SPECIFICATION

AGM 0035WT

AGTechnologies

MODLE NO：
AGM 0035WT

RECORDS OF REVISION	DOC. FIRST ISSUE

VERSION	DATE	REVISED PAGE NO.	SUMMARY
0	2013/09/09		First issue
A	2014/09/23		Add size & Surface. Modify Pixel Data Format & Block Diagram & Package Specification.
B	2015/04/14		Add Resistance Touch Panel General Specifications.
C	2015/04/27		Modify Reliability.

Contents

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1.Summary

This technical specification applies to 3.45' color TFT-LCD panel. The 3.45' color TFT-LCD panel is designed for camcorder, digital camera application and other electronic products which require high quality flat panel displays. This module follows RoHS.

2.General Specifications

| Item	Dimension	Unit
Size	3.5	inch
Dot Matrix	320 x RGBx240(TFT)	dots
Module dimension	93.5 x 66.44 x 8.4	mm
Active area	70.08 x 52.56	mm
Dot pitch	0.073 x 0.219	mm
LCD type	TFT, Normally White, Transmissive	
View Direction	12 o'clock	
Gray Scale Inversion Direction	6 o'clock	
Backlight Type	LED ,Normally White	
Controller IC	SSD1963	
Interface	Digital 8080 family MPU	
With /Without TP	With RTP	
Surface	Anti-Glare	

*Color tone slight changed by temperature and driving voltage.

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3.Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	TOP	-20	—	+70	℃
Storage Temperature	TST	-30	—	+80	℃

Note: Device is subject to be damaged permanently if stresses beyond those absolute maximum ratings listed above

1. Temp. ≦60℃, 90% RH MAX. Temp.＞60℃, Absolute humidity shall be less than 90% RH at 60℃


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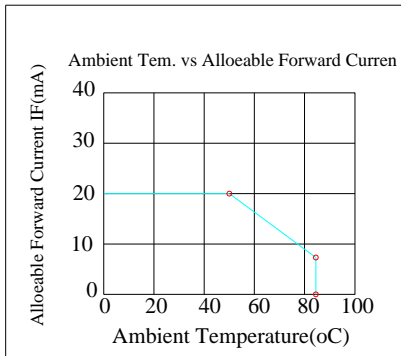
4.Electrical Characteristics

4.1. Operating conditions:

Item	Symbol	Condition	Min	Typ	Max	Unit	Remark
Supply Voltage For LCM	VDD	-	3.0	3.3	3.6	V	-
Power Supply For LCM	IDD	-	-	310	470	mA	Note1
Power Consumption	-	-	-	1020	1690	mW	VDD=3.3V

Note 1 : This value is test for VDD=3.3V , Ta=25 ℃ only

4.2. LED driving conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
LED current	-	-	20	-	mA	-
Power Consumption	-	348	384	408	mW	-
LED voltage	VBL+	17.4	19.2	20.4	V	Note 1
LED Life Time	-	-	50,000	-	Hr	Note 2,3,4

Note 1 : There are 1 Groups LED
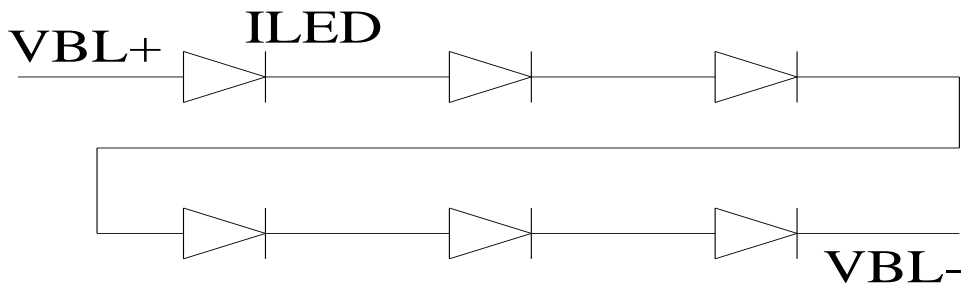
Note 2 : Ta = 25 ℃
Note 3 : Brightness to be decreased to 50% of the initial value
Note 4 : The single LED lamp case

5.DC CHARATERISTICS

Parameter	Symbol	Rating			Unit	Condition
		Min	Typ	Max		
Low level input voltage	V_{IL}	0	-	0.3VDD	V	
High level input voltage	V_{IH}	0.7VDD	-	VDD	V	

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6.Interface timing

6.1. 8080 Mode

The 8080 mode MCU interface consist of CS#, D/C#, RD#, WR#, Data bus. This interface use WR# to define a write cycle and RD# for read cycle. If the WR# goes low when the CS# signal is low, the data or command will be latched into the system at the rising edge of WR#. Similarly, the read cycle will start when RD# goes low and end at the rising edge of RD#.

6.2. 8080 Mode Write Cycle

Symbol	Parameter		Min	Typ	Max	Unit
fMCLK	System Clock Frequency		1	—	110	MHz
tMCLK	System Clock Period		1/ fMCLK	—	—	ns
tPWCSH	Control Pulse High Width	Write	13	1.5* tMCLK	—	ns
		Read	30	3.5* tMCLK		
tPWCSL	Control Pulse Low Width	Write (next write cycle)	13	1.5* tMCLK	—	ns
		Write (next read cycle)	80	9* tMCLK		
		Read	80	9* tMCLK		
tAS	Address Setup Time		1	—	—	ns
tAH	Address Hold Time		2	—	—	ns
tDSW	Write Data Setup Time		4	—	—	ns
tDHW	Write Data Hold Time		1	—	—	ns
tPWLW	Write Low Time		12	—	—	ns
tDHR	Read Data Hold Time		1	—	—	ns
tACC	Access Time		32	—	—	ns
tPWLR	Read Low Time		36	—	—	ns
tR	Rise Time		—	—	0.5	ns
tF	Fall Time		—	—	0.5	ns
tCS	Chip select setup time		2	—	—	ns
tCSH	Chip select hold time to read signal		3	—	—	ns

6.3. Parallel 8080-series Interface Timing Diagram(Write Cycle)

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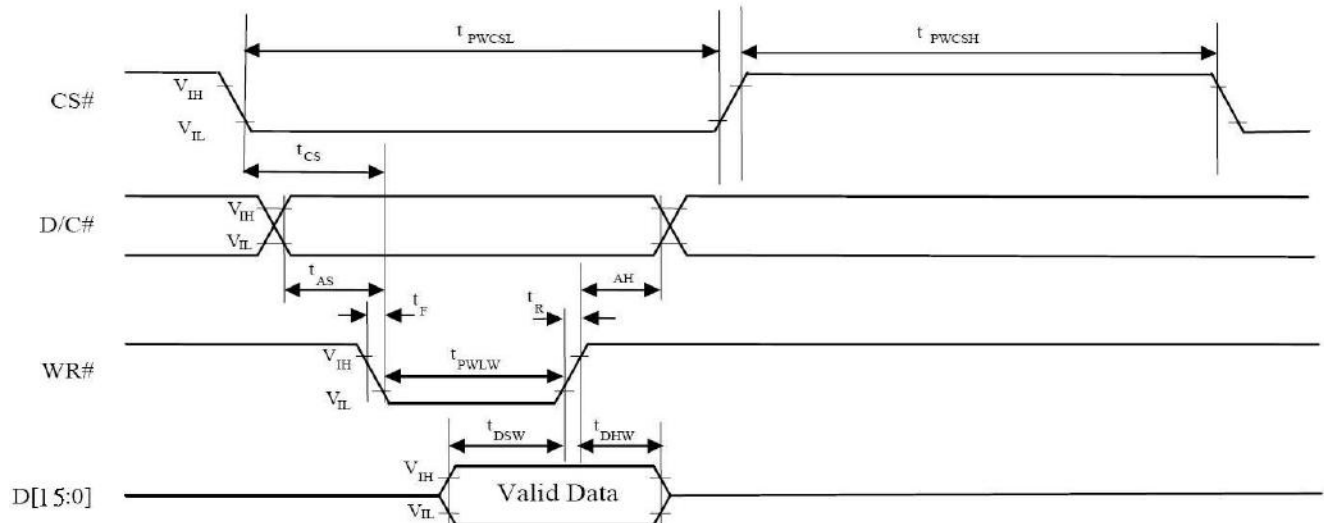
6.4. Parallel 8080-series Interface Timing Diagram (Read Cycle)
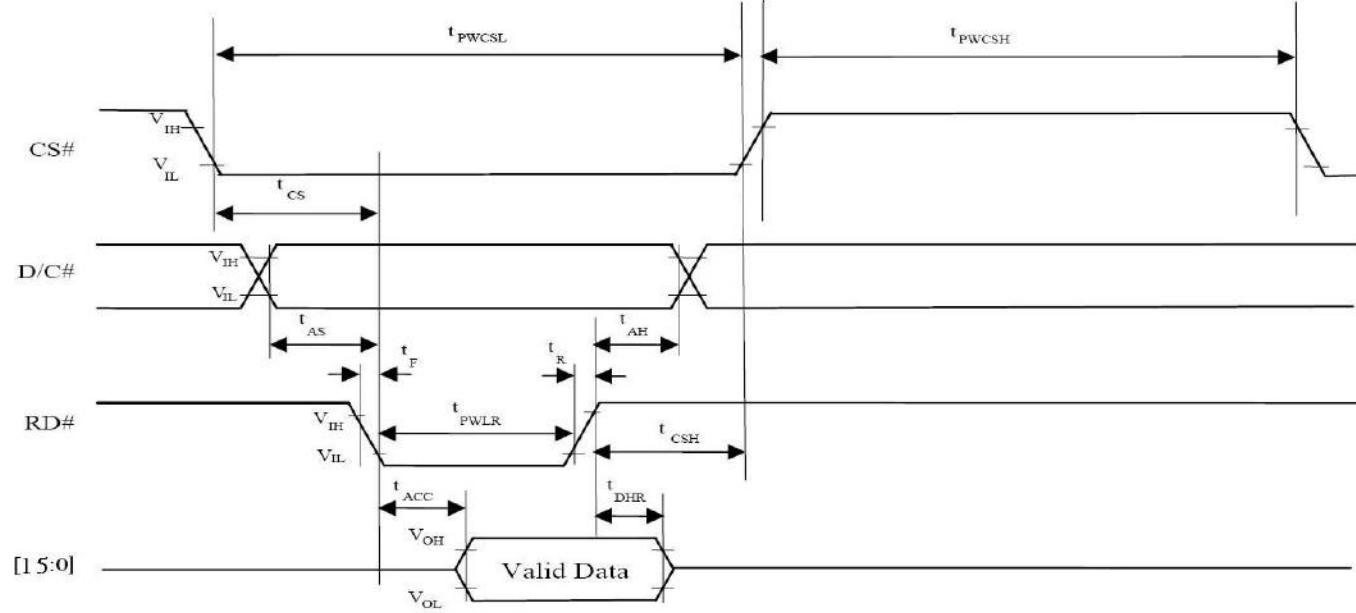
6.5. Pixel Data Format

Interface	Cycle	D[15]	D[14]	D[13]	D[12]	D[11]	D[10]	D[9]	D[8]	D[7]	D[6]	D[5]	D[4]	D[3]	D[2]	D[1]	D[0]
16 bits (565 format)	1st	R5	R4	R3	R2	R1	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1
16 bits	1st	R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0
	2nd	B7	B6	B5	B4	B3	B2	B1	B0	R7	R6	R5	R4	R3	R2	R1	R0
	3rd	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
8 bits	1st									R7	R6	R5	R4	R3	R2	R1	R0
	2nd									G7	G6	G5	G4	G3	G2	G1	G0
	3rd									B7	B6	B5	B4	B3	B2	B1	B0

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7.Optical Characteristics

Item		Symbol	Condition.	Min	Typ.	Max.	Unit	Remark
Response time		Tr	$\theta=0°$ 、 $\Phi=0°$	-	10	-	ms	Note 3,5
		Tf		-	15	-	ms	
Contrast ratio		CR	At optimized viewing angle	300	350	-	-	Note 4,5
Color Chromaticity	White	Wx	$\theta=0°$ 、 $\Phi=0$	0.26	0.31	0.36	-	Note 2,6,7
		Wy		0.28	0.33	0.38	-	-
Viewing angle (Gray Scale Inversion Direction)	Hor.	Θ R	CR $\geqq$ 10	-	55	-	Deg.	Note 1
		Θ L		-	55	-		
	Ver.	Φ T		-	45	-		
		Φ B		-	50	-		
Brightness		-	-	250	300	-	cd/m^2	Center of display

Ta=25±2℃, IL=20mA

Note 1: Definition of viewing angle range
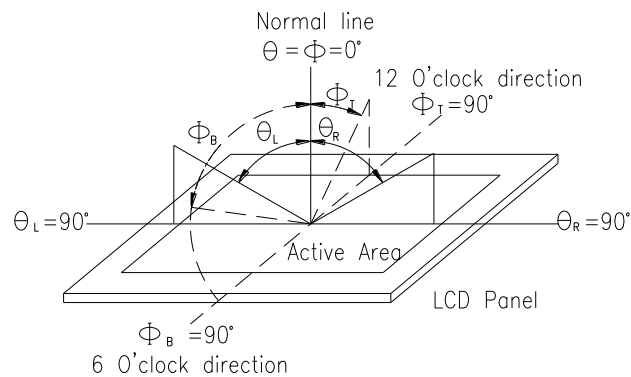
Fig. 8.1. Definition of viewing angle

Note 2: Test equipment setup:
After stabilizing and leaving the panel alone at a driven temperature for 10 minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7orBM-5 luminance meter 1.0° field of view at a distance of 50cm and normal direction.
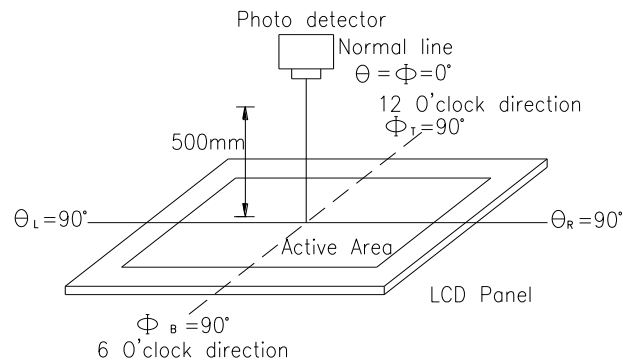

Fig. 8.2. Optical measurement system setup

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Note 3: Definition of Response time:
The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time, Tr, is the time between photo detector output intensity changed from 90% to 10%. And fall time, Tf, is the time between photo detector output intensity changed from 10% to 90%
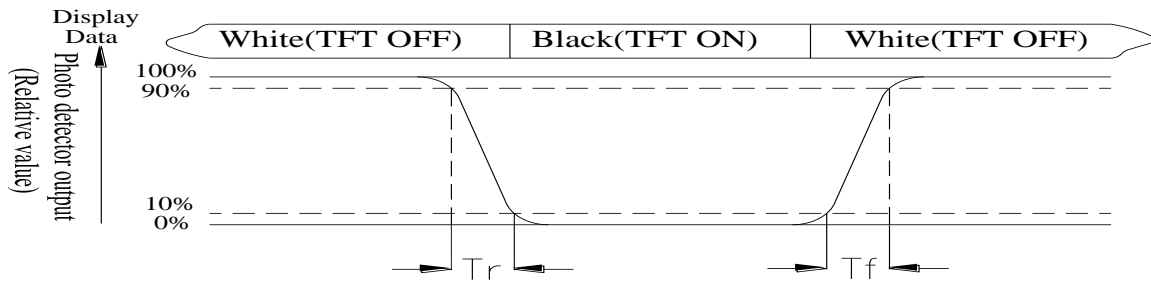
Note 4: Definition of contrast ratio:
The contrast ratio is defined as the following expression.

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

Note 5: White Vi = Vi50 ± 1.5V
Black Vi = Vi50 ± 2.0V
"±" means that the analog input signal swings in phase with VCOM signal.
"±" means that the analog input signal swings out of phase with VCOM signal.
The 100% transmission is defined as the transmission of LCD panel when all the input terminals of module are electrically opened.

Note 6: Definition of color chromaticity (CIE 1931)
Color coordinates measured at the center point of LCD

Note 7: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

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8.Interface

8.1. LCM PIN Definition

Pin	Symbol	Function	Remark
1	GND	System ground pin of the IC. Connect to system ground.	
2	VDD	Power Supply : +3.3V	
3	BL_E	Backlight control signal , H: On \ L:Off	
4	D/C	Data/Command select	
5	WR	Write strobe signal	
6	RD	Read strobe signal	
7	DB0	Data bus	
8	DB1	Data bus	
9	DB2	Data bus	
10	DB3	Data bus	
11	DB4	Data bus	
12	DB5	Data bus	
13	DB6	Data bus	
14	DB7	Data bus	
15	CS	Chip select	
16	RES	Hardware reset	
17	NC	No connect	
18	NC	No connect	
19	NC	No connect	
20	NC	No connect	

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9. Block Diagram

User Connector

Control board

LCD Panel

Power supply — VDD,GND

Control Signal — C/S#, D/C#, RD#(E), WR#(R/W)

If 8 bit [7:0] / If 16 bit [15:0] — Data Bus

SSD1963

MCU Interface

Registers

LCD Controller

Rotation/Mirror

DBC

Frame Buffer

System Clock and Reset Mgr

Clock Generator

LCD Interface

VDD — VCC
LFRAME — VS
LLINE — HS
LSHIFT — PLCK
LDATA〔23：0〕RGB 24 Bit
LDEN — DE
RESET — RESET

3.5"
320(RGB)x240

Reset — RES#

RTP Signal

XL,YU,XR,YD — RTP

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10.Reliability

Content of Reliability Test (Wide temperature, -20℃~70℃)

Environmental Test			
Test Item	**Content of Test**	**Test Condition**	**Note**
High Temperature storage	Endurance test applying the high storage temperature for a long time.	80℃ 200hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30℃ 200hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	70℃ 200hrs	——
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-20℃ 200hrs	1
High Temperature/ Humidity Operation	The module should be allowed to stand at 60℃,90%RH max	60℃,90%RH 96hrs	1,2

Thermal shock resistance	The sample should be allowed stand the following 10 cycles of operation
	
	    -20℃ 25℃ 70℃
	
	    30min 5min 30min
	    1 cycle
		-20℃/70℃
		10 cycles
			——

Vibration test	Endurance test applying the vibration during transportation and using.	Total fixed amplitude : 15mm Vibration Frequency : 10~55Hz One cycle 60 seconds to 3 directions of X,Y,Z for Each 15 minutes	3
Static electricity test	Endurance test applying the electric stress to the terminal.	VS=800V, RS=1.5kΩ CS=100pF 1 time	——

Note1: No dew condensation to be observed.
Note2: The function test shall be conducted after 4 hours storage at the normal
      Temperature and humidity after remove from the test chamber.
Note3: The packing have to including into the vibration testing.

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11.Touch Panel Information

1	XR
2	YD
3	XL
4	YU
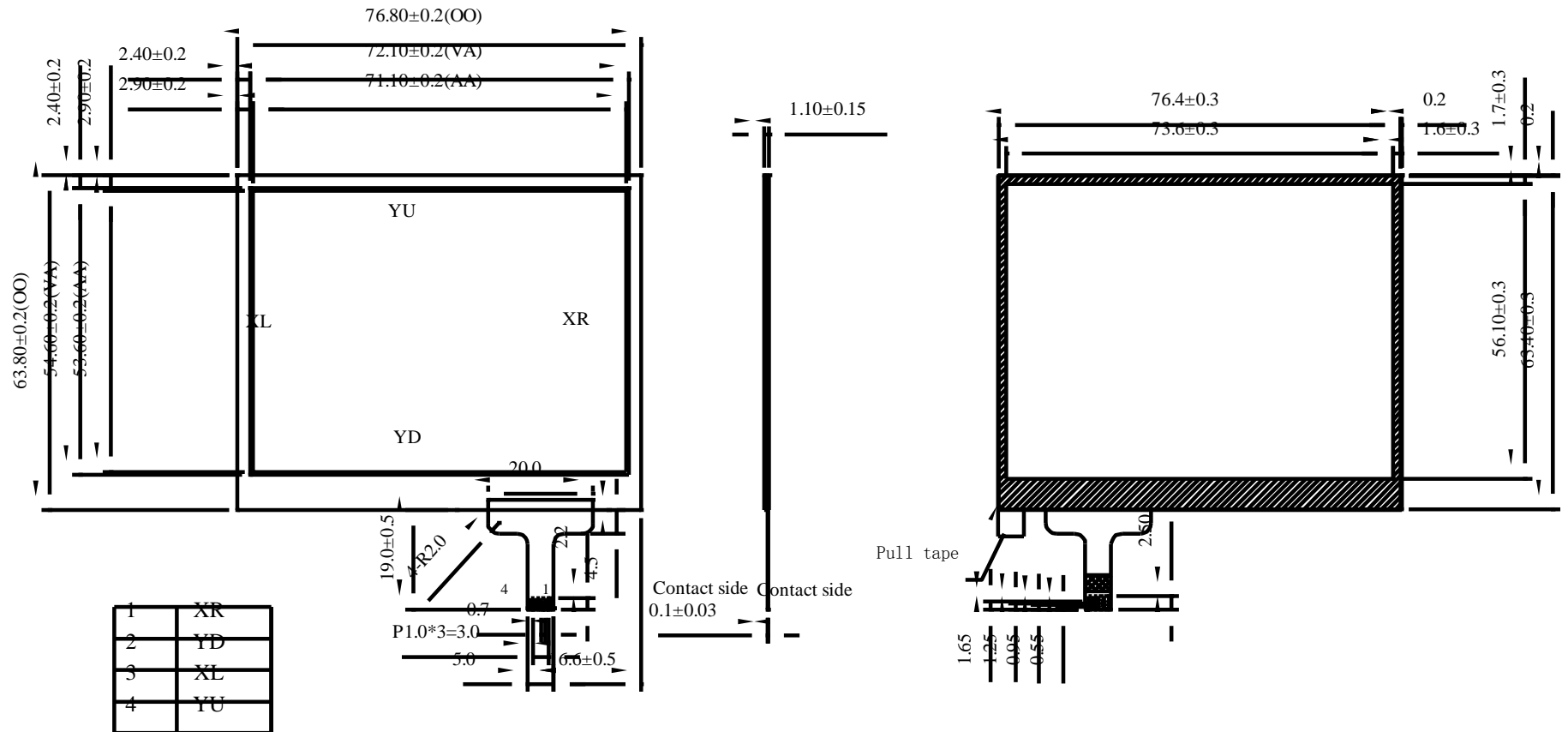
Non-Proper Ways to handle the touch screen

1. Do not pull or crease the tail of the touch screen.
2. Tails, unless the drawing calls out for a bend, are to be free of permanent creases in the polyester, slight crease lines in the adhesive tail

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11.1. Resistance Touch Panel General Specifications

Item	Description
Driving condition	DC5V
Operating force	60~150g
Linearity max	≤±1.5%
Insulating resistance	＞20MΩ，25V(DC)
Light transparence	70%
Structure type	ITO Film/ITO Glass(F/G)
Surface Hardness	3H typ
Pen Hitting Durability (with the silicon rubber)	＞1000,000 times
X resistance	200~1100Ω
Y resistance	200~1100Ω

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12.Contour Drawing

The non-specified tolerance of dimension is ±0.3mm.

DETAIL"A"
SCALE 2X

SCALE 1:100

PIN NO.	SYMBOL
1	GND
2	VDD
3	BL_E
4	D/C
5	WR
6	RD
7	DB0
8	DB1
9	DB2
10	DB3
11	DB4
12	DB5
13	DB6
14	DB7
15	CS
16	RES
17	NC
18	NC
19	NC
20	NC

PIN OUT	
1	XR
2	YD
3	XL
4	YU

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16
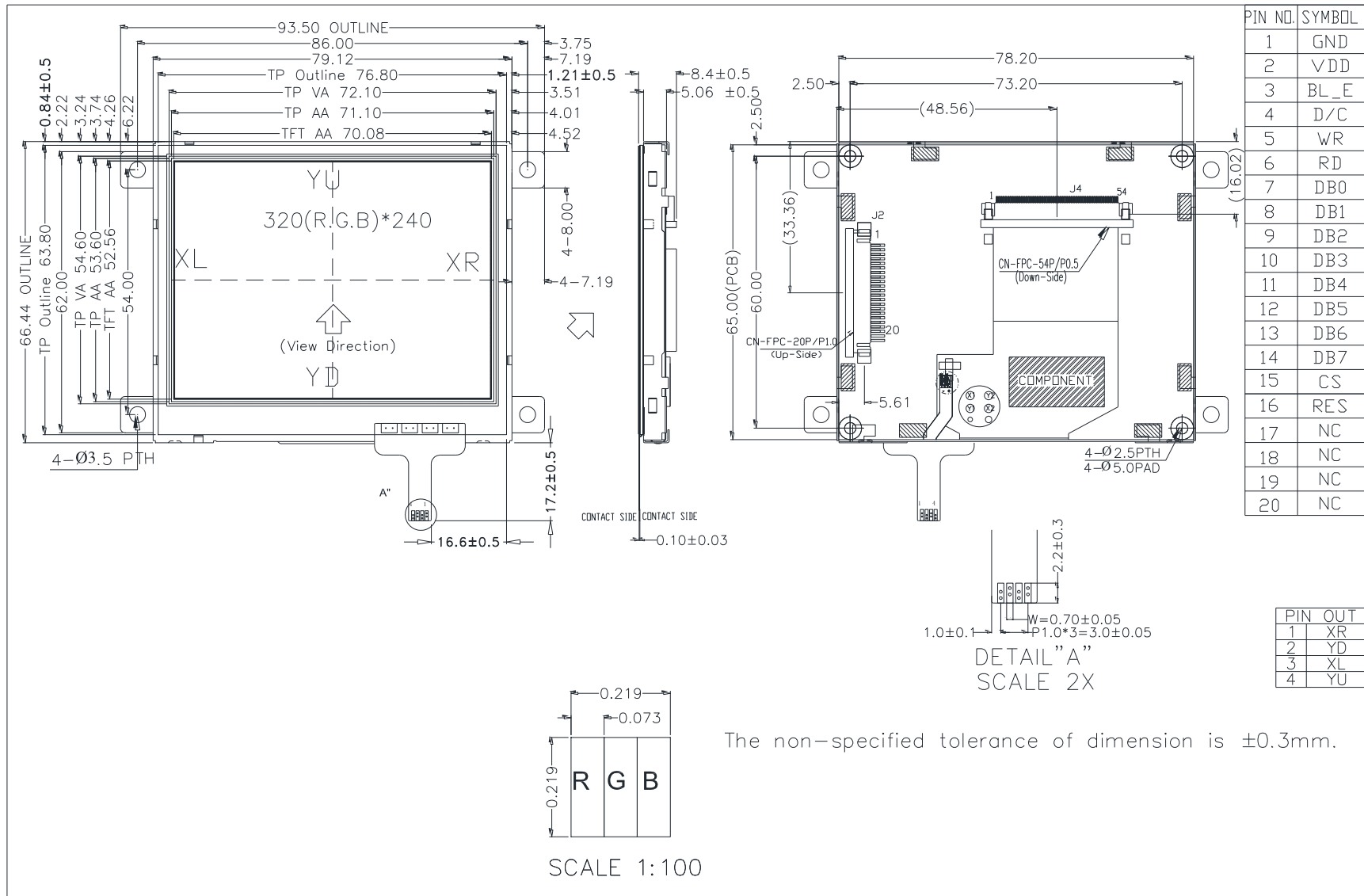
13.Initial Code For Reference

```
void Initial_SSD1963()
{

          Write_Command(0x01);
          Delay_ms(10);
          Write_Command(0xe0);
          Write_Parameter(0x01);
          Delay_ms(5);
          Write_Command(0xe0);
          Write_Parameter(0x03);
          Delay_ms(5);

          Write_Command(0xb0);
          Write_Parameter(0x0c);
          Write_Parameter(0x80);
          Write_Parameter(0x01);
          Write_Parameter(0x3f);
          Write_Parameter(0x00);
          Write_Parameter(0xef);
          Write_Parameter(0x00);

          Write_Command(0xf0);
          Write_Parameter(0x00);

          Write_Command(0xe2);
          Write_Parameter(0x1d);
          Write_Parameter(0x02);
          Write_Parameter(0x54);

          Write_Command(0xe6);
          Write_Parameter(0x00);
          Write_Parameter(0xdd);
          Write_Parameter(0xde);

          Write_Command(0xb4);
          Write_Parameter(0x01);
          Write_Parameter(0x98);
          Write_Parameter(0x00);
          Write_Parameter(0x44);
          Write_Parameter(0x14);
          Write_Parameter(0x00);
          Write_Parameter(0x00);
          Write_Parameter(0x00);

          Write_Command(0xb6);
          Write_Parameter(0x01);
          Write_Parameter(0x06);
          Write_Parameter(0x00);
```

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```
        Write_Parameter(0x12);
        Write_Parameter(0x04);
        Write_Parameter(0x00);
        Write_Parameter(0x00);

        Write_Command(0x2a);
        Write_Parameter(0x00);
        Write_Parameter(0x00);
        Write_Parameter(0x01);
        Write_Parameter(0x3f);

        Write_Command(0x2b);
        Write_Parameter(0x00);
        Write_Parameter(0x00);
        Write_Parameter(0x00);
        Write_Parameter(0xef);

        Write_Command(0x29);
        Write_Command(0x2c);
}
```

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