Document Title	M118AW41 R0 Product Specification			Page No.	1/29
Document No.		Issue date	2018/12/25	Revision	00

Product Specification

To:

Product Name: M118AW41 R0 HW1.3

Document Issue Date: 2018/12/25

Customer	InfoVision Optoelectronics
SIGNATURE _____ _____ _____ Please return 1 copy for your confirmation with your signature and comments.	**SIGNATURE** **REVIEWED BY CQM** _____ **PREPARED BY FAE** _____

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Revision	Date	Page	Revised Content/Summary	Remark
00	2018/12/25	--	First issued.	

CONTENTS

1.0 General Descriptions

1.1 Introduction

The M118AW41 R0 is a Color Active Matrix Liquid Crystal Display with a back light system. The matrix uses a-Si Thin Film Transistor as a switching device. This TFT LCD has a 11.8 inch diagonally measured active display area with 1,200×1,600 resolution (1,200 horizontal by 1,600 vertical pixels array).

1.2 Features

- Supported 1,200×1,600 Resolution
- LVDS Interface
- Wide View Angle
- Compatible with RoHS Standard

1.3 Product Summary

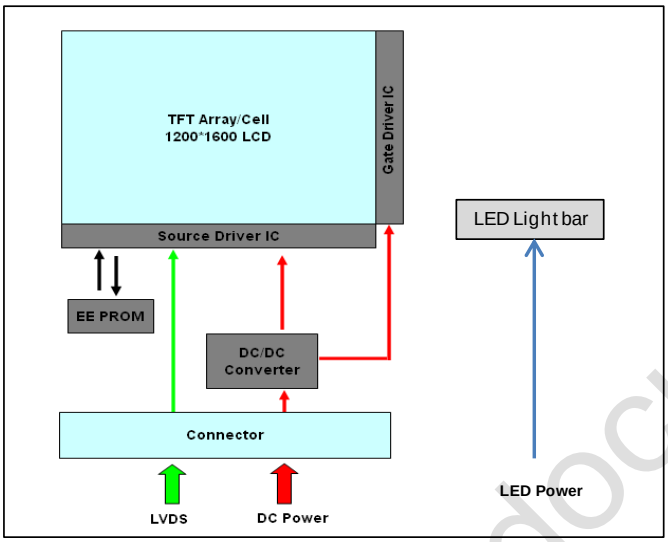
Items	Specifications	Unit
Screen Diagonal	11.8	inch
Active Area (H x V)	180.00 x 240.00	mm
Number of Pixels (H x V)	1,200 x 1,600	-
Pixel Pitch (H x V)	0.1500 x 0.1500	mm
Pixel Arrangement	R.G.B. Vertical Stripe	-
Display Mode	Normally Black	-
White Luminance	750(Typ.)	cd /m^2
Contrast Ratio	1000(Typ.)	-
Response Time	35(Max.)@25℃	ms
Input Voltage	3.3 (Typ.)	V
Power Consumption	9.8(Max.) @White pattern，FV=60Hz	W
Weight	560 (Max.)	g
Outline Dimension (H x V x D)	194.00(Typ.) x258.55(Typ.) x10.60 (Max.)	mm
Electrical Interface (Logic)	LVDS	-
Support Color	16.7 M (8bit)	-
NTSC	70 (Min.)	%
Surface Treatment	AG,3H	-
Reflectivity	SCE: ≤4.5	%

Note: The Reflectivity measurement tool is CM-700d.

1.4 Functional Block Diagram

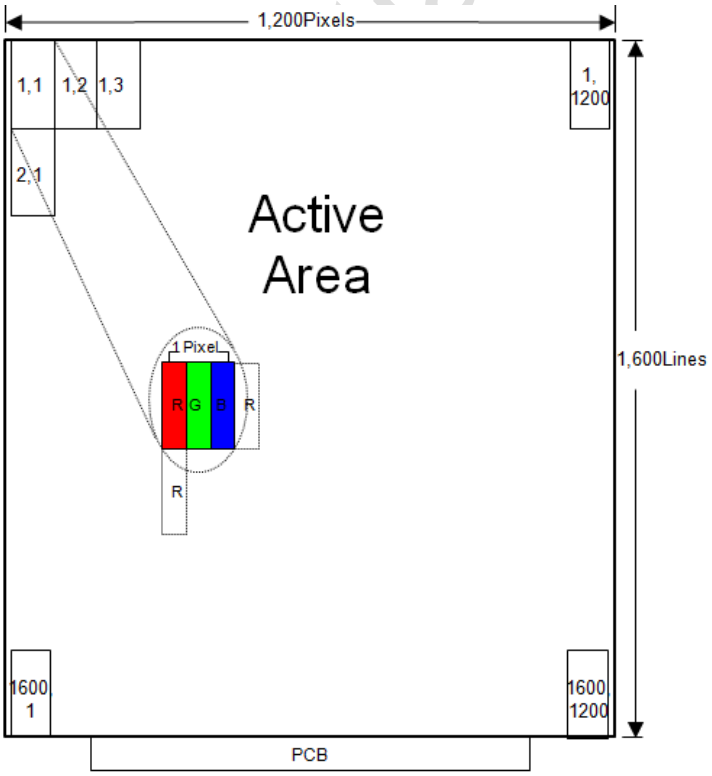
Figure 1 shows the functional block diagram of the LCD module.

Figure 1 Block Diagram



1.5 Pixel Mapping

Figure2 Pixel Mapping



2.0 Absolute Maximum Ratings

Table 1 Electrical & Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Logic Supply Voltage	V_{DD}	-0.3	4.0	V	(1),(2), (3),(4)
Logic Input Signal Voltage	V_{Signal}	-0.3	1.9	V	
Operating Temperature	T_{gs}	-30	85	℃	
Storage Temperature	T_a	-40	95	℃	

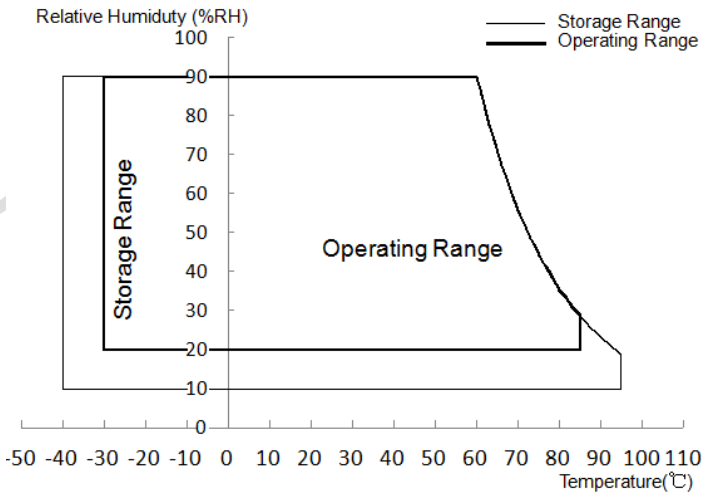
Note (1) All the parameters specified in the table are absolute maximum rating values that may cause faulty operation or unrecoverable damage, if exceeded. It is recommended to follow the typical value.

Note (2) All the contents of electro-optical specifications and display fineness are guaranteed under Normal Conditions. All the display fineness should be inspected under normal conditions. Normal conditions are defined as follow: Temperature: 25℃, Humidity: 55± 10%RH.

Note (3) Unpredictable results may occur when it was used in extreme conditions. T_a= Ambient Temperature, T_{gs}= Glass Surface Temperature. All the display fineness should be inspected under normal conditions.

Note (4) Temperature and relative humidity range are shown in the figure below. Wet bulb temperature should be lower than 57.8℃, and no condensation of water. Besides, protect the module from static electricity.

Figure 3 Absolute Ratings of Environment of the LCD Module



3.0 Optical Characteristics

The optical characteristics are measured under stable conditions as following notes.

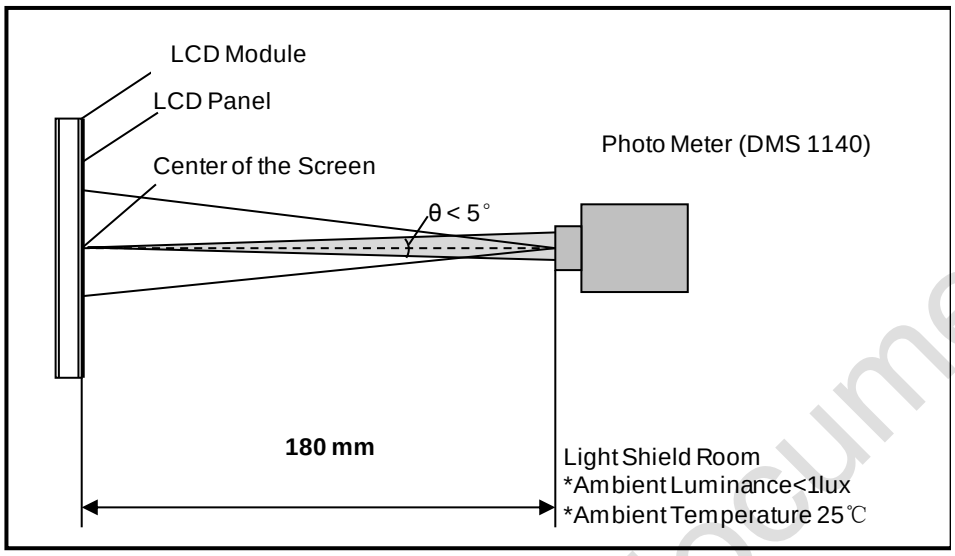
Table 2 Optical Characteristics

Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle （CR≥10）	Horizontal	θ_{x+}	80	85	-	degree	(1),(2),(3),(4),(8)
		θ_{x-}	80	85	-		
	Vertical	θ_{y+}	80	85	-		
		θ_{y-}	80	85	-		
Contrast Ratio	Center		700	1000	-	-	(1),(2),(4),(8) θx=θy=0°
Response Time	Rising + Falling	25℃	-	25	35	ms	(1),(2),(5),(8) θx=θy=0°
		-20℃	-	150	200		
		-30℃	-	300	350		
Color Chromaticity (CIE1931)	Red x		-0.03	0.652	+0.03	-	(1),(2),(3),(8) θx=θy=0°
	Red y			0.339		-	
	Green x			0.315		-	
	Green y			0.630		-	
	Blue x			0.145		-	
	Blue y			0.069		-	
	White x			0.307		-	
	White y			0.327		-	
NTSC	-		70	72	-	%	(1),(2),(3),(8) θx=θy=0°
White Luminance	Center		650	750	-	cd/m^2	(1),(2),(6),(8) θx=θy=0°
Luminance Uniformity	9 Points		75	80	-	%	(1),(2),(7),(8) θx=θy=0°

Note (1) Measurement Setup:

The LCD module should be stabilized at given ambient temperature (25℃) for 30 minutes to avoid abrupt temperature changing during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 30 minutes in the windless room.

Figure 4 Measurement Setup

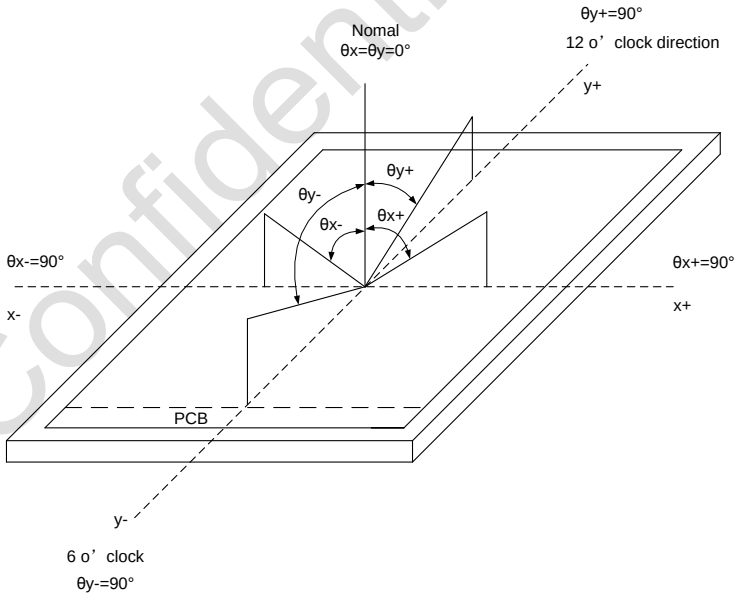


Note (2) The LED input parameter setting as:

I_{LED}: 330mA @25℃

Note (3) Definition of Viewing Angle

Figure 5 Definition of Viewing Angle



Note (4) Definition of Contrast Ratio (CR)

The contrast ratio can be calculated by the following expression:

Contrast Ratio (CR) = The luminance of White pattern/ The luminance of Black pattern

Note (5) Definition of Response Time (T_R, T_F)

Figure 6 Definition of Response Time

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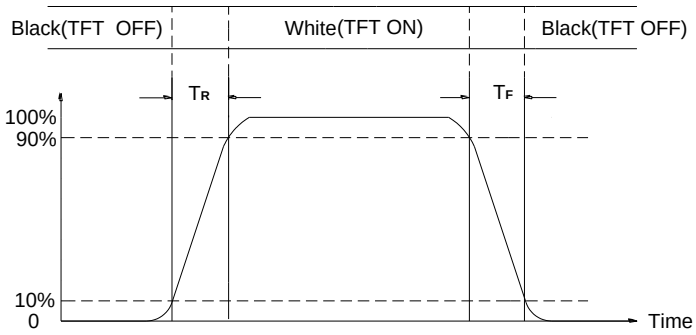


Note (6) Definition of Luminance of White

Measure the luminance of White pattern (Ref.: Active Area)

Display Luminance=L1(center point)

H—Active Area Width, V—Active Area Height, L—Luminance

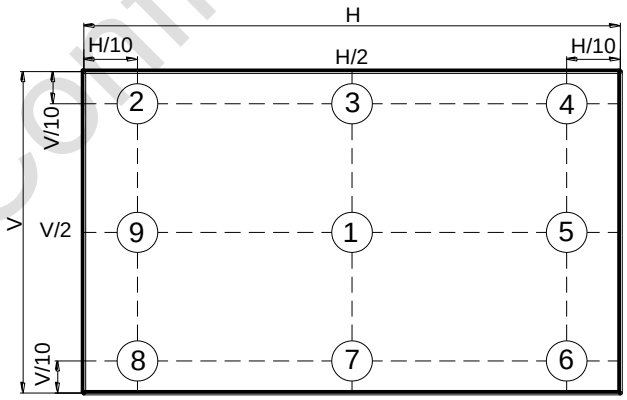
Note (7) Definition of Luminance Uniformity (Ref.: Active Area)

Measure the luminance of White pattern at 9 points.

Luminance Uniformity= Min.(L1, L2, ... L9) / Max.(L1, L2, ... L9)

H—Active Area Width, V—Active Area Height, L—Luminance

Figure 7 Measurement Locations of 9 Points



Note (8) All optical data are based on IVO given system & nominal parameter & testing machine in this document.

4.0 Electrical Characteristics

4.1 Interface Connector

Table 3 Signal Connector Type

Item	Description
Manufacturer / Type	HRS/ FH41-40S-0.5SH(05)

Table 4 Signal Connector Pin Assignment

Pin No.	Symbol	I/O	Description	Remarks
1	GND	G	Power ground	-
2	GND	G	Power ground	-
3	RxOIN0-	I	Negative LVDS differential data input(Odd data)	-
4	RxOIN0+	I	Positive LVDS differential data input(Odd data)	-
5	GND	G	Power ground	-
6	RxOIN1-	I	Negative LVDS differential data input(Odd data)	-
7	RXOIN1+	I	Positive LVDS differential data input(Odd data)	-
8	GND	G	Power ground	-
9	RxOIN2-	I	Negative LVDS differential data input(Odd data)	-
10	RxOIN2+	I	Positive LVDS differential data input(Odd data)	-
11	GND	G	Power ground	-
12	RxOCLK-	I	Negative LVDS differential data input(Odd clock)	-
13	RxOCLK+	I	Positive LVDS differential data input(Odd clock)	-
14	GND	G	Power ground	-
15	RxOIN3-	I	Negative LVDS differential data input(Odd data)	-
16	RxOIN3+	I	Positive LVDS differential data input(Odd data)	-
17	GND	G	Power ground	-
18	RxEIN0-	I	Negative LVDS differential data input(Even data)	-
19	RxEIN0+	I	Positive LVDS differential data input(Even data)	-
20	GND	G	Power ground	-
21	RxEIN1-	I	Negative LVDS differential data input(Even data)	-
22	RxEIN1+	I	Positive LVDS differential data input(Even data)	-
23	GND	G	Power ground	-
24	RxEIN2-	I	Negative LVDS differential data input(Even data)	-
25	RxEIN2+	I	Positive LVDS differential data input(Even data)	-
26	GND	G	Power ground	-
27	RxECLK-	I	Negative LVDS differential data input(Even clock)	-

28	RxECLK+	I	Positive LVDS differential data input(Even clock)	-
29	GND	G	Power ground	-
30	RxEIN3-	I	Negative LVDS differential data input(Even data)	-
31	RxEIN3+	I	Positive LVDS differential data input(Even data)	-
32	GND	G	Power ground	-
33	STVD	O	Feedback signal	-
34	RESET	I	Global reset pin	-
35	VDD	P	Power input	-
36	VDD	P	Power input	-
37	VDD	P	Power input	-
38	VDD	P	Power input	-
39	GND	G	Power ground	-
40	GND	G	Power ground	-

Table 5 LED Connector Name / Designation

Item	Description
Manufacturer / Type	HRS FH52-10S-0.5SH(05)

Table 6 LED Connector Pin Assignment

Pin No.	Symbol	I/O	Description	Remarks
1	THERMISTORS	Rout	Thermistor	-
2	NC	NA	No Use	-
3	THERMISTORS	Rin	Thermistor	-
4	CATHODE 4	G4	LED Cathode(Negative)	-
5	CATHODE 3	G3	LED Cathode(Negative)	-
6	CATHODE 2	G2	LED Cathode(Negative)	-
7	CATHODE 1	G1	LED Cathode(Negative)	-
8	NC	NA	No Use	-
9	ANODE 1	V_{LED}	LED power supply voltage	-
10	ANODE 1	V_{LED}	LED power supply voltage	-

4.2 Signal Electrical Characteristics

4.2.1 Signal Electrical Characteristics For LVDS Receiver

The built-in LVDS receiver is compatible with (ANSI/TIA/TIA-644) standard.

Table 7 LVDS Receiver Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Differential Input High Threshold	Vth		-	+150	mV	V_{CM}=+1.2V
Differential Input Low Threshold	Vtl	--150	-		mV	V_{CM}=+1.2V
Magnitude Differential Input	$\|V_{ID}\|$	150	-	600	mV	-
Strobe Width	TSW	0.4	-	-	UI	FLVCLK≤65MHz
Common Mode Voltage	V_{CM}	1.0	1.2	1.7-|VID|/2	V	-
Common Mode Voltage Offset	ΔV_{CM}	-	-	50	mV	V_{CM}=+1.2V

Note (1) Input signals shall be low or Hi- resistance state when VDD is off.

Note (2) All electrical characteristics for LVDS signal are defined and shall be measured at the LVDS terminal resistor of LCD.

Figure 8 Voltage Definitions

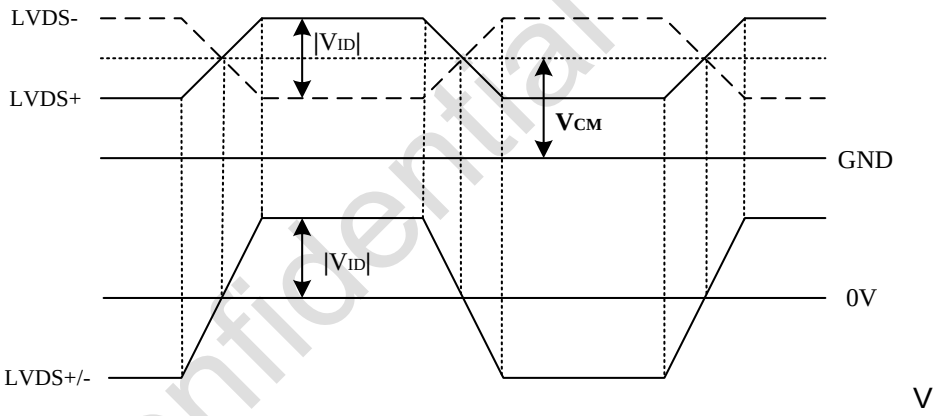


Figure 9 Measurement System

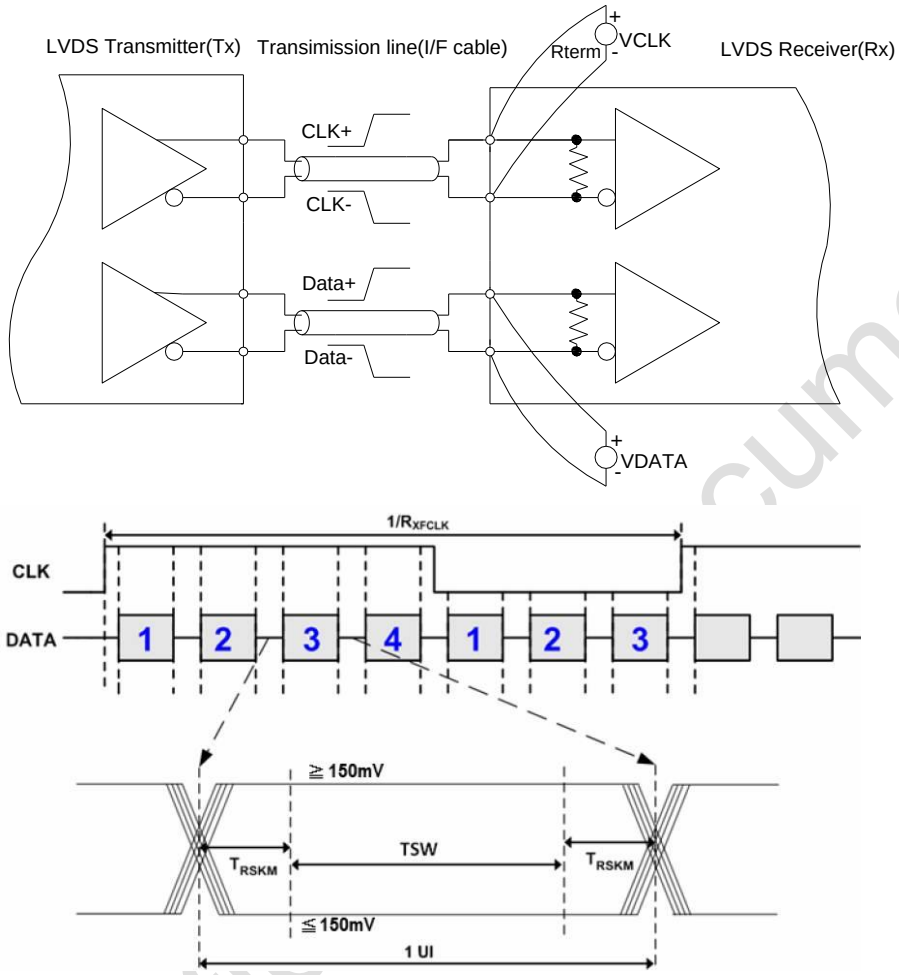
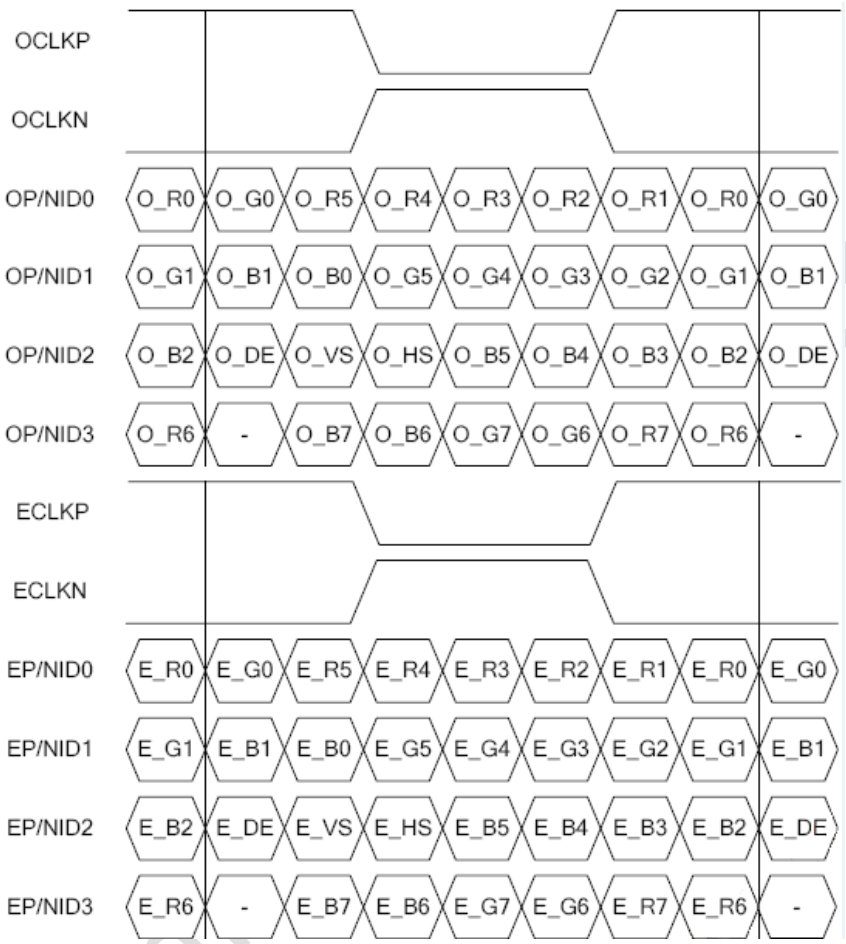


Figure 10 Data Mapping

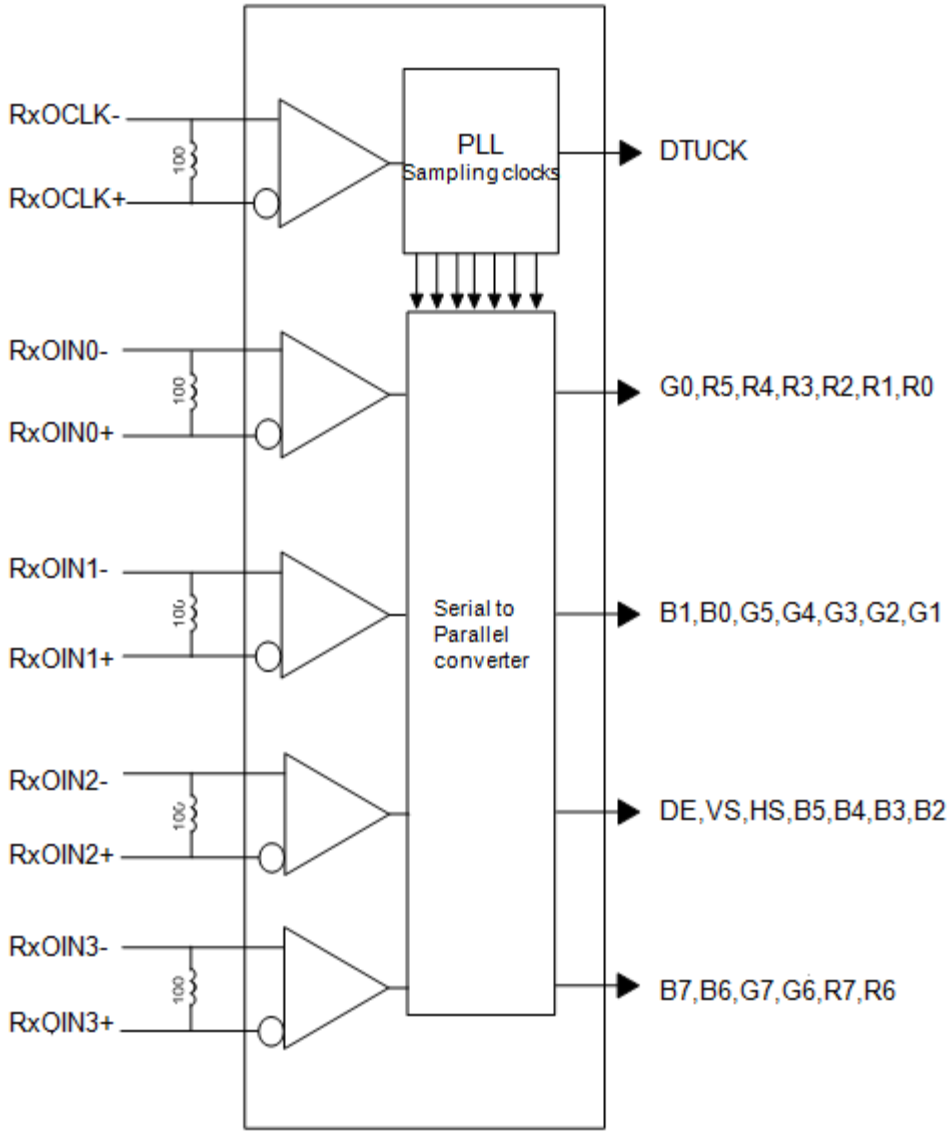
Single 8 bit LVDS input

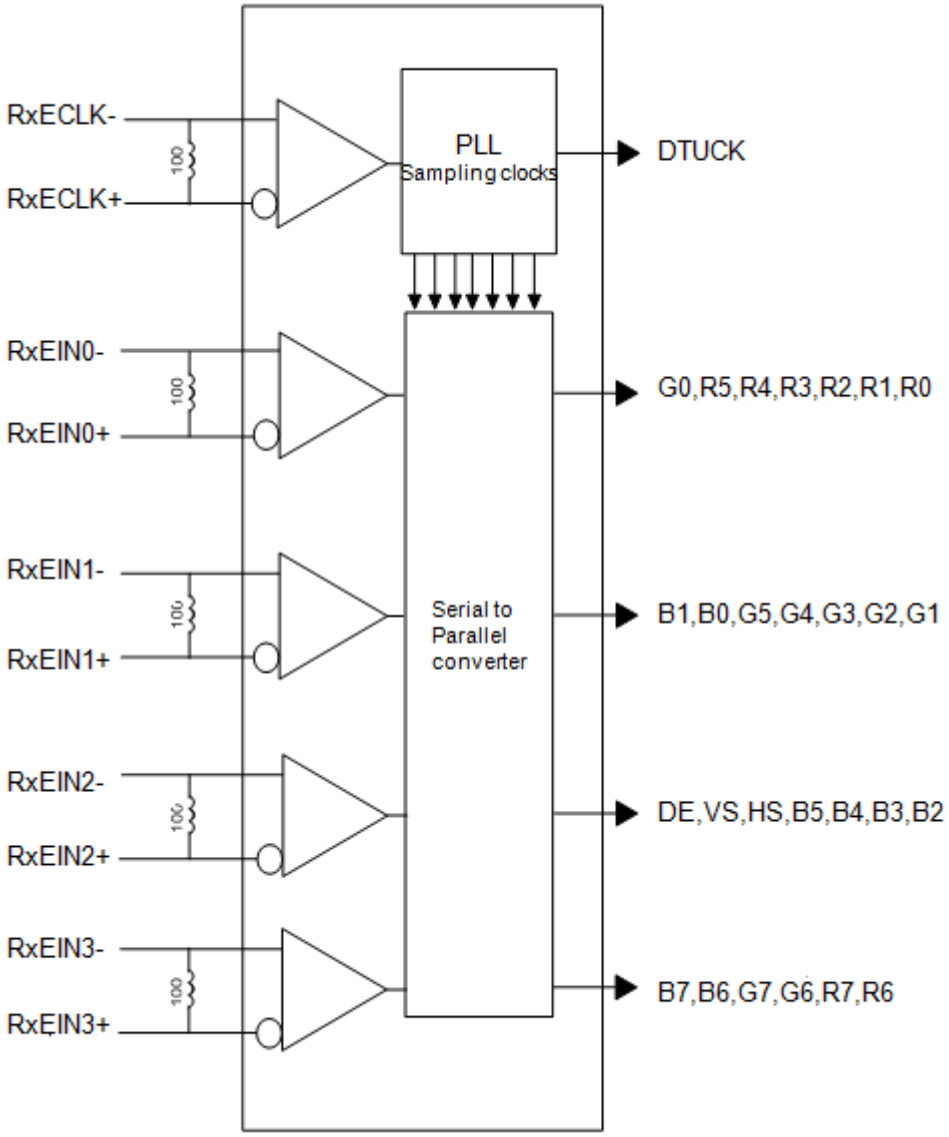


4.2.2 LVDS Receiver Internal Circuit

Figure 11 shows the internal block diagram of the LVDS receiver. This LCD module equips termination resistors for LVDS link.

Figure 11 LVDS Receiver Internal Circuit





4.3 Interface Timings

Table 8 Interface Timings

Parameter	Symbol	Min.	Typ.	Max.	Unit
LVDS Clock Frequency	Fclk	63.7	64.1	76.2	MHz
H Total Time	HT	660	664	790	Clocks
H Active Time	HA		600		Clocks
V Total Time	VT	1,606	1,608	1,729	Lines
V Active Time	VA		1,600		Lines
Frame Rate	FV	55	60	65	Hz

Note1：HT * VT *Frame Frequency≤76.2 MHz

Note2：Dual link LVDS

Note3: All reliabilities are specified for timing specification based on refresh rate of 60Hz. M118AW41 R0 is secured only for function under lower refresh rate; 60Hz at Normal mode, 55Hz at Power save mode. Don’t care flicker level (power save mode).

4.4 Input Power Specifications

Input power specifications are as follows.

Table 9 Input Power Specifications

Parameter		Symbol	Min.	Typ.	Max.	Unit	Note
System Power Supply							
LCD Drive Voltage (Logic)		V_{DD}	3	3.3	3.6	V	(1),(2)
VDD Current	White Pattern	I_{DD}	-	-	0.17	A	(1),(4)
VDD Power Consumption	White Pattern	P_{DD}	-	-	0.56	W	
STVD	VIH	V_{STVD}	VDD-0.4	-	VDD	V	(1)
	VIL		GND	-	GND+0.4	V	
RESET	VIH	V_{RST}	0.7VDD	-	VDD	V	(1)
	VIL		GND	-	0.3VDD	V	
Rush Current		I_{Rush}	-	-	2	A	(1),(5)
Allowable Logic/LCD Drive Ripple Voltage		V_{VDD-RP}	-	-	200	mV	(1),(3)
LED Power Supply							
LED Input Voltage		V_{LED}	-	-	28	V	(1),(2),(10)
LED Power Consumption		P_{LED}	-	-	9.24	W	(1),(6),(10)
LED Forward Voltage		V_F	2.6	-	3.5	V	(1),(2),(11)
LED Forward Current	@25℃	I_{F1}	-	82.5	-	mA	
	@85℃	I_{F2}	-	27.5	-	mA	(2),(11)
LED Life Time		LT	30,000	-	-	Hours	(1),(9)

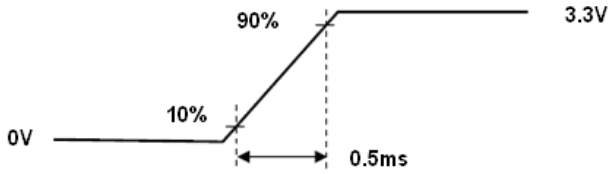
Note (1) All of the specifications are guaranteed under normal conditions. Normal conditions are defined as follow: Temperature: 25℃, Humidity: 55± 10%RH.

Note (2) All of the absolute maximum ratings specified in the table, if exceeded, may cause faulty operation or unrecoverable damage. It is recommended to follow the typical value.

Note (3) The specified V_{DD} current and power consumption are measured under the V_{DD} = 3.3 V, FV= 60 Hz condition and White pattern.

Note (4) The figures below is the measuring condition of V_{DD}. Rush current can be measured when T_{RUSH} is 0.5 ms.

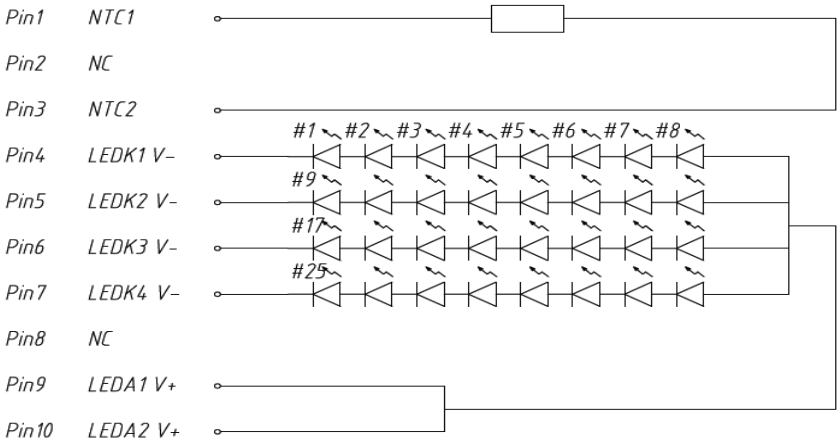
Figure 12 V_{DD} Rising Time



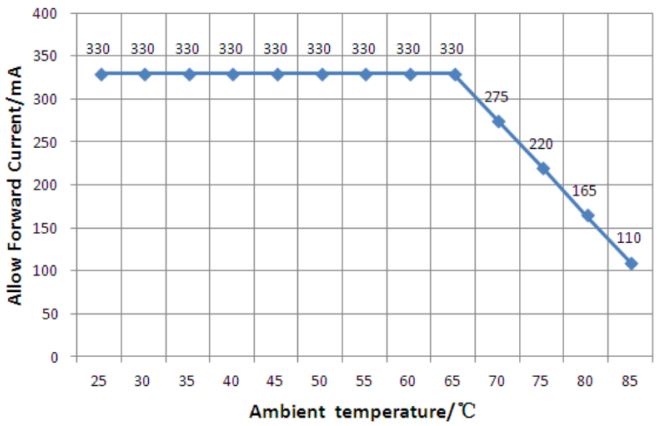
Note (9) The life time is determined as the sum of the lighting time till the luminance of LCD at the typical LED current reducing to 50% of the minimum value under normal operating condition.

Note (10) Definition of V_{LED} and P_{LED}

$V_{LED} = V_F \times 8$, $I_{LED} = I_F \times 4$, $P_{LED} = V_{LED} \times I_{LED}$



Note (11) Backlight operation must be follow diagram of Ambient temperature and Allowed forward current.



Note (12) NTC Thermistor Specification (Type:NCP18XH103F03RC)

Temperature/℃	Resistance/Kohm	Temperature/℃	Resistance/Kohm
-40	195.652	45	4.917
-35	148.171	50	4.161
-30	113.347	55	3.535
-25	87.559	60	3.014
-20	68.237	65	2.586
-15	53.65	70	2.228
-10	42.506	75	1.925
-5	33.892	80	1.669
0	27.219	85	1.452
5	22.021	90	1.268
10	17.926	95	1.11
15	14.674	100	0.974
20	12.081	105	0.858
25	10	110	0.758
30	8.315	115	0.672
35	6.948	120	0.596
40	5.834	125	0.531

4.5 Power ON/OFF Sequence

1. Interface signals are also shown in the chart. Signals from any system shall be Hi-resistance state or low level when VDD voltage is off.
2. When system first start up, should keep the VDD high time longer than 200ms, otherwise may cause image sticking when VDD drop off.

Figure 13 Power Sequence

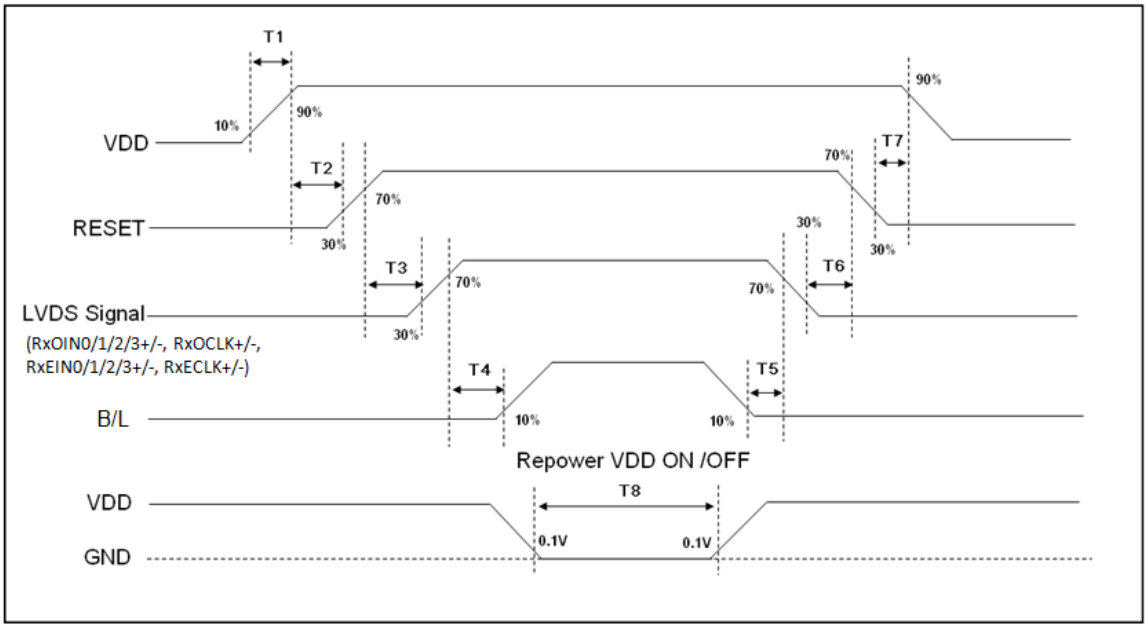


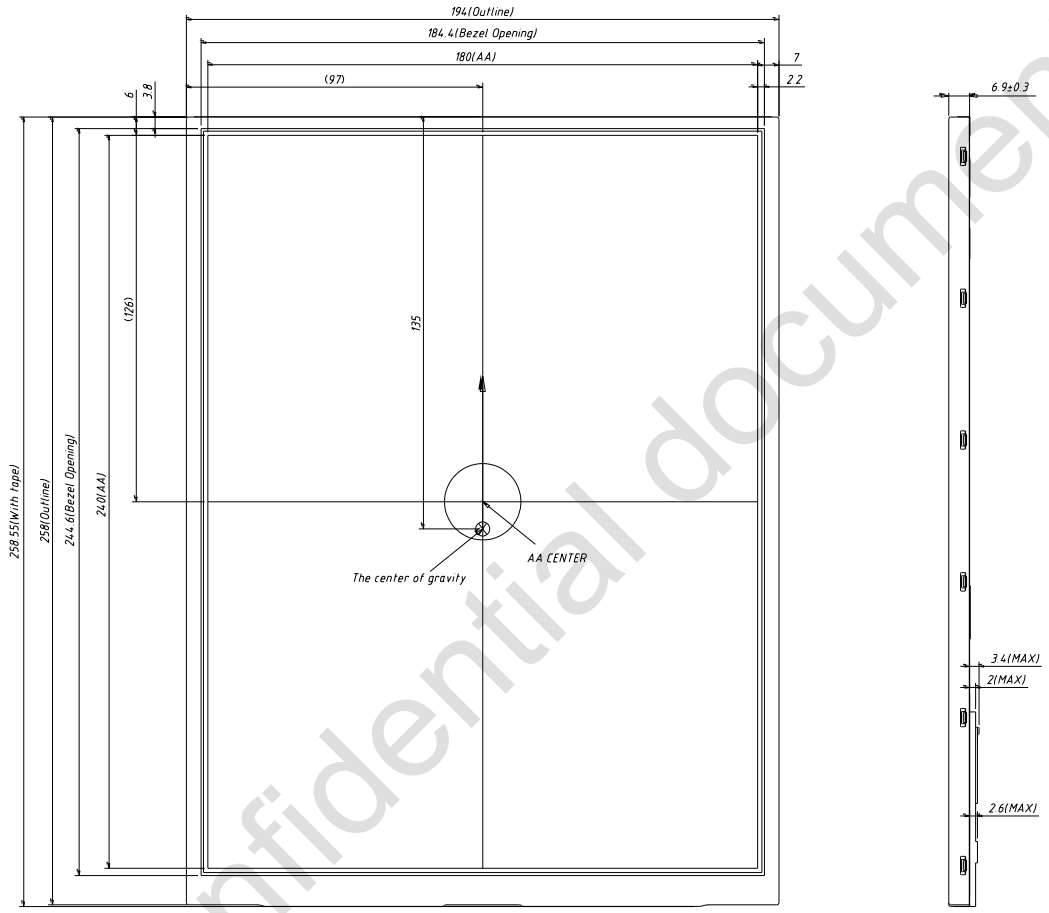
Table 10 Power Sequencing Requirements

Parameter	Symbol	Unit	Min.	Typ.	Max.
VDD Rising Time	T1	ms	--	--	15
VDD ready to RESET Rising	T2	ms	1	--	20
RESET ready to LVDS Rising	T3	ms	0	--	20
LVDS ready to LED Power Rising	T4	ms	500	--	--
LED Power shut down over to LVDS off	T5	ms	200	--	--
LVDS shut down over to RESET off	T6	ms	0	--	20
RESET shut down over to VDD off	T7	ms	1	--	20
Repower VDD ON/ OFF time	T8	ms	1000	--	--

5.0 Mechanical Characteristics

5.1 Outline Drawing

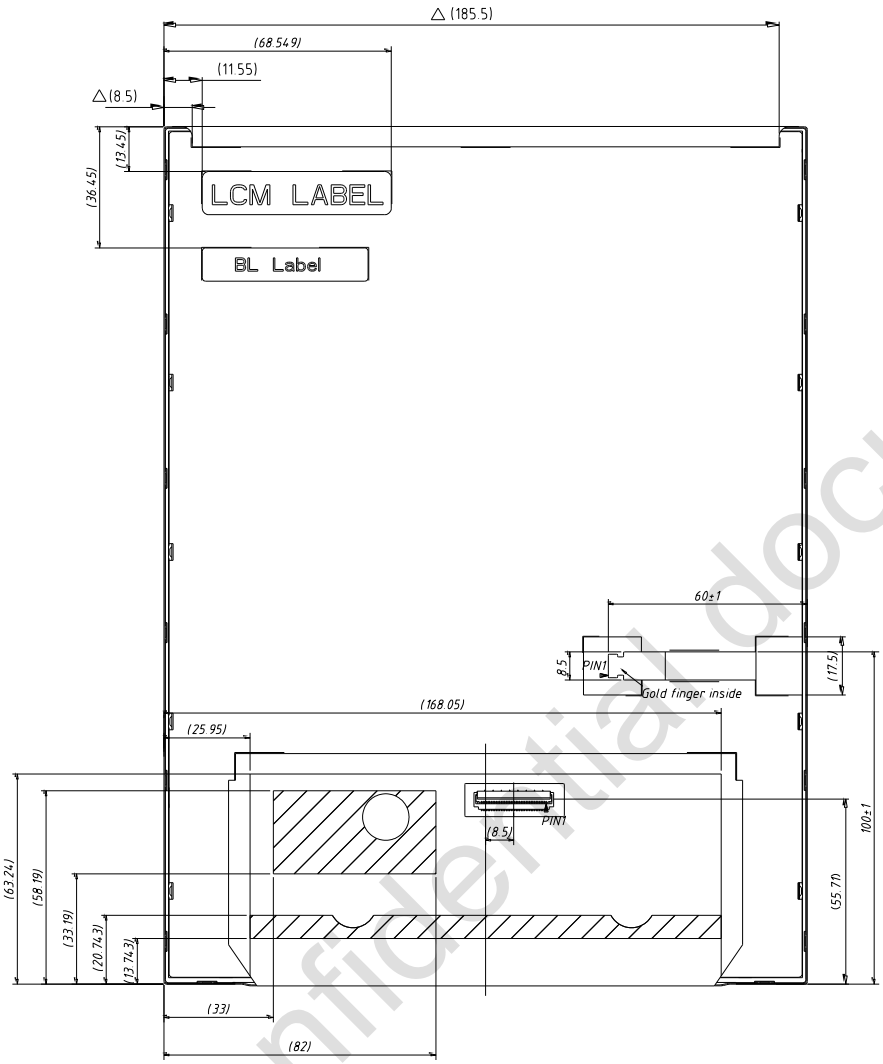
Figure 14 Reference Outline Drawing (Front Side)



Notes:
1.Unmarked tolerance 0.3mm
2.Shadow area components on PCBA height exceed 1.2mm.

Unit:mm

Figure 15 Reference Outline Drawing (Back Side)



Unit:mm

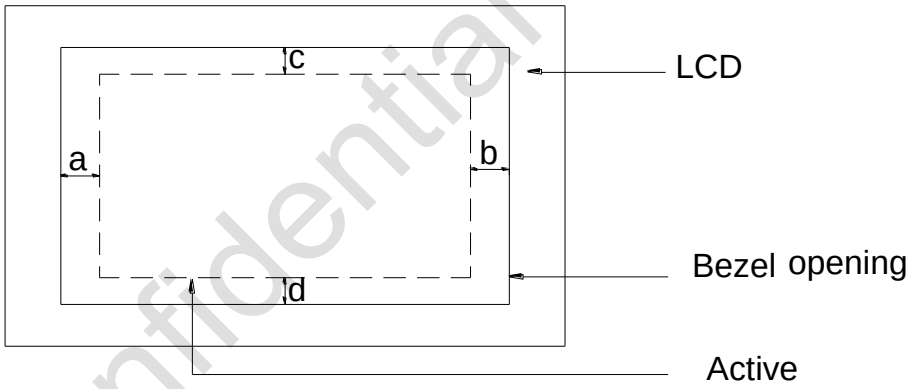
5.2 Dimension Specifications

Table 11 Module Dimension Specifications

Item		Min.	Typ.	Max.	Unit
Width		193.70	194.00	194.30	mm
Height		258.25	258.55	258.85	mm
Thickness	Without PCBA	6.60	6.90	7.20	mm
	With PCBA	-	-	10.60	mm
Weight		-	-	560	g
BM: | a-b | & | c-d |		-	-	1.0	mm

Note：Outline dimension measure instrument: Vernier Caliper.

Figure 16 BM Area



6.0 Reliability Conditions

Table 12 Reliability Condition

Item	Package	Test Conditions	Note
High Temperature/High Humidity Operating Test	Module	T_{gs}=60℃, 90%RH, 240 hours	(1),(2),(3),(4)
High Temperature Operating Test	Module	T_{gs}=85℃, 240 hours	
Low Temperature Operating Test	Module	T_a= -40℃, 240 hours	(1),(2),(3),(4)
High Temperature Storage Test	Module	T_a=95℃, 240 hours	(1),(3),(4)
Low Temperature Storage Test	Module	T_a= -40℃, 240 hours	
Shock Non-operating Test	Module	100G,6ms,X Y Z×2faces×3times, Total 18 times	(1),(3),(5)
Vibration Non-operating Test	Module	half-sine Frequency: 8Hz ~ 33Hz Stroke: 1.3mm Sweep: 2.9G 33.3Hz ~ 400Hz X,Z Cycle : 15 minutes 2 hrs for each direction of X,Z ; 4 hours for Y direction	
ESD Test / Operating	Module	Contact: ±8KV,classB,150pF(330Ohm) Air: ±15KV,classB,150pF(330Ohm)	(1),(2),(6)

Note (1) A sample can only have one test. Outward appearance, image quality and optical data can only be checked at normal conditions according to the IVO document before reliable test. Only check the function of the module after reliability test.

Note (2) The setting of electrical parameters should follow the typical value before reliability test.

Note (3) During the test, it is unaccepted to have condensate water remains. Besides, protect the module from static electricity.

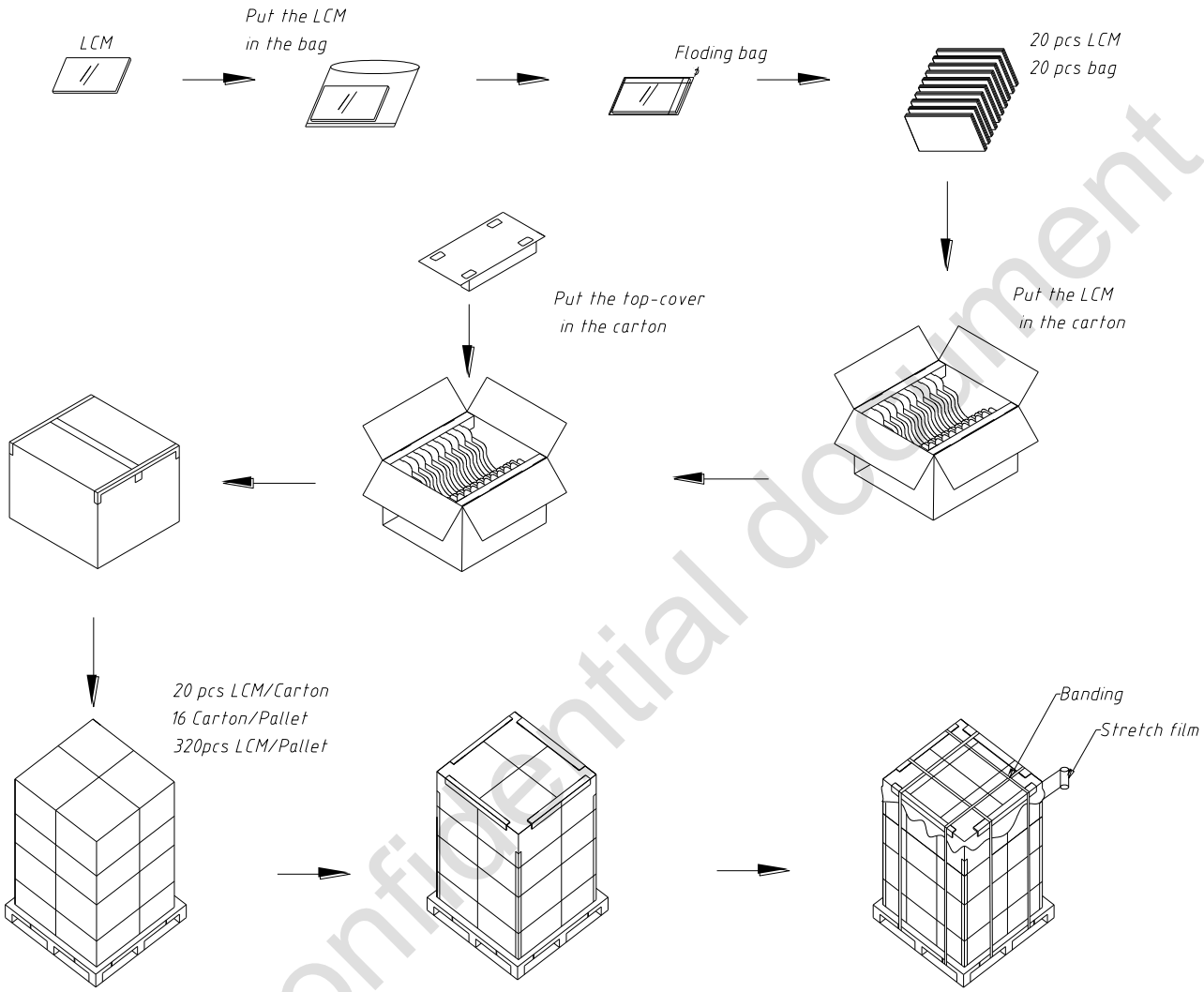
Note (4) The sample must be released for 24 hours under normal conditions before judging. Furthermore, all the judgment must be made under normal conditions. Normal conditions are defined as follow: Temperature: 25℃, Humidity: 55± 10%RH. T_a= Ambient Temperature, T_{gs}= Glass Surface Temperature.

Note (5) The module should be fixed firmly in order to avoid twisting and bending.

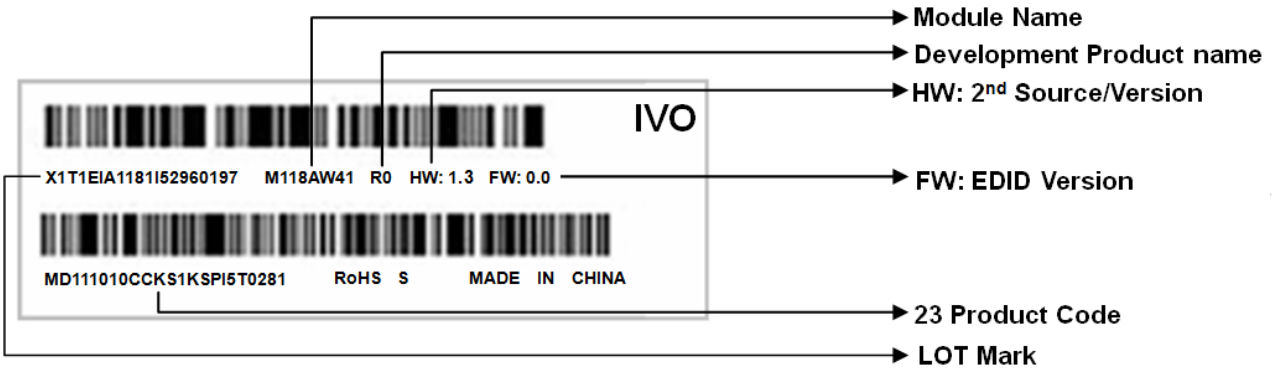
Note (6) It could be regarded as pass, when the module recovers by itself from function fault caused by ESD.

7.0 Package Specification

Figure 18 Packing Method



8.0 Lot Mark



Note: This picture is only an example.

8.1 20 Lot Mark

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Code 1,2,4,5,6,7,8,9,10,11,16: IVO internal flow control code.
Code 3: Production Location.
Code 12: Production Year.
Code 13: Production Month.
Code 14,15: Production Day.
Code 17,18,19,20: Serial Number.

8.2 23 Product Barcode

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23

Code 1,2: Manufacture District.
Code 3,4,5,6,7: IVO internal module name.
Code 8,9,10,13,16: IVO internal flow control code.
Code 11,12: Cell location Suzhou, China defined as “KS”.
Code 14 ,15: Module location Kunshan, China defined as “KS”; Yangzhou, China defined as “YZ”; Shenzhen, China defined as “SE”; Zhuhai, China defined as “ZH”; Suzhou, China defined as “SZ”.
Code 17,18,19 : Year, Month, Day refer to Note(1), Note(2) and Note(3).
Note (1) Production Year

Year	2006	2007	2008	2009	2010	2011	2012	2013	.....	2035
Mark	6	7	8	9	A	B	C	D	.....	Z

Note (2) Production Month

Month	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct	Nov.	Dec.
Mark	1	2	3	4	5	6	7	8	9	A	B	C

Note (3) Production Day: 1~V.
Code 20~23 : Serial Number.

9.0 General Precaution

9.1 Using Restriction

This product is not authorized for using in life supporting systems, aircraft navigation control systems, military systems and any other appliance where performance failure could be life-threatening or lead to be catastrophic.

9.2 Operation Precaution

(1)The LCD product should be operated under normal conditions.
Normal conditions are defined as below:

Temperature: 25℃
Humidity: 55±10%
Display pattern: continually changing pattern (Not stationary)

(2) Brightness and response time depend on the temperature. (It needs more time to reach normal brightness in low temperature.)

(3) It is necessary for you to pay attention to condensation when the ambient temperature drops suddenly. Condensate water would damage the polarizer and electrical contacted parts of the module. Besides, smear or spot will remain after condensate water evaporating.

(4) If the absolute maximum rating value was exceeded, it may damage the module.

(5) Do not adjust the variable resistor located on the module.

(6) Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding may be important to minimize the interference.

(7) Image sticking may occur when the module displayed the same pattern for long time.

(8) Do not connect or disconnect the module in the “power on” condition. Power supply should always be turned on/off by the “power on/off sequence”

(9) Ultra-violet ray filter is necessary for outdoor operation.

9.3 Mounting Precaution

(1) All the operators should be electrically grounded and with Ion-blown equipment turning on when mounting or handling. Dressing finger-stalls out of the gloves is important for keeping the panel clean during the incoming inspection and the process of assembly.

(2) It is unacceptable that the material of cover case contains acetic or chloric. Besides, any other material that could generate corrosive gas or cause circuit break by electro-chemical reaction is not desirable.

(3) The case on which a module is mounted should have sufficient strength so that external force is not transmitted to the module directly.

(4) It is obvious that you should adopt radiation structure to satisfy the temperature specification.

(5) So as to acquire higher luminance, the cable of the power supply should be connected directly with a minimize length.

(6) It should be attached to the system tightly by using all holes for mounting, when the module is assembled. Be careful not to apply uneven force to the module，especially to the PCB on the back.

(7) A transparent protective film needs to be attached to the surface of the module.
(8) Do not press or scratch the polarizer exposed with anything harder than HB pencil lead. In addition, don't touch the pin exposed with bare hands directly.
(9) Clean the polarizer gently with absorbent cotton or soft cloth when it is dirty.
(10) Wipe off saliva or water droplet as soon as possible. Otherwise, it may cause deformation and fading of color.
(11) Desirable cleaners are IPA (Isopropyl Alcohol) or hexane. Do not use Ketone type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.
(12) Do not disassemble or modify the module. It may damage sensitive parts in the LCD module, and cause scratches or dust remains. IVO does not warrant the module, if you disassemble or modify the module.

9.4 Handling Precaution

(1) Static electricity will generate between the film and polarizer, when the protection film is peeled off. It should be peeled off slowly and carefully by operators who are electrically grounded and with Ion-blown equipment turning on. Besides, it is recommended to peel off the film from the bonding area.
(2) The protection film is attached to the polarizer with a small amount of glue. When the module with protection film attached is stored for a long time, a little glue may remain after peeling.
(3) If the liquid crystal material leaks from the panel, keep it away from the eyes and mouth. In case of contact with hands, legs or clothes, it must be clean with soap thoroughly.

9.5 Storage Precaution

When storing modules as spares for long time, the following precautions must be executed.
(1) Store them in a dark place. Do not expose to sunlight or fluorescent light. Keep the temperature between 5℃ and 35℃ at normal humidity.
(2) The polarizer surface should not come in contact with any other object. It is recommended that they be stored in the container in which they were shipped.
(3) It is recommended to use it in a short-time period, after it's unpacked. Otherwise, we would not guarantee the quality.

9.6 Others

When disposing LCD module, obey the local environmental regulations.