SPECIFICATION

FOR

TFT LCD MODULE

CUSTOMER : _____

CUSTOMER MODULE :_____

HG MODEL : HG018QQ002

□ Preliminary Specification

■Final Specification

Customer Confirmation column : Approved by :_____ Dept. :_____ Data :_____ Please return one of the copies of the specification with your signature to us within two weeks after you receive this document.If it is not returned,we will assume that you agree to the entire contents of this specification document.

Designed by	Checked by	Approved by

Product Summary

1. Basic description
2. Mechanical specifications
3. Mechanical dimension drawing
4. Electrical limit
5. Brightness characteristics & Power consumption
6. Definition of display screen position
7. Response time and contrast
8. Viewing angle width
9. Reliability test
10. Inspection standard
11. Packaging method

1.Basic description

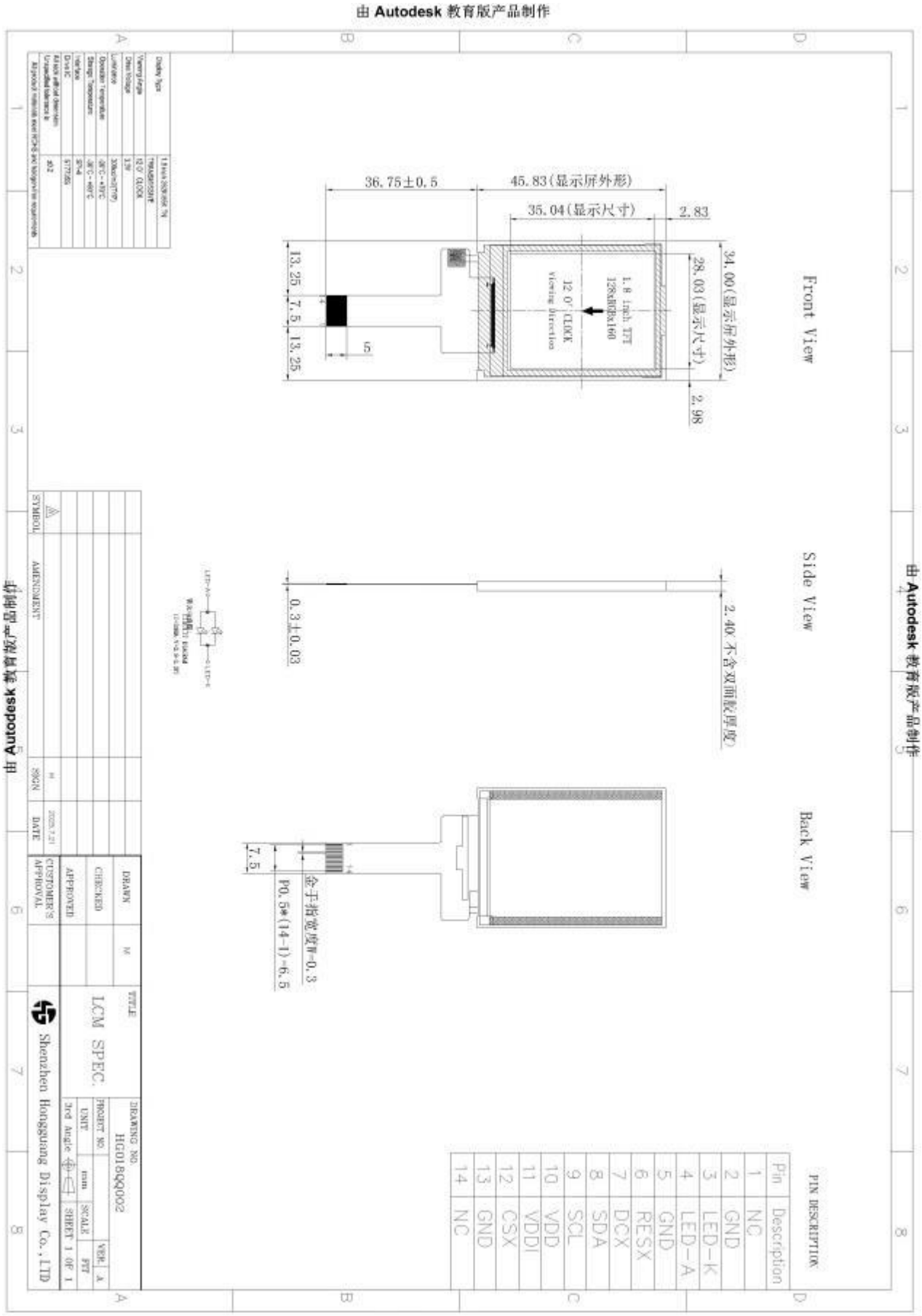
Product Name	**1.8 inch TFT Display**
Display mode	**Fully transparent ①**
Display format	**128 x RGB x 160 Graphic dot matrix ②**
Data format	**RGB565**
Display screen interface type	**4-wire SPI cross-port**
Viewing angle direction	**12 o'clock ③**
Display screen driver chip	**ST7735S (Taiwan Silicon Innovation)**

Note ① If the display in full transparency mode is displayed normally, the human eye cannot see the display content when the backlight is not lit. So when the display is working properly, the backlight must be lit. When in sleep mode, the backlight can be turned off to reduce power consumption.
(2) RGB indicates that each point of the true color LCD screen is composed of R (red), G (green), B (blue) 3 small points.
③ The perspective of the LCD screen is divided into four directions according to the clock we usually use: 3 o 'clock, 6 o 'clock, 9 o 'clock, 12 o 'clock; TFT display generally has three large viewing angles and one small viewing Angle; The viewing Angle direction is 12 o 'clock, which represents the smallest viewing Angle in the 12 o 'clock direction. See Section 8 View Width for details on view.

2.Machinery Specification

project	specification	dot
Outer dimensions of display screen	**34.00(W)*45.83(H)*2.40(D) (Thickness does not include wire and double-sided glue)**	mm
resolution ratio	**128 RGB*160**	dot
display size	**28.03(H)*35.04 (W)**	mm
pixel size	**0.219(H)*0.219(W)**	mm

3.机械尺寸图


由 Autodesk 教育版产品制作
Front View
Side View
Back View
36.75±0.5
45.83(显示屏外形)
35.04(显示尺寸)
2.83
34.00(显示屏外形)
28.03(显示尺寸)
2.98
13.25
7.5
13.25
5
1.8 inch TFT
128x(RGB)x160
12 O' CLOCK
Viewing Direction
0.3±0.03
2.40(不含双面胶厚度)
7.5
金手指宽度W=0.3
P0.5*(14-1)=6.5
PIN DESCRIPTION
Pin Description
1 NC
2 GND
3 LED-K
4 LED-A
5 GND
6 RESX
7 DCX
8 SDA
9 SCL
10 VDD
11 VDDI
12 CSX
13 GND
14 NC
SYMBOL AMENDMENT SIGN DATE
DRAWN
CHECKED
APPROVED
CUSTOMER'S APPROVAL
TITLE
LCM SPEC.
DRAWING NO.
HG018QQ002
PROJECT NO.
UNIT
mm
SCALE
SHEET 1 OF 1
VER. A
Shenzhen Hongguang Display Co.,LTD
由 Autodesk 教育版产品制作

- **4.** Limit of electrical

Project	Symbol	Least value	Max	Unit	Remark
IO Voltage (VDDI)	V	1.8	3.3	V	-
Analog voltage (VDD)	V	2.8	3.3	V	-
Operating temperature range	TOPR	-20	70	℃	-
Storage temperature range	TSTR	-30	80	℃	-

※ Note: VDDI and VDD can be directly connected together, sharing a set of voltage (2.8V~3.3V) power supply.

5.Brightness characteristics & power consumptio

Project	Symbol	Min	Typ	Max	Unit
Forward voltage of LED backlight	V_{LED}	3.0	3.1	3.3	V
LED backlight current	I_{LED}	-	30	-	mA
Display surface brightness	L_S	-	300	-	Cd/m^2
LED backlight uniformity	L_D	80	-	-	%
Total power consumption of display	P_{LCD}	-	0.099	-	W

※ Note :1.PLCD=VCI * (ILED+ILCD)

2. The backlight is composed of 2 LED lights, the typical current value of each LED light is 15mA, the total current of the 2 LED lights is: 2*15mA=15mA; In the design of products, to use the current limiting circuit (usually with a current limiting resistance of about 10 ohm), the total current of the backlight is limited to 30mA, to prevent the backlight from heating for a long time, resulting in irreversible permanent damage to the display and backlight.

3. When the VDD adopts 3.3V, the VDD, VDDI and LED-A(backlight positive) can be powered by the same set of voltages.

- **6.** Display footer definition

Pin number	Name of pin	Description of action	remarks
1	NC	suspend in midair	-
2	GND	Ground grounding foot	-
3	LED-K	Backlit negative power supply foot. It can be grounded through current limiting resistor when no control is required	-
4	LED-A	Backlight positive supply pin, voltage range :3.0-3.3V, typical value :3.1V	-
5	GND	Ground grounding foot	-
6	RESX	Display reset pin, low level reset	-
7	DCX	Display instruction or display data select foot DCX=1: Select display data or register parameters DCX=0: Select register instruction	-
8	SDA	SPI serial port data input	-
9	SCL	SPI serial port clock signal	-
10	VDD	Display analog power supply pin 2.8-3.3V	-
11	VDDI	Display I/O port power supply pin 1.8V-3.3V	-
12	CSX	Display driver chip select foot, low level enable	-
13	GND	Ground grounding foot	-
14	NC	Hanging in the air	-

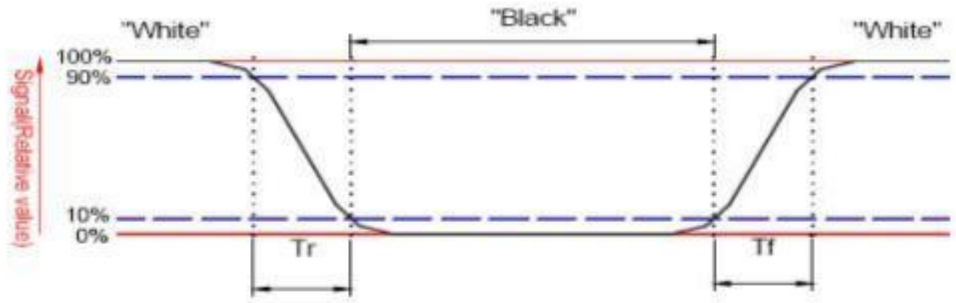
※ Note :1. When providing power to the backlight, it is necessary to connect a current limiting resistor to the positive or negative end of the backlight to limit the total current of the backlight within 30mA to avoid a long time

The display screen is permanently damaged due to excessive current heating. Backlight current limit is very important, the specification repeatedly reminded.

2. Display the data transmission sequence in the first place.

7. Response time and contrast

The Project	Symbol of	Conditions	Remarks			Unit of
			Minimum value	Typical value	Maximum value	
Time of response	Tr+Tf	θ=0°	30	60	-	millisecond
Degree of contrast	CR	θ=0°	200	300	-	-



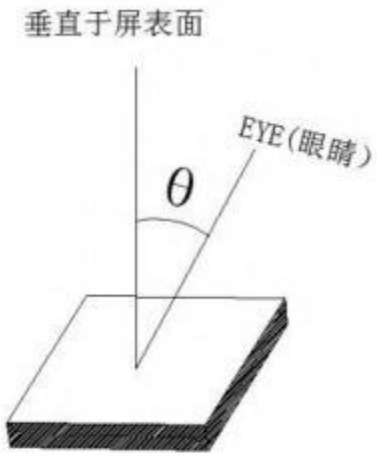
Response time diagram

$$\text{Contrast ratio (CR)} = \frac{\text{Brightness on the "white" state}}{\text{Brightness on the "black" state}}$$

Contrast calculation formula

8. View width

The Project	Symbol of	Conditions	Remarks			Unit of
			Minimum value	Typical value	Maximum value	
Width of view	12 o 'clock direction	CR≥10 Contrast is greater than or equal to 10	15	20	-	Degree of
	6 o 'clock direction	CR≥10 Contrast is greater than or equal to 10	40	45	-	
	9 o 'clock direction	CR≥10 Contrast is greater than or equal to 10	40	45	-	
	Three point direction	CR≥10 Contrast is greater than or equal to 10	40	45	-	



※ Note: (1) The directions of 3 o 'clock, 6 o 'clock, 9 o 'clock and 12 o 'clock of the display Angle of view are defined according to the clock we usually use.
(2) The Angle of view in the direction of 3, 6, 9 and 12 points refers to the Angle (θ) between the line of sight and eyes perpendicular to the screen surface.

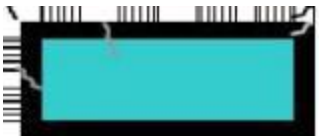
9. Reliability test

Serial number	Experimental project	Experimental environment	Standard of judgment
1	High temperature storage experiment	80℃*120 hours	After the test, the tested LCD samples must be placed in the room under normal temperature and humidity for more than 2~4hours before functional and appearance inspection. sample The following defects are not allowed: 1. There are bubbles in the module; 2. Loose sealing; 3. Do not display; 4. Skip a pen 5. Broken glass; 6. Current Idd is greater than 2 times of the initial value
2	Low temperature storage experiment	-30℃*120 hours	
3	High temperature and high humidity storage experiment	60℃*90%RH*120Hrs	
4	High temperature working experiment	70 ° C *72 hours	
5	Low temperature working experiment	-20℃*72 hours	
6	Hot and cold circulation storage experiment	-20 ℃(30 minutes)~25 ℃(5 minutes)~70℃(30 minutes) *10 cycling cycles	

※ Note: After the reliability test, the display must be placed at room temperature for 2~4 hours before power on, otherwise it will cause permanent damage to the display.

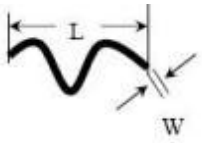
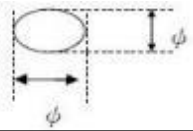
10. Inspection standards

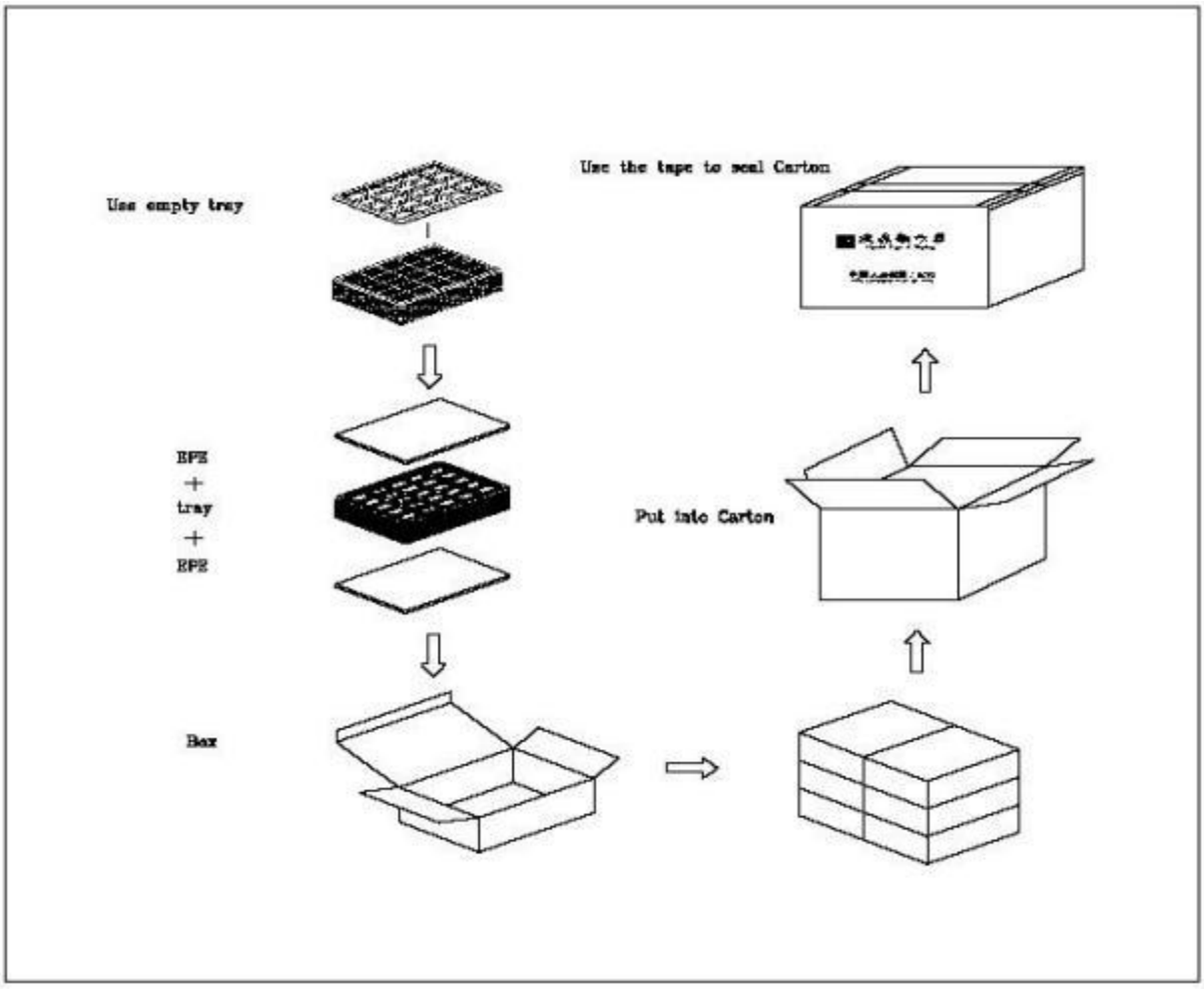
10.1 Appearance Defects

Serial number	Defective item	Criteria for judging	Remarks
1	The structure does not match (Material defects)	Take engineering drawings as the evaluation standard	
2	Break up (Material defects)	1) The display screen appears linear rupture 【 Reject 】 2) The display screen appears nonlinear rupture	
3	Deformation and damage of rubber frame (major defect)	The glue frame is flat and intact	

4	FPC soft cable cracking (major defect)	The wiring is flat and intact	

10.2 Functional Defects

Serial number	Defective item	Criteria for judging		Remarks
1	Plastic frame, liquid crystal glass, Polarizer scratch (Minor defect)	Specifications	Quantity allowed	Remark 1:L: length, W: width Remark 2: If such defects are not shown It can be ignored in the region 
		W≦0.03 mm	neglect	
		0.03 mm < W≦0.05 mm; L ≦ 3.0 mm	Two of them	
		0.05 mm < W≦0.1 mm; L≦3.0 mm	1 of them	
		W> 0.1 mm; L> 3.0 mm	0 of them	
2	Polarizer bubble, Concave point, convex point (Minor defect)	φ ≦0.2 mm	neglect	Remark 1: φ=(L+W)/2,L: length, W: width Remark 2: If such defects are not shown It can be ignored in the region
		0.2 mm < φ ≦0.3 mm	Two of them	
		0.3 mm < φ ≦0.5 mm	1 of them	
		0.5 mm < phi	0 of them	
3	Plastic frame, liquid crystal glass, Polarizer scratch (Minor defect)	φ ≦0.15 mm	neglect	Remark 1: φ=(L+W)/2,L: length, W: width Remark 2: Such defects can be ignored if they are not in the display area 
		0.15 mm < φ ≦0.25 mm	2	
		0.25 mm < φ ≦0.3 mm	1	
		0.3 mm < phi	0	
4	Polarizer pinhole (Minor defect)	φ ≦0.1 mm	neglect	Remark 1: φ=(L+W)/2,L: length, W: width Remark 2: The distance between two points. 5 millimetres
		0.1 mm < φ ≦0.25 mm	3	
		Phi & gt; 0.25 mm	0	

11.包装方法

显示屏出货包装示意图：