SHENZHEN STARTEK ELECTRONIC TECHNOLOGY CO.,LTD

SPECIFICATION
FOR
LCM Module

MODULE No:	KD050WVFLA072
CUSTOMER:	

STARTEK	INITIAL	DATE
PREPARED BY		
CHECKED BY		
APPROVED BY		

CUSTOMER	INITIAL	DATE
APPROVED BY		

Part. No	KD050WVFLA072	REV	V1.0	Page 1 of 26

常 备 库 存	长 期 供 货	支持小量	品 种 齐 全
Stock For Sale	Long Time supply	NO MOQ	In Full Range

SHENZHEN STARTEK ELECTRONIC TECHNOLOGY CO.,LTD

Revision History

Date	Rev. No.	Page	Summary
2021.10.16	V1.0	ALL	FIRST ISSUE

常 备 库 存　　　　　长 期 供 货　　　　　支持小量　　　　　品 种 齐 全
Stock For Sale　　　Long Time supply　　　NO MOQ　　　In Full Range

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* Description

This is a color active matrix TFT (Thin Film Transistor) LCD (liquid crystal display) that uses amorphous silicon TFT as a switching device. This module is composed of a Transmissive type TFT-LCD Panel,driver circuit,back-light unit. The resolution of a 5.0'TFT-LCD contains 800x480 pixels, and can display up to 16.7M colors.
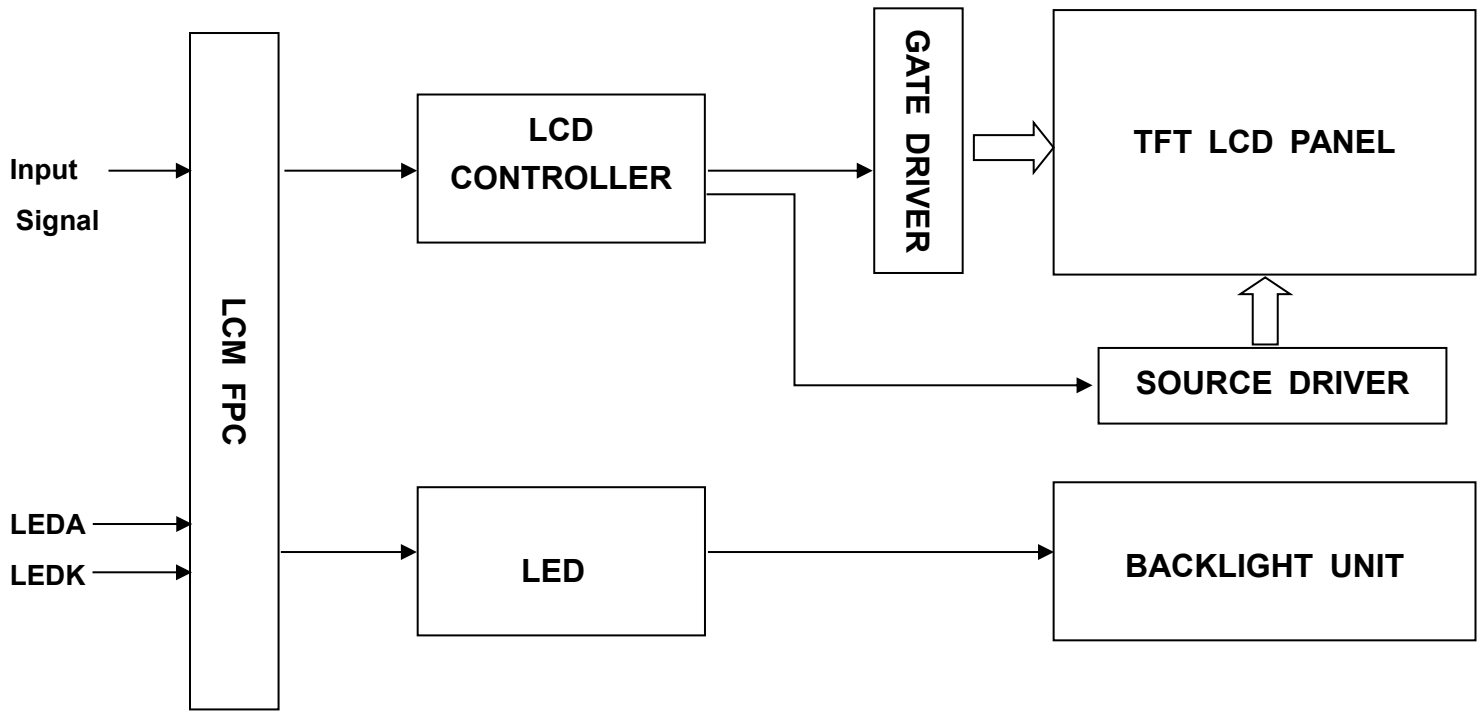
* Features

General Information Items	Specification	Unit	Note
	Main Panel		
Display area(AA)	108.0(H)*64.80(V)　(5.0inch)	mm	
Driver element	TFT active matrix	-	
Display colors	16.7M	colors	
Number of pixels	800(RGB)*480	dots	
Pixel arrangement	RGB vertical stripe	-	
Pixel pitch	0.135(H)*0.135(V)	mm	
Viewing angle	ALL	o'clock	
Controller　IC	ST7262	-	
Display mode	Transmissive /Normally Black	-	
LCM Interface	4-Lane LVDS/8BIT LVDS	-	
Operating temperature	-30～+85	℃	
Storage temperature	-30～+85	℃	

* Mechanical Information

Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal(H)	-	120.70	-	mm	
	Vertical(V)	-	75.90	-	mm	
	Depth(D)	-	2.95	-	mm	
Weight		-	49	-	g	

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1. Block Diagram

```
                        ┌──────────────┐            ┌──────────────┐
                        │     LCD      │            │     TFT      │
Input Signal ──→ │ │ ──→ │  CONTROLLER  │ ──→ GATE DRIVER ──→ │ LCD PANEL   │
                 │ │     └──────────────┘                     │              │
                 │LCM│            │                            └──────────────┘
                 │FPC│            └──────────→ ┌──────────────┐       ↑
                 │ │                           │SOURCE DRIVER │ ──────┘
LEDA ──→ │ │                           └──────────────┘
LEDK ──→ │ │ ──→ ┌──────────┐ ──────→ ┌──────────────┐
                        │   LED    │          │BACKLIGHT UNIT│
                        └──────────┘          └──────────────┘
```

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2. Outline dimension

Rear View

BL0501609
XX YYMMDD

Side View

2.95±0.2 LCM
0.13±0.03 FPC
0.30±0.03 PI+FPC
2.00Max Components
PI Stiffener
Contact side
BACK
FRONT

Front View

Front View
Pull Tape
4.96
5.31
6.36
120.70±0.2 BL OD
110.80±0.2 UP B.Z OPEN
110.10±0.2 UP POL
108.00 LCD A.A
800 RGB(H) x 480(V)
5.0"
A.A
05-012
27.02±0.5
Yellow Tape
3.31
2.26
1.91
64.80 LCD A.A
67.40±0.2 UP POL
68.10±0.2 UP B.Z OPEN
75.90±0.2 BL OD
48.00±0.5

0.50±0.1
W=0.30±0.03
P0.5*39±9.50±0.05
20.50±0.1
3.50±0.2

5.00±0.3
3.00±0.3

Pin	Name
1	NC
2	VDD
3	VDD
4	NC
5	RESET
6	STBYB
7	GND
8	RXIN0-
9	RXIN0+
10	GND
11	RXIN1-
12	RXIN1+
13	GND
14	RXIN2-
15	RXIN2+
16	GND
17	RCCLKIN-
18	RCCLKIN+
19	GND
20	RXIN3-
21	RXIN3+
22	GND
23	NC
24	NC
25	GND
26	NC
27	NC
28	NC
29	GND
30	NC
31	LED-
32	LED-
33	L/R/VDIR
34	U/D/HDIR
35	XR
36	YD
37	XL
38	YU
39	LED+
40	LED+

L/R/VDIR	1	Set left to right scan direction
L/R/VDIR	0	Set right to left scan direction
U/D/HDIR	1	Set top to bottom scan direction
U/D/HDIR	0	Set bottom to top scan direction

深圳市柯达科电子科技有限公司
SHENZHEN STARTEK ELECTRONICS CO.,LTD

TOLERANCE(公差)		DRAWING NAME	KD050WVFLA072
		PARTS NO.	59050096A
TOLERANCE UNLESS	X.X±0.3	Drawn	Unit
OTHERWISE SPECIFIED	X.XX±0.2	Checked	mm
Scale 1:1		Approve	Page 1/1

B/L Circuit

K(-)
A(+)

NOTE:
1. DISPLAY TYPE:5.0",TFT-LCD,16.7M COLORS
2. DISPLAY MODE:NORMALLY BLACK/IPS
3. VIEWING DIRECTION:ALL
4. LCM DRIVER IC:SST7262 (COG)
   LCM Interface:4-Lane LVDS Interface
5. VDD:3.3V
6. OPERATING TEMP: -30°C TO 85°C
   STORAGE TEMP: -30°C TO 85°C
7. BACK LIGHT:LED WHITE, 16 LED, 40mA,25.6±0.3V
8. RoHS COMPLIANT.
9. "*"Critical Dimension;( )Reference Dimension..

RoV.	Revision content description	Date
V0	FIRST	2021.09.10

常 备 库 存
Stock For Sale

长 期 供 货
Long Time supply

支持小量
NO MOQ

品 种 齐 全
In Full Range

3. Input terminal Pin Assignment

NO.	SYMBOL	DISCRIPTION	I/O
1	NC	--	--
2	VDD	Supply voltage(3.3V).	P
3	VDD	Supply voltage(3.3V).	P
4	NC	--	--
5	RESET	Reset pin. The chip is in reset state when RESETB=0.	I
6	STBYB	Display power control PIN. H: Power ON. L: Power OFF. Internal pull down resistor 100K.	I
7	GND	Ground.	P
8	RXIN0-	- LVDS differential data input	I
9	RXIN0+	+ LVDS differential data input	I
10	GND	Ground.	P
11	RXIN1-	- LVDS differential data input	I
12	RXIN1+	+ LVDS differential data input	I
13	GND	Ground.	P
14	RXIN2-	- LVDS differential data input	I
15	RXIN2+	+ LVDS differential data input	I
16	GND	Ground.	P
17	RXCLKIN-	- LVDS differential clock input	I
18	RXCLKIN+	+ LVDS differential clock input	I
19	GND	Ground.	P
20	RXIN3-	- LVDS differential data input	I
21	RXIN3+	+ LVDS differential data input	I
22	GND	Ground.	P
23	NC	--	--

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24	NC	--	--
25	GND	Ground.	P
26	NC	--	--
27	NC	--	--
28	NC	--	--
29	NC	--	--
30	GND	Ground.	I
31	LED-	LED Cathode	P
32	LED-	LED Cathode	P
33	L/R/VDIR	Horizontal shift direction (source output) selection(NOTE1)	I
34	U/D/HDIR	Vertical shift direction (gate output) selection(NOTE1)	I
35	XR(NC)	Touch panel Right Glass Terminal	A/D
36	YD(NC)	Touch panel Bottom Film Terminal	A/D
37	XL(NC)	Touch panel LIFT Glass Terminal	A/D
38	YU(NC)	Touch panel Top Film Terminal	A/D
39	LED+	LED Anode	P
40	LED+	LED Anode	P

NOTE1

L/R	1	Set left to right scan direction
L/R	0	Set right to left scan direction.
U/D	1	Set top to bottom scan direction
U/D	0	Set bottom to top scan direction

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Stock For Sale　　Long Time supply　　NO MOQ　　In Full Range

4. LCD Optical Characteristics

4.1 Optical specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit.	Note
Contrast Ratio		CR	$\Theta=0$	800	1200	--		(1)(2)
Response time	Rising	T_R+T_F	Normal viewing angle	--	30	40	msec	(1)(3)
	Falling			--				
Color Gamut		S(%)		42	46	--	%	-
Color Filter Chromacicity	White	W_X		-0.04	0.306	+0.04		CA-310 Test
		W_Y			0.325			
	Red	R_X			0.592			
		R_Y			0.357			
	Green	G_X			0.357			
		G_Y			0.548			
	Blue	B_X			0.148			
		B_Y			0.099			
Viewing angle	Hor.	ΘL	CR>10	70	80	--		(1)(4)
		ΘR		70	80	--		
	Ver.	ΘU		70	80	--		
		ΘD		70	80	--		
Option View Direction			ALL					-

*The data comes from the LCD specification.

Measuring Condition

Measuring surrounding : dark room

Ambient temperature : 25±2₀C

15min. warm-up time.

Measuring Equipment

FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.

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Note (1): Definition of Viewing Angle :
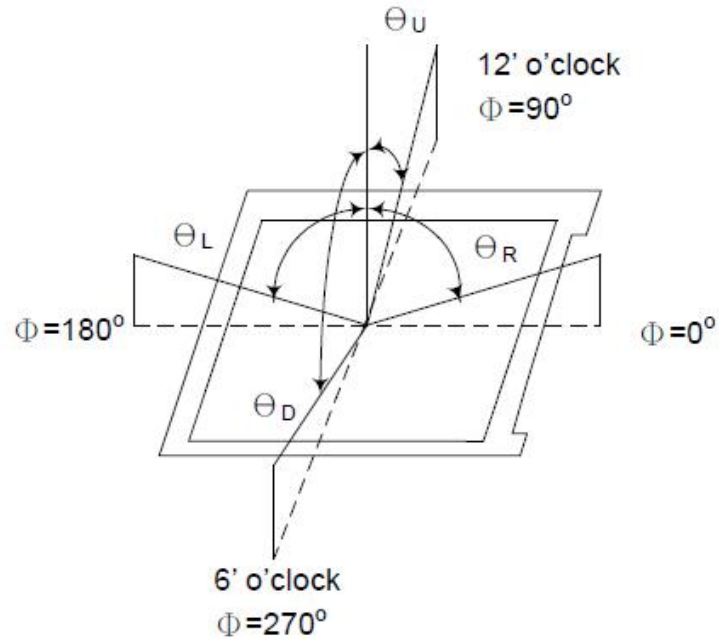
Note (2): Definition of Contrast Ratio(CR) :measured at the center point of panel

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

Note (3): Response Time
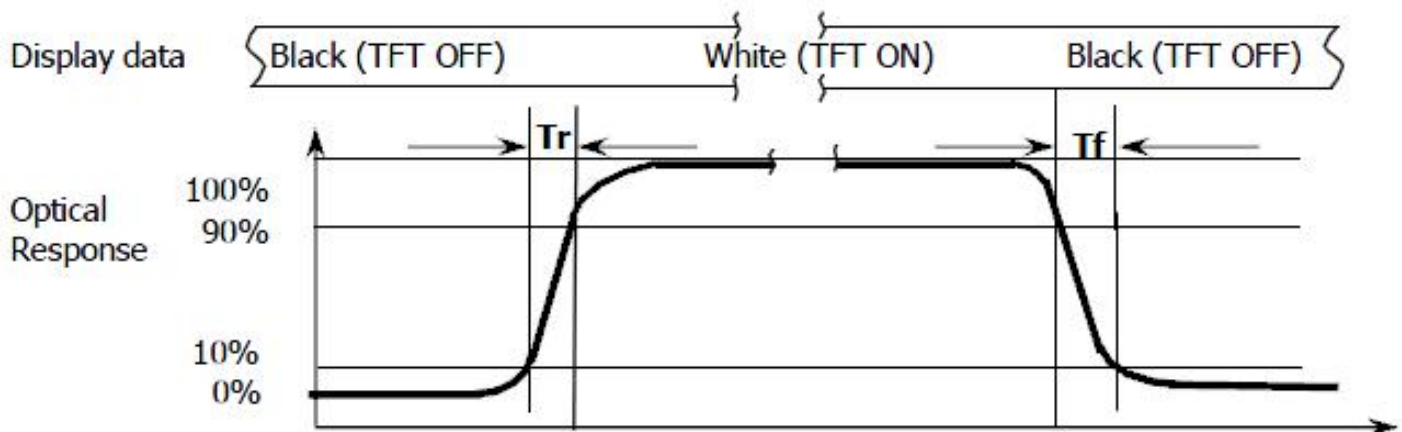
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Note (4): Definition of optical measurement setup

Photo-detector (BM-5A)

50cm

Field=1°

Center of panel

LCD panel
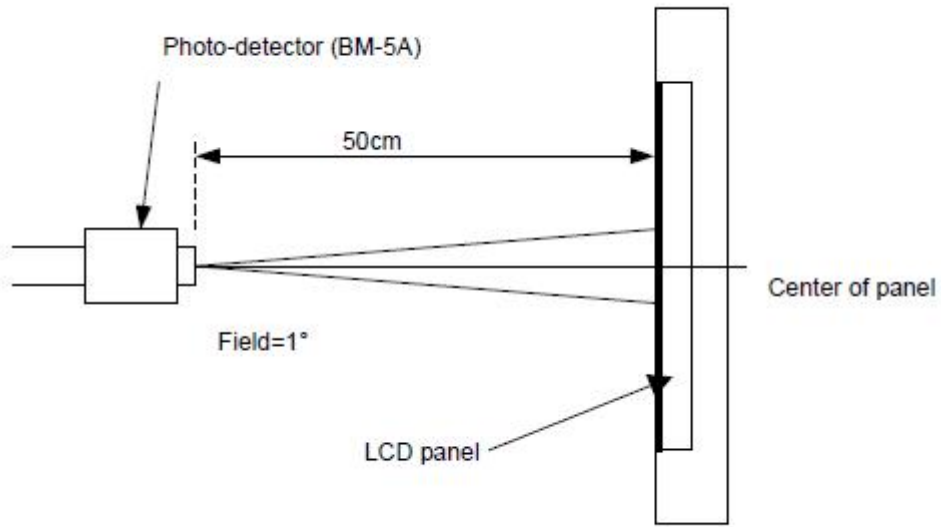
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5. Electrical Characteristics

5.1 Absolute Maximum Rating

Characteristics	Symbol	Min.	Max.	Unit	Note
Digital Supply Voltage	VDD	-0.3	4.0	V	Note1
Operating temperature	T_{OP}	-30	+85	℃	
Storage temperature	T_{ST}	-30	+85	℃	

NOTE1: If the absolute maximum rating of even is one of the above parameters is exceeded even momentarily, the quality of the product may be degraded. Absolute maximum ratings, therefore, specify the values exceeding which the product may be physically damaged. Be sure to use the product within the range of the absolute maximum ratings.

5.2 DC Electrical Characteristics

Characteristics		Symbol	Min.	Typ.	Max.	Unit	Note
LCM Supply Voltage		VDD	3.0	3.3	3.6	V	
LCM Normal mode Current		IDD	--	90	--	mA	
LVDS Interface	Differential Input Hight Threshold Voltage	VLVTH	--	--	100	mV	
	Differential Input Low Threshold Voltage	VLVTL	-100	--	--	mV	
RGB Interface		VIH	2.0	--	VDD	V	
		VIL	GND	--	0.8	V	

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Stock For Sale　　Long Time supply　　NO MOQ　　In Full Range

5.3 LED Backlight Characteristics

The back-light system is edge-lighting type with 16 chips LED

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Forward Current	I_F	30	40	--	mA	
Forward Voltage	V_F	--	25.6	--	V	
LCM Luminance	LV	850	900	--	cd/m2	Note3
LED life time	Hr	--	50000	--	Hour	Note1,2
Uniformity	Avg	80	--	--	%	Note3

Note1: LED life time (Hr) can be defined as the time in which it continues to operate under the condition:

Ta=25±3 ℃, typical IL value indicated in the above table until the brightness becomes less than 50%.

Note 2: The "LED life time" is defined as the module brightness decrease to 50% original brightness at

Ta=25℃ and IL=40mA. The LED lifetime could be decreased if operating IL is larger than 40mA. The

constant current driving method is suggested.

A(+) o ── ──o K(−)

B/L Circuit

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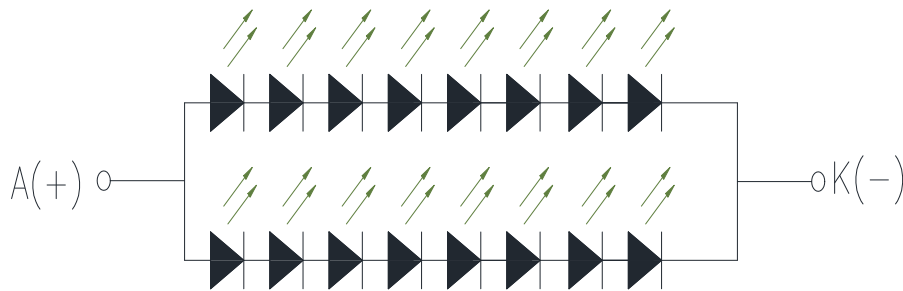
Note (3)   Luminance Uniformity of these 9 points is defined as below:
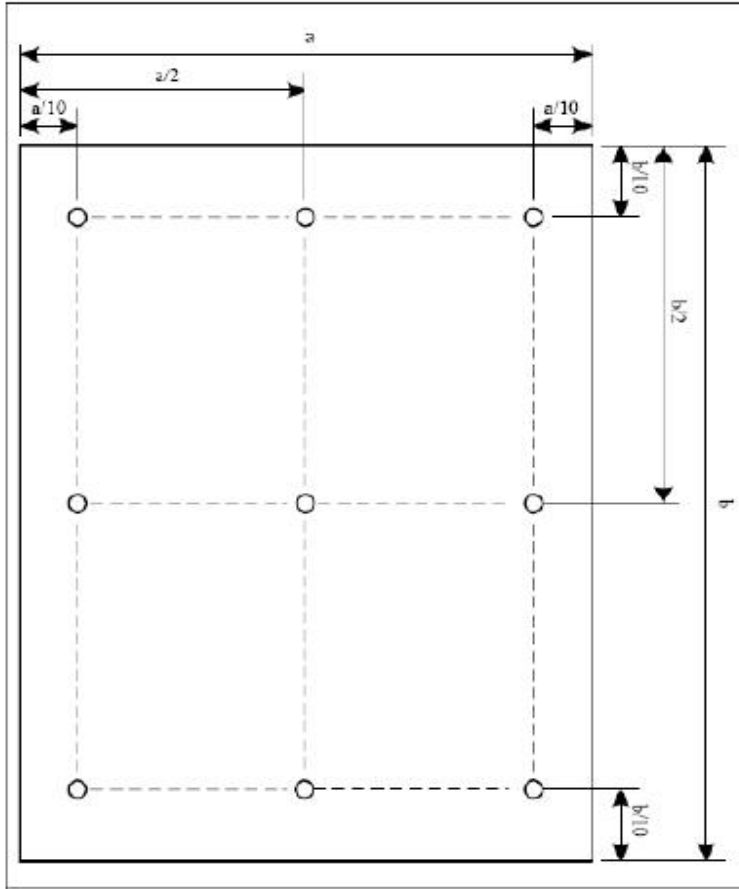
$$\text{Uniformity} = \frac{\text{minimum luminance in 9 points (1-9)}}{\text{maximum luminance in 9 points (1-9)}}$$

$$\text{Luminance} = \frac{\text{Total Luminance of 9 points}}{9}$$

6. LVDS Signal Timing Characteristics

6.1 AC Electrical Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Note
LVDS Differential input high Threshold voltage	RxVTH	--	--	+100	mV	RXVCM=1.2V
LVDS Differential input low Threshold voltage	RxVTL	-100	--	--	mV	
LVDS Differential input common mode voltage	RxVCM	0.7	--	1.6	V	
LVDDS Differential voltage	|VID|	200	--	600	mV	
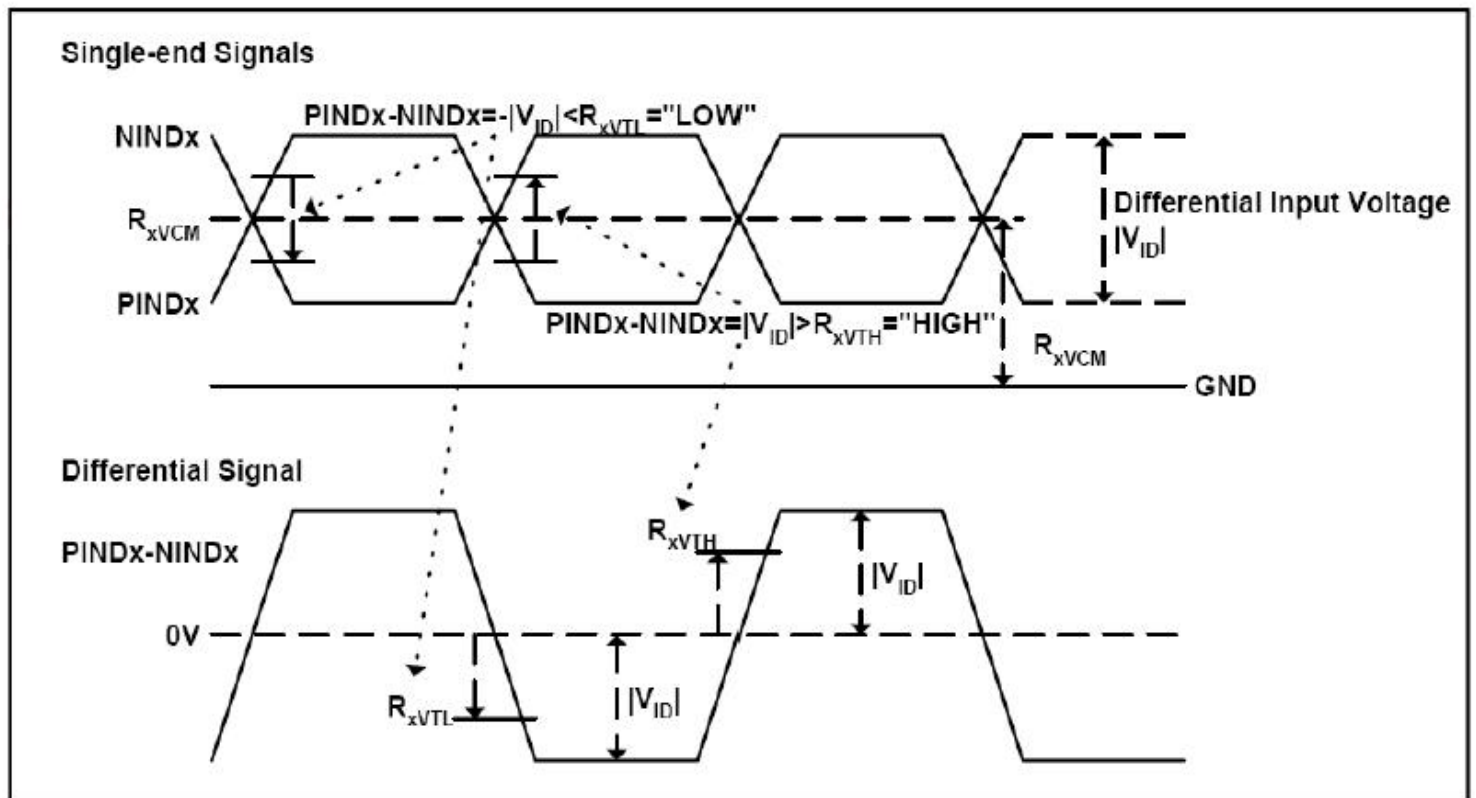
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6.2 Timing Table

Parallel 24-bit RGB Interface Timing Table							
Item		Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK Frequency		Fclk	23	25	27	MHz	
HSYNC	Period Time	Th	808	816	896	DCLK	
	Display Period	Thdisp		800		DCLK	
	Back Porch	Thbp	4	8	48	DCLK	
	Front Porch	Thfp	4	8	48	DCLK	
	Pulse Width	Thw	2	4	8	DCLK	
VSYNC	Period Time	Tv	488	496	504	HSYNC	
	Display Period	Tvdisp		480		HSYNC	
	Back Porch	Tvbp	4	8	12	HSYNC	
	Front Porch	Tvfp	4	8	12	HSYNC	
	Pulse Width	Tvw	2	4	8	HSYNC	
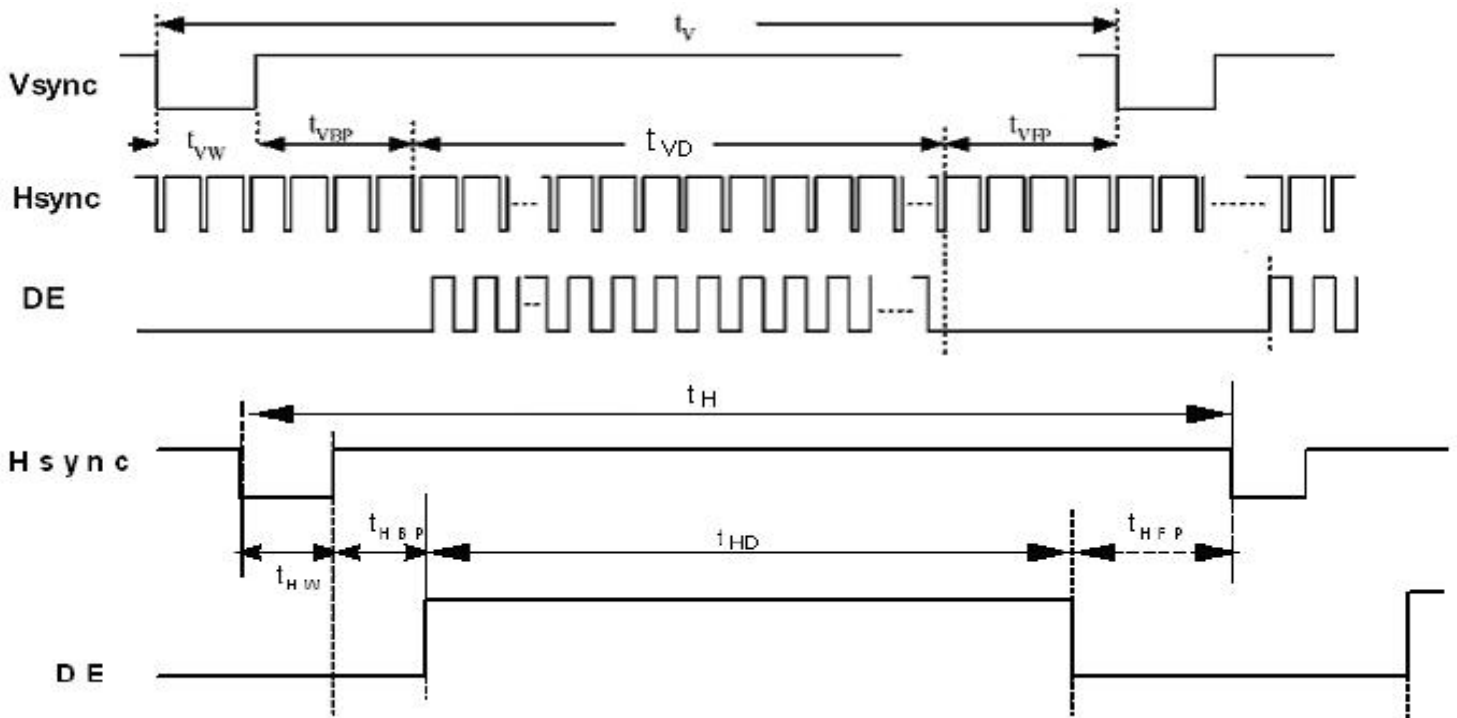
常 备 库 存 Stock For Sale	长 期 供 货 Long Time supply	支持小量 NO MOQ	品 种 齐 全 In Full Range

6.3 LVDS Data Input Format
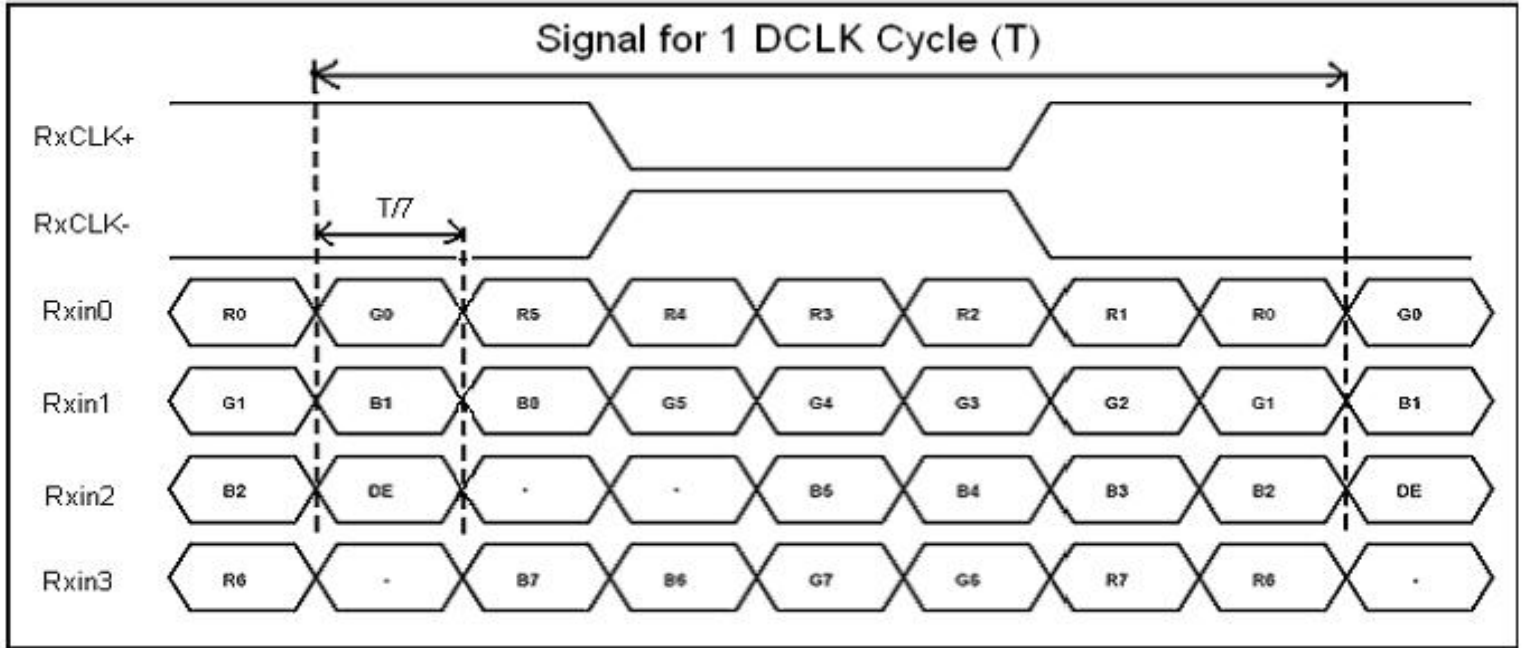
常 备 库 存 Stock For Sale	长 期 供 货 Long Time supply	支持小量 NO MOQ	品 种 齐 全 In Full Range

7. LCD Module Out-Going Quality Level

7.1 VISUAL & FUNCTION INSPECTION STANDARD

7.1.1 Inspection conditions

Inspection performed under the following conditions is recommended.

Temperature：25±5℃

Humidity： 65%±10%RH

Viewing Angle：Normal viewing Angle.

Illumination: Single fluorescent lamp (300 to 700Lux)

Viewing distance:30-50cm
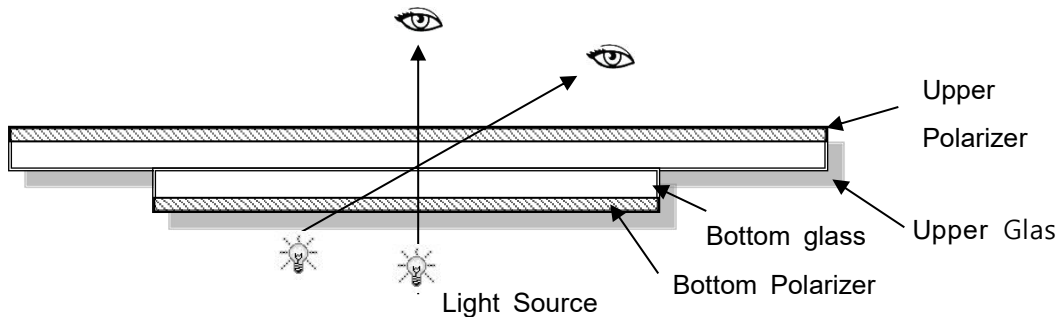
7.1.2 Definition
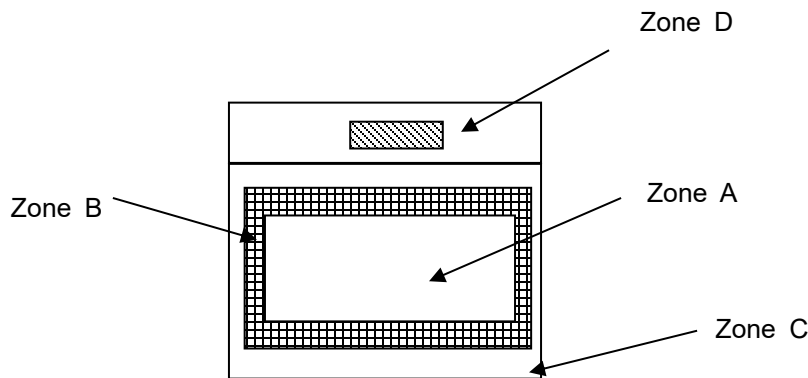
Zone A：Effective Viewing Area(Character or Digit can be seen)

Zone B：Viewing Area except Zone A

Zone C：Outside (Zone A+Zone B) which can not be seen after assembly by customer .)

Zone D：IC Bonding Area

Note:As a general rule ,visual defects in Zone C can be ignored when it doesn't effect product function or appearance after assembly by customer

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7.1.3 Sampling Plan

According to GB/T 2828-2003；, normal inspection, Class Ⅱ

AQL:

Major defect	Minor defect
0.65	1.5

LCD: Liquid Crystal Display , LCM: Liquid Crystal Module
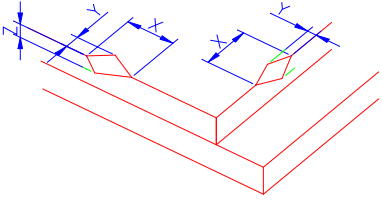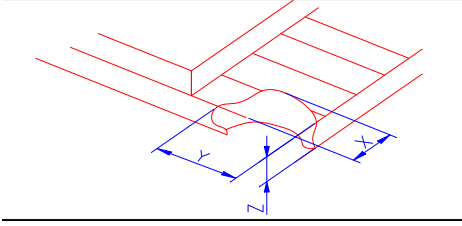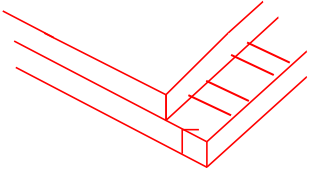
No	Items to be inspected	Criteria	Classification of defects
1	Functional defects	1) No display, Open or miss line 2) Display abnormally, Short 3) Backlight no lighting, abnormal lighting. etc…	Major
2	Missing	Missing components and etc…	
3	Outline dimension	Overall outline dimension beyond the drawing is not allowed,deformation and etc…	
4	Color tone	Color unevenness, refer to limited sample	Minor
5	Spot/Line defect	Light dot,Dim spot,(Note1) Polarizer Air Bubble, Polarizer accidented spot and etc…	
6	Soldering appearance	Good soldering , Peeling off is not allowed and etc…	
7	LCD/Polarizer	Black/White spot/line, scratch, crack, etc.	
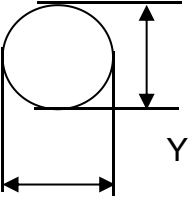
Note1: a) Light dot：Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern.
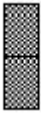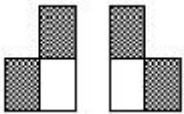
b) Dim dot: Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green, blue picture.

7.1.4 Criteria (Visual)

Number	Items	Criteria(mm)		
1.0　LCD Crack/Broken NOTE: X: Length Y: Width Z: Height L: Length of ITO, T: Height of LCD	(1) The edge of LCD broken			
		X	**Y**	**Z**
		≤3.0mm	<Inner border line of the seal	≤T
	(2)LCD corner broken			
		X	**Y**	**Z**
		≤3.0mm	≤L	≤T
	(3) LCD crack	Crack Not allowed		

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2.0

Spot defect

Y

X

$\Phi=(X+Y)/2$

① light dot（ black/white spot，pinhole, stain，etc.）

Zone Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.15	Ignore	Ignore	
0.15<Φ≤0.25	3(distance≧10mm)		
0.25<Φ≤0.4	2(distance≧10mm)		
Φ>0.4	0		

② Dim spot（light leakage、dent、dark spot，etc）

Zone Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.15	Ignore	Ignore	
0.15<Φ≤0.25	3(distance≧10mm)		
0.25<Φ≤0.4	2(distance≧10mm)		
Φ>0.4	0		

③ Polarizer accidented spot

Zone Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.2	Ignore		Ignore
0.2<Φ≤0.5	2(distance≧10mm)		
Φ>0.5	0		

④Polarizer Bubble

Zone Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.2	Ignore		Ignore
0.2<Φ≤0.4	2(distance≧10mm)		
0.4<Φ≤0.5	1		
Φ>0.5	0		

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| 3.0 | LCD Pixel defect | Pixel bad points |

Item	Zone A		Acceptable Qt
Bright dot	Random		N≤2
	2 dots adjacent		N≤0
	3 dots adjacent		N≤0
Dark dot	Random		N≤3
	2 dots adjacent		N≤0
	3 dots adjacent		N≤0
Distance	1. Minimum Distance Between Bright dots. 2. Minimum Distance Between dark dots 3. Minimum Distance Between dark and bright dot.		5mm
Total bright and dark dot			N≤4

Note:

A) Bright dot：Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern.

B) Dark dot: Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green, blue picture.

C) 2 dot adjacent = 1 pair = 2 dots
Picture:

2 dot adjacent   2 dot adjacent

2 dot adjacent (vertical)   2 dot adjacent (slant)

| 4.0 | Line defect (LCD /Polarizer backlight black/white line, scratch, stain) W: width, L : length N : Count | | | | | |

Width(mm)	Length(mm)	Acceptable Qty		
		A	B	C
Φ≤0.05	Ignore	Ignore		Ignore
0.05<W≤0.06	L≤5.0	N≤3		
0.06<W≤0.08	L≤4.0	N≤2		
W>0.08	Define as spot defect			

5.0	Electronic Components SMT.	Not allow missing parts，solderless connection，cold solder joint，mismatch，The positive and negative polarity opposite
6.0	Display color& Brightness.	1. Color：Measuring the color coordinates, The measurement standard according to the datasheet or samples. 2. Brightness：Measuring the brightness of White screen, The measurement standard according to the datasheet or Samples.
7.0	LCD Mura/Waving/ Hot spot	Not visible through 5% ND filter in 50% gray or judge by limit sample if necessary.

Criteria (functional items)

Number	Items	Criteria (mm)
1	No display	Not allowed
2	Missing segment	Not allowed
3	Short	Not allowed
4	Backlight no lighting	Not allowed

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| 常 备 库 存
 Stock For Sale | 长 期 供 货
 Long Time supply | 支持小量
 NO MOQ | 品 种 齐 全
 In Full Range |

8. Reliability Test Result

Item	Condition	Inspection after test
High Temperature Operating	85℃,96HR	Inspection after 2~4hours storage at room temperature, the sample shall be free from defects: 1.Air bubble in the LCD; 2.Non-display; 3.Missing segments/line; 4.Glass crack; 5.Current IDD is twice higher than initial value.
Low Temperature Operating	-30℃, 96HR	
High Temperature Storage	85℃, 96HR	
Low Temperature Storage	-30℃, 96HR	
High Temperature & High Humidity Operating	+60℃, 90% RH ,96 hours.	
Thermal Shock (Non-operation)	-30℃,30 min ↔ 85℃,30 min, Change time:5min 20CYC.	
ESD test	C=150pF, R=330,5points/panel Air:±8KV, 5times; Contact:±6KV, 5 times; (Environment: 15℃~35℃, 30%~60%).	
Vibration (Non-operation)	Frequency range:10~55Hz, Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z. (6 hours for total) (Package condition).	
Box Drop Test	1 Corner 3 Edges 6 faces,80㎝(MEDIUM BOX)	

Remark:

1.The test samples should be applied to only one test item.

2.Sample size for each test item is 5~10pcs.

3.For Damp Proof Test, Pure water(Resistance > 10MΩ) should be used.

4.In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judged as a good part.

5.Failure Judgment Criterion: Basic Specification, Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.

6. The color fading mura of polarizing filter should not care.

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9. Cautions and Handling Precautions

9.1 Handling and Operating the Module

(1) When the module is assembled, it should be attached to the system firmly.

Do not warp or twist the module during assembly work.

(2) Protect the module from physical shock or any force. In addition to damage, this may cause improper operation or damage to the module and back-light unit.

(3) Note that polarizer is very fragile and could be easily damaged. Do not press or scratch the surface.

(4) Do not allow drops of water or chemicals to remain on the display surface.

If you have the droplets for a long time, staining and discoloration may occur.

(5) If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.

(6) The desirable cleaners are water, IPA (Isopropyl Alcohol) or Hexane.

Do not use ketene type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.

(7) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs, or clothes, it must be washed away thoroughly with soap.

(8) Protect the module from static; it may cause damage to the CMOS ICs.

(9) Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.

(10) Do not disassemble the module.

(11) Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.

(12) Pins of I/F connector shall not be touched directly with bare hands.

(13) Do not connect, disconnect the module in the "Power ON" condition.

(14) Power supply should always be turned on/off by the item 6.1 Power On Sequence &6.2 Power Off Sequence

9.2 Storage and Transportation.

(1) Do not leave the panel in high temperature, and high humidity for a long time.

It is highly recommended to store the module with temperature from 0 to 35 ℃ and relative humidity of less than 70%

(2) Do not store the TFT-LCD module in direct sunlight.

(3) The module shall be stored in a dark place. When storing the modules for a long time, be sure to adopt effective measures for protecting the modules from strong ultraviolet radiation, sunlight, or fluorescent light.
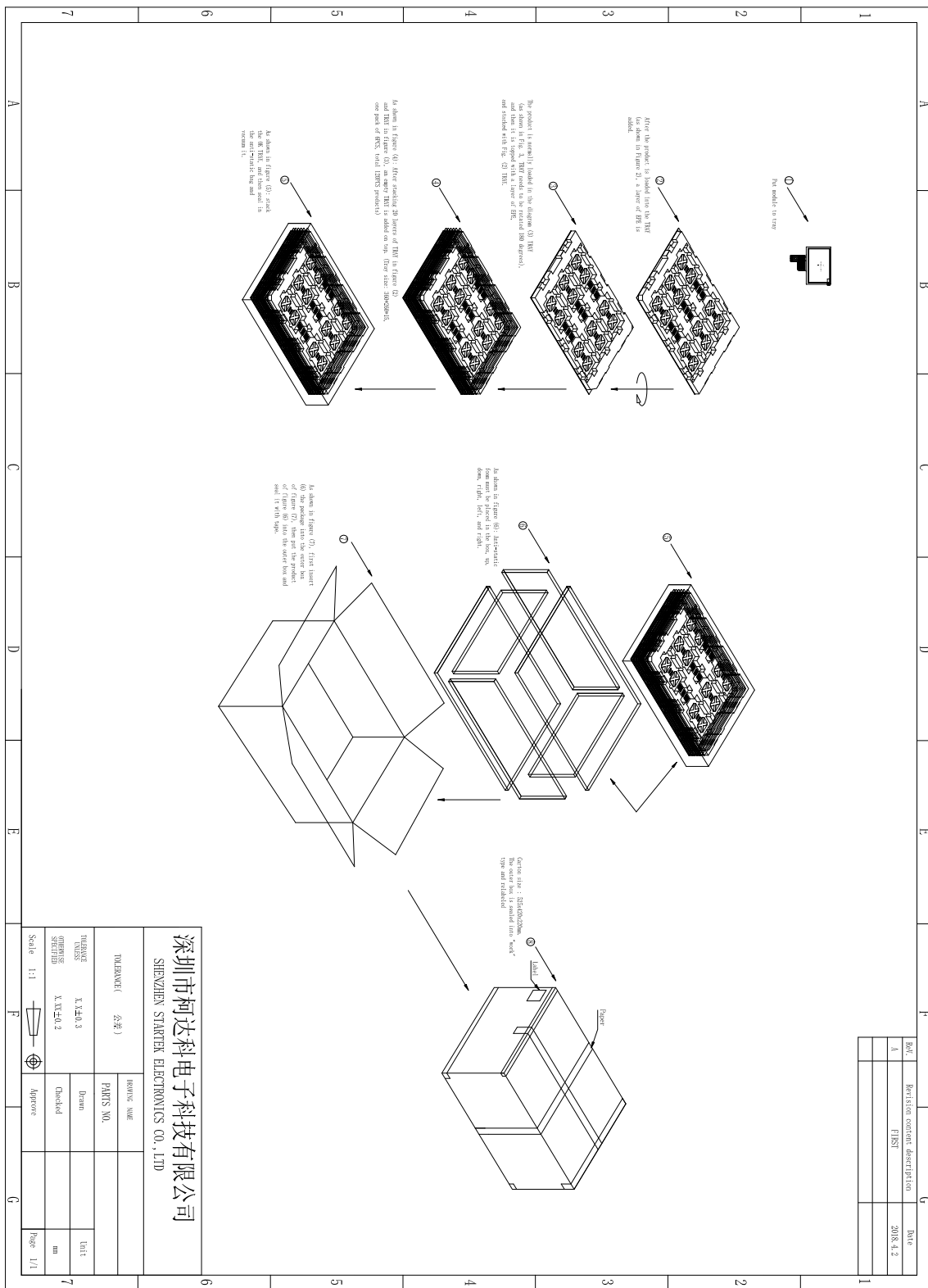
(4) It is recommended that the modules should be stored under a condition where no condensation is allowed. Formation of dewdrops may cause an abnormal operation or a failure of the module.

In particular, the greatest possible care should be taken to prevent any module from being operated where condensation has occurred inside.

(5) This panel has its circuitry FPC on the bottom side and should be handled carefully in order not to be stressed.

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常 备 库 存	长 期 供 货	支持小量	品 种 齐 全
Stock For Sale	Long Time supply	NO MOQ	In Full Range

10. Packing

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常 备 库 存　　　　　　长 期 供 货　　　　　　支持小量　　　　　　品 种 齐 全
Stock For Sale　　　　Long Time supply　　　　NO MOQ　　　　In Full Range