Diagonal)	
4	Dot Pitch	mm	152.1x152.1	
5	Color Configuration	-	R. G. B. Stripe	Note 1
6	Color Depth	-	16.7M Colors	
7	Overall Dimension	mm	308.79(H)X128.85(V)X8.55(T)	Note 2
8	Weight	g	TBD	
9	Display Mode	-	Normally Black	
10	Surface Treatment		AG	

Note 1: Below figure shows dot stripe arrangement.

AUO-General

D. Outline Dimension
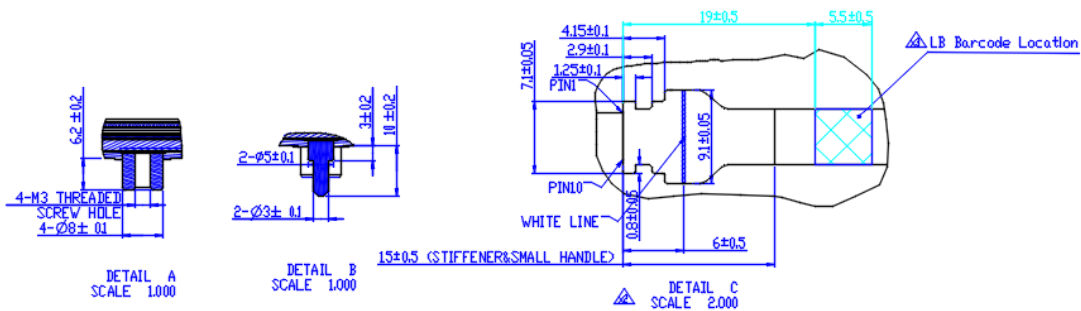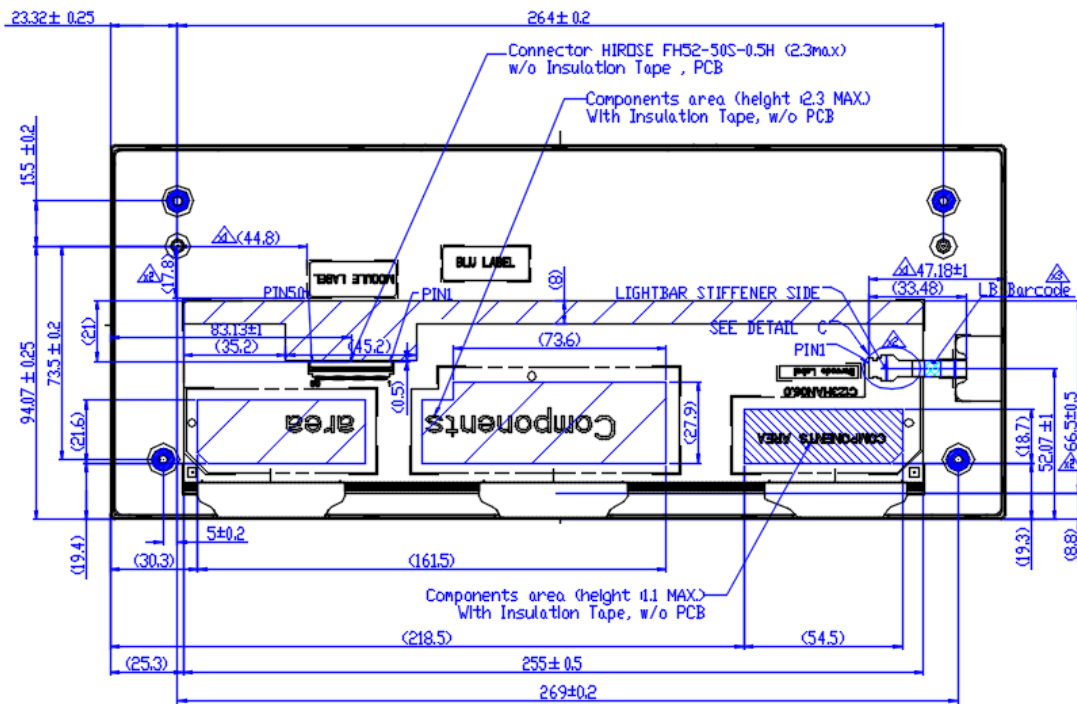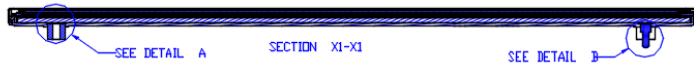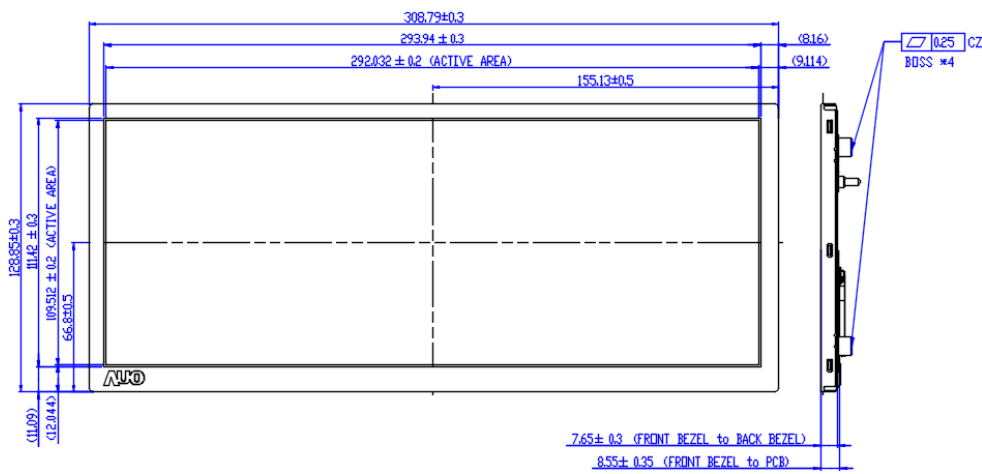
Will LB FPC die lose line?

✓ Confirm the pressure on the line damage when the dead fold is confirmed

   a. XBL factory production line, the pressure of the compaction block on the LB FPC dead fold is 0.5Kgf, and the action area on the LB FPC is 33mm². The force per unit area is: 0.5Kgf/33mm2=0.01515Kgf/mm²

   b. The area of the weight acting on the LB FPC is: 138mm2. According to the above unit area force 0.01515Kgf, it can be calculated that the weight of the weight should be：138*0.01515 = 2Kgf

   c. The LB factory re-tested the LB FPC resistance test and used static pressure with 2Kg weight to test 3pcs. Each LB can withstand at least 11 bends. Please refer to the next page for results.
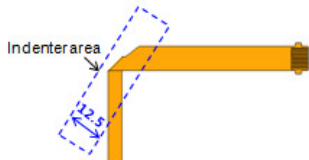
Indenter area
R16
Weight action area

Figure 9 The action area of the BL factory indenter on the LB PFC
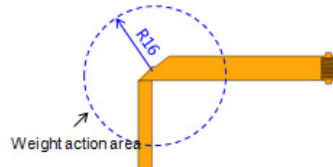
Figure 10 Weight pressure action area during FPC dead fold test

驗證方式

（1）使用整片（光板）對商品白線 → （2）180°彎折 → （3）2Kg砝碼平壓靜置10s → （4）萬用表量測所有線路確認功能性
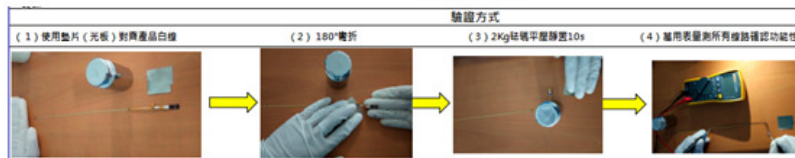
5

Will LB FPC die lose line?

✓ LB factory performs LB FPC resistance test and static pressure test using 2Kg weight
✓ The test results are as follows, total 20pcs LB, each LB FPC can withstand at least 10 folding test.

SMT

驗證結果

電折次數 / 樣品編號	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1#	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	NG	NA	NA
2#	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	NG	NA	NA	NA	NA
3#	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	NG	NA
4#	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	NG	NA	NA
5#	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	NG	NA	NA	NA
6#	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	NG	NA	NA	NA
7#	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	NG	NA
8#	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	NG	NA	NA
9#	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	NG	NA	NA	NA	NA	NA
10#	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	NG	NA	NA
11#	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	NG	NA	NA
12#	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	NG	NA	NA
13#	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	NG	NA	NA
14#	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	NG	NA	NA	NA	NA	NA
15#	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	NG	NA	NA
16#	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	NG	NA	NA	NA	NA	NA
17#	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	NG	NA	NA
18#	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	NG	NA	NA	NA	NA
19#	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	NG	NA
20#	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	NG	NA	NA	NA

【Conclusion】：
The ability is confirmed as PASS result according to the BL FPC folding test as above, and it could be guaranteed accordingly.

E. Electrical Specifications

Pin Assignment

a. Main FPC

Connector=FH52-50S-0.5SH(05)

No.	Pin Name	I/O	Description	Remarks
1	GND	G	Power ground	
2	RxOIN0-	I	Negative LVDS differential data input (Odd data)	
3	RxOIN0+	I	Positive LVDS differential data input (Odd data)	
4	GND	G	Power ground	
5	RxOIN1-	I	Negative LVDS differential data input (Odd data)	
6	RxOIN1+	I	Positive LVDS differential data input (Odd data)	
7	GND	G	Power ground	
8	RxOIN2-	I	Negative LVDS differential data input (Odd data)	
9	RxOIN2+	I	Positive LVDS differential data input (Odd data)	
10	GND	G	Power ground	
11	RxOCLK-	I	Negative LVDS differential clock input (Odd clock)	
12	RxOCLK+	I	Positive LVDS differential clock input (Odd clock)	
13	GND	G	Power ground	
14	RxOIN3-	I	Negative LVDS differential data input (Odd data)	
15	RxOIN3+	I	Positive LVDS differential data input (Odd data)	
16	GND	G	Power ground	
17	RxEIN0-	I	Negative LVDS differential data input (Even data)	
18	RxEIN0+	I	Positive LVDS differential data input (Even data)	
19	GND	G	Power ground	
20	RxEIN1-	I	Negative LVDS differential data input (Even data)	
21	RxEIN1+	I	Positive LVDS differential data input (Even data)	
22	GND	G	Power ground	
23	RxEIN2-	I	Negative LVDS differential data input (Even data)	
24	RxEIN2+	I	Positive LVDS differential data input (Even data)	
25	GND	G	Power ground	
26	RxECLK-	I	Negative LVDS differential clock input (Even clock)	
27	RxECLK+	I	Positive LVDS differential clock input (Even clock)	
28	GND	G	Power ground	
29	RxEIN3-	I	Negative LVDS differential data input (Even data)	
30	RxEIN3+	I	Positive LVDS differential data input (Even data)	
31	GND	G	Power ground	
32	RESET	I	Global reset pin	
33	NC	-	Dummy Pin	
34	VDD	P	Power input	
35	VDD	P	Power input	
36	VDD	P	Power input	
37	VDD	P	Power input	
38	NC	-	Dummy Pin	
39	AB_IND	O	Abnormal signal detection. Combine the source driver & gate driver detection result. AB_IND="H",IC is at normal operation. AB_IND="L",IC is at abnormal states.	
40	NC	-	Dummy Pin	
41	CS	I	CS (TFT Maker Use),please floating	
42	SCL	I	SCL (TFT Maker Use),please floating	
43	SDA	I/O	SDA (TFT Maker Use),please floating	
44	GND	G	Power ground	
45	GND	G	Power ground	
46	UD	I	Vertical scanning direction control UD="H",UP to Down	

| 47	LR	I	Horizontal scanning direction control LR="H",Left to Right LR="L",Right to Left	
48	NC	-	Dummy Pin	
49	NC	-	Dummy Pin	
50	VPP	P	VPP (TFT Maker Use),Please floating	

I: Digital signal input, G: GND, P: Power input, O: Digital signal output
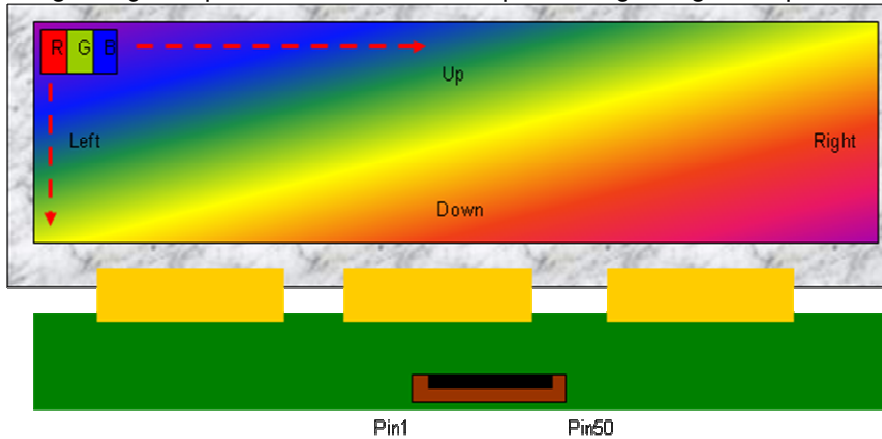
b. BACK LIGHT UNIT FPC

No.	Pin Name	I/O	Description	Remarks
1	THERMISTORS	Rout	Thermistor	
2	NC	NA	No Use	
3	THERMISTORS	Rin	Thermistor	
4	CATHODE 1	C4	LED Cathode (Negative)	
5	CATHODE 2	C3	LED Cathode (Negative)	
6	CATHODE 3	C2	LED Cathode (Negative)	
7	CATHODE 4	C1	LED Cathode (Negative)	
8	NC	NA	No Use	
9	ANODE 1	A1	LED power supply voltage	
10	ANODE 1	A1	LED power supply voltage	

R: Resistance, V_{in}: Power input
Gold finger side:
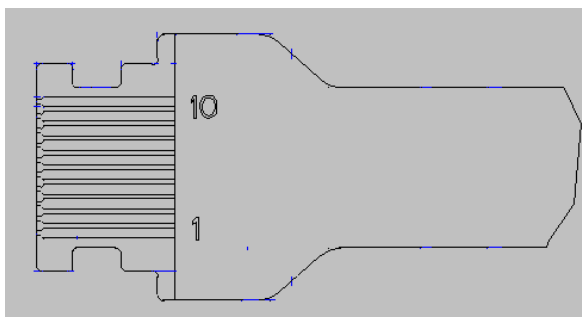
1. Absolute Maximum Ratings

Items	Symbol	Values		Unit	Condition
		Min	Max		
Power Voltage	VDD	-0.3	5	V	Note1
Operation Temperature	T_{OP}	-30	85	℃	
Storage Temperature	T_{ST}	-40	95	℃	

Note 1: Functional operation should be restricted under normal ambient temperature.

1.   DC Electrical Characteristics

The following items are measured under stable condition and suggested application circuit.

a.   Power Specification(Tentative)

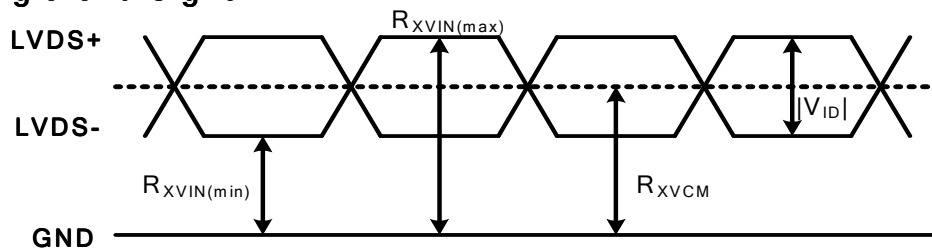| Parameter	Symbol	Min	Typ	Max	Unit	Notes
Power Supply	VDD	3.0	3.3	3.6	V	
	IVDD	-	TBD	TBD	mA	Note1
	IVDD Inrush	-	TBD	TBD	mA	

Note 1: Test pattern is the following picture (white pattern)

b.   Signal DC Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Differential input high threshold	R_{XVTH}	-	-	200	mV	R_{XVCM}=1.2V
Differential input low threshold	R_{XVTL}	-200	-	-	mV	R_{XVCM}=1.2V
Input differential voltage	$|V_{ID}|$	200	-	600	mV	
Differential Input Common Mode Voltage	R_{XVCM}	1.0	1.2	1.3	V	

Single-end Signal
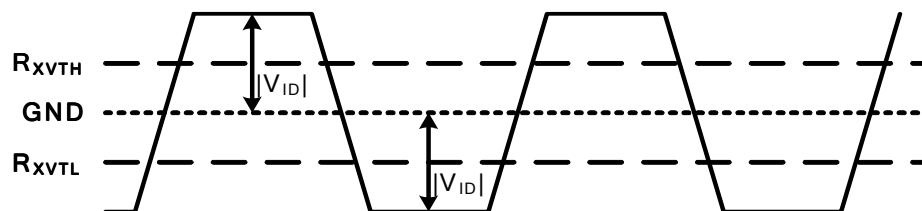
Differential Signal

Fig. 4 LVDS DC characteristics diagram

c. Backlight Driving Conditions (Note 1)

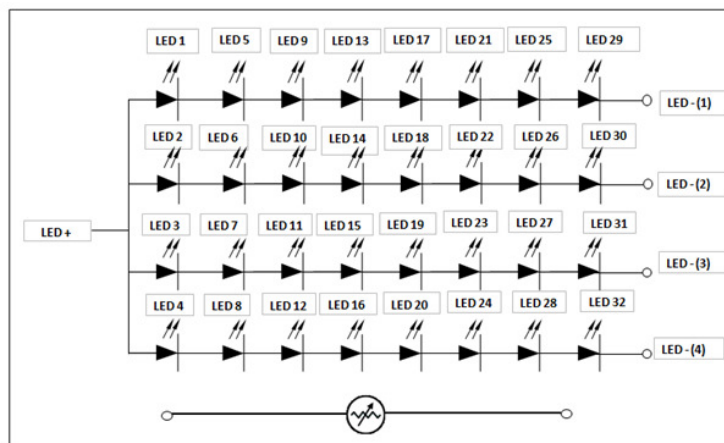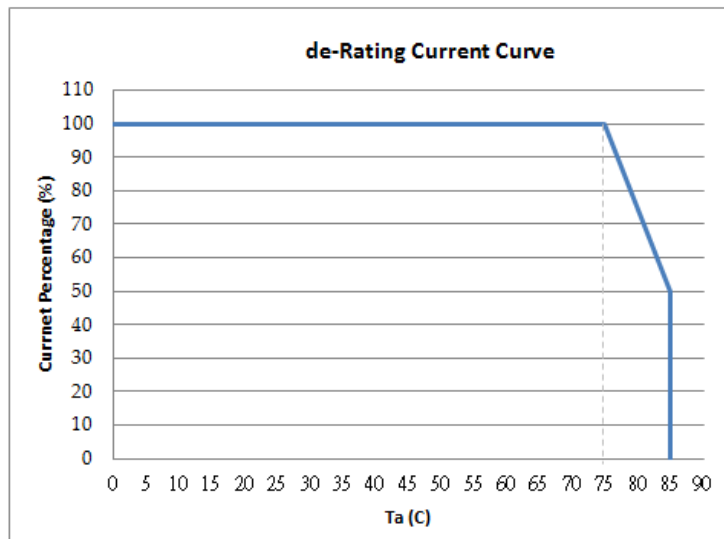| Parameter	Symbol	Condition	Min	Typ	Max	Unit	Remark
Forward Current	I_F	at 25℃	-	90	95	mA	Single serial (Note 4)
LED Supply power	P	IF=80(mA) at 25℃	-	8.9	10.1	W	Note 2
Forward Voltage	V_F	I_F=80 mA	-	(24)	(27.2)	V	One string (Note 3)
LED Life Time	T_{LED}	at 25℃	10000	-	-	Hrs	Note3,4 (Reference)

Note 1:   LED backlight is 32 LEDs (Total 4 strings, 8 pcs for each string).   Ambient temperature is 25 ℃
Note 2:   The LED supply power is for 4 strings of LED.
Note 3:   The LED lifetime 10,000 hrs means the brightness will decrease to 70% of original level after normal use at 90mA under +25 ℃.
Note 4:   The backlight should be operated with constant driving current, with permissible driving current range between 90 mA   ~ 95mA.
Note 5:   LED current should follow below de-rating curve:

2. AC Electrical Characteristics
a. Differential signal AC characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Clock frequency	R_{XFCLK}	44.7	54.26	60.48	MHz	
Input data skew margin	T_{RSKM}	-	-	0.25	UI	|VID|=200mV RXVCM =1.2V Note1
Clock strobe width	T_{SW}	0.5	-	-	UI	
Clock High Time	T_{LVCH}	-	$4/(7* R_{XFCLK})$	-	ns	
Clock Low Time	T_{LVCL}	-	$3/(7* R_{XFCLK})$	-	ns	

Note1.For the Data Skew Margin, "Input Signal Skew + Input Signal Jitter" must be smaller than TRSKM.
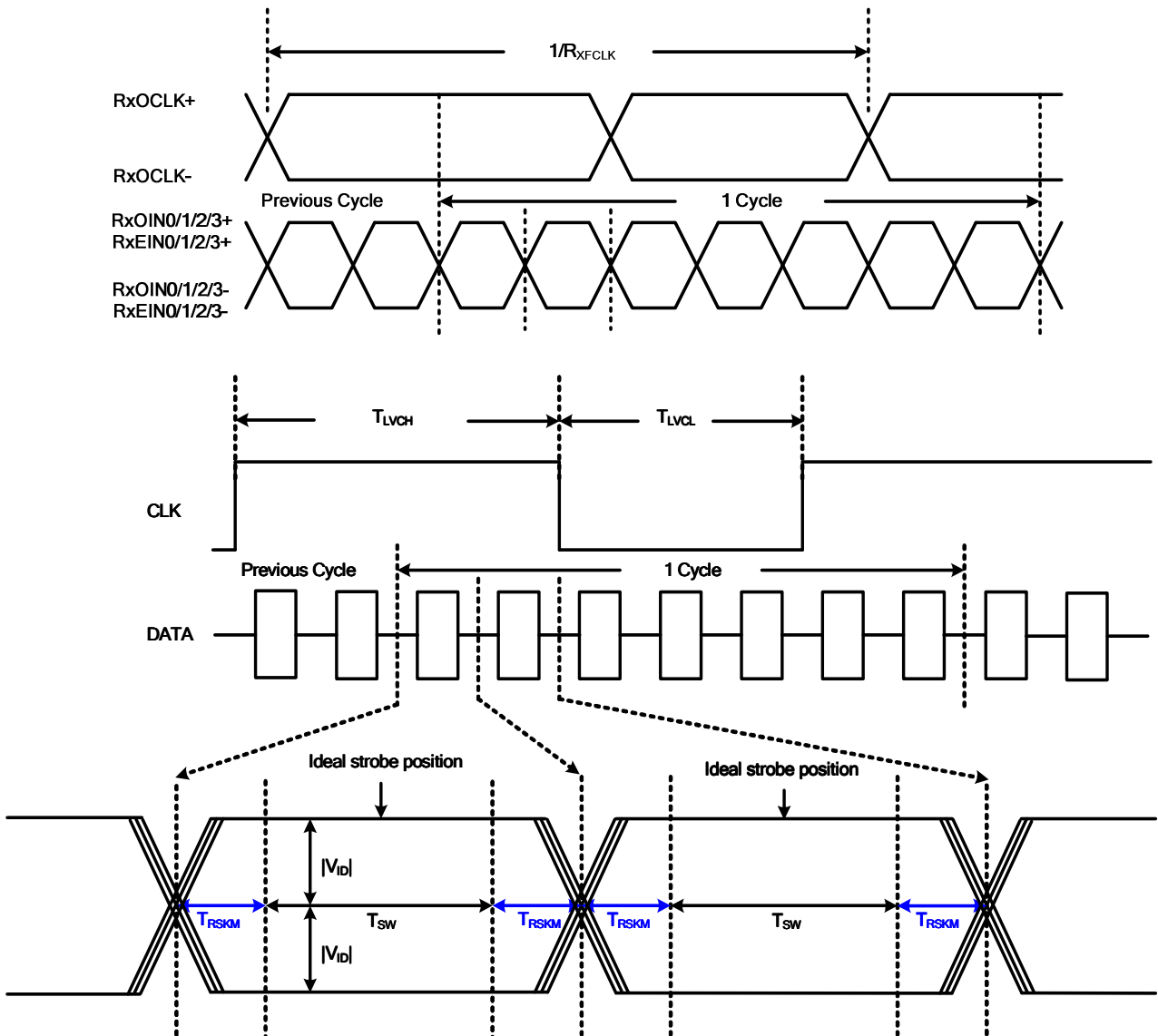
3. Fig. 7 Data skew margin Differential Input Data Format
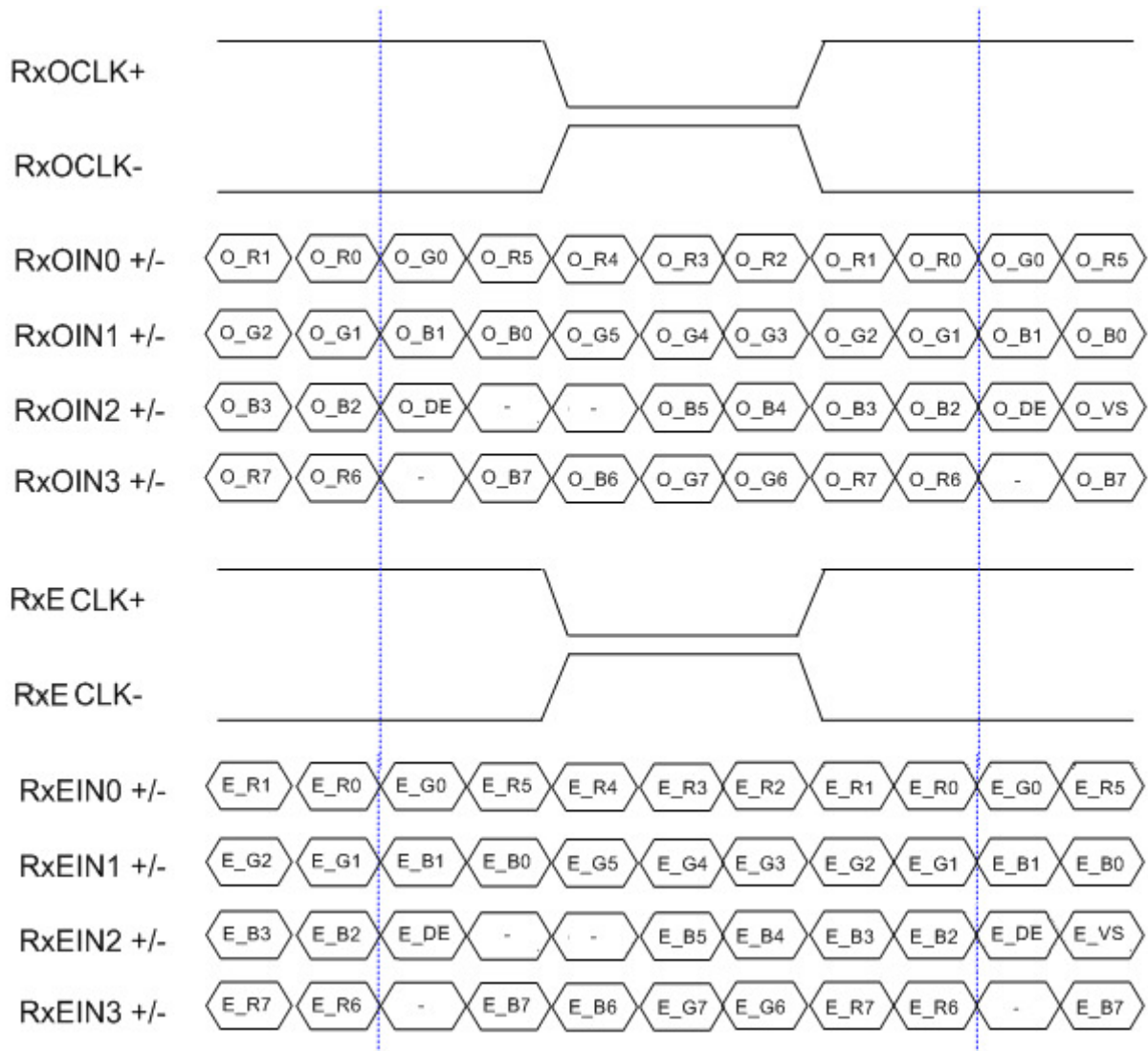

Fig.1 LVDS input data VESA format

4. Timing Condition DE Mode

Item	Symbol	Min	Typ.	Max	Unit	Remark
Clock frequency	F_{DCLK}	44.7	54.26	60.48	MHz	
Horizontal period area	T_H	1020	1190	1200	DCLK	
Horizontal display area	T_{HD}	960	960	960	DCLK	
Horizontal blanking area	T_{HB}	60	230	240	DCLK	
Horizontal pulse width	T_{HPW}	16	-	40	DCLK	
Horizontal back porch	T_{HBP}		48		DCLK	
Horizontal front porch	T_{HFP}	12	182	192	DCLK	
Vertical period area	T_V	730	760	840	T_H	
Vertical display area	T_{VD}	720	720	720	T_H	
Vertical blanking area	T_{VB}	10	40	120	T_H	
Vertical pulse width	T_{VPW}	1	-	20	T_H	
Vertical back porch	T_{VBP}		3		T_H	
Vertical front porch	T_{VFP}	7	37	117	T_H	

a. Timing Diagram
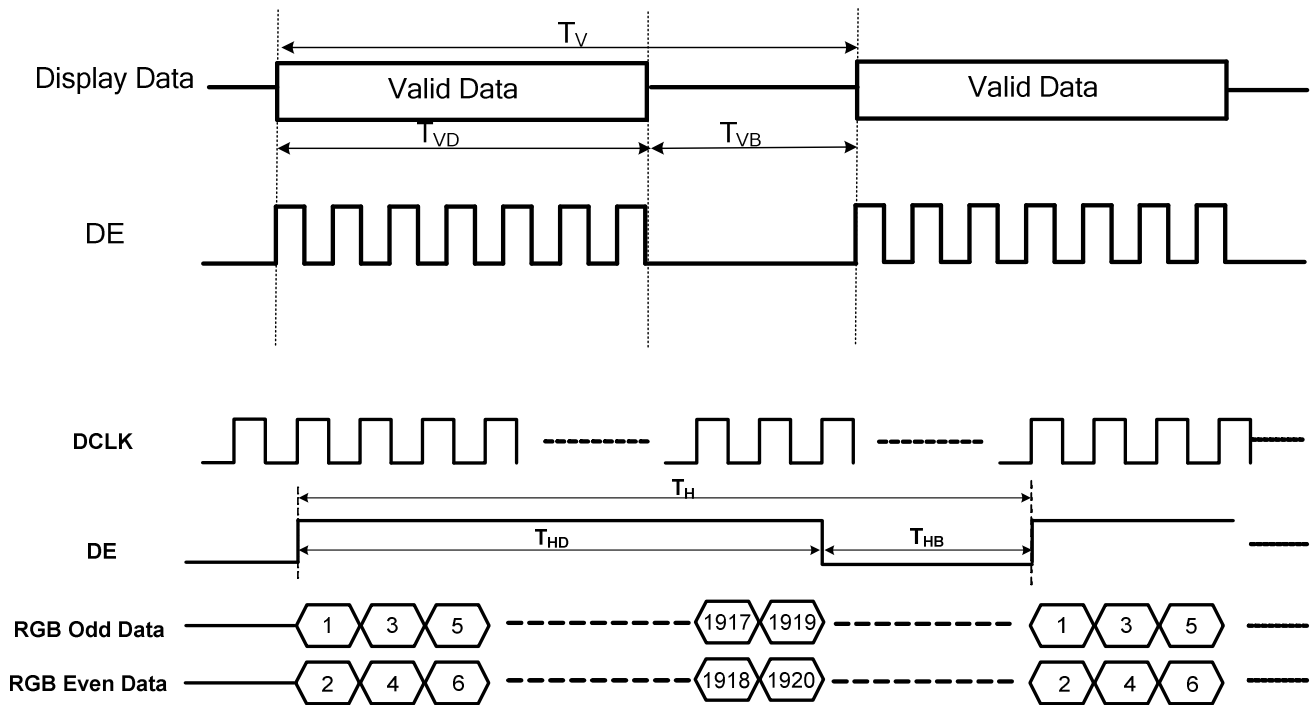
5. RESET Function

Item	Symbol	Min	Typ	Max	Unit	Remark
RESET	T1	1	-	10	ms	

RESET

AUO-General
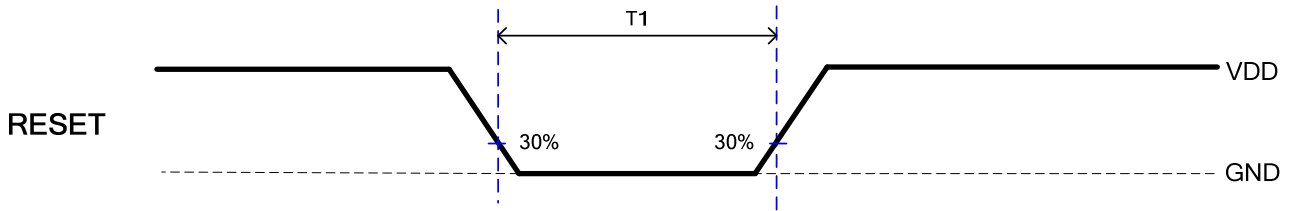
6. Power ON / OFF timing
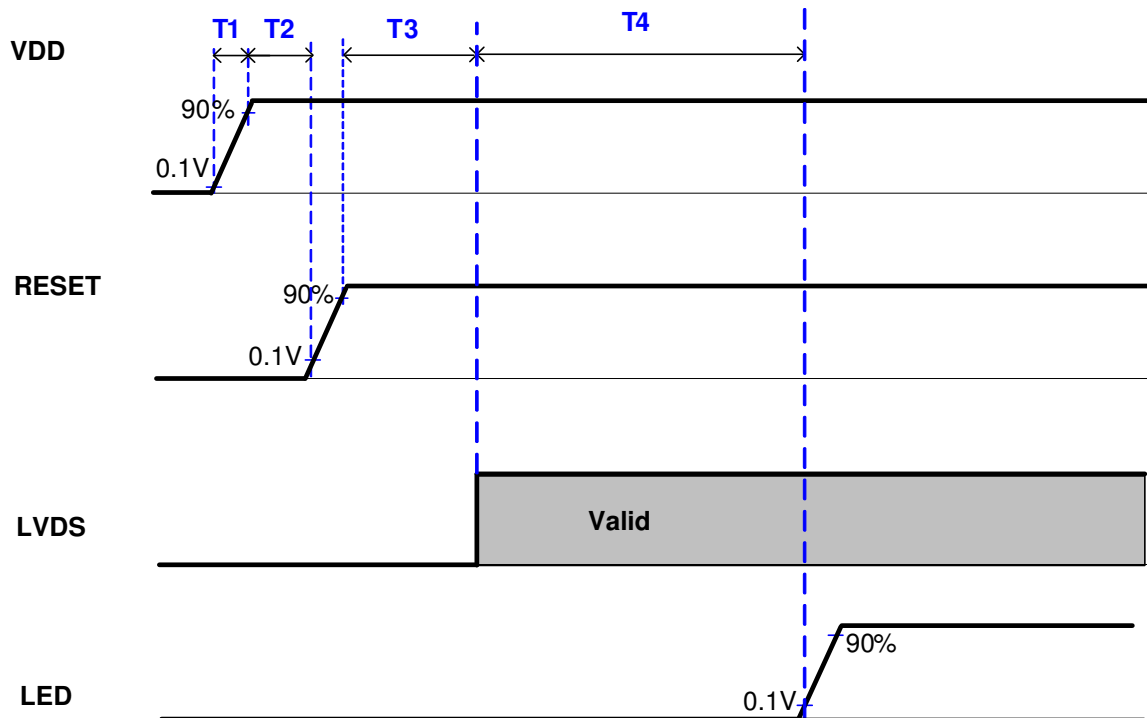
The LCD adopts high voltage driver IC, so it could be permanently damaged under a wrong power on/off sequence. The suggested LCD power sequence is below:
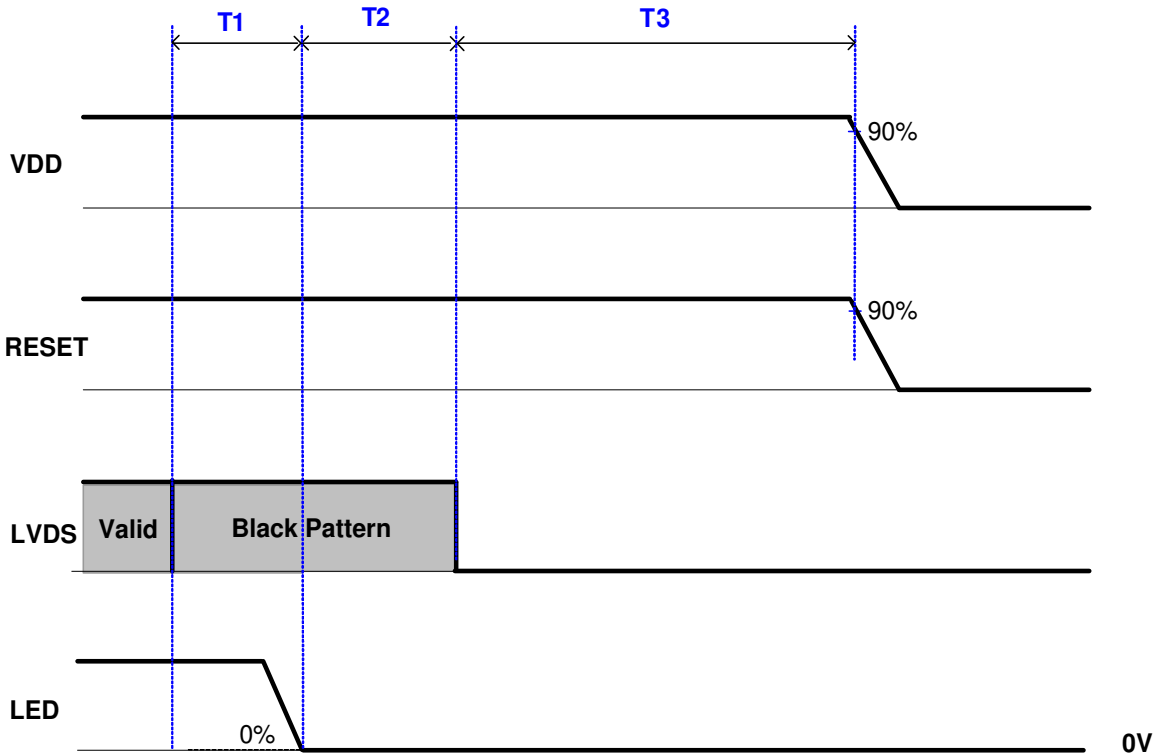
a. Power ON sequence

VDD → RESET→ LVDS→ LED

Parameter	Value			Unit
	Min.	Typ.	Max.	
T1	-	-	15	ms
T2	1	-	-	ms
T3	1	-	25	ms
T4	200	-	-	ms

b.   Power OFF sequence

LED → LVDS → VDD & RESET

Parameter	Value			Unit
	Min.	Typ.	Max.	
T1	32	-	-	ms
T2	32	-	-	ms
T3	1	-	-	ms

T1   **T2**   **T3**

VDD
90%

RESET
90%

LVDS Valid   Black Pattern

LED
0%
0V

c.   VDD ON / OFF

Parameter	Value			Unit
	Min.	Typ.	Max.	
T1	1000	-	-	ms

VDD ON / OFF

T1

VDD
0.1V   0.1V
VDD

GND
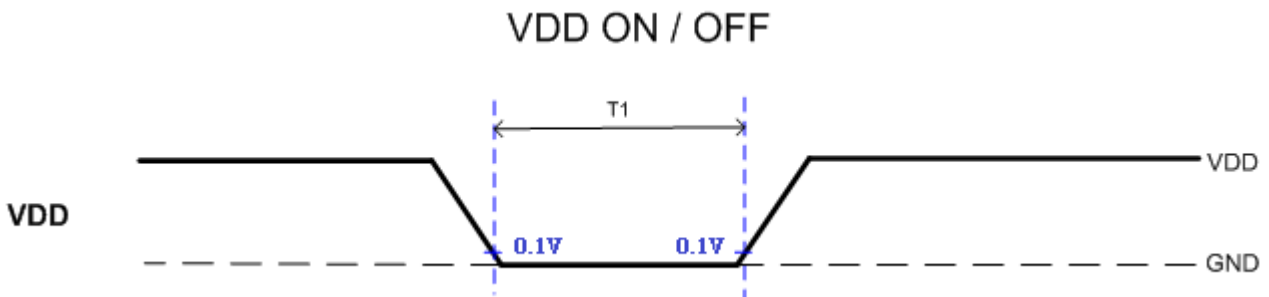
F. Optical specifications (Note 1, 2)

| Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Response Time	Tr+Tf	25 ℃°	-	15	20	ms	Note 3
		-20℃		135	150		
		-30℃		285	350		
Contrast ratio	CR	θ=0°	800	1000	-		Note 4, 5, 6
Viewing Angle Top Bottom Left Right		CR≧10	70 70 70 70	80 80 80 80	- - - -	deg.	Note 7, 8
Brightness (center)	Y_L	θ=0°	630	760	-	cd/m^2	Note 1,2,9
Brightness	Y_L	ID18	540	650	-	cd/m^2	
	Y_L	ID19	240	290			
	Y_L	ID20	150	180			
White Chromaticity	X	θ=0°	0.273	0.313	0.353		Note 8
	Y	θ=0°	0.289	0.329	0.369		
Red Chromaticity	X	θ=0°	0.604	0.644	0.684		
	Y	θ=0°	0.268	0.308	0.348		
Green Chromaticity	X	θ=0°	0.267	0.307	0.347		
	Y	θ=0°	0.610	0.650	0.690		
Blue Chromaticity	X	θ=0°	0.107	0.147	0.187		
	Y	θ=0°	0.032	0.072	0.112		
Uniformity White		9-point, θ=0°	80%				Note 10
Uniformity Black		9-point, θ=0°	50%				

PS. Regarding Color Chromaticity, will be updated after real sample out.

Note 1: Measurement should be performed in the dark room, optical ambient temperature =25˚C, and backlight current I_L=90 mA

Note 2: To be measured on the center area of panel with a field angle of 1°by Topcon luminance meter SR-3, after 10 minutes operation.

Note 3: Definition of response time:

The output signals of photo detector are measured when the input signals are changed from "white" to "black"(falling time) and from "black" to "white"(rising time), respectively.
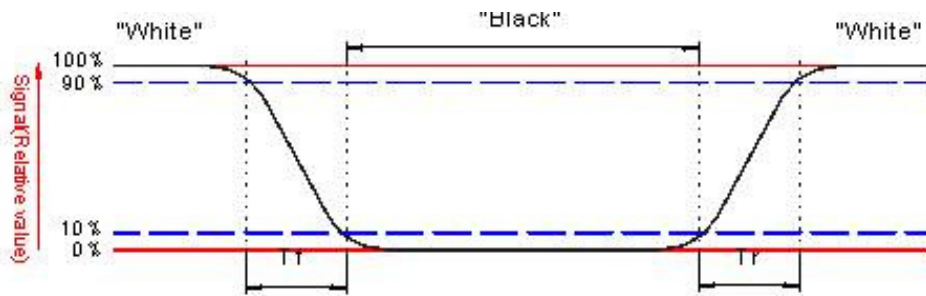
Note 4. From liquid crystal characteristics, response time will become slower and the color of panel will become darker when ambient temperature is below 25℃.
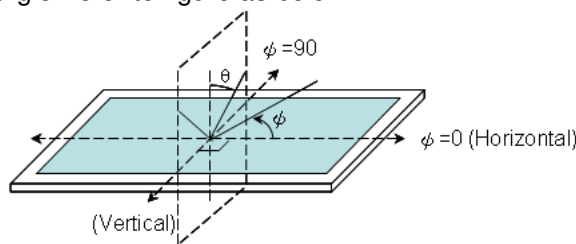
$$\text{Contrast ratio} = \frac{\text{Photo detector output when LCD is at "White" state}}{\text{Photo detector output when LCD is at "Black" state}}$$

Note 5. Contrast ratio is calculated with the following formula.

Note 6. When "White" state, R[7:0]=G[7:0]=B[7:0]=11111111
        When "Black" state, R[7:0]=G[7:0]=B[7:0]=0000000

Note 7. Definition of viewing angle: refer to figure as below.

Note 8. The viewing angles are measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

Note 9. Brightness is measured at the center of the display with white pattern in 90mA

Note 10. Luminance Uniformity is defined as following within the 9 measurements (L1~L9),
        Luminance Uniformity(%) =Minimum luminance(brightness)/Maximum luminance(brightness)

AUO-General
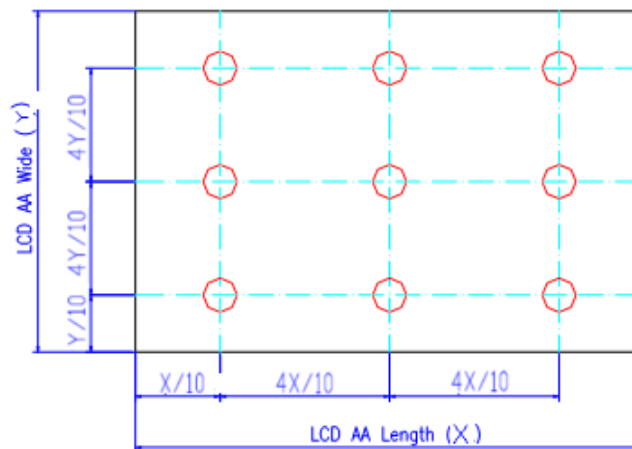
G. Reliability Test Items (Note 2)

No.	Test items	Conditions		Remark
1	High temperature storage	Ta= 95℃	240Hrs	
2	Low temperature storage	Ta= -40℃	240Hrs	Note1
3	High temperature operation	Ta= 85℃	240Hrs	
4	Low temperature operation	Ta= -30℃	240Hrs	Note1, 3
5	High temperature and high humidity	Ta= 60℃, 90% RH	240Hrs	Operation
6	Heat shock	-30℃~85℃/100 cycles 1Hrs/cycle		Non-operation
7	Electrostatic discharge	Contact = ± 8 kV, class B (R=330Ω,C=150pF) Air = ± 15 kV, class B (R=330Ω,C=150pF) 1 times for each point.		Operation (Note 4)
8	Vibration	Frequency range	8~33.3Hz	JIS D1601,A10 Condition A
		Stoke	1.3mm	
		Sweep	2.9G, 33.3~400Hz	
		Cycle	15min.	
		2 hours for each direction of X, Z 4 hours for Y direction		
9	Mechanical shock	100G, 6ms, ±X,±Y,±Z 3 times for each direction		
10	Vibration (with carton)	Random vibration: 0.015G^2/Hz from 5~200Hz –6dB/Octave from 200~500Hz		IEC 68-34
11	Drop (with carton)	Height: 60cm 1 corner, 3 edges, 6 surfaces		

Note 1: Ta: Ambient temperature.

Note 2: In the standard condition, there is not display function NG issue occurred. All the cosmetic specification is judged before the reliability stress.
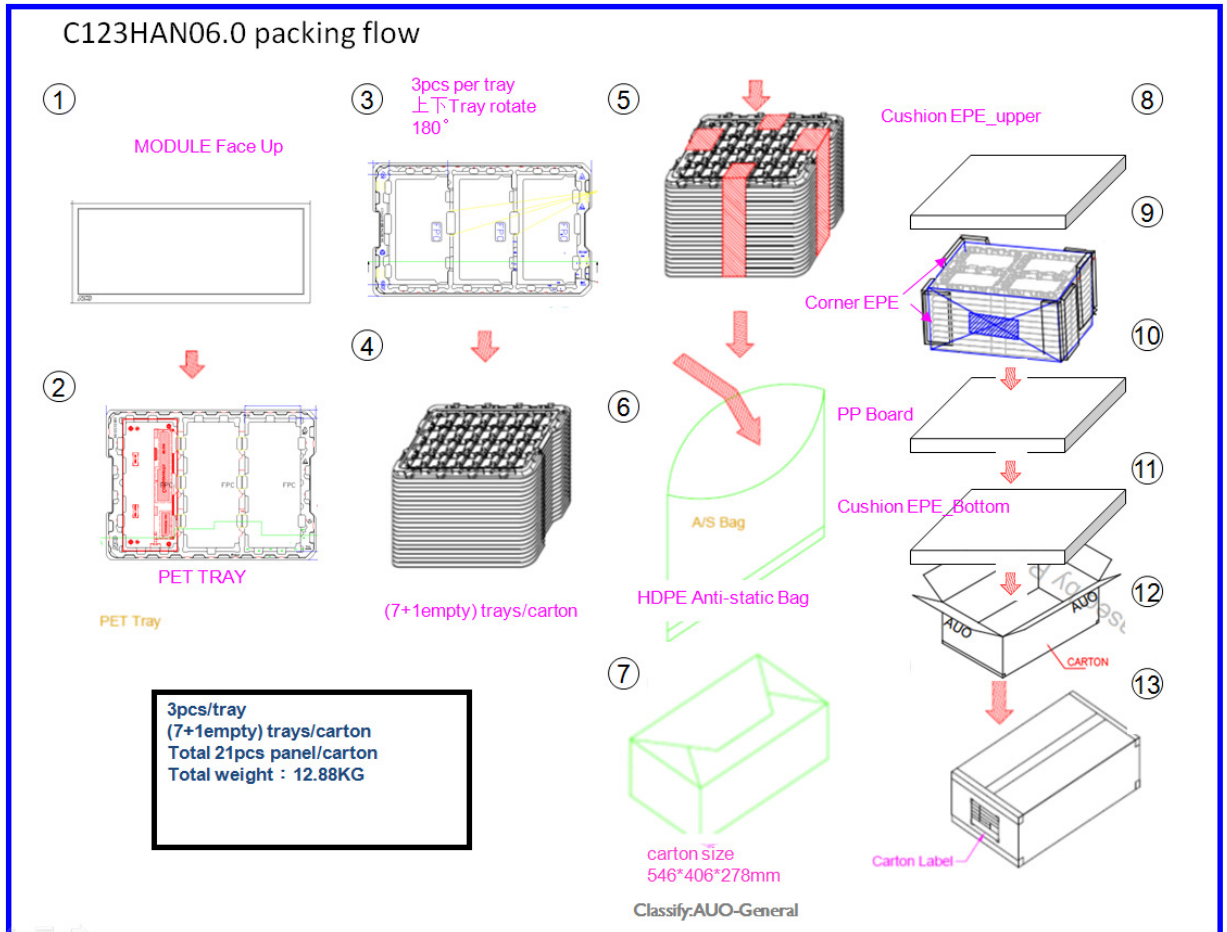
Note 3: Short time operation between -40℃~-30℃ doesn't provide full performance but a correct image on the LCD. The LCD is guaranteed to suffer no permanent damage.

Note 4: Test techniques follow IEC61000-4-2 standard. Test points and pattern as below.
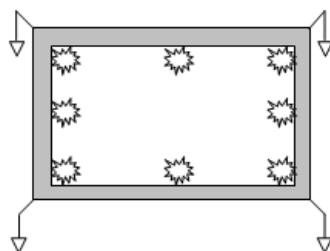
H. Packing and marketing
1. Packing Form

C123HAN06.0 packing flow

① MODULE Face Up

③ 3pcs per tray 上下Tray rotate 180°

⑤ Cushion EPE_upper ⑧

⑨

Corner EPE ⑩

④

② PET TRAY

PET Tray

⑥

PP Board ⑪

A/S Bag

Cushion EPE_Bottom ⑫

(7+1empty) trays/carton

HDPE Anti-static Bag

CARTON ⑬

3pcs/tray
(7+1empty) trays/carton
Total 21pcs panel/carton
Total weight：12.88KG

⑦

carton size
546*406*278mm

Carton Label

Classify:AUO-General

2.Module/Panel Label Information

The module/panel (collectively called as the "Product") will be attached with a label of shipping number that 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 and printed with code 128 with the following definition:

ABCDEFGHIJKLMNOPQRSTUV

└── For internal system usage and production serial numbers.

└── AUO Module or Panel factory code, represents the final production factory to complete the Product

└── Product version code, ranging from 0~9 or A~Z (for Version after 9)

└── Week Code, the production week when the product is finished at its production process

Example:
500S16ZL06123456781Z05:
Product Manufacturing Week Code: WK50
Product Version: Version 0
Product Manufacturing Factory: S16

Array and ODF FAB Address:
189, Hwaya Rd. 2, Kueishan Dist, Taoyuan City 33383, Taiwan, R.O.C.

Module FAB Address:
No.1689 Xiang An North Road, Xiang An Branch, Torch Hi-tech Industrial Development Zone, Xiamen, 361102, China

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 appearing in the following format:

ABC-DEFG-HIJK-LMN

    DEFG appear after first "-" represents the packing date of the carton
    Date from 01 to 31
  Month, ranging from 1~9, A~C. A for Oct, B for Nov and C for Dec.
A.D. year, ranging from 1~9 and 0. The single digit code reprents the last number of the year

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

I. Incoming inspection standard

1. Scope:

The incoming inspection standards shall be applied to TFT-LCD Modules (hereinafter called "Modules") that supplied by AU Optronics Corporation (hereinafter called "seller") when inspection is to be performed specifically on the "Module" in buyer's premisses, including

1.1   incoming inspection;

1.2   production test;

1.3   final inspection;

1.4   0KM/field returned units;

2.   Incoming inspection:

When incoming inspection is applied to determine the lot acceptance, Paragraph 2, Incoming inspection is to be followed.

2.1   Disposition and Reporting of Incoming Inspection:

The results of the inspection (acceptance or rejection) shall be recorded in writing, and a copy of this writing will be promptly submitted to the seller in adequate format, e.g. e-mails, Fax.

The buyer may, under commercially reasonable reject procedures, reject an entire lot in the delivery involved if, such samples of modules within such lot show an unacceptable number of defect in accordance with this cosmetic inspection standards provided, however that the buyer should notify the seller in writing of any such rejection promptly, and no later than within three business days when the inspection incoming is competed.

Should the buyer fail to notify the seller incompliance with the defined procedured in Paragraph 2.1, the buyer's right to reject the modules shall be lapsed and the modules shall be deemed to have been accepted by the buyer.

2.2   Sampling Plan:

Unless otherwise agreed in writing, the sampling plan of incoming inspection shall comply with ANSI/ASQL Z1.4-1993, which determines the acceptance/rejection criterion.

2.2.1 Lot size: Quantity per shipment lot per model.

2.2.2 Sampling type: Normal inspection, single smapling.

2.2.3 Sampling level: Level II.

2.2.4 Acceptable quality level (AQL):

2.2.4.1   Major defect: AQL=0.65

2.2.4.2   Minor defect: AQL=1.00

3.　　Inspection instruments:

3.1 Room temperature: 25±5 ℃.

3.2 Lighting: Fluorescent light (Day-Light Type) display surface illumination to be 500~1000 Lux.

3.3 Unless otherwise specified, the inspection shall be conducted in perpendicular to the display surface.

3.4 Inspection distance: 35±5 cm

3.5 The module shall be driven in compliance to the driving condition provided by AUO.

3.6 The inspection shall be proceeded in an ESD-protected area where the ESD shall be managed to meet the

respective AUO product Specification.

4. Inspection environment conditions:

Defects are classified as major defects and minor defects according to the degree of defectiveness defined herein. The definition of defects and respective criteria is only applied to the Active Area. Items outside the Active Area and not affecting the functionality, reliability and mechanical fitting are to be ignored. When anomalous mode occurs, a separate discussion shall be hold between buyer and seller.

4.1.Major defects:

A major defect is a defect that is likely to result in failure, or to reduce the usability of the product for its

intended purpose.

Abnormal operation: modules cannot display normally, typical abnormal operations may include but not limited

to Abnormal Displays, Line Defect and Block Display.

There is serious distortion or sharp burr on mechanical housing.

Glass breakage.

4.2 Minor defects:

A minor defect is a defect that is not likely to reduce the usability of the product for its intended

purpose.

4.2.1 Dot defect:

Inspection pattern : Full white, full black, red, green and blue screens.

Criteria :(acceptable)

Item	Total (dot)
Bright dot defect	N≦ 0
Dark dot defect	N≦ 4
Total	N≦ 4

Note: 1. Dot defect is defined as the defective area of the dot area is larger than 50% of the dot area. And the bright dot defect must be visible through 5% ND filter.

2. Except for the allowed numbers of adjacent dots, the distance between dot defects should be more than 3mm apart.

3. "N" represents the acceptable number of the dot defect. Each dot defect refers to a "sub-pixel" (a single R, G or B) as Fig. 1.

Fig. 1

The illustration in Fig. 1 does not represent the actual pixel arrangement.

4-2-2.Scratches,dent and extraneous substances:
A: Criteria: (Note 1,2,3,4,5)

Item			Acceptable Criteria (Numbers.)
Linear Scratch on the polarizer L : Length W :Width ((mm.)		W ＜ 0.05	Ignore
		L ≦ 5.0 0.05 ≦ W ≦ 0.2	N≦3 min. distance ≥ 5mm
		5.0 ＜ L, & 0.05 ＜ W	Not Allowed
Dent on polarizer((mm.)		D＜0.1	Ignore
		0.1≦D≦0.3	N≦2 min. distance ≥ 5mm
		0.3 ＜ D	Not Allowed
Bubble on polarizer(mm.)	Dot shape ((mm.)	D＜0.1	Ignore
		0.1≦D≦0.3	N ≦2 min. distance ≥ 5mm
		0.3 ＜ D	Not Allowed
Extraneous Substances (Foreign Material)	Dot Shape ((mm.)	D ＜ 0.1	Ignore
		0.1 ≦ D ≦ 0.4	N ≦2 min. distance ≥ 5mm
		0.4 ＜ D	Not Allowed
	Linear Shape L: Length W:Width ((mm.)	W ＜ 0.05	Ignore
		L ≦ 5.0 0.05 ≤ W ≤0.2	N≦3 min. distance ≥ 5mm
		5.0 ＜ L, & 0.05 ＜ W	Not Allowed
Dirt and contamination on Polarizer		The rust and water mark can be cleaned by dry cloth	Ignore

Note:1. Polarizer bubble is defined as the bubble appears on active display area. The defect of

polarizer bubble shall be ignored if the polarizer bubble appears on the outside of the active

display area.

2. The extraneous substance is defined as it can be observed when the module is power on.

3. If the scratches or damages on the lateral side of bezel or on the appearance of backlight unit do not

have the concerns of safety, function display and assembly with the customer's system set, it can be

acceptable.

4. The definition of D, average diameter is defined as follows:

$$D=(X+Y)/2, \text{ where}$$
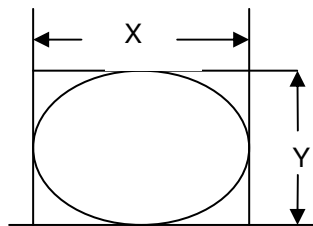
5. Unless otherwise specified by written document or limit samples, Mura (display un-uniformity)

should be inspected under the ND filter and shall be accepted when it is invisible 5% ND filter

is applied. The ND filter shall be placed within 5cm to the LCD surface during inspection.

6. FPC with cosmetic issue, but without functional effect after assembly should be accepted.

7. Inspection angle: in perpendicular to the display surface

8. For Mura (display un-uniformity) under lower temperature, should be inspected

and shall be accepted base on following inspection conditions,

8-1 -20 degree temperature / 2hrs

8-2 No obvious Mura under ND Filter 1%

8-3 The ND filter shall be placed within 50cm to the LCD surface during inspection.

8-4 Backlight current value = 90mA/1ch

8-5 Backlight light PWM 30%

8-6 Sampling 5 pcs, in -20 degree for 2hrs, then judge Mura status with ND Filter 1%,

once Mura is no obvious, then judged as PASS.

8-7 Environment Lighting: following IIS inspection criteria.(Non-Dark room / Non-Cover by cloth)

8-8 In addition, AUO will only provide failure analysis and replace OK panel via RMA process, no

sorting on lower temperature Mura case after mass production.

5. Inspection judgement :

The following procedure is applicable when incoming inspection is performed for lot acceptance:

5.1 The judgment of the shipped lot(acceptance or rejection) should follow the sampling plan of ANSI/ASQL

Z1.4-1993, single sampling, normal inspection, level II.

5.2 If the number of defects is equal to or less than the applicable acceptance level, the lot shall be accepted.

5.3 If the number of defects is more than the applicable acceptance level, the lot shall be rejected and the buyer

Should inform the seller of the result of incoming Inspection in writing.

6. Precaution:

Please pay attention to the following items when you use the LCD Modules:

6.1.　　Do not twist or bend the module and prevent the unsuitable external force for display　module during assembly.

6.2.　　Adopt measures for good heat radiation. Be sure to use the module with in the specified temperature.

6.3.　　Avoid dust or oil mist during assembly.

6.4.　　Follow the correct power sequence while operating. Do not apply the invalid signal, otherwise, it will cause improper shut down and damage the module.

6.5.　　Less EMI: it will be more safety and less noise.

6.6.　　Please operate module in suitable temperature. The response time & brightness will drift by different temperature.

6.7.　　Avoid being displayed the fixed pattern (exclude the white pattern) in a long period, otherwise, it will cause image sticking.

6.8.　　Be sure to turn off the power when connecting or disconnecting the circuit.

6.9.　　Polarizer scratches easily, please handle it carefully.

6.10.　　Display surface never likes dirt or stains.

6.11.　　Dew may lead to destruction. Please wipe off any moisture before using module.

6.12.　　Sudden temperature changes cause condensation, and it will cause polarizer damaged.

6.13.　　High temperature and humidity may degrade performance.　Please do not expose the module to the direct sunlight and so on.

6.14.　　Acetic acid or chlorine compounds are not friends with TFT display module.

6.15.　　Static electricity will damage the module, please do not touch the module without any grounded device.

6.16.　　Do not disassemble and reassemble the module by self.

6.17.　　Be careful do not touch the rear side directly.

6.18.　　No strong vibration or shock. It will cause module broken.

6.19.　　Storage the modules in suitable environment with regular packing.

6.20.　　Be careful of injury from a broken display module.

6.21.　　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.

AUO-General

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