MODEL NO. :   __TM150XDHG01__

MODEL VERSION: __02__

SPEC VERSION :   __Ver 2.0__

ISSUED DATE: __2020-07-08__

□**Preliminary Specification**

■**Final Product Specification**

Customer : _____

Approved by	Notes

TIANMA Confirmed :

Prepared by	Checked by	Approved by
Gang.Li	Longping.Deng	Kevin.Kim

This technical specification is subjected to change without prior notice.

Table of Contents

Record of Revision

Rev	Issued Date	Description	Editor
1.0	2019-10-23	Preliminary Specification released.	Gang.Li
2.0	2020-07-08	Final Specification released.	Gang.Li

1 General Specifications

Feature		Spec
Display Spec.	Size	15 inch
	Resolution	1600(RGB) x 1200
	Technology Type	a-Si TFT
	Pixel Configuration	R.G.B. Vertical Stripe
	Pixel pitch(mm)	0.1905x0.1905
	Display Mode	Transmissive, Normally white
	Surface Treatment	Anti-Glare
	Viewing Direction	12 o'clock
	Gray Scale Inversion Direction	6 o'clock
Mechanical Characteristics	LCM (W x H x D) (mm)	318.7(W)x242.65(H) x6.5(D)(Max)
	Active Area(mm)	304.8x228.6
	With /Without TSP	Without TSP
	CN1 Matching Connection Type	MDF76-30P-1C
	CN2 Matching Connection Type	DF19G-14S-1C(05) or DF19-14S-1C
	LED Numbers	56
	Weight (g)	620
Electrical Characteristics	Interface	2 ports LVDS(8bit)
	Color Depth	16.2M

Note 1:   Viewing direction for best image quality is different from TFT definition. There is a 180 degree shift.

Note 2:   Requirements on Environmental Protection: Q/S0002

Note 3:   LCM weight tolerance: +/- 5%

2 Input/Output Terminals

2.1 CN1 of Connector

Matching connector: MDF76KBW-30S-1H(55)

Pin	Symbol	I/O	Description	Remark
1	E_CLKIN+	I	+LVDS differential Clock input (Even pixel)	
2	E_CLKIN-	I	-LVDS differential Clock input (Even pixel)	
3	VSS	P	GND	
4	E_RIN3+	I	+LVDS differential data input (R6~R7,G6~G7,B6~B7) (Even pixel)	
5	E_RIN3-	I	-LVDS differential data input (R6~R7,G6~G7,B6~B7) (Even pixel)	
6	E_RIN2+	I	+LVDS differential data input (B2~B5,HS,VS,DE) (Even pixel)	
7	E_RIN2-	I	-LVDS differential data input (B2~B5,HS,VS,DE) (Even pixel)	
8	VSS	P	GND	
9	E_RIN1+	I	+LVDS differential data input (G1~G5,B0,B1) (Even pixel)	
10	E_RIN1-	I	-LVDS differential data input (G1~G5,B0,B1) (Even pixel)	
11	E_RIN0+	I	+LVDS differential data input (R0~R5,G0) (Even pixel)	
12	E_RIN0-	I	-LVDS differential data input (R0~R5,G0) (Even pixel)	
13	VSS	P	GND	
14	O_CLKIN+	I	+LVDS differential Clock input (Odd pixel)	
15	O_CLKIN-	I	-LVDS differential Clock input (Odd pixel)	
16	VSS	P	GND	
17	O_RIN3+	I	+LVDS differential data input (R6~R7,G6~G7,B6~B7) (Odd pixel)	
18	O_RIN3-	I	-LVDS differential data input (R6~R7,G6~G7,B6~B7) (Odd pixel)	
19	O_RIN2+	I	+LVDS differential data input (B2~B5,HS,VS,DE) (Odd pixel)	
20	O_RIN2-	I	-LVDS differential data input (B2~B5,HS,VS,DE) (Odd pixel)	
21	VSS	P	GND	
22	O_RIN1+	I	+LVDS differential data input (G1~G5,B0,B1) (Odd pixel)	
23	O_RIN1-	I	+LVDS differential data input (G1~G5,B0,B1) (Odd pixel)	
24	O_RIN0+	I	+LVDS differential data input (R0~R5 G0) (Odd pixel)	
25	O_RIN0-	I	-LVDS differential data input (R0~R5,G0) (Odd pixel)	
26	VSS	P	GND	
27	VSS	P	GND	
28	VDD	P	Power Supply : +3.3V (typical)	
29	VDD	P	Power Supply : +3.3V (typical)	
30	VDD	P	Power Supply : +3.3V (typical)	

I---Input, O---Output, P--- Power/Ground, "-" ---No connection

Table 2.1 Terminal pin assignments

2.2 CN2 of Connector

Matching connector: DF19L-14P-1H

Terminal	Symbol	Functions
1	VSS	Ground
2	VLED+	Power Supply:+12V
3	VLED+	Power Supply:+12V
4	VLED+	Power Supply:+12V
5	VLED+	Power Supply:+12V
6	VLED+	Power Supply:+12V
7	NC	No Connection
8	EN	BL On/Off
9	PWM	PWM Brightness Control
10	VSS	Ground
11	VSS	Ground
12	VSS	Ground
13	VSS	Ground
14	VSS	Ground

Table 2.2 Backlight pin assignments
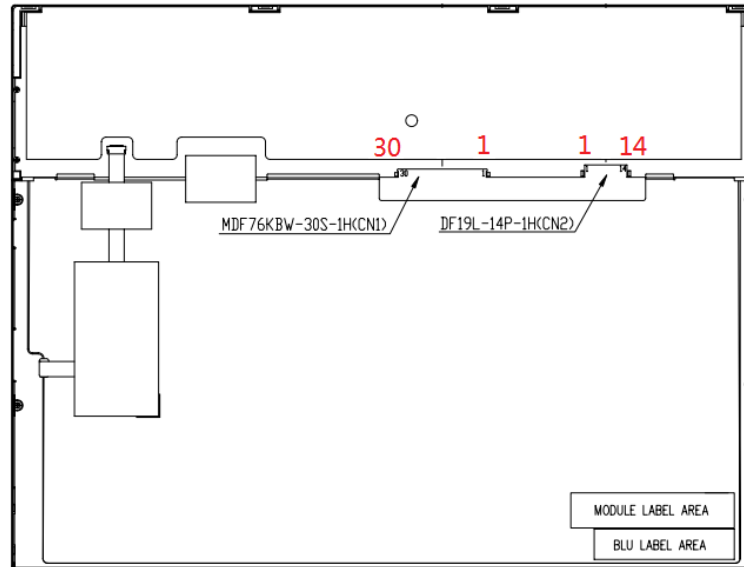
Figure2.2 Connector pin direction

3 Absolute Maximum Ratings

GND=0V, Ta = 25℃

Item	Symbol	MIN	MAX	Unit	Remark
Power Voltage	VDD	-0.3	4.0	V	
Data Input voltage	V_{IN}	-0.3	4.0	V	
Backlight forward current	I_{LED}	-	1500	mA	
Operating Temperature	Top	-30	70	℃	
Storage Temperature	Tst	-40	80	℃	

Table 3.1 Absolute maximum rating

4 Electrical Characteristics

4.1 Recommended Operating Condition

Parameter	Symbol	min.	typ.	max.	Unit	Remarks
Power supply voltage	VDD	3.0	3.3	3.6	V	-
Power supply ripple	Vp-p	-	-	100	mV	Including spike noise
Power supply current	ICC	-	990	-	mA	Note 1

Note 1: VDD = 3.3V,Black pattern.Strong copper wire is recommended to avoid voltage drop.

4.2 Driving For Backlight

Parameter		Symbol	min.	typ.	max.	Unit	Remarks
Power supply voltage		VLED	10.8	12.0	13.2	V	
Power supply current		IDD	-	1140	1290	mArms	
Light bar life time		Hr	20000	30000	-	Hour	Note1
Input voltage for PWM signal	High	VDFH1	2.0	-	5.0	V	
	Low	VDFL1	0	-	0.4	V	
Input voltage for BRTC signal	High	VDFH2	2.0	-	5.0	V	
	Low	VDFL2	0	-	0.4	V	
PWM frequency		fpwm	200	-	(10K)	Hz	
PWM pulse width		tPWH	10	-	-	us	

Note1: The operating lifetime is mean time to half-luminance. In case the product works under room temperature environment.
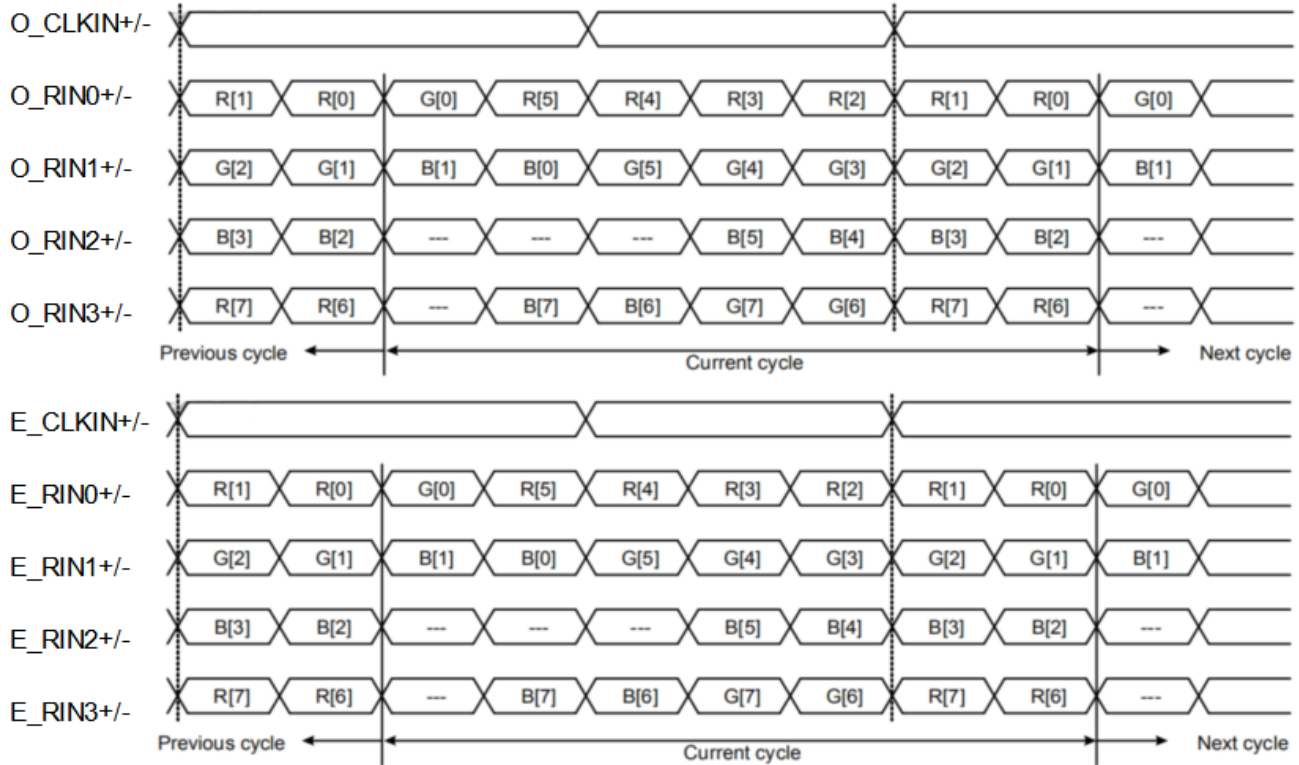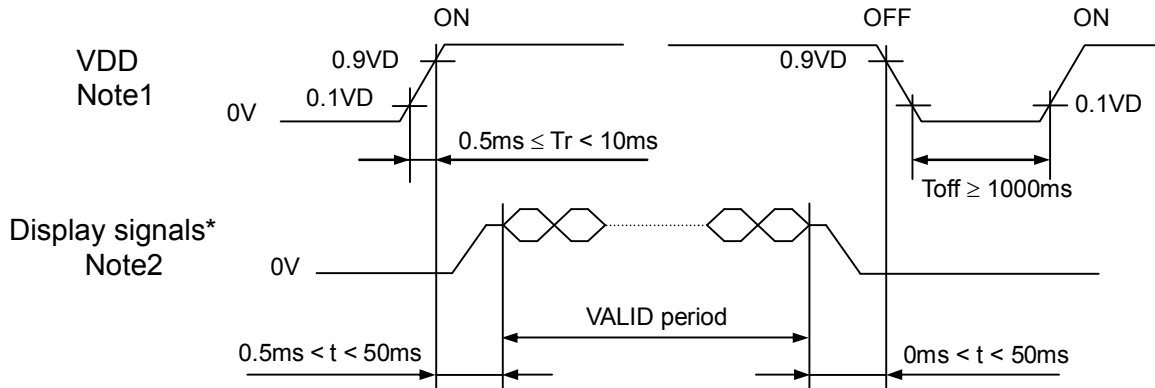
5 Timing Chart

5.1 Data Mapping

Figure 5.1 LVDS data mapping(8bit,VESA mode)

5.2 Logic circuit power on/off sequence

Note1: If there is a voltage variation (voltage drop) at the rising edge of VDD below 3.0V, there is a possibility that a product does not work properly due to a protection circuit.

Note2: Display LVDS signals must be set to Low or High-impedance, except the VALID period (See above sequence diagram), in order to avoid the circuitry damage.
If some of display of this product are cut while this product is working, even if the signal input to it once again, it might not work normally. If a customer stops the display and function signals, VDD also must be shut down.

5.3 LED driver power on/off sequence
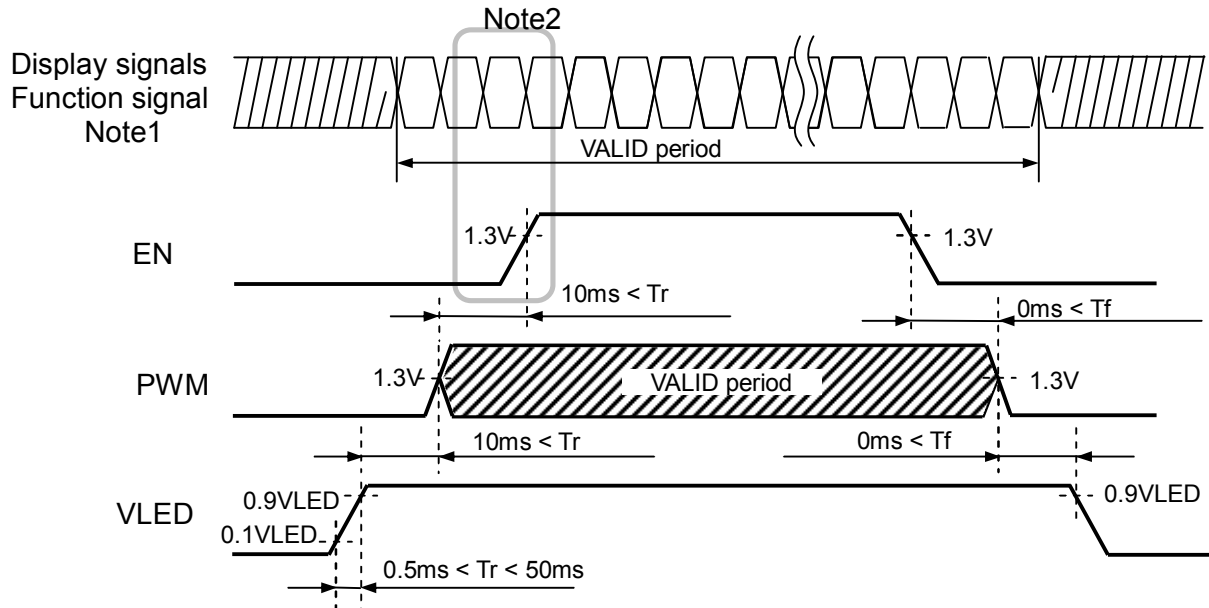
Note1: These are the display and function signals for LCD panel signal processing board.
Note2: The backlight should be turned on within the valid period of display and function signals, in order to avoid unstable data display.

5.4 Input signal timing

Parameter	Symbol	Condition	1600*1200	Unit
Horizontal total timing	HT	Min.	2100	Clock
		Typ.	2160	Clock
		Max.	2960	Clock
Horizontal active timing	HVD	Typ.	1600	Clock
Vertical total timing	VT	Min.	1210	Line
		Typ.	1250	Line
		Max.	1460	Line
Vertical active timing	VVD	Typ.	1200	Line

Table 5.4 Timing setting

6 Optical Characteristics

Ta=25℃

| Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≧10	70	80	-	Degree	Note 2
		θB		70	80	-		
		θL		70	80	-		
		θR		70	80	-		
Contrast Ratio		CR	θ=0°	800	1000	-		Note1 Note3
Response Time		T_{ON}	25℃	-	20	30	ms	Note1 Note4
		T_{OFF}						
Chromaticity	White	x	Backlight is on	0.263	0.313	0.363		Note1 Note5
		y		0.279	0.329	0.379		
	Red	x		0.545	0.595	0.645		
		y		0.288	0.338	0.388		
	Green	x		0.252	0.302	0.352		
		y		0.515	0.565	0.615		
	Blue	x		0.107	0.157	0.207		
		y		0.049	0.099	0.149		
Uniformity		U		75	80	-	%	Note1 Note6
NTSC				-	50	-	%	Note 5
Luminance		L		800	1000	-	cd/m^2	Note1 Note7

Test Conditions:

1. The ambient temperature is 25±2℃.humidity is 65±7%

2. The test systems refer to Note 1 and Note 2.

Note 1: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 5 Minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.
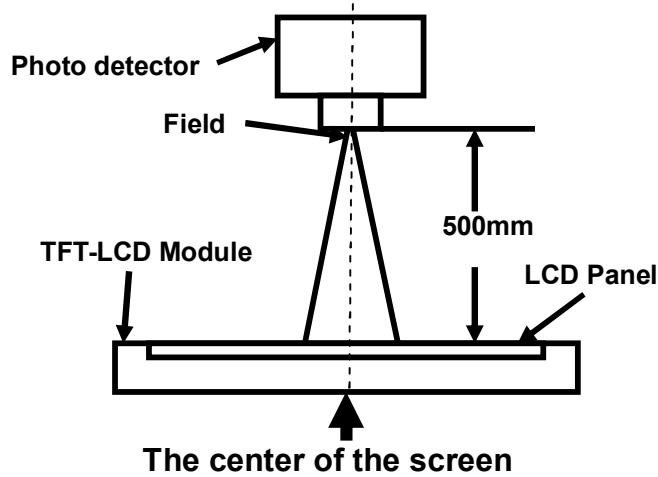
Note 2: Definition of viewing angle range and measurement system.Viewing angle is measured at the center point of the LCD.
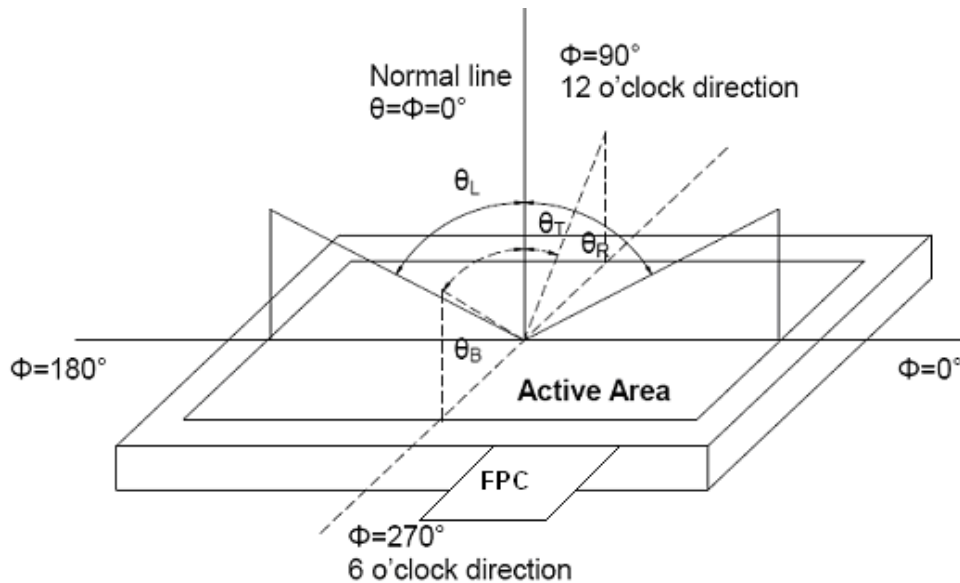
Note 3: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD is on the "White" state}}{\text{Luminance measured when LCD is on the "Black" state}}$$

"White state ": The state is that the LCD should drive by Vwhite.

"Black state": The state is that the LCD should drive by Vblack.

Vwhite: To be determined   Vblack: To be determined.

Note 4: Definition of Response time

The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (T_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.
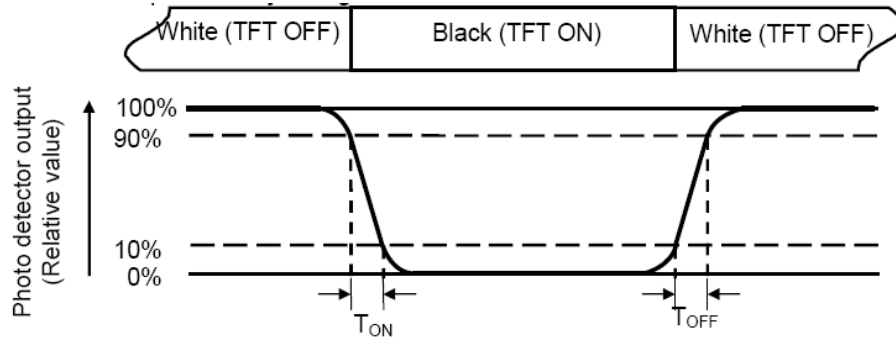
Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note 6: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

Luminance Uniformity (U) = Lmin/ Lmax

L-------Active area length W----- Active area width
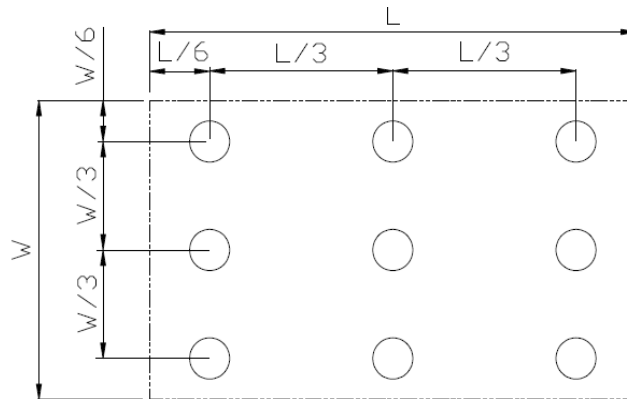
Lmax: The measured Maximum luminance of all measurement position.

Lmin: The measured Minimum luminance of all measurement position.

Note 7: Definition of Luminance:

Measure the luminance of white state at center point.

7 Environmental / Reliability Test

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ta = +70℃, 240 hours	IEC60068-2-1 GB2423.2
2	Low Temperature Operation	Ta = -30℃, 240 hours	IEC60068-2-1 GB2423.1
3	High Temperature Storage	Ta = +80℃, 240 hours	IEC60068-2-1 GB2423.2
4	Low Temperature Storage	Ta = -40℃, 240 hours	IEC60068-2-1 GB2423.1
5	Storage at High Temperature and Humidity (non-operation)	Ta = +60℃, 90% RH max,240hours	IEC60068-2-78 GB/T2423.3
6	Thermal Shock (non-operation)	-30℃ 30 min~+80℃ 30 min, Change time:5min, 20 Cycle	Start with cold temperature, End with high temperature, IEC60068-2-14,GB2423.22
7	ESD	C=150pF,R=330Ω,5point/panel Air:±15Kv,5times; Contact:±8Kv,5times (Environment:15℃~35℃, 30%~60%.86Kpa~106Kpa)	IEC61000-4-2 GB/T17626.2
8	Vibration Test	Frequency range:10~55Hz Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z. (6 hours for total)	IEC60068-2-6 GB/T2423.10
9	Mechanical Shock (Non Op)	60G,6ms,X,Y,Z 3times,For each direction	IEC60068-2-27 GB/T2423.5
10	Package Drop Test	Height:60cm, 1corner,3edges,6surfaces	GB/T4857.5—1992
11	Package Vibration	Frequency：5-20-200HZ， PSD：0.01-0.01-0.001 Total：0.781g2/HZ, （x/y/z each direction 30min）	GB/T4857.23-2012

Note1:　Ta is the ambient temperature of samples.

8 Mechanical Drawing

NOTES:
1. Display Type: a-Si TFT;
2. Backlight: 56-chips LED,7 series,8 Parallel;
3. Gray Scale Inversion: 6 o'clock;
4. Driver IC: RM76M59FA-GQ20(Gate),RM9JM39FA-GQ10(Source);
5. Matched connector:MDF76-30P-1C(CN1), DF19G-14S-1C(0.5) or DF19-14S-1C(CN2);
6. General Tolerance: ±0.5;
7. Requirements on environment protection: 0/SO002,LED,A3;
8. Recommended Case Open Area should be less than Module V.A.

Pin Symbol(CN1)

No.	Symbol
1	E_CLKIN+
2	E_CLKIN-
3	VSS
4	E_RIN3+
5	E_RIN3-
6	E_RIN2+
7	E_RIN2-
8	VSS
9	E_RIN1+
10	E_RIN1-
11	E_RIN0+
12	E_RIN0-
13	VSS
14	O_CLKIN+
15	O_CLKIN-
16	VSS
17	O_RIN3+
18	O_RIN3-
19	O_RIN2+
20	O_RIN2-
21	VSS
22	O_RIN1+
23	O_RIN1-
24	O_RIN0+
25	O_RIN0-
26	VSS
27	VSS
28	VDD
29	VDD
30	VDD

Pin Symbol(CN2)

No.	Symbol
1	VSS
2	VLED+
3	VLED+
4	VLED+
5	VLED+
6	VLED+
7	NC
8	EN
9	PWM
10	VSS
11	VSS
12	VSS
13	VSS
14	VSS

M2.5 Screw use hole 8 places

Protect Film

LED Circuit
LED_A1, LED_A2, LED_A3
LED_K1 ... LED_K8

Detail A Scale 100:1
RGB 0.1905 0.5900

Dimensions:
242.5±0.3 (Outline)
231.1±0.2 (Bezel opening)
228.6 (Active Area)
(5.7) (5.45)
1600RGB×1200
Viewing direction 12 o'clock
304.8(Active Area)
307.8±0.2(Bezel opening)
318.7±0.3(Outline)
6±0.1, 27.25±0.3, 188±0.3, 3.4±0.2
18±0.1, (75.25), 6.9 Max, 60.9 Max

Ordinary Trade Secrets 普通商业秘密

CONTROL DIMENSION	2D Rev.	00
REFERENCE DIMENSION	3D Rev.	NA
APPROVED	Du Wanchun	2019-8-2
CHECKED	Zhang Xin	2019-8-2
DESIGNED	Zheng Huailing	2019-8-2

PRODUCT NAME: LCM
PART NUMBER: TM150XDHG01-02
DRAWING NUMBER: YGT1-00
MATERIAL NUMBER: TM150XDHG01-02
3rd ANGLE
PAGE 1/2 SCALE 1:1 UNIT mm

REV / DC/EC NUMBER / DESCRIPTION / DATE

MDF76KBW-30S-1H(CN1)

DF19L-14P-1H(CN2)

MODULE LABEL AREA

BLU LABEL AREA

(34.1)

(5.3)

(94.3)

(3.3)

(73.7)

普通商业秘密
Ordinary Trade Secrets

REV	DC/EC NUMBER	DESCRIPTION	DATE

CONTROL DIMENSION		2D Rev.	00	PRODUCT NUMBER	TM150XDHG01-02	3rd ANGLE	
REFERENCE DIMENSION		3D Rev.	NA	PART NAME	LCM	UNIT	mm
APPROVED	Du Wanchun	2019-8-2		DRAWING NUMBER	YGT1-00	SCALE	1:1
CHECKED	Zhang Xin	2019-8-2		MATERIAL NUMBER	TM150XDHG01-02	PAGE	2/2
DESIGNED	Zheng Hualing	2019-8-2					

9 Packing drawing

No.	Item	Model (Material)	Dimensions(mm)	Unit Weight(Kg)	Quantity	Remark
1	LCM module	TM150XDHG01	318.7(W)x242.65(H)x6.5(D)	0.620	15	
2	Partition_1	EPE(Bottom)	510x425x325	1.222	1	
3	Partition_2	EPE(Top)	470x375x20	0.066	1	
4	Anti-static Bag	PE	450x300	0.001	15	Anti-static
5	Carton	Corrugated Paper	520x435x330	2	1	
6	Total weight	12.753±10% kg				

Table 9: Packing specification and quantity

LCM

A/S Bag(PE)

Use packaging tapes to seal carton

Use strop bind the EPE
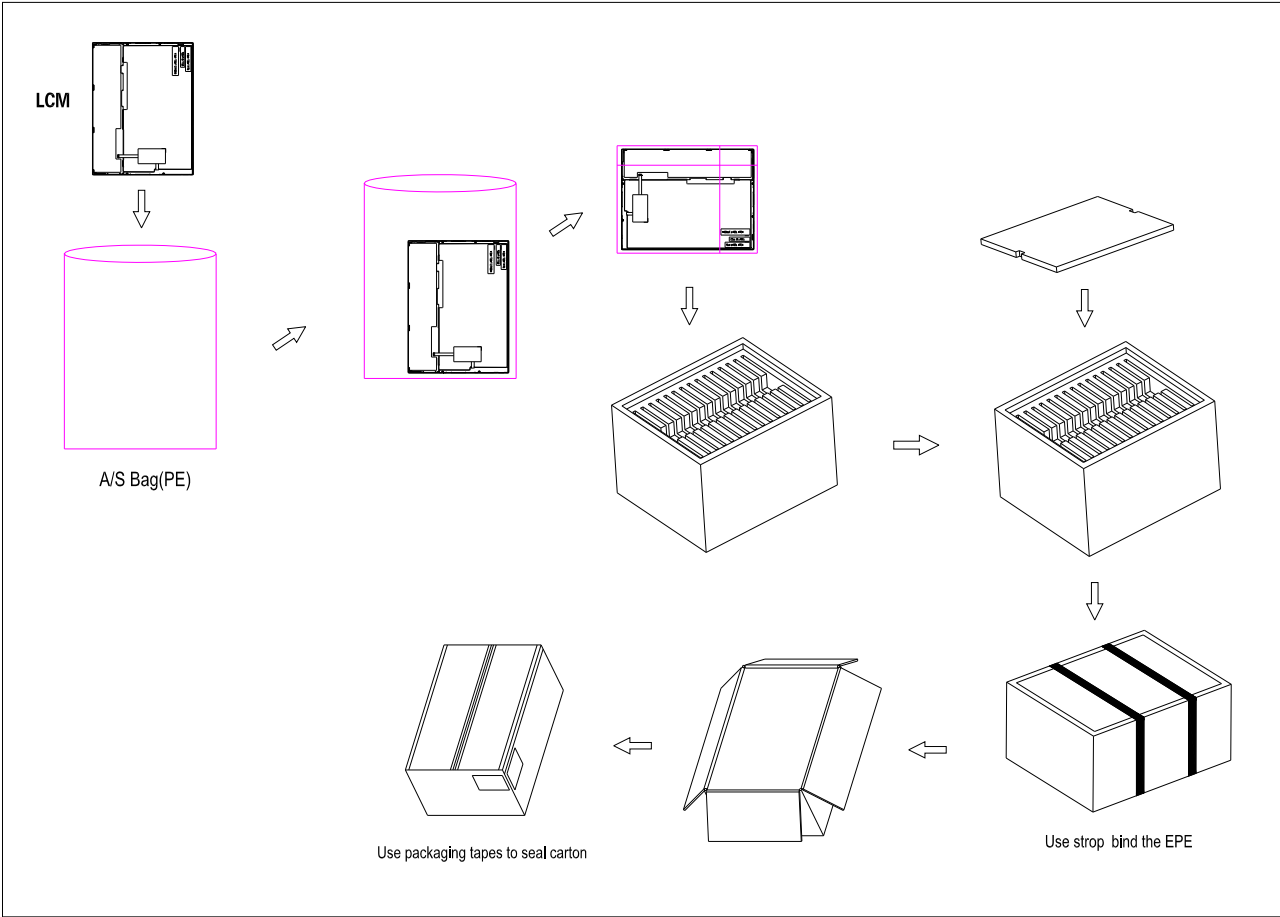
10 Precautions for Use of LCD Modules

10.1 Handling Precautions

10.1.1 The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

10.1.2 If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.

10.1.3 Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

10.1.4 The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

10.1.5 If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

－ Isopropyl alcohol

－ Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

－ Water

－ Ketone

－ Aromatic solvents

10.1.6 Do not attempt to disassemble the LCD Module.

10.1.7 If the logic circuit power is off, do not apply the input signals.

10.1.8 To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

10.1.8.1 Be sure to ground the body when handling the LCD Modules.

10.1.8.2 Tools required for assembly, such as soldering irons, must be properly ground.

10.1.8.3 To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

10.1.8.4 The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

10.2 Storage precautions

10.2.1 When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

10.2.2 The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is 0℃ ～ 40℃,Relatively humidity: ≤80%

10.2.3 The LCD modules should be stored in the room without acid, alkali and harmful gas.

10.3 Transportation Precautions

10.3.1 The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.