TFT DISPLAY SPECIFICATION

WINSTAR Display Co.,Ltd.
華凌光電股份有限公司

Winstar Display Co., LTD
華凌光電股份有限公司
WEB: https://www.winstar.com.tw E-mail: sales@winstar.com.tw

SPECIFICATION

CUSTOMER : _____

MODULE NO.: WFN0180A2S0XASNC000

APPROVED BY: **(FOR CUSTOMER USE ONLY)**	**PCB VERSION:** **DATA:**

SALES BY	APPROVED BY	CHECKED BY	PREPARED BY
			葉虹蘭
ISSUED DATE: 2025/06/26			

TFT Display Inspection Specification: https://www.winstar.com.tw/technology/download.html
Precaution in use of TFT module: https://www.winstar.com.tw/technology/download/declaration.html

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MODLE NO：

RECORDS OF REVISION			DOC. FIRST ISSUE
VERSION	DATE	REVISED PAGE NO.	**SUMMARY**
0	2025/03/31		First issue
A	2025/05/05		Modify CTP Support Operation
B	2025/06/26		Add backlight tape

Contents

1.Module Classification Information

W	F	N	0180	A2	S	0X	A	S	N	C	0	00
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬

①	Brand：WINSTAR DISPLAY CORPORATION
②	Display Type：F→TFT Type, J→Custom TFT
③	N: Normal　E：EFD　M：MIP
④	Display Size：1.8” TFT
⑤	Model serials no.

⑥ Backlight Type：

F：	CCFL, White	T：	LED, White
S：	LED, High Light White	Z：	Nichia LED, White
N：	With out Backlight	A：	Front Light

⑦ LCD Polarize Type/ Temperature range/ Gray Scale Inversion Direction

Operating Temperature	Normal temperature				Super Wide temperature					
LCD tape	TN		IPS	VA	TN				IPS	VA
View angle	6H	12H			6H	12H	O-Film	OD-Film		
Reflective	AA	-	-	AT	AN	-	-	-	AW	AV
Transflective	0B	0E	-	02	0M	0P	-	-	08	04
Transmissive	0C	0F	0A	0T	0N	0Q	0R	0S	0W	0V

Operating Temperature	Wide temperature									
LCD tape	TN								IPS	VA
View angle	6H	12H	2H	3H	9H	O-Film	OD-Film	All View		
Reflective	AG	AJ	AB	-	-	-	-	05	AY	AX
Transflective	0H	0K	-	0G	0D	0U	-	-	07	03
Transmissive	0I	0L	-	-	-	0Z	0J	-	0Y	0X

⑧

A：	TFT LCD	G：	TFT+ Screw holes
B：	TFT+ Screw holes+ Control board	H：	TFT+ D/V board
C：	TFT+ Screw holes + A/D board	I：	TFT+ Screw holes +D/V board
D：	TFT+ Screw holes + A/D board + Control board	J：	TFT+ Power board
E：	TFT+ Screw holes + Power board	Z：	TFT+ Power board (Embedded)
F：	TFT+ Control board		

⑨

A：Analog	B：6-bits parallel	D：Digital	E：eDP
L：LVDS	M：MIPI	S：SPI	

⑩ Interface:

A：8Bit	B：16Bit	E：eDP	H：HDMI	I：I2C Interface	M：MIPI
N：Without Control board	P：DP	R：RS232	S：SPI	U：USB	

⑪ TS:

A：	CTP + Optical bonding	B：	CTP + USB	C：	CTP
D：	CTP + USB + Optical bonding	E：	RTP + Optical bonding	F：	CG + Optical bonding
H：	CTP + Only G-sensor	J：	CTP + Only G-sensor + USB	L：	CTP+ Hover Touch
N：	Without TS	Q：	in-cell	R：	on-cell
T：	RTP	U：	CG	V：	in-cell + CG
W：	on-cell + CG				

⑫	Version:
⑬	Serial No.: Serial number (00~99)

2.Summary

WFN0180A2 is a 1.77-inch LCD cell with thin film transistors as active elements and contains 128(H) X 160(V) pixels. Each pixel is divided into red, green and blue dot, which are arranged in vertical stripe. The cell is normally black mode, and can be applied to the transmission type display.

3.General Specification

Item	Dimension	Unit
Size	1.77	inch
Dot Matrix	128 x RGB x 160(TFT)	dots
Module dimension	36.5(W) x 47.0(H) x 4.73 (D)	mm
Active area	28.032 x 35.040	mm
Pixel pitch	0.219 x 0.219	mm
LCD type	TFT, Normally Black, Transmissive	
View Angle	80/80/80/80	
Aspect Ratio	Portrait	
TFT IC	NV3023B or equivalent	
TFT Interface	SPI	
CTP Driver IC	FT6336U or equivalent	
CTP Support Operation	Support single-finger touch & gesture	
CTP Interface	I2C	
CTP FW Version	0x02	
CTP Resolution	128*160	
Backlight Type	LED,Normally White	
With /Without TP	With CTP	
Surface	Glare	

*Color tone slight changed by temperature and driving voltage.

4.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℃

5.Electrical Characteristics

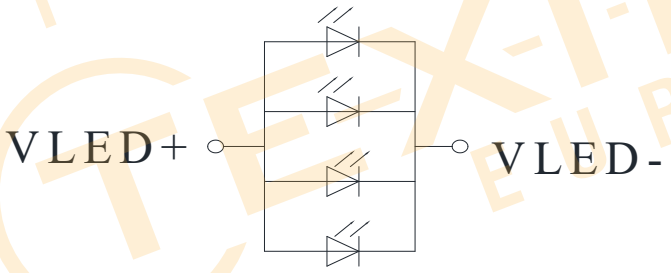
5.1. Operating conditions:

Item	Symbol	Min	Typ	Max	Unit
Supply Voltage	VCC	2.8	3.3	3.6	V
Supply LCM current	ICC	—	7	10.5	mA
Supply Voltage For Touch	VDDT	2.8	-	3.3	V
	IDDT		4	6	mA

5.2. LED driving conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
LED current	—	—	80	—	mA	
LED voltage	VLED+	2.7	2.9	3.3	V	Note 1
LED Life Time	—	50,000	—	—	Hr	Note 2,3,4

Note 1 : There are 1 Groups LED



Circuit diagram

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

6.DC Characteristics

Parameter	Symbol	Rating			Unit	Condition
		Min	Typ	Max		
Low level input voltage	VIL	GND	-	0.3VCC	V	
High level input voltage	VIH	0.7VCC	-	VCC	V	

7.AC Characteristics

7.1. SPI 3-Wire Interface

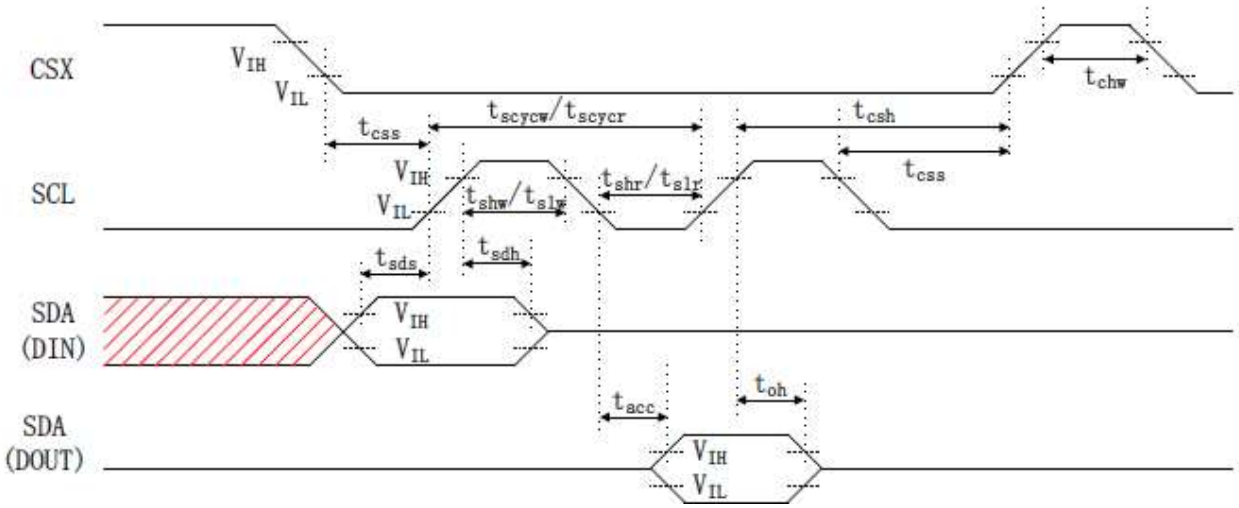


Table 1: 3-pin Serial Interface Characteristics

Signal	Symbol	Parameter	MIN	MAX	UNIT	Description
CSX	TCSS	Chip Select Setup Time	10		ns	
	TCSH	Chip Select Hold Time	30		ns	
	TCHW	Chip Select “H” Pulse Width	30		ns	
SCL	TSCYCW	Serial Clock Cycle(Write)	16		ns	
	TSHW	S”L””H” Pulse Width(Write)	8		ns	
	TSLW	S”L””L” Pulse Width(Write)	8		ns	
	TSCYCR	Serial Clock Cycle(Read)	150		ns	
	TSHR	S”L””H” Pulse Width(Read)	60		ns	
	TSLR	S”L””L” Pulse Width(Read)	60		ns	
SDA(DIN) /(DOUT)	TSDS	Data Setup Time	15		ns	
	TSDH	Data Hold Time	5		ns	
	TACC	Access Time	5	50	ns	CLmax=30pF CLmin=8pF
	TOH	Output Disable Time	10		ns	

7.2. SPI 4-Wire Interface

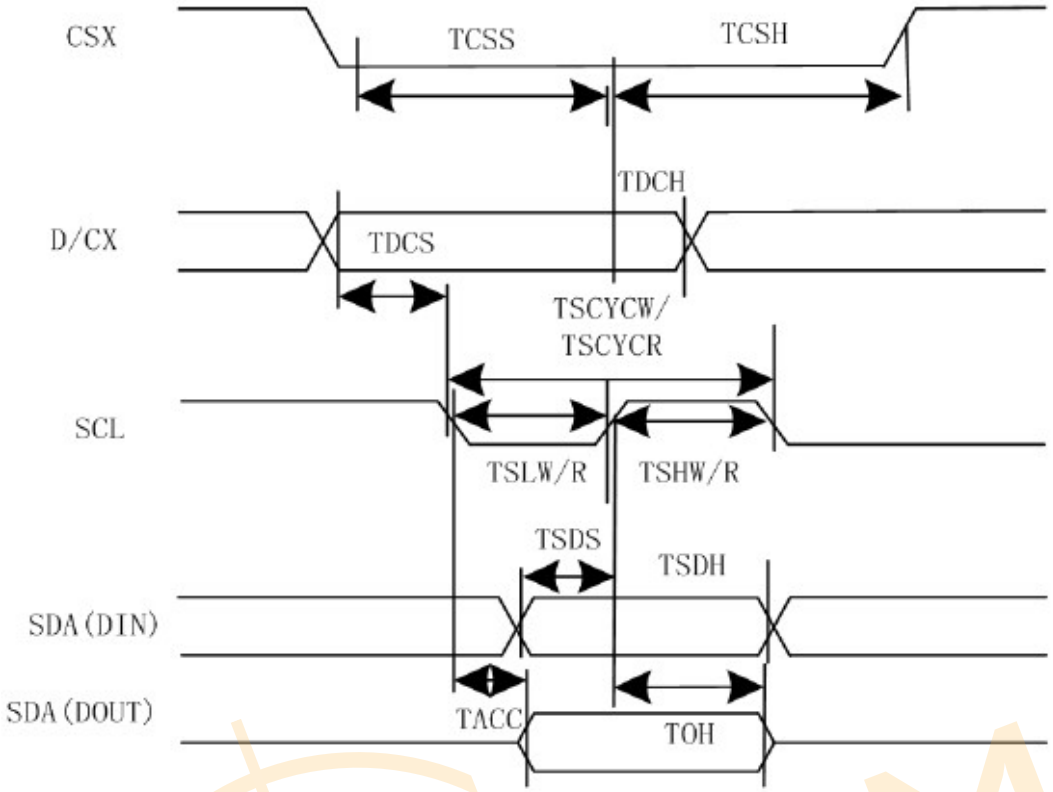


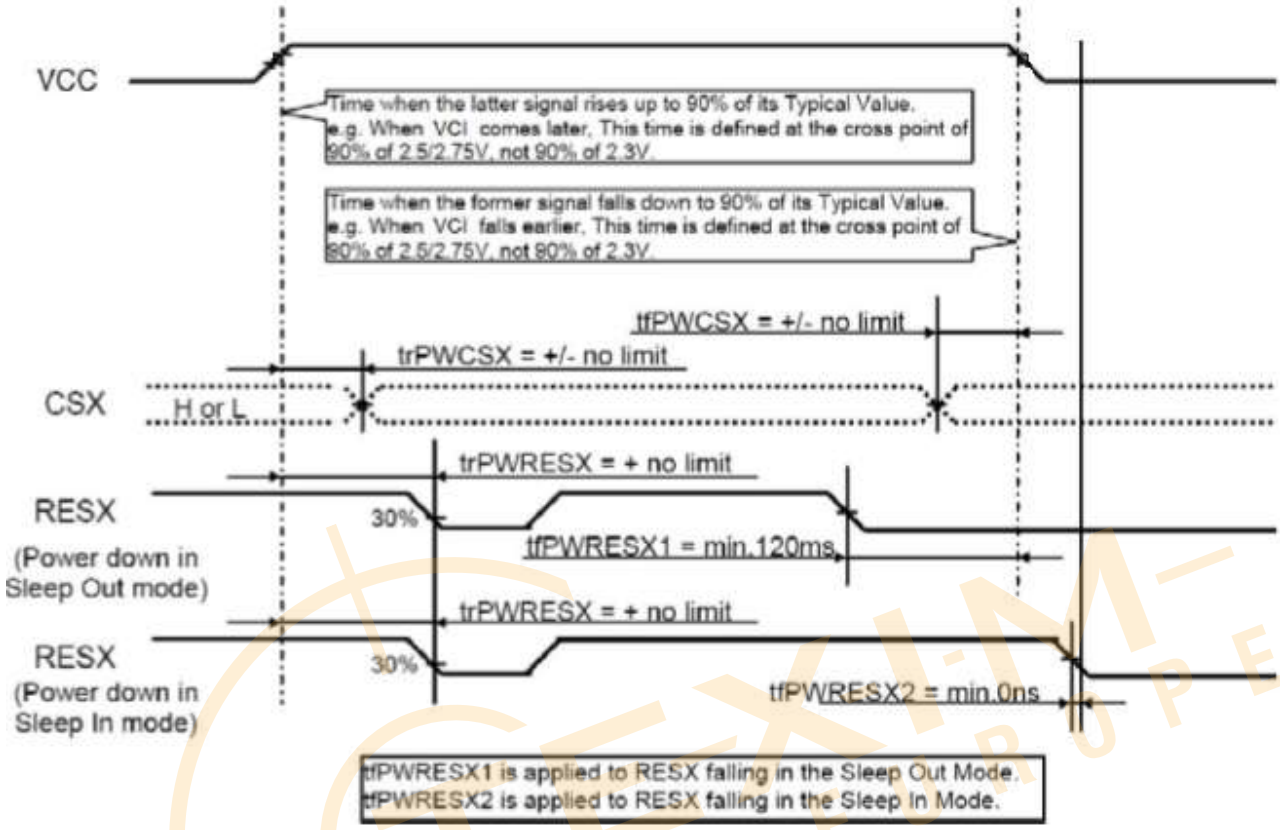
Table 2: 4 pin Serial Interface Characteristics

Signal	Symbol	Parameter	MIN	MAX	UNIT	Description
CSX	TCSS	Chip Select Setup Time	10		ns	
	TCSH	Chip Select Hold Time	30		ns	
	TCHW	Chip Select “H” Pulse Width	30		ns	
SCL	TSCYCW	Serial Clock Cycle(Write)	16		ns	
	TSHW	S”L””H” Pulse Width(Write)	8		ns	
	TSLW	S”L””L” Pulse Width(Write)	8		ns	
	TSCYCR	Serial Clock Cycle(Read)	150		ns	
	TSHR	S”L””H” Pulse Width(Read)	60		ns	
	TSLR	S”L””L” Pulse Width(Read)	60		ns	
D/CX	TDCS	D/CX Setup Time	5		ns	
	TDCH	D/CX Hold Time	5		ns	
SDA(DIN) (DOUT)	TSDS	Data Setup Time	9.5		ns	
	TSDH	Data Hold Time	5		ns	
	TACC	Access Time	5	50	ns	CLmax=30pF CLmin=8pF
	TOH	Output Disable Time	10		ns	

8.Power ON/OFF Sequence

8.1. Case 1 - RESX line is held high or Unstable by Host at Power On

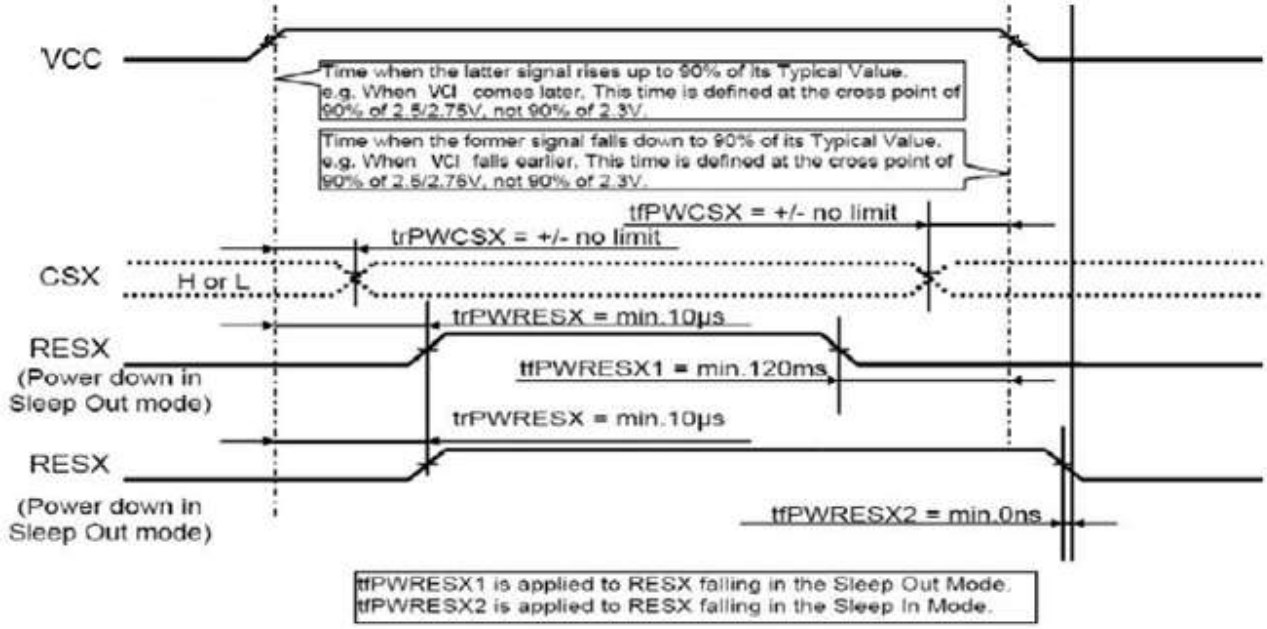
If RESX line is held high or unstable by the host during Power On, then a Hardware Reset must be applied after VCC have been applied – otherwise correct functionality is not guaranteed. There is no timing restriction upon this hardware reset.



Note: Unless otherwise specified, timings herein show cross point at 50% of signal/power level.

8.2. Case 2 - RESX line is held low by Host at Power On

If RESX line is held Low (and stable) by the host during Power On, then the RESX must be held low for minimum 10 µ sec after VCC have been applied.



Note: Unless otherwise specified, timings herein show cross point at 50% of signal/power level.

9.Data input format

9.1. Serial Interface

The Module uses a 3-wire 9-bit serial interface or 4-pins/8-bit bi-directional interface for communication between the micro controller and the LCD driver chip. The 3-pins serial use: CSX (chip enable), SCL (serial clock) and SDA (serial data input/output) and the 4-pins serial use: CSX (chip enable), D/CX (data/ command select), SCL (serial clock), and SDA (serial data input/output).

Table 3 Serial Interface Type Selection

4WSPI	Interface	Read back selection
0	3-Pins Serial Interface	Via the read instruction (8-bit , 24-bit and 32-bit read parameter)
1	4-Pins Serial Interface	Via the read instruction (8-bit , 24-bit and 32-bit read parameter)

9.2. Command/Data Write

The write mode of the interface means the micro controller writes commands and data to the LCD driver. 3-pins serial data packet contains a control bit D/CX and a transmission byte, but in 4-pins serial case, data packet contains just transmission byte and control bit D/CX is transferred by the D/CX pin. If D/CX is “low”, the transmission byte is interpreted as a command byte. If D/CX is “high”, the transmission byte is stored in the display data RAM (Memory write command), or command register as parameter.

Any instruction can be sent in any orders to the Driver. The MSB is transmitted first. The serial interface is initialized when CSX is high status. In this state, SCL clock pulse or SDA data have no effect. A falling edge on CSX enables the serial interface and indicated the start of data transmission.

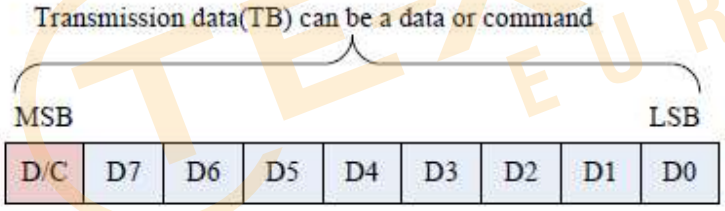


Figure 1: SPI 3-Wire Write Data Format

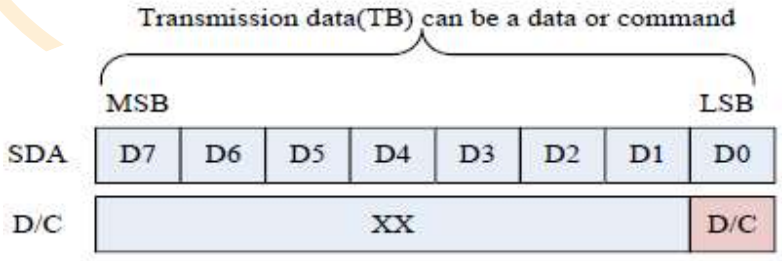


Figure 2: SPI 4-Wire Write Data Format

When CSX is “high”, SCL clock is ignored. At the falling edge of CSX, SCL can be high or low. SDA is sampled at the rising edge of SCL. D/CX indicates, whether the byte is command code (D/CX=’0’) or parameter/RAM data (D/CX=’1’). If CSX stays low after the last bit of command/data byte, the serial interface expects the D/CX bit (3-pin serial interface) or D7 (4-pins serial interface) of the next byte at the next rising edge of SCL.

9.3. Command/Data Read

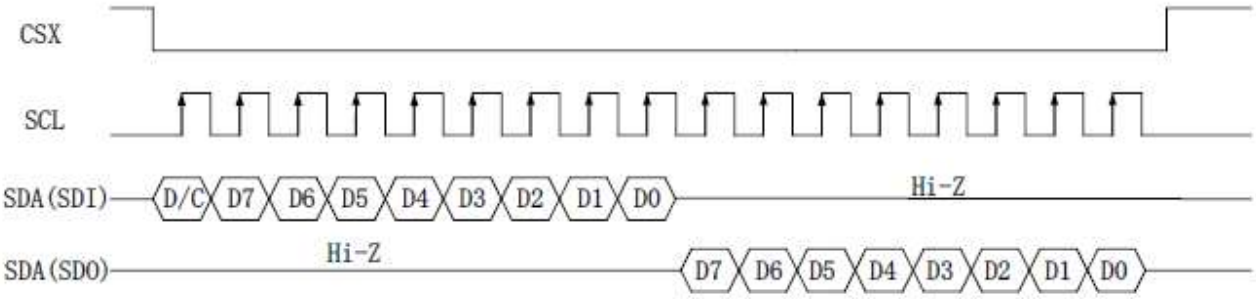


Figure 3: SPI 3-Wire 8-bit Read Operation
(For ‘DAH/DBH/DCH/0Ah/0Bh/0Ch/0Dh/0Eh/0Fh’ Command)

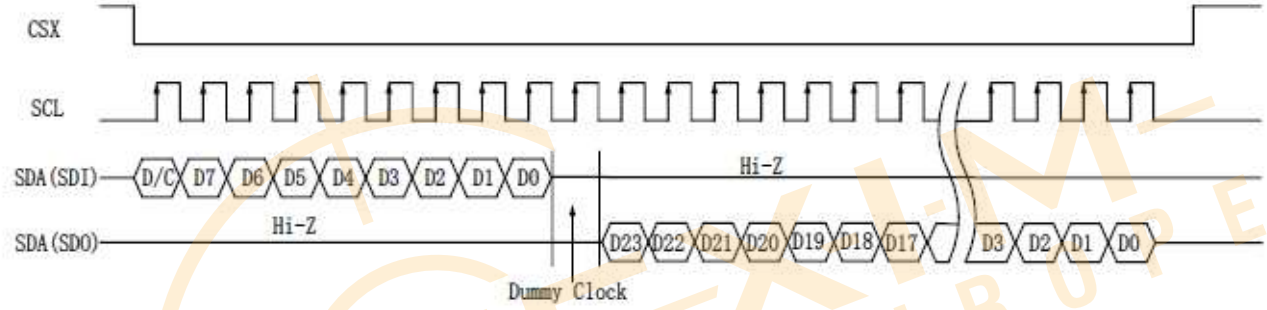


Figure 4: SPI 3-Wire 24-bit Read Operation
(For ‘04H’ Command with one dummy clock)

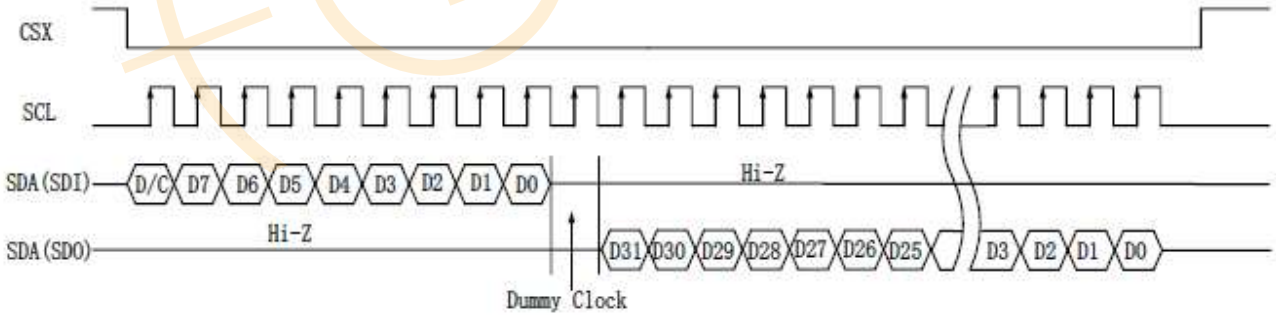


Figure 5: SPI 3-Wire 32-bit Read Operation
(For ‘09H’ Command with one dummy clock)

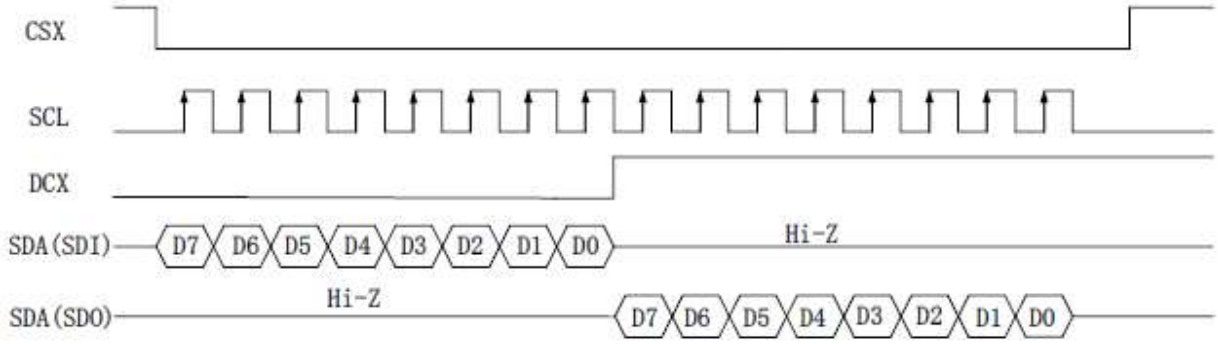


Figure 6: SPI 4-Wire 8-bit Read Operation
(For 'DAH/DBH/DCH/0Ah/0Bh/0Ch/0Dh/0Eh/0Fh' Command)

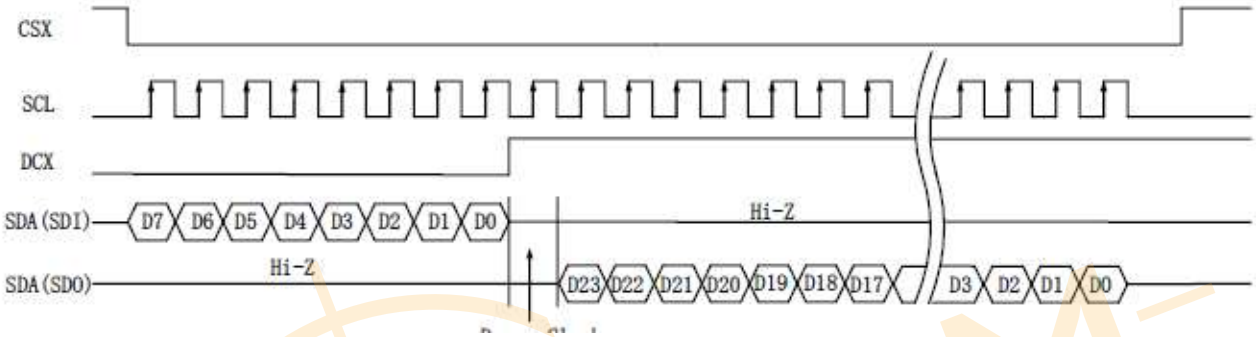


Figure 7: SPI 4-Wire 24-bit Read Operation
(For '04H' Command with one dummy clock)

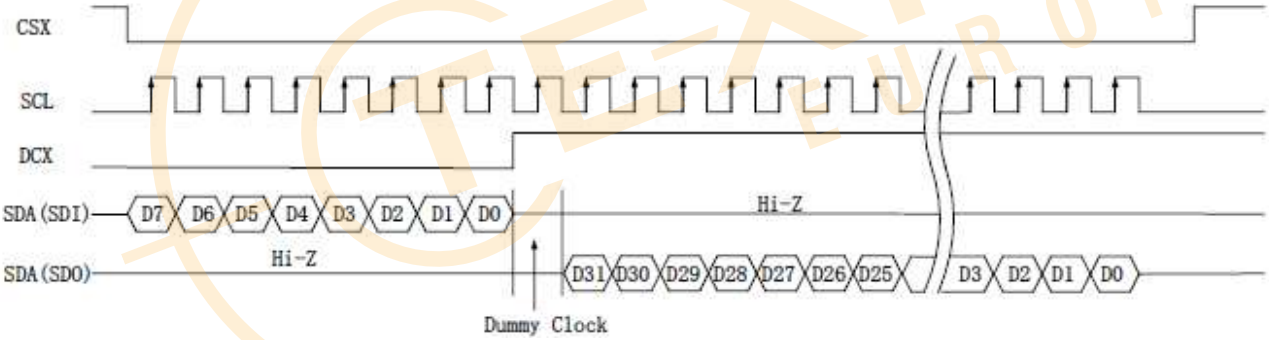


Figure 8: SPI 4-Wire 32-bit Read Operation
(For '09H' Command with one dummy clock)

10.Optical Characteristics

Item		Symbol	Condition.	Min	Typ.	Max.	Unit	Remark
Response time		Tr+ Tf	θ=0°、Φ=0°	-	35	-	.ms	Note 3
Contrast ratio		CR	At optimized viewing angle	1000	1500	-	-	Note 4
Color Chromaticity	White	Wx	θ=0°、Φ=0	0.248	0.298	0.348		Note 2,6,7
		Wy		0.275	0.325	0.375		
Viewing angle	Hor.	ΘR	CR≧10	70	80	-	Deg.	Note Note 1
		ΘL		70	80	-		
	Ver.	ΦT		70	80	-		
		ΦB		70	80	-		
Brightness		-	-	800	850	-	cd/m^2	Center of display
Uniformity		(U)	-	80	-	-	%	Note 5

Ta=25±2℃

Note 1: Definition of viewing angle range

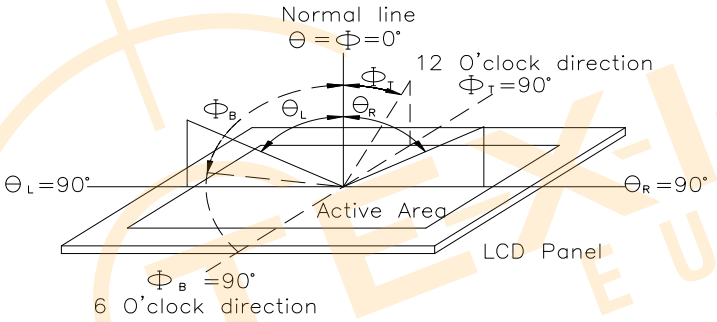


Fig.10.1. Definition of viewing angle

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.

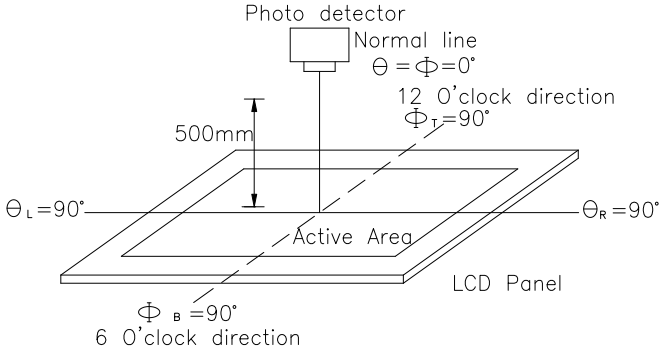
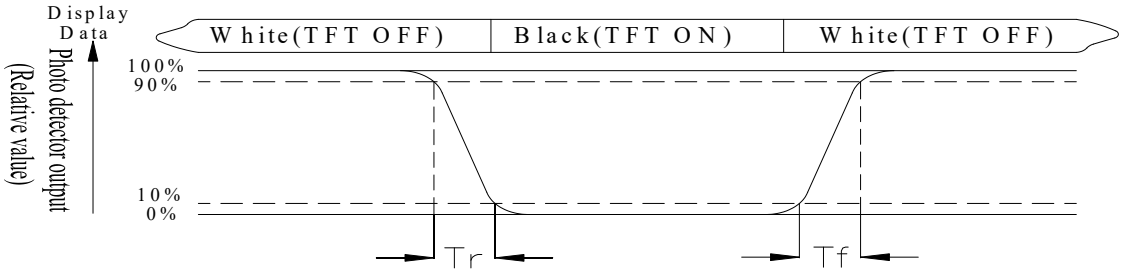


Fig. 10.2. Optical measurement system setup

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: Definition of Luminance Uniformity
Active area is divided into 9 measuring areas (reference the picture in below). Every measuring point is placed at the center of each measuring area.
Luminance Uniformity (U) = Lmin/Lmax x100%
L = Active area length
W = Active area width

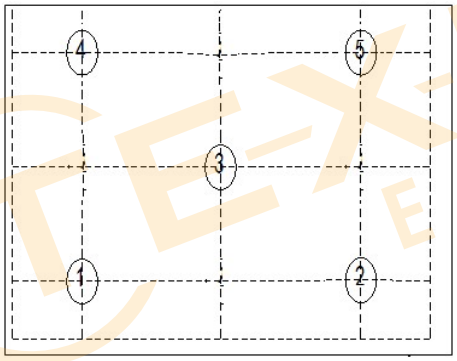


Fig10.3. Definition of uniformity

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.

11.Interface

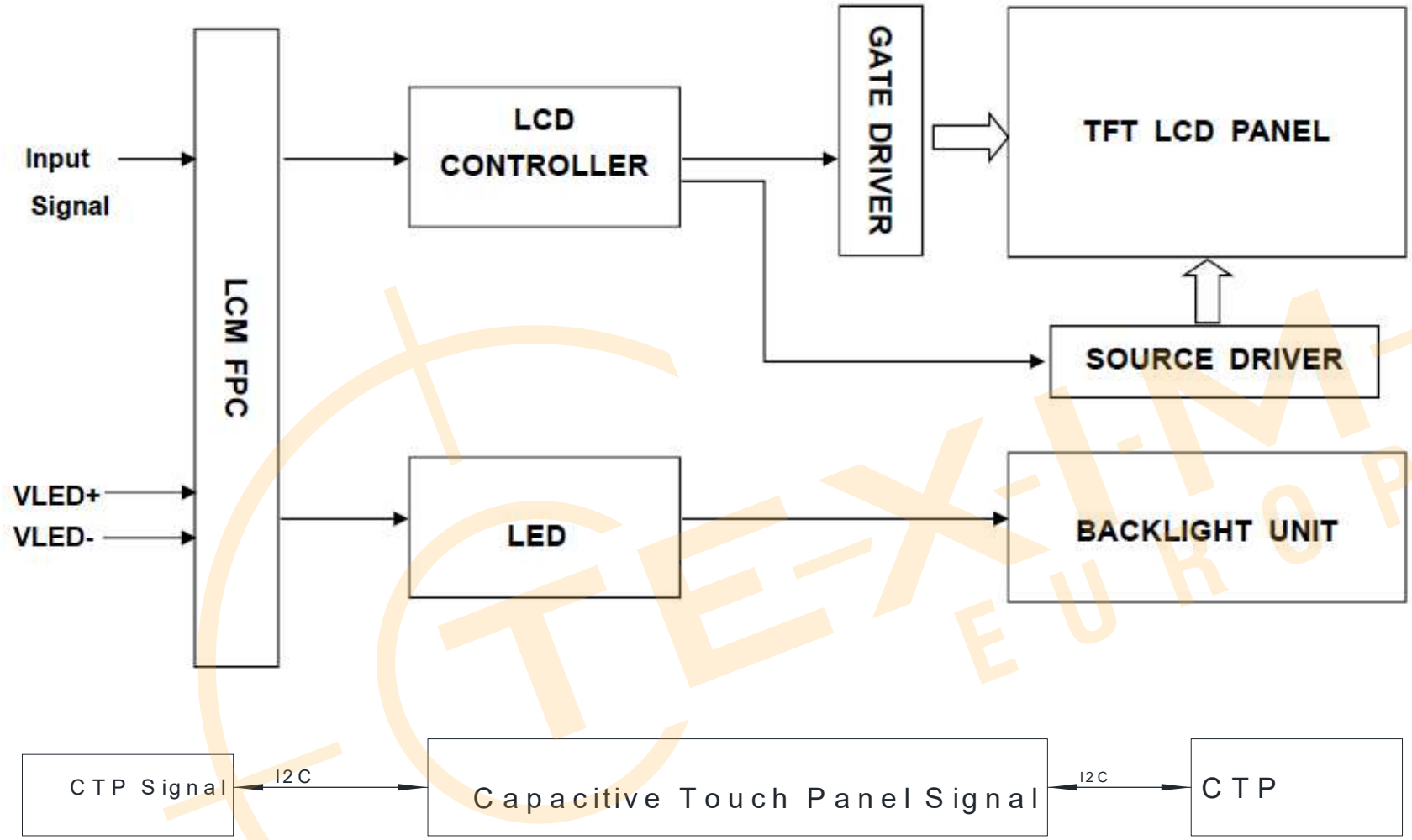
11.1. LCM PIN Definition

Pin no	Symbol	Function	Remark
1	VLED+	Back light anode	
2	VLED-	Back light cathode	
3	SPI4W (VCC=4 WIRE)	SPI4W='1', SPI 4 Wire Serial SPI4W='0', SPI 3 Wire Serial	
4	VCC	Power Supply.	
5	GND	Ground	
6	CS	Chip enable (CSX)	
7	RST	Reset signal (RESX)	
8	SDA	Serial input/output signal in serial interface mode.	
9	SCL	In Serial Interface, this is used as SCL.	
10	D/C	Data/ command selection. (D/CX)	

11.2. CTP PIN Definition

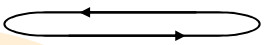
Pin no	Symbol	Function	Remark
1	VSS	Ground for analog circuit	
2	VDDT	Power Supply	
3	SCL	I2C clock inputI2C clock input	
4	SDA	I2C data input and output	
5	/RST	External reset signal, active low	
6	/INT	External interrupt to the host	

12.Block Diagram



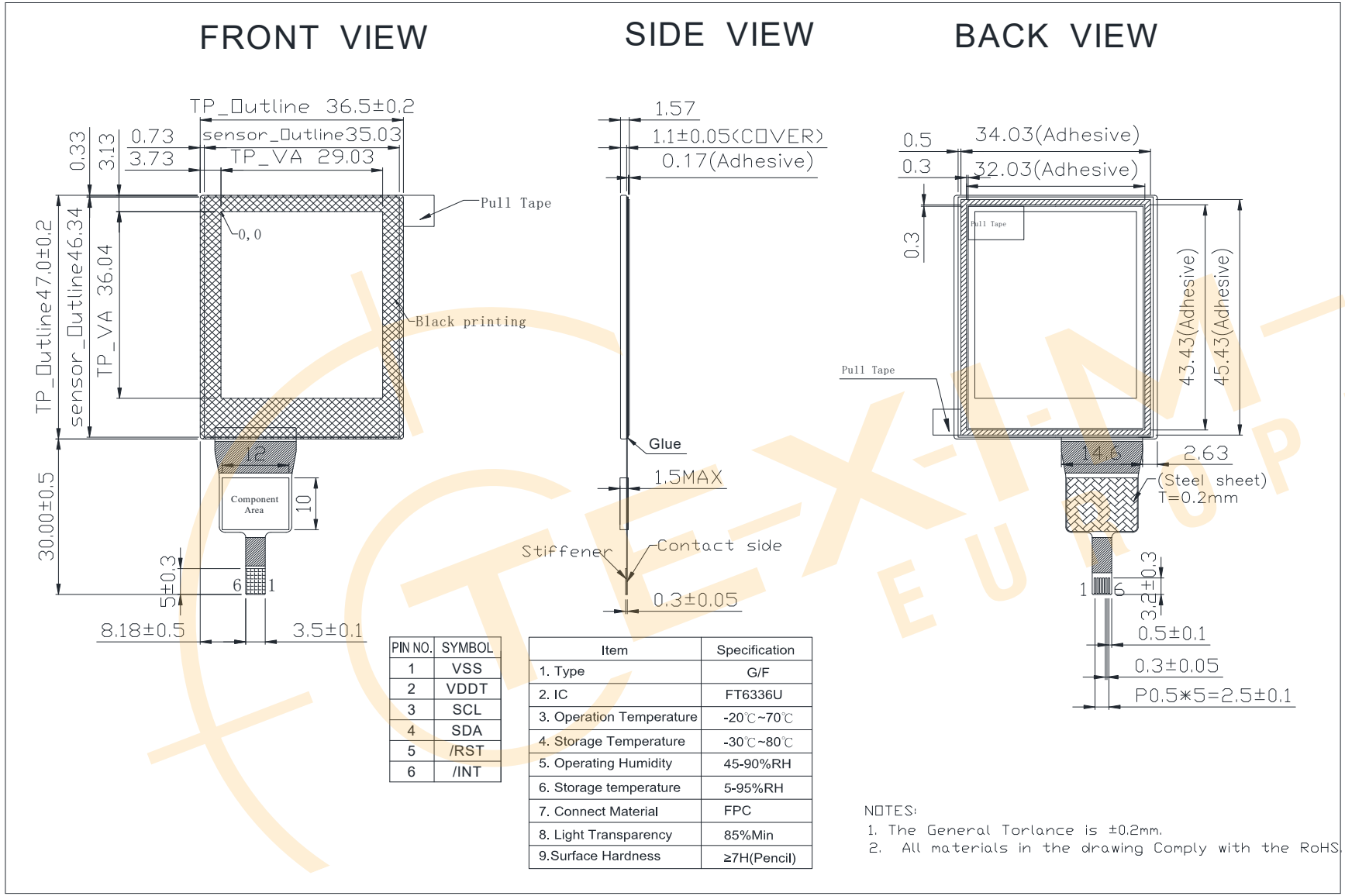
13.Reliability

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℃ 240hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30℃ 240hrs	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℃ 240hrs	2
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-20℃ 240hrs	1,2
High Temperature/ Humidity Operation	The module should be allowed to stand at 60℃,90%RH max	60℃,90%RH 240hrs	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	2
Vibration test	Endurance test applying the vibration during transportation and using.	Total fixed amplitude : 1.5mm 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=±TBDV(contact) ,±TBDV(air), RS=330Ω CS=150pF 10 times	4

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.
Note4: Endurance test applying the electric stress to the finished product housing

14.Touch Panel Information

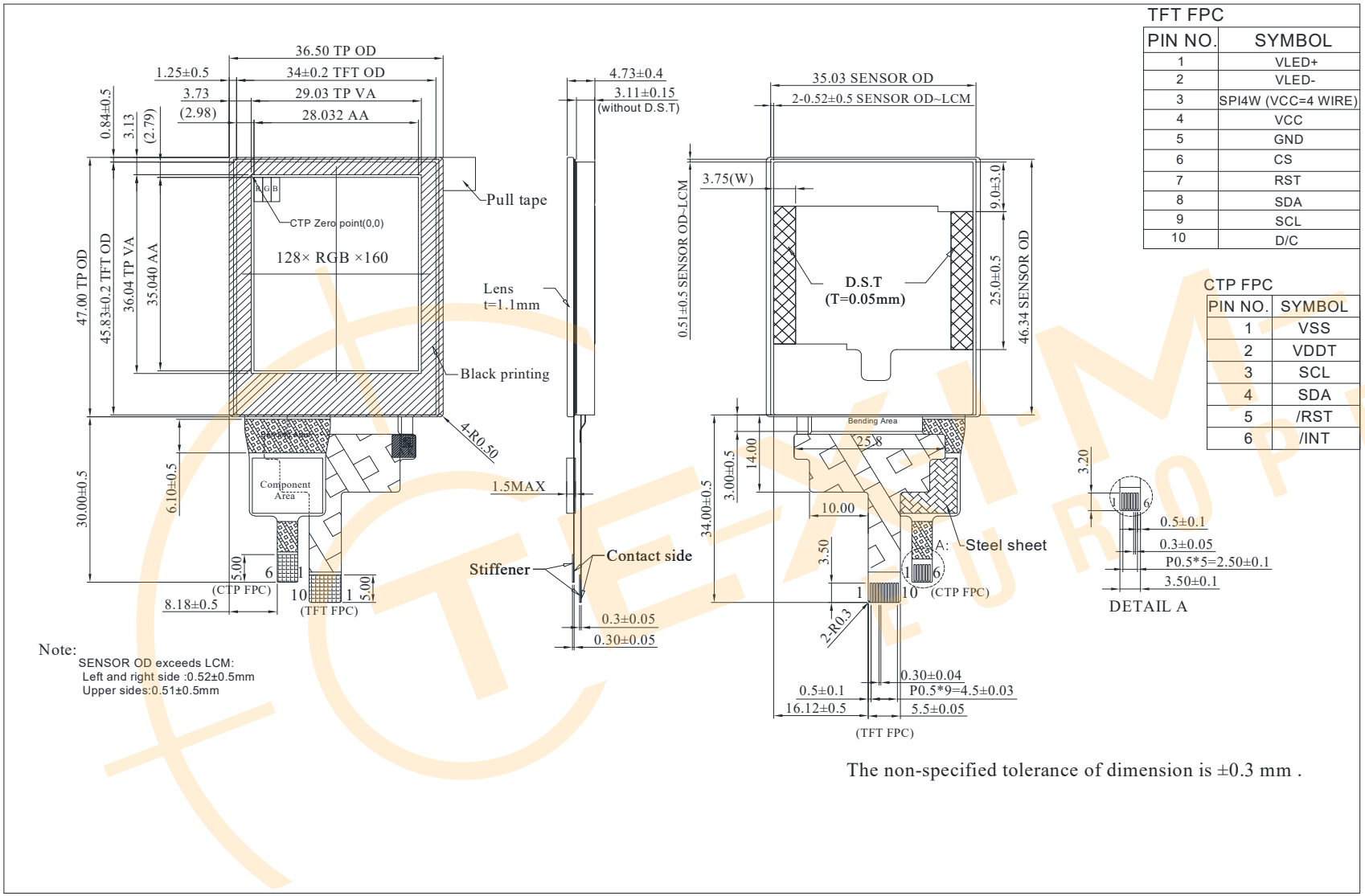


PIN NO.	SYMBOL
1	VSS
2	VDDT
3	SCL
4	SDA
5	/RST
6	/INT

Item	Specification
1. Type	G/F
2. IC	FT6336U
3. Operation Temperature	-20℃~70℃
4. Storage Temperature	-30℃~80℃
5. Operating Humidity	45-90%RH
6. Storage temperature	5-95%RH
7. Connect Material	FPC
8. Light Transparency	85%Min
9.Surface Hardness	≥7H(Pencil)

NOTES:
1. The General Torlance is ±0.2mm.
2. All materials in the drawing Comply with the RoHS.

15.Contour Drawing



TFT FPC

PIN NO.	SYMBOL
1	VLED+
2	VLED-
3	SPI4W (VCC=4 WIRE)
4	VCC
5	GND
6	CS
7	RST
8	SDA
9	SCL
10	D/C

CTP FPC

PIN NO.	SYMBOL
1	VSS
2	VDDT
3	SCL
4	SDA
5	/RST
6	/INT

Note:
SENSOR OD exceeds LCM:
Left and right side :0.52±0.5mm
Upper sides:0.51±0.5mm

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

16.Initial Code For Reference

```
void NV3023B(void)
{
    //----------------------------------reset sequence----------------------------------//
    SPI_RST = 1;
    delay_ms(1); // Delay 1ms
    SPI_RST = 0;
    delay_ms(10); // Delay 10ms
    SPI_RST = 1;
    delay_ms(10); // Delay 120ms
    //-----------------------------display and color format setting-----------------------------//
    NV3023B_CMD_W(0xff);
    NV3023B_DATA_W(0xa5);
    NV3023B_CMD_W(0x3a);
    NV3023B_DATA_W(0x55);
    NV3023B_CMD_W(0x3e);
    NV3023B_DATA_W(0x00);
    NV3023B_CMD_W(0x51);
    NV3023B_DATA_W(0x16);
    NV3023B_CMD_W(0x52);
    NV3023B_DATA_W(0x11);
    NV3023B_CMD_W(0x53);
    NV3023B_DATA_W(0x13);
    NV3023B_CMD_W(0x63);
    NV3023B_DATA_W(0x0f);
    NV3023B_CMD_W(0x64);
    NV3023B_DATA_W(0x0f);
    NV3023B_CMD_W(0x82);
    NV3023B_DATA_W(0x00);
    NV3023B_CMD_W(0x83);
    NV3023B_DATA_W(0x13);
    NV3023B_CMD_W(0x84);
    NV3023B_DATA_W(0x02);
    NV3023B_CMD_W(0x85);
    NV3023B_DATA_W(0x89);
    NV3023B_CMD_W(0x87);
    NV3023B_DATA_W(0x16);
    NV3023B_CMD_W(0x88);
    NV3023B_DATA_W(0x14);
    NV3023B_CMD_W(0x89);
    NV3023B_DATA_W(0x34);
    NV3023B_CMD_W(0x93);
    NV3023B_DATA_W(0x63);
    NV3023B_CMD_W(0x96);
    NV3023B_DATA_W(0x82);
    NV3023B_CMD_W(0x97);
    NV3023B_DATA_W(0x00);
    NV3023B_CMD_W(0x98);
    NV3023B_DATA_W(0x00);
```

```
NV3023B_CMD_W(0x99);
NV3023B_DATA_W(0x01);
NV3023B_CMD_W(0xb1);
NV3023B_DATA_W(0x05);
NV3023B_CMD_W(0xb2);
NV3023B_DATA_W(0x88);
NV3023B_CMD_W(0xb4);
NV3023B_DATA_W(0x34);
NV3023B_CMD_W(0xb3);
NV3023B_DATA_W(0x04);
NV3023B_CMD_W(0xc3);
NV3023B_DATA_W(0x10);
NV3023B_CMD_W(0xe6);
NV3023B_DATA_W(0x00);
NV3023B_CMD_W(0x44);
NV3023B_DATA_W(0x00);
//------------------------------ gamma setting------------------------------------//
NV3023B_CMD_W(0x70);
NV3023B_DATA_W(0x00);
NV3023B_CMD_W(0x71);
NV3023B_DATA_W(0x02);
NV3023B_CMD_W(0x72);
NV3023B_DATA_W(0x05);
NV3023B_CMD_W(0x73);
NV3023B_DATA_W(0x0B);
NV3023B_CMD_W(0x74);
NV3023B_DATA_W(0x13);
NV3023B_CMD_W(0x75);
NV3023B_DATA_W(0x0B);
NV3023B_CMD_W(0x76);
NV3023B_DATA_W(0x14);
NV3023B_CMD_W(0x77);
NV3023B_DATA_W(0x0B);
NV3023B_CMD_W(0x78);
NV3023B_DATA_W(0x08);
NV3023B_CMD_W(0x79);
NV3023B_DATA_W(0x1D);
NV3023B_CMD_W(0x7a);
NV3023B_DATA_W(0x03);
NV3023B_CMD_W(0x7b);
NV3023B_DATA_W(0x07);
NV3023B_CMD_W(0x7c);
NV3023B_DATA_W(0x05);
NV3023B_CMD_W(0x7d);
NV3023B_DATA_W(0x00);
NV3023B_CMD_W(0x7e);
NV3023B_DATA_W(0x00);
NV3023B_CMD_W(0x7f);
NV3023B_DATA_W(0x0a);
NV3023B_CMD_W(0xa0);
NV3023B_DATA_W(0x0F);
```

```
NV3023B_CMD_W(0xa1);
NV3023B_DATA_W(0x3C);
NV3023B_CMD_W(0xa2);
NV3023B_DATA_W(0x0C);
NV3023B_CMD_W(0xa3);
NV3023B_DATA_W(0x12);
NV3023B_CMD_W(0xa4);
NV3023B_DATA_W(0x0C);
NV3023B_CMD_W(0xa5);
NV3023B_DATA_W(0x05);
NV3023B_CMD_W(0xa6);
NV3023B_DATA_W(0x5D);
NV3023B_CMD_W(0xa7);
NV3023B_DATA_W(0x06);
NV3023B_CMD_W(0xa8);
NV3023B_DATA_W(0x09);
NV3023B_CMD_W(0xa9);
NV3023B_DATA_W(0x5C);
NV3023B_CMD_W(0xaa);
NV3023B_DATA_W(0x0D);
NV3023B_CMD_W(0xab);
NV3023B_DATA_W(0x19);
NV3023B_CMD_W(0xac);
NV3023B_DATA_W(0x19);
NV3023B_CMD_W(0xad);
NV3023B_DATA_W(0x0F);
NV3023B_CMD_W(0xae);
NV3023B_DATA_W(0x3F);
NV3023B_CMD_W(0xaf);
NV3023B_DATA_W(0x0C);
NV3023B_CMD_W(0xC5);
NV3023B_DATA_W(0x01);
NV3023B_CMD_W(0x94);
NV3023B_DATA_W(0x07);
NV3023B_CMD_W(0x95);
NV3023B_DATA_W(0x07);
NV3023B_CMD_W(0xff);
NV3023B_DATA_W(0x00);
NV3023B_CMD_W(0x21);
NV3023B_CMD_W(0x11);
NV3023B_CMD_W(0x36);
NV3023B_DATA_W(0x88);
NV3023B_CMD_W(0x35);
NV3023B_DATA_W(0x00);
NV3023B_CMD_W(0x3A);
NV3023B_DATA_W(0x55);
NV3023B_CMD_W(0xB2);
NV3023B_DATA_W(0x0C);
NV3023B_DATA_W(0x0C);
NV3023B_DATA_W(0x00);
NV3023B_DATA_W(0x33);
```

```
NV3023B_DATA_W(0x33);
NV3023B_CMD_W(0xB7);
NV3023B_DATA_W(0x00);
NV3023B_CMD_W(0xBB);
NV3023B_DATA_W(0x36);
NV3023B_CMD_W(0xC0);
NV3023B_DATA_W(0x2C);
NV3023B_CMD_W(0xC2);
NV3023B_DATA_W(0x01);
NV3023B_CMD_W(0xC3);
NV3023B_DATA_W(0x13);
NV3023B_CMD_W(0xC4);
NV3023B_DATA_W(0x20);
NV3023B_CMD_W(0xC6);
NV3023B_DATA_W(0x0F);
NV3023B_CMD_W(0xD6);
NV3023B_DATA_W(0xA1);
NV3023B_CMD_W(0xD0);
NV3023B_DATA_W(0xA4);
NV3023B_DATA_W(0xA1);
NV3023B_CMD_W(0xE0);
NV3023B_DATA_W(0xF0);
NV3023B_DATA_W(0x08);
NV3023B_DATA_W(0x0E);
NV3023B_DATA_W(0x09);
NV3023B_DATA_W(0x08);
NV3023B_DATA_W(0x04);
NV3023B_DATA_W(0x2F);
NV3023B_DATA_W(0x33);
NV3023B_DATA_W(0x45);
NV3023B_DATA_W(0x36);
NV3023B_DATA_W(0x13);
NV3023B_DATA_W(0x12);
NV3023B_DATA_W(0x2A);
NV3023B_DATA_W(0x2D);
NV3023B_CMD_W(0xE1);
NV3023B_DATA_W(0xF0);
NV3023B_DATA_W(0x0E);
NV3023B_DATA_W(0x12);
NV3023B_DATA_W(0x0C);
NV3023B_DATA_W(0x0A);
NV3023B_DATA_W(0x15);
NV3023B_DATA_W(0x2E);
NV3023B_DATA_W(0x32);
NV3023B_DATA_W(0x44);
NV3023B_DATA_W(0x39);
NV3023B_DATA_W(0x17);
NV3023B_DATA_W(0x18);
NV3023B_DATA_W(0x2B);
NV3023B_DATA_W(0x2F);
NV3023B_CMD_W(0x2A);
```

```
    NV3023B_DATA_W(0x00);
    NV3023B_DATA_W(0x00);
    NV3023B_DATA_W(0x00);
    NV3023B_DATA_W(0x9F);
    NV3023B_CMD_W(0x2B);
    NV3023B_DATA_W(0x00);
    NV3023B_DATA_W(0x00);
    NV3023B_DATA_W(0x00);
    NV3023B_DATA_W(0x9F);
    NV3023B_CMD_W(0x29);
    delay_ms(10);
}
```

winstar

LCM Sample Estimate Feedback Sheet

Module Number： _____

1、Panel Specification：

1.	Panel Type：	□ Pass	□ NG , _____
2.	View Direction：	□ Pass	□ NG , _____
3.	Numbers of Dots：	□ Pass	□ NG , _____
4.	View Area：	□ Pass	□ NG , _____
5.	Active Area：	□ Pass	□ NG , _____
6.	Operating Temperature：	□ Pass	□ NG , _____
7.	Storage Temperature：	□ Pass	□ NG , _____
8.	Others： _____		

2、Mechanical

1.	PCB Size：	□ Pass	□ NG , _____
2.	Frame Size：	□ Pass	□ NG , _____
3.	Material of Frame：	□ Pass	□ NG , _____
4.	Connector Position：	□ Pass	□ NG , _____
5.	Fix Hole Position：	□ Pass	□ NG , _____
6.	Backlight Position：	□ Pass	□ NG , _____
7.	Thickness of PCB：	□ Pass	□ NG , _____
8.	Height of Frame to PCB：	□ Pass	□ NG , _____
9.	Height of Module：	□ Pass	□ NG , _____
10.	Others：	□ Pass	□ NG , _____

3、Relative Hole Size：

1.	Pitch of Connector：	□ Pass	□ NG , _____
2.	Hole size of Connector：	□ Pass	□ NG , _____
3.	Mounting Hole size：	□ Pass	□ NG , _____
4.	Mounting Hole Type：	□ Pass	□ NG , _____
5.	Others：	□ Pass	□ NG , _____

4、Backlight Specification：

1.	B/L Type：	□ Pass	□ NG , _____
2.	B/L Color：	□ Pass	□ NG , _____
3.	B/L Driving Voltage (Reference for LED Type)：	□ Pass	□ NG , _____
4.	B/L Driving Current：	□ Pass	□ NG , _____
5.	Brightness of B/L：	□ Pass	□ NG , _____
6.	B/L Solder Method：	□ Pass	□ NG , _____
7.	Others：	□ Pass	□ NG , _____

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5、Electronic Characteristics of Module：

1.	Input Voltage：	□ Pass	□ NG ,_____
2.	Supply Current：	□ Pass	□ NG ,_____
3.	Driving Voltage for LCD：	□ Pass	□ NG ,_____
4.	Contrast for LCD：	□ Pass	□ NG ,_____
5.	B/L Driving Method：	□ Pass	□ NG ,_____
6.	Negative Voltage Output：	□ Pass	□ NG ,_____
7.	Interface Function：	□ Pass	□ NG ,_____
8.	LCD Uniformity：	□ Pass	□ NG ,_____
9.	ESD test：	□ Pass	□ NG ,_____
10.	Others：	□ Pass	□ NG ,_____

6、Summary：

Sales signature：_____

Customer Signature：_____ **Date**：____/____/____

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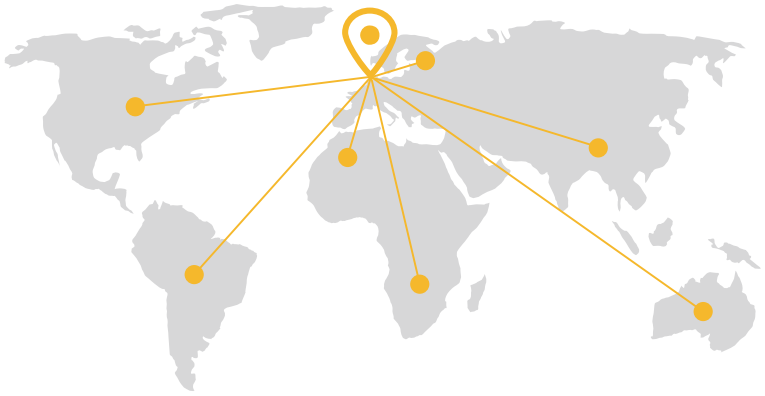

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