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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.: **WFN0460B2TOYADNT000**

APPROVED BY: (FOR CUSTOMER USE ONLY)	PCB VERSION: _____ DATA: _____
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SALES BY	APPROVED BY	CHECKED BY	PREPARED BY
			葉虹蘭
ISSUED DATE: 2025/04/24			

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	2025/04/24		First issue



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1.Module Classification Information

W	F	N	0460	B2	T	0Y	A	D	N	T	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 : 4.6" 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									
		View angle		6H	12H	2H	3H	9H	O-Film	OD-Film	All View	IPS	VA
		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

TFT 4.6" is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This TFT LCD has a 4.6 inch diagonally measured active display area with 800x320 (800 horizontal by 320 vertical pixel) resolution.



3.General Specifications

Item	Dimension	Unit
Size	4.6	inch
Dot Matrix	800× 3(RGB) × 320	dots
Module dimension	120.7 (W) × 56.16 (H) × 4.2	mm
Active area	108.0 (W) × 43.2 (H)	mm
Pixel pitch	0.135(W) ×0.135(H)	mm
LCD type	TFT, Normally Black, Transmissive	
View Direction	80/80/80/80	
Aspect Ratio	Bar Type	
TFT Driver IC	ST7262 or equivalent	
TFT Interface	24 bit R.G.B.	
Backlight Type	LED ,Normally White	
With /Without TP	With RTP	
Surface	Anti-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	°C
Storage Temperature	TST	-30	—	+80	°C

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

1. Temp. $\leq 60^{\circ}\text{C}$, 90% RH MAX. Temp. $> 60^{\circ}\text{C}$, Absolute humidity shall be less than 90% RH at 60°C



5. Electrical Characteristics

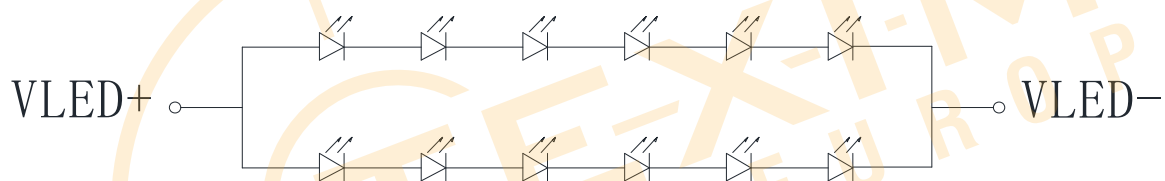
5.1. Typical Operation Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	VCC	3.1	3.3	3.6	V	
Current for Driver(Black)	I _{CC}	-	56.0	85.0	mA	V _{CC} =3.3V

5.2. Backlight Driving Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED backlight	VLED	16.2	18.0	19.8	V	
Current for LED backlight	I _{LED}	-	40	-	mA	Note 1
LED life time	-	50,000	-	-	Hr	Note 2,3,4

Note 1 : There are 1 Groups LED



Backlight LED Circuit

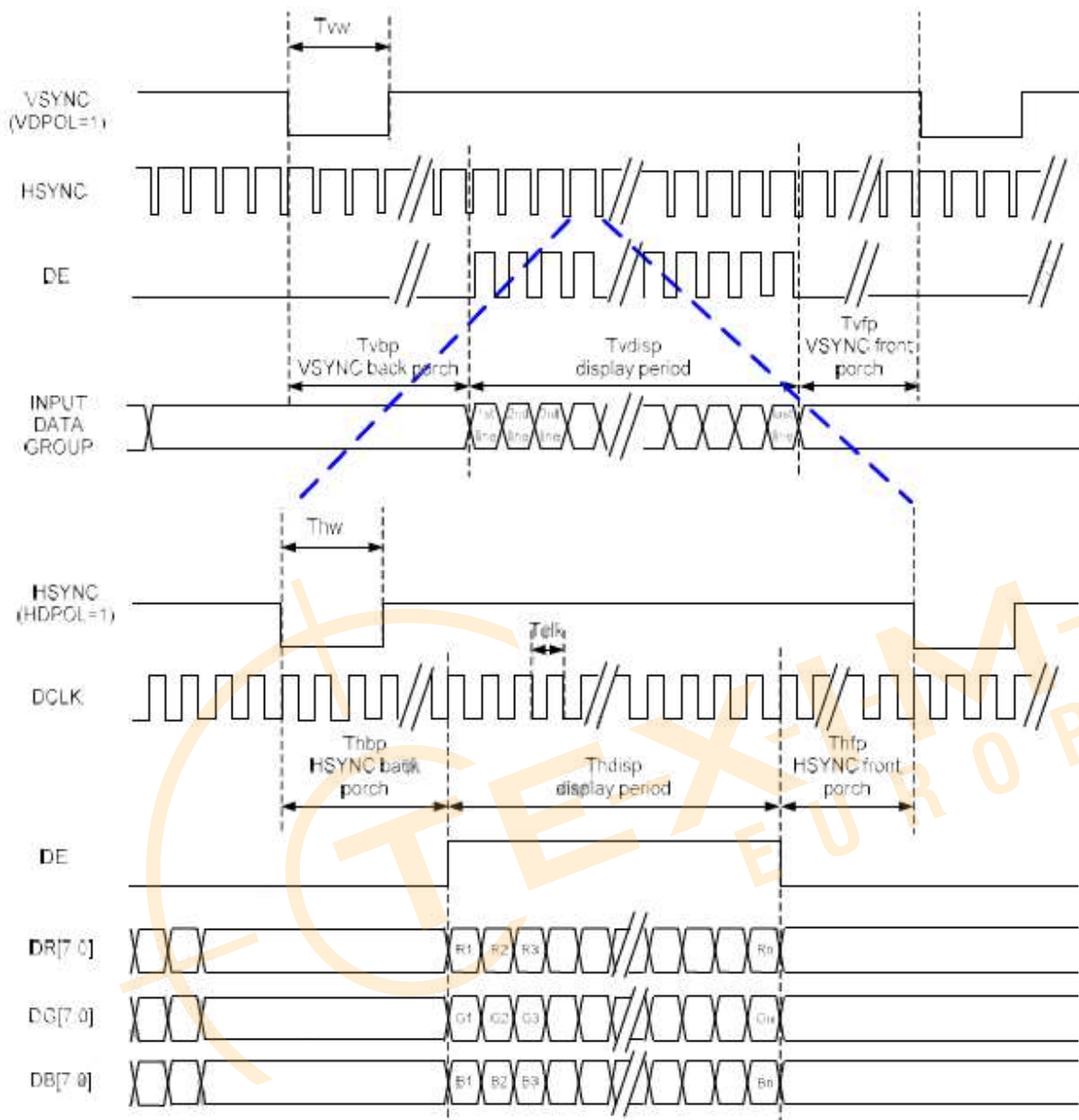
Note 2 : T_a = 25 °C

Note 3 : Brightness to be decreased to 50% of the initial value

Note 4 : The single LED lamp case

6.Communication Interface

6.1. SYNC-DE Mode



6.2. Parallel 24-bit RGB Input Timing Table

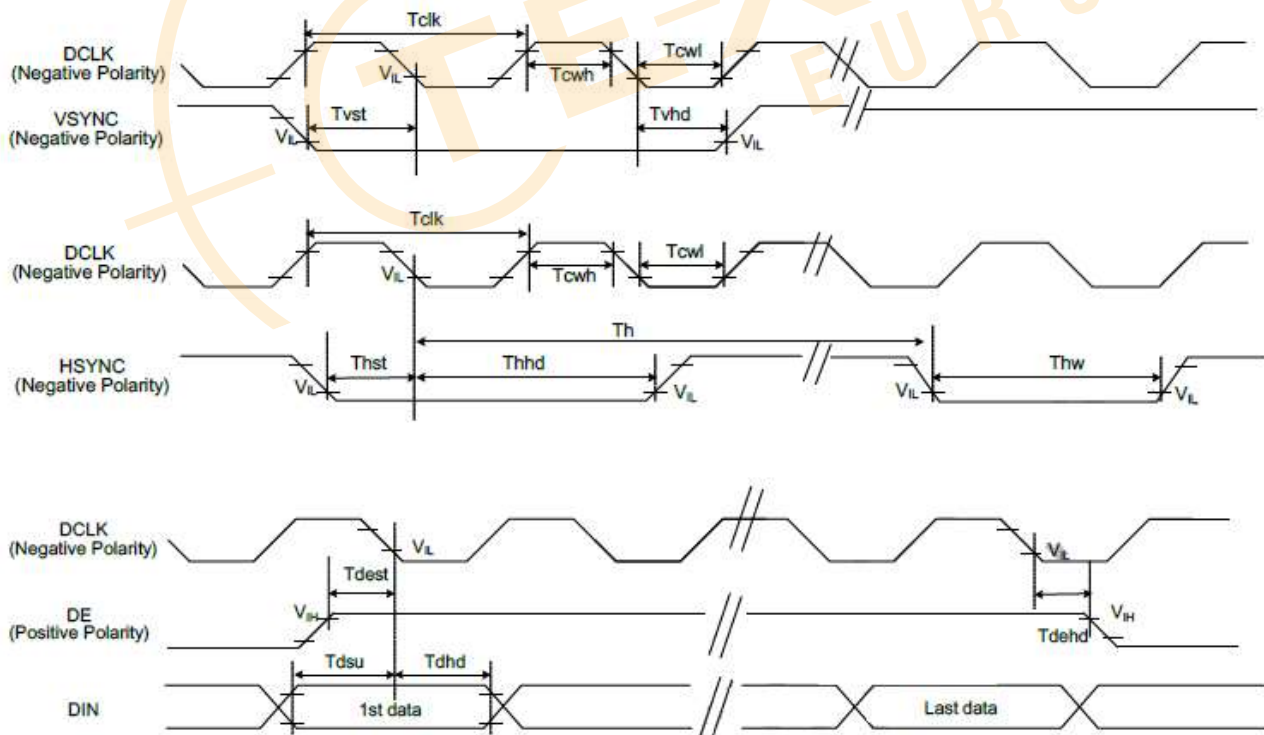
Parallel 24-bit RGB Input Timing

(VCC= 3.3V, GND= 0V, TA=25°C)

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	492	496	504	HSYNC
	Display Period	Tvdisp	480		HSYNC	
	Back Porch	Tvbp	6	8	12	HSYNC
	Front Porch	Tvfp	6	8	12	HSYNC
	Pulse Width	Tvw	2	4	8	HSYNC

Note:1. The minimum blanking time depends on the GIP timing of the panel specification.
 2. To ensure the compatibility of different panels, it is recommended to use the typical setting.
 3. It is necessary to keep Tvbp =12 and Thbp =43 in sync mode. DE mode is unnecessary to keep it.

6.3. System Bus Timing for RGB Interface

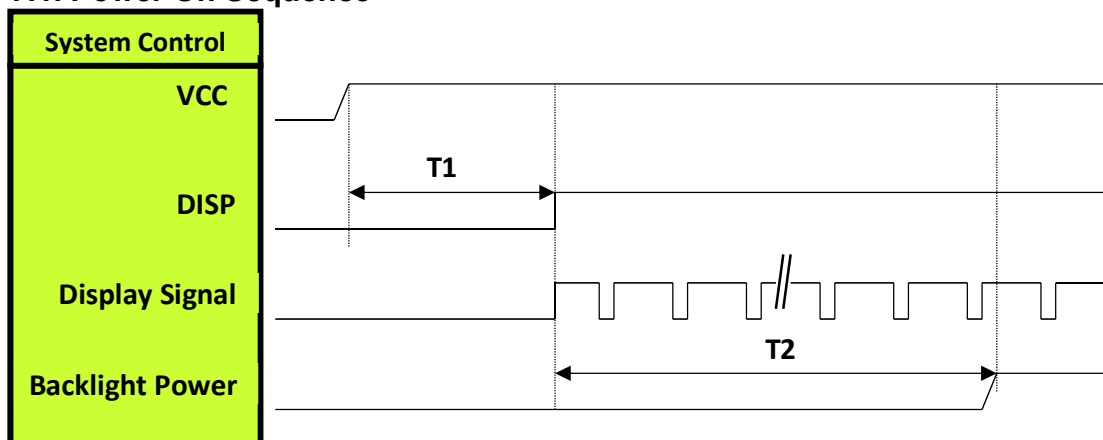


Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
CLK Pulse Duty	Tclk	40	50	60	%	
VSYNC Setup Time	Tvst	10	-	-	ns	
VSYNC Hold Time	Tvhd	10	-	-	ns	
HSYNC Setup Time	Thst	10	-	-	ns	
HSYNC Hold Time	Thhd	10	-	-	ns	
Data Setup Time	Tdsu	10	-	-	ns	
Data Hold Time	Tdhd	10	-	-	ns	
DE Setup Time	Tdest	10	-	-	ns	
DE Hold Time	Tdehd	10	-	-	ns	



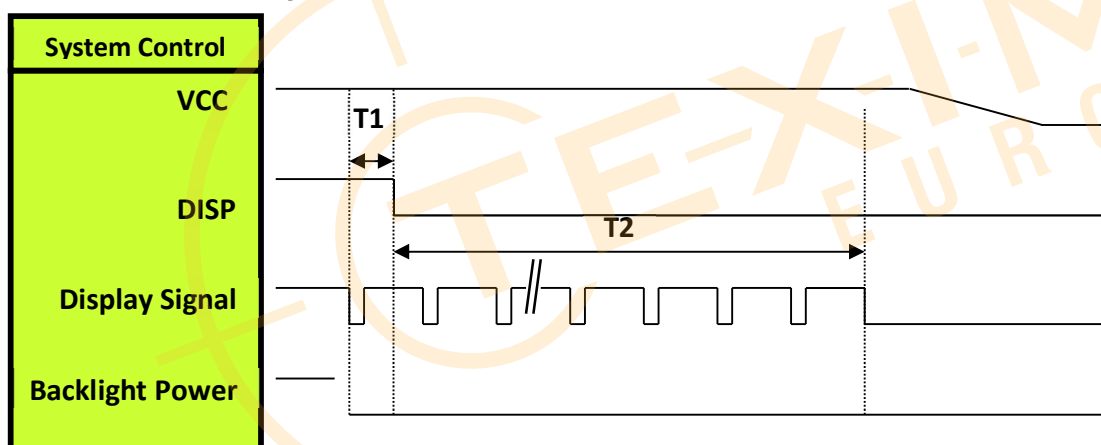
7. Power ON/OFF Sequence

7.1. Power On Sequence



Symbol	Description	Min. Time	Unit
T1	System power stability to DISP="High"	10	ms
T2	Display signal output to Backlight power on	250	ms

7.2. Power Off Sequence



Symbol	Description	Min. Time	Unit
T1	Backlight Power off to DISP ="Low"	5	ms
T2	DISP ="Low" to IC internal voltage discharge complete	100	ms

8. Optical Characteristics

Item		Symbol	Condition.	Min	Typ.	Max.	Unit	Remark
Response time		Tr+Tf	$\theta=0^{\circ}$ 、 $\Phi=0^{\circ}$	-	30	40	.ms	Note 3
Contrast ratio		CR	At optimized viewing angle	800	1000	-	-	Note 4
Color Chromaticity	White	Wx	$\theta=0^{\circ}$ 、 $\Phi=0$	0.270	0.320	0.370		Note 2,6,7
		Wy		0.295	0.345	0.395		
Viewing angle	Hor.	ΘR	$CR\geq 10$	70	80	-	Deg.	Note 1
		ΘL		70	80	-		
	Ver.	ΦT		70	80	-		
		ΦB		70	80	-		
Brightness		-	-	300	350	-	cd/m ²	Center of display
Uniformity		(U)	-	75	-	-	%	Note5

Ta=25±2°C

Note 1: Definition of viewing angle range

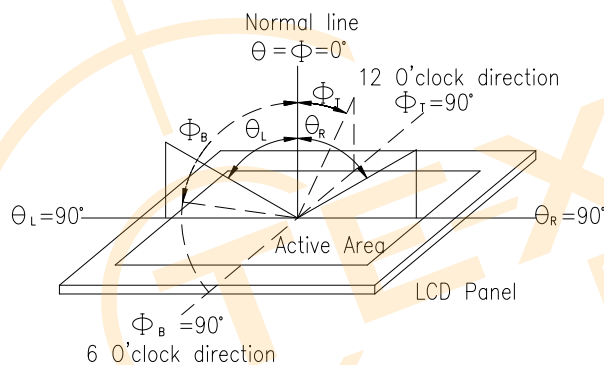


Fig. 8.1. Definition of viewing angle

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-7 or BM-5 luminance meter 1.0° field of view at a distance of 50cm and normal direction.

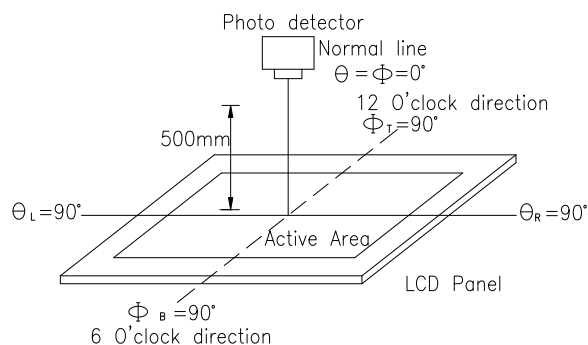
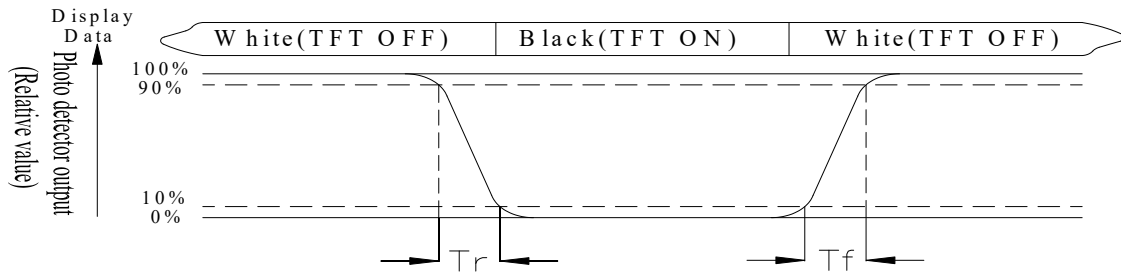


Fig. 8.2. Optical measurement system setup

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, T_r , is the time between photo detector output intensity changed from 90% to 10%. And fall time, T_f , 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.

$$\text{Luminance Uniformity (U)} = L_{\min}/L_{\max} \times 100\%$$

L = Active area length

W = Active area width

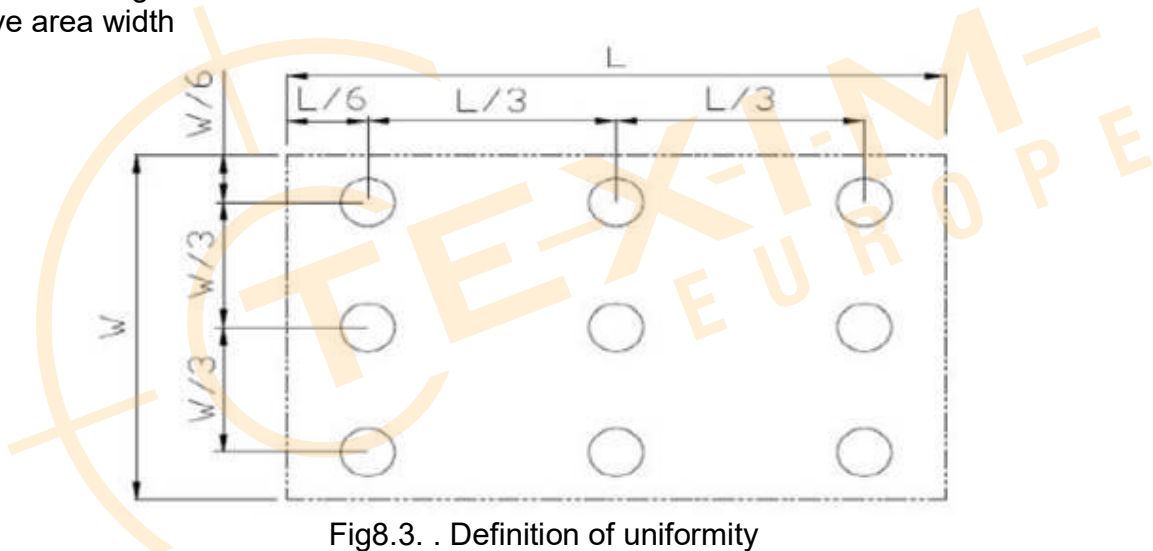


Fig8.3. . Definition of uniformity

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.

9.Interface

9.1. LCM PIN Definition

FPC Connector is used for the module electronics interface.

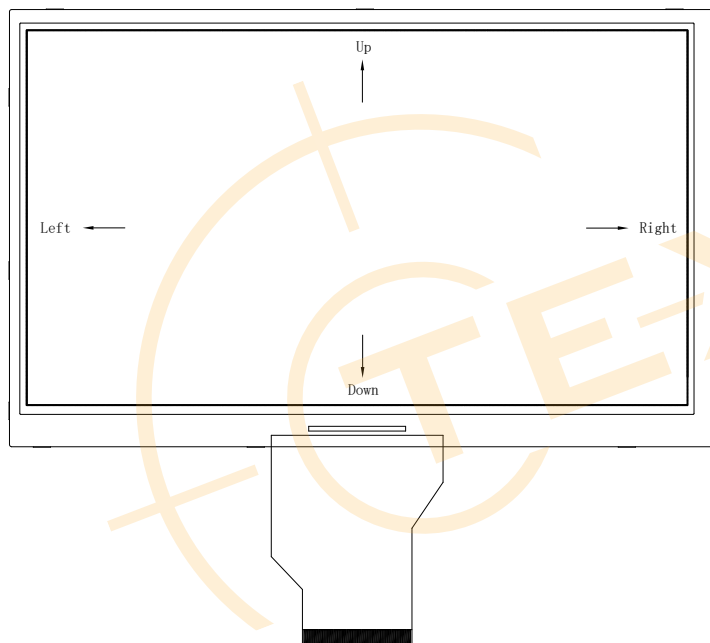
Pin	Symbol	Function	Remark
1	VLED-	Power for LED backlight (Cathode)	
2	VLED+	Power for LED backlight (Anode)	
3	GND	Power Ground	
4	VCC	Power voltage	
5	R0	Red data (LSB)	
6	R1	Red data	
7	R2	Red data	
8	R3	Red data	
9	R4	Red data	
10	R5	Red data	
11	R6	Red data	
12	R7	Red data(MSB)	
13	G0	Green data(LSB)	
14	G1	Green data	
15	G2	Green data	
16	G3	Green data	
17	G4	Green data	
18	G5	Green data	
19	G6	Green data	
20	G7	Green data(MSB)	
21	B0	Blue data(LSB)	
22	B1	Blue data	
23	B2	Blue data	
24	B3	Blue data	
25	B4	Blue data	
26	B5	Blue data	
27	B6	Blue data	
28	B7	Blue data(MSB)	
29	GND	Power Ground	
30	DCCLK	Sample clock	

31	DISP	Display on/off	
32	HSYNC	Horizontal sync signal applied to the RGB interface, default is negative polarity.	
33	VSYNC	Vertical sync signal applied to the RGB interface, default is negative polarity.	
34	DE	Data input enable	Note 1
35	NC	No connection	
36	GND	Power Ground	
37	XR	Right electrode	
38	YD	Bottom electrode	
39	XL	Left electrode	
40	YU	Top electrode	

Note1: DE must pull high

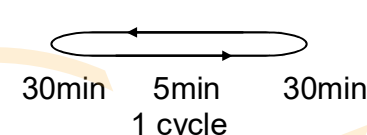
Note2: Scanning direction Down to Up, Right to Left

Refer to the figure as below:



10. Reliability

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

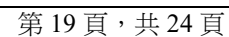
Environmental Test			
Test Item	Content of Test	Test Condition	Note
High Temperature storage	Endurance test applying the high storage temperature for a long time.	80°C 240hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30°C 240hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	70°C 240hrs	2
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-20°C 240hrs	1,2
High Temperature/ Humidity Operation	The module should be allowed to stand at 60°C,90%RH max	60°C,90%RH 240hrs	1,2
Thermal shock resistance	The sample should be allowed stand the following 10 cycles of operation -20°C 25°C 70°C  30min 5min 30min 1 cycle	-20°C/70°C 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=±4KV(contact),±4KV(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.

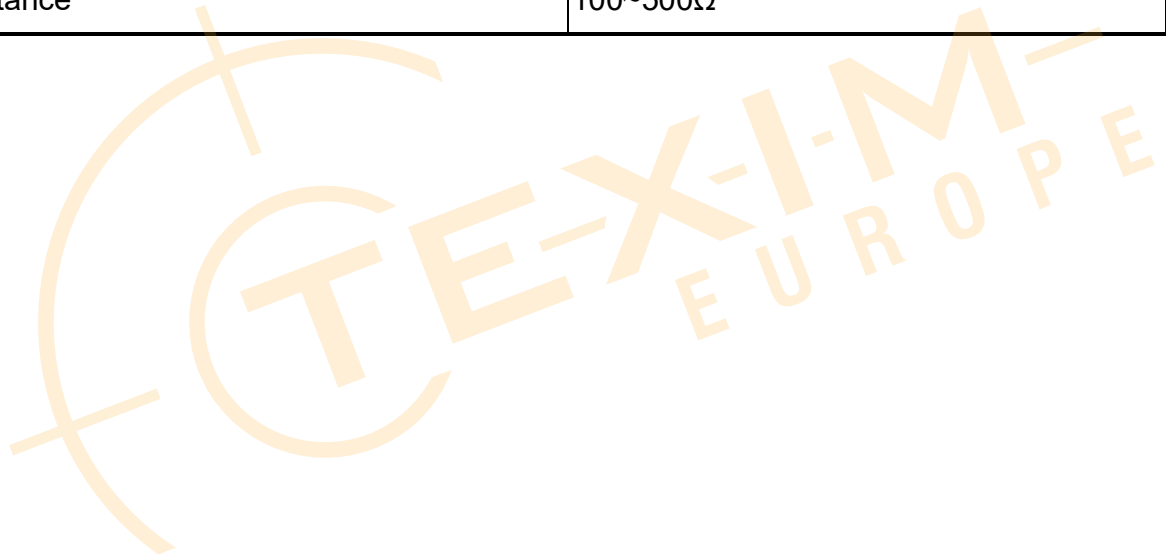
Note3: The packing have to including into the vibration testing.

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

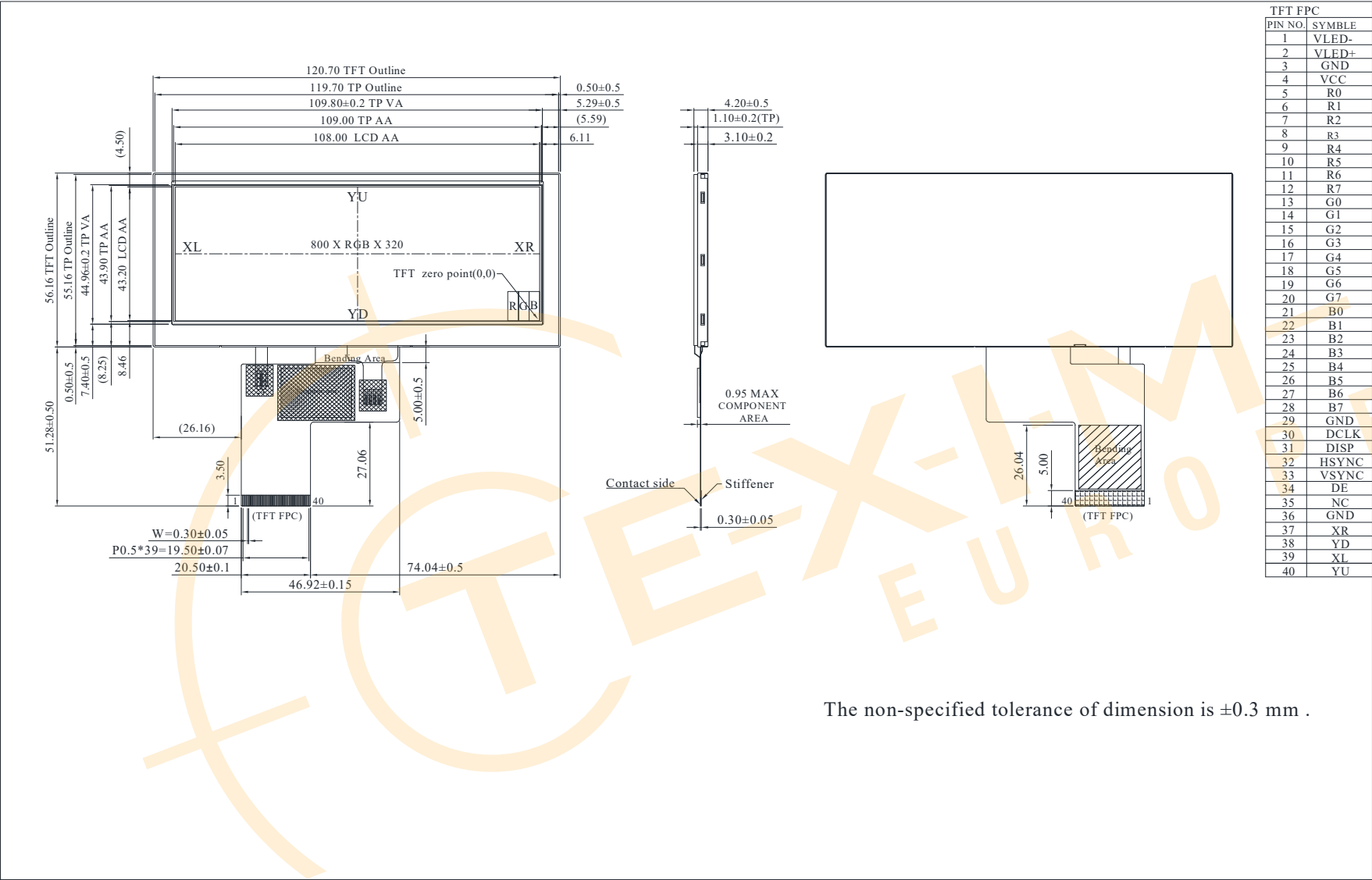


11.1. Resistance Touch Panel General Specifications

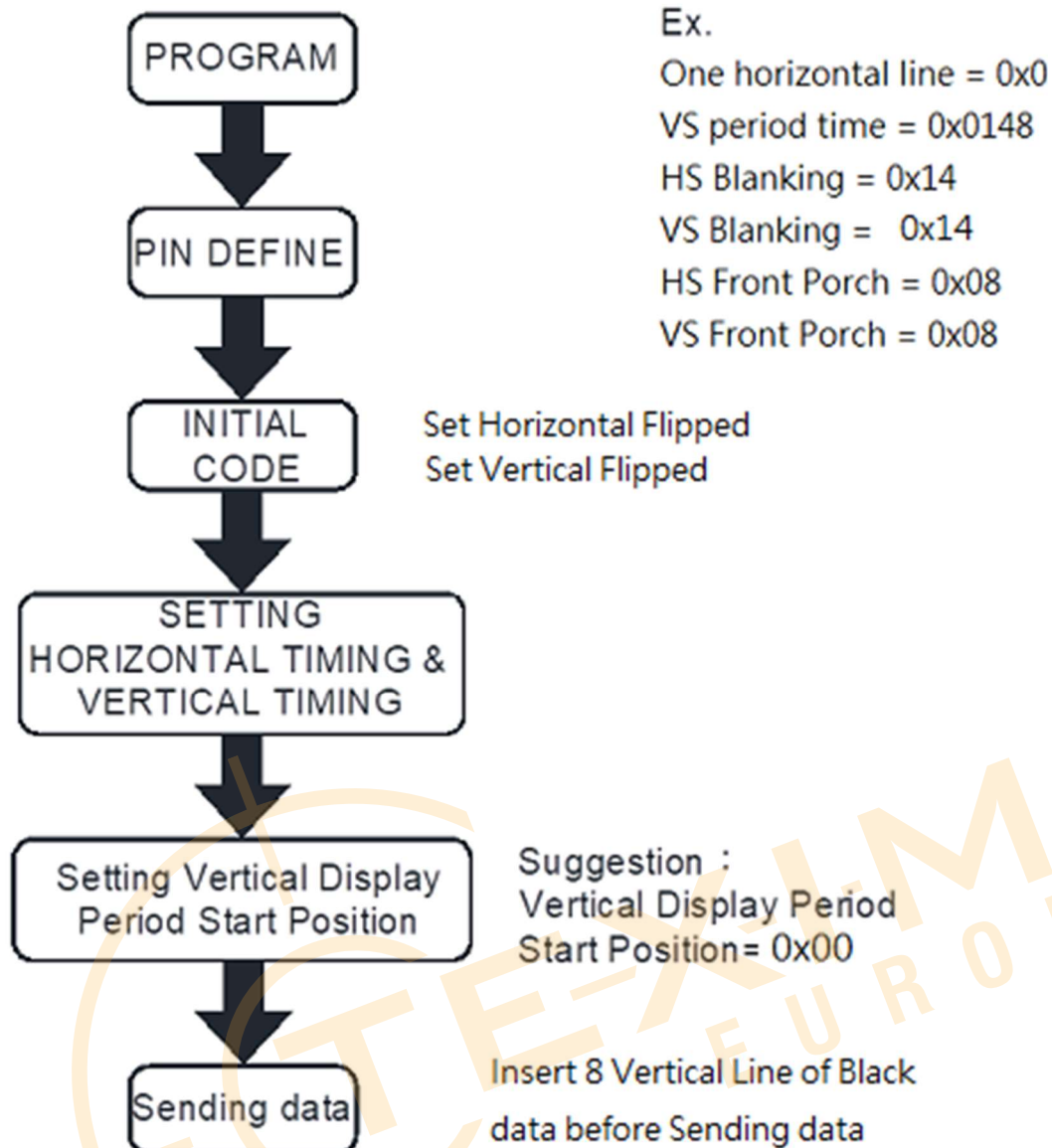
Item	Description
Driving condition	DC5V
Operating force	10~120g
Linearity max	$\leq \pm 1.5\%$
Insulating resistance	$> 20\text{M}\Omega$, 25V(DC)
Light transparence	70%
Structure type	ITO Film/ITO Glass(F/G)
Surface Hardness	3H typ
Pen Hitting Durability (with the silicon rubber)	$> 1000,000$ times
X resistance	700~1500 Ω
Y resistance	100~500 Ω



12.Contour Drawing



13.Display start address setting



Note :

For different Controller ICs, the value of vertical display period start position need to be adjusted accordingly.



winstar

LCM Sample Estimate Feedback Sheet

Module Number : _____

Page: 1

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 Temperature) : | ☐ 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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Winstar Module Number : _____

Page: 2

5、Electronic Characteristics of Module :

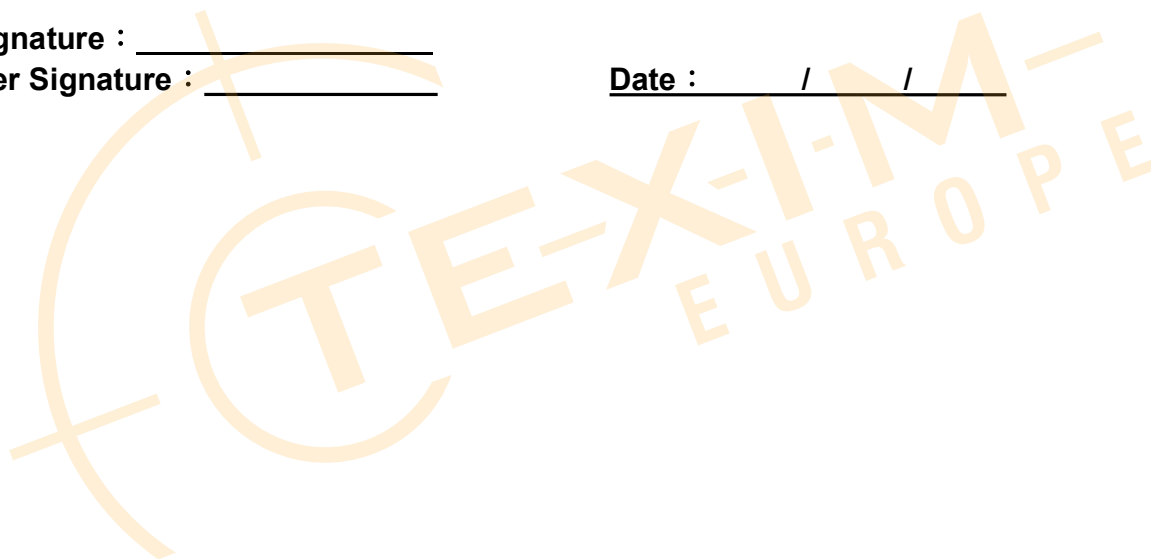
- | | | |
|------------------------------|-------------------------------|-------------------------------------|
| 1. Input Voltage : | ☐ Pass | ☐ NG , _____ |
| 2. Supply Current : | ☐ Pass | ☐ NG , _____ |
| 3. Driving Voltage for LCD : | ☐ Pass | ☐ NG , _____ |
| 4. Contrast for LCD : | ☐ Pass | ☐ 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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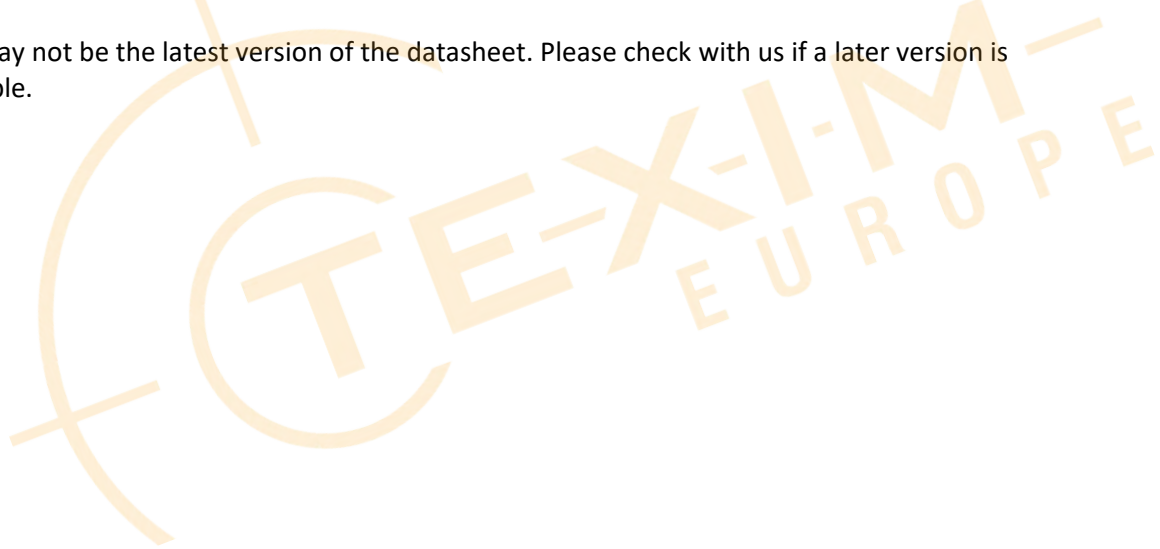
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Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time.

All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts.

Please contact us if you have any questions about the contents of the datasheet.

This may not be the latest version of the datasheet. Please check with us if a later version is available.





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