

TFT DISPLAY SPECIFICATION

Distributed by:



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.: WF101JSYAHNNO#

<p>APPROVED BY: (FOR CUSTOMER USE ONLY)</p>	<p>PCB VERSION: _____ DATA: _____</p>
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SALES BY	APPROVED BY	CHECKED BY	PREPARED BY
			葉虹蘭
ISSUED DATE: 2024/07/16			

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>



Winstar Display Co., LTD
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MODLE NO :

RECORDS OF REVISION

DOC. FIRST ISSUE

VERSION	DATE	REVISED PAGE NO.	SUMMARY
0	2024/07/16		First issue



Contents

- 1.Module Classification Information
- 2.Summary
- 3.General Specifications
- 4.Absolute Maximum Ratings
- 5.Electrical Characteristics
- 6.Electrical Specification
- 7.Function Description
- 8.Optical Characteristics
- 9.Interface
- 10.Reliability
- 11.Contour Drawing
- 12.Other

1. Module Classification Information

W F 101 J S Y A H D N N 0 #
 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	Display Size : 10.1" TFT											
④	Model serials no.											
⑤	Backlight Type :	F→CCFL, White S→LED, High Light White				T→LED, White Z→Nichia LED, White						
⑥	LCD Polarize Type/ Temperature range/ Gray Scale Inversion Direction	A→Transmissive, N.T, IPS TFT C→Transmissive, N. T, 6:00 ; F→Transmissive, N.T,12:00 ; I→Transmissive, W. T, 6:00 K→Transflective, W.T,12:00 L→Transmissive, W.T,12:00 N→Transmissive, Super W.T, 6:00				Q→Transmissive, Super W.T, 12:00 R→Transmissive, Super W.T, O-TFT V→Transmissive, Super W.T, VA TFT W→Transmissive, Super W.T, IPS TFT X→Transmissive, W.T, VA TFT Y→Transmissive, W.T, IPS TFT Z→Transmissive, W.T, O-TFT						
⑦	A : TFT LCD B : TFT+SCREW HOLES+CONTROL BOARD C : TFT+ SCREW HOLES +A/D BOARD D : TFT+ SCREW HOLES +A/D BOARD+CONTROL BOARD E : TFT+ SCREW HOLES +POWER BOARD				F : TFT+CONTROL BOARD G : TFT+ SCREW HOLES H : TFT+D/V BOARD I : TFT+ SCREW HOLES +D/V BOARD J : TFT+POWER BD							
⑧	Resolution:											
	A	128160	B	320234	C	320240	D	480234	E	480272	F	640480
	G	800480	H	1024600	I	320480	J	240320	K	800600	L	240400
	M	1024768	N	128128	P	1280800	Q	480800	R	640320	S	480128
	T	800320	U	8001280	V	176220	W	1280398	X	1024250	Y	1920720
	Z	800200	2	1024324	3	7201280	4	19201200	5	1366768	6	1280320
⑨	D: Digital L : LVDS M:MIPI											
⑩	Interface:											
	N	Without control board			A	8Bit		B	16Bit		H	HDMI
	I	I2C Interface			R	RS232		S	SPI Interface		U	USB
⑪	TS:											
	N	Without TS			T	Resistive touch panel			C	Capacitive touch panel (G-F-F)		
	G	Capacitive touch panel (G-G)					C1	Capacitive touch panel (G-F-F)+OCA				
	C2	Capacitive touch panel (G-F-F)+OCR					G1	Capacitive touch panel (G-G)+OCA				
	G2	Capacitive touch panel (G-G)+OCR					B	CTP+GG+USB				
⑫	Version: X:Raspberry pi											
⑬	Special Code	#:Fit in with ROHS directive regulations										

2.Summary

TFT 10.1" is a color active matrix thin film transistor (TFT) liquid crystal display without polarizer. This model is composed of amorphous silicon TFT as a switching device.

This TFT LCD has a 10.1" wide (16:9) diagonally measured active display area with WVGA (1024 horizontal by 600 vertical pixel) resolution. Each pixel is divided into Red, Green, Blue dots which are arranged in vertical stripes.



3.General Specifications

Item	Dimension	Unit
Size	10.1	inch
Dot Matrix	1024 RGB X 600	dots
Module dimension	235.0(W) x143.0(H) x 5.05(D)	mm
Active area	222.72 (H) x 125.28(V)	mm
Pixel pitch	0.2175(W) x 0.2088(H)	mm
LCD type	TFT, Normally Black, Transmissive	
TFT Interface	24 bit RGB	
TFT Driver IC	EK79001HN-S+EK73215BCGA or equivalent	
Viewing Angle	85/85/85/85	
Aspect Ratio	16:9	
Backlight Type	LED, Normally White	
With /Without TP	Without TP	
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. 60°C, 90% RH MAX. Temp. > 60°C, Absolute humidity shall be less than 90% RH at 60°C



5. Electrical Characteristics

5.1. Typical Operation Conditions (At Ta = 25 °C,)

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Digital Power Supply Voltage For LCD	Vcc	3.0	3.3	3.6	V	Note1
Analog Power Supply Voltage	AVDD	9.89	10.2	10.5	V	-
Gate On Power Supply Voltage	VGH	19.4	20.0	20.6	V	-
Gate Off Power Supply Voltage	VGL	-10.3	-10.0	-9.7	V	-
Common Power Supply Voltage	VCOM	4.0	4.3	4.6	V	Note2
Input logic high voltage	VIH	0.7 Vcc	-	Vcc	V	Note3
Input logic low voltage	VIL	0	-	0.3 Vcc	V	

Note1:Vcc setting should match the signals output voltage (refer to Note 3) of customer's system board.

Note 2.Please adjust VCOM to make the flicker level be minimum.

Note 3:RESET,STBYB,U/D,L/R,SELB

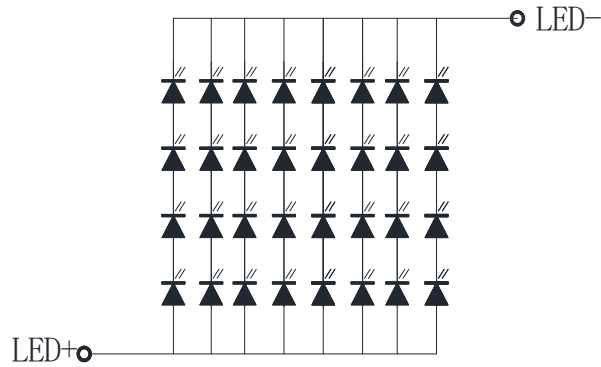
5.2. Current Consumption

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Current for Driver	IGH	-	0.4	1.0	mA	VGH =20.0V
	IGL	-	1.4	2.5	mA	VGL = -10.0V
	IVcc	-	10	15	mA	Vcc =3.3V
	IAVDD	-	14.3	25	mA	AVDD =10.2V

5.3. Backlight Driving Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Supply voltage of white LED backlight	VL	10.8	12.4	14.0	V	Note 1
Current for LED backlight	IL	-	480	-	mA	
LED life time	-	50,000	-	-	Hr	Note2

Note 1 : There are 1 Groups LED



CIRCUIT DIAGRAM

Note 2 : $T_a = 25\text{ }^{\circ}\text{C}$

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

Note 4 : The single LED lamp case

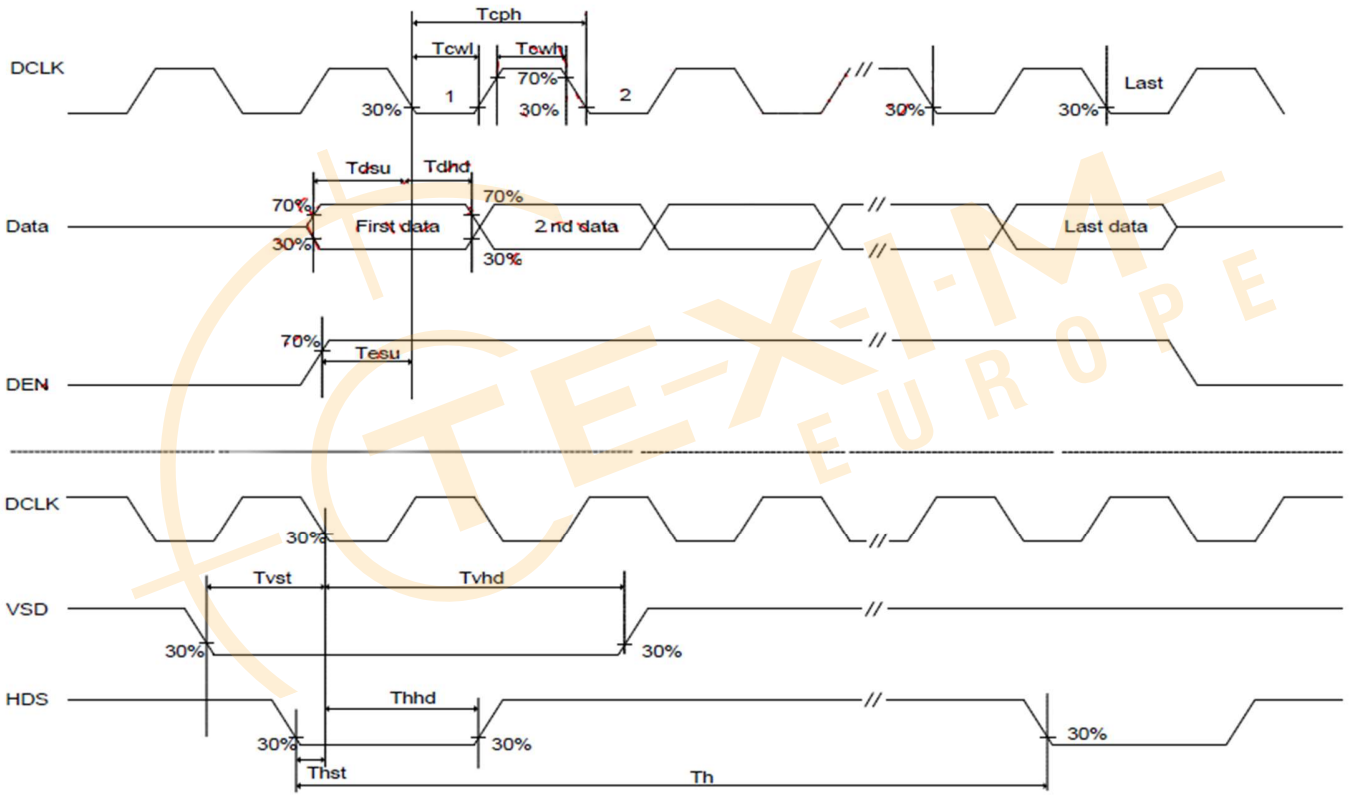
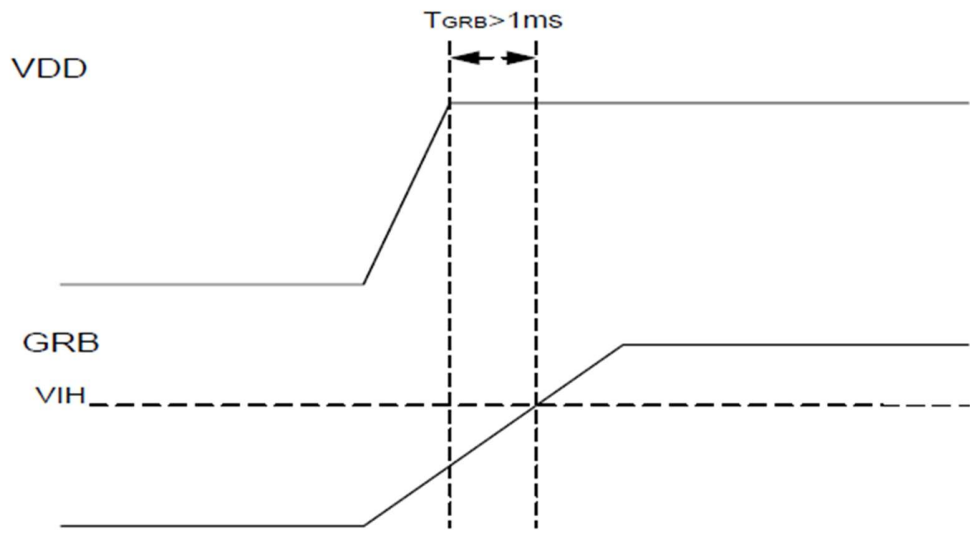
6. Electrical Specification

6.1. AC Electrical Characteristics

(TA = -30 to 85°C, VDD = 2.3 to 3.6V, AVDD = 8 to 13.5V, GND = AGND = 0V)

TTL mode

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
VDD Power On Slew rate	TPOR	From 0V to 90% VDD	1	-	20	ms
RST pulse width	TRST	DCLK = 65MHz	50	-	-	us
DCLK cycle time	Tcph	-	14	-	-	ns
DCLK pulse duty	Tcwh	-	40	50	60	%
VSD setup time	Tvst	-	5	-	-	ns
VSD hold time	Tvhd	-	5	-	-	ns
HSD setup time	Thst	-	5	-	-	ns
HSD hold time	Thhd	-	5	-	-	ns
Data set-up time	Tdsu	D0[7:0], D1[7:0], D2[7:0] to DCLK	5	-	-	ns
Data hold time	Tdhd	D0[7:0], D1[7:0], D2[7:0] to DCLK	5	-	-	ns
DE setup time	Tesu	-	5	-	-	ns
DE hold time	Tehd	-	5	-	-	ns
Output stable time	Tsst	Dual gate	-	-	3	us

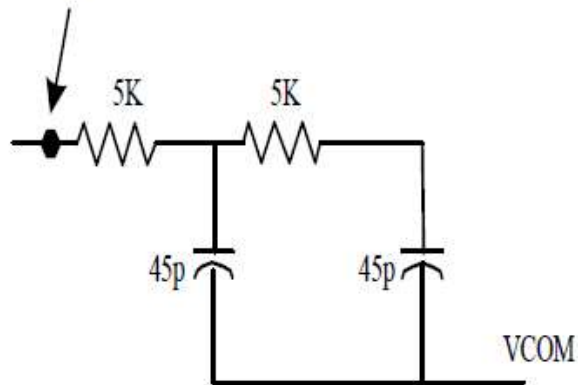
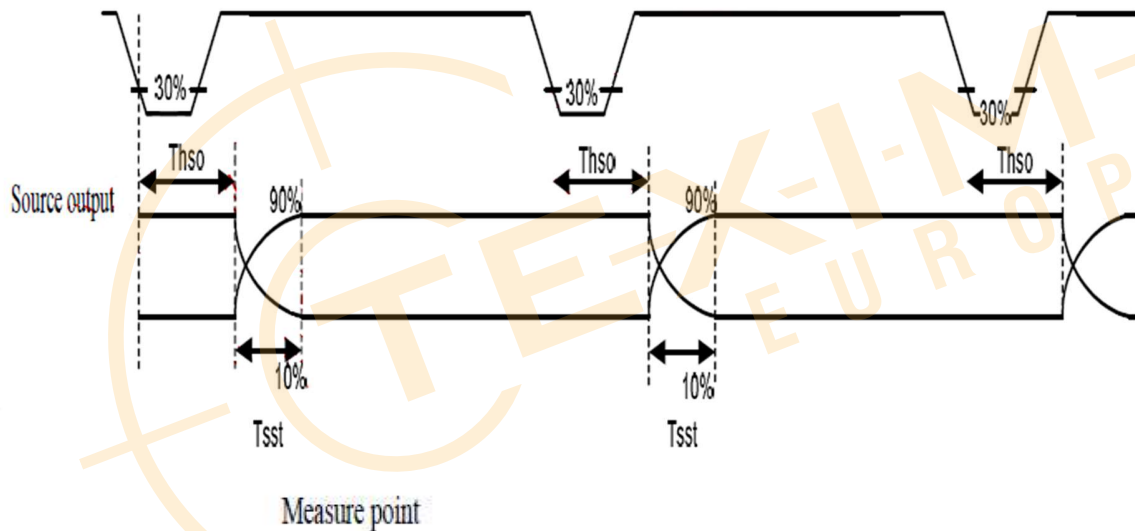


Parallel Input Clock and Data timing

6.2. Output Timing Table

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
DCLK frequency	Fclk	-	65	71	MHz	VDD =2.3~3.6V
DCLK cycle time	Tclk	14.1	15.4		ns	
DCLK pulse duty	Tcwh	40	50	60	%	Tclk
Time from HSD to Source Output	Thso	-	64	-	DCLK	
Time from HSD to LD	Thld	-	64	-	DCLK	
Time from HSD to STV	Thstv	-	2	-	DCLK	
Time from HSD to CKV	Thckv	-	20	-	DCLK	
Time from HSD to OEV	Thoev	-	4	-	DCLK	
LD pulse width	Twld	-	10	-	DCLK	
CKV pulse width	Twckv	-	66	-	DCLK	
OEV pulse width	Twoev	-	74	-	DCLK	

HSD



Source Output Timing

**Parallel RGB Timing Characteristic
For 1024RGB x 600 panel**

DE mode

DE mode					
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency @Frame rate=60hz	fclk	40.8	51.2	67.2	Mhz
Horizontal display area	thd	1024			DCLK
HSYNC period time	th	1114	1344	1400	DCLK
HSYNC blanking	thb+thfp	90	320	376	DCLK
Vertical display area	tvd	600			H
VSYNC period time	tv	610	635	800	H
VSYNC blanking	tvb+tvfp	10	35	200	H

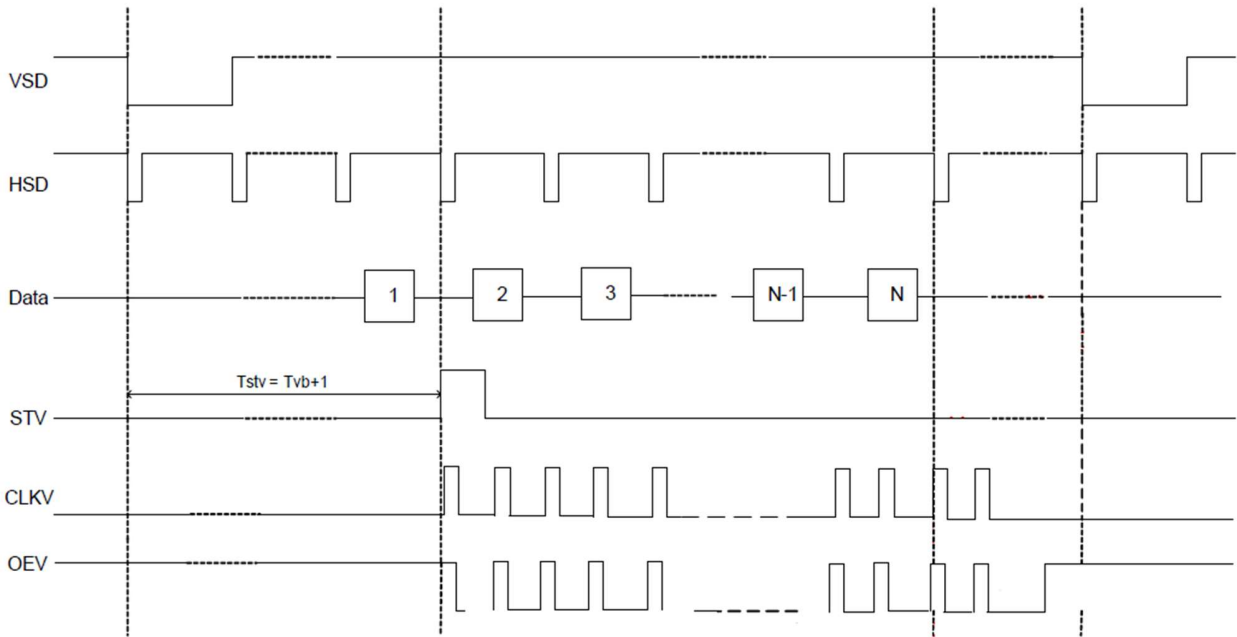
HV mode(1)

HV mode					
Horizontal input timing					
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Horizontal display area	thd	1024			DCLK
DCLK frequency@ Frame rate=60hz	fclk	44.9	51.2	63	Mhz
1 Horizontal Line	th	1200	1344	1400	DCLK
HSYNC pulse width	thpw	Min.	1		
		Typ.	-		
		Max.	140		
HSYNC back porch	thbp	160	160	160	
HSYNC front porch	thfp	16	160	216	

HV mode(2)

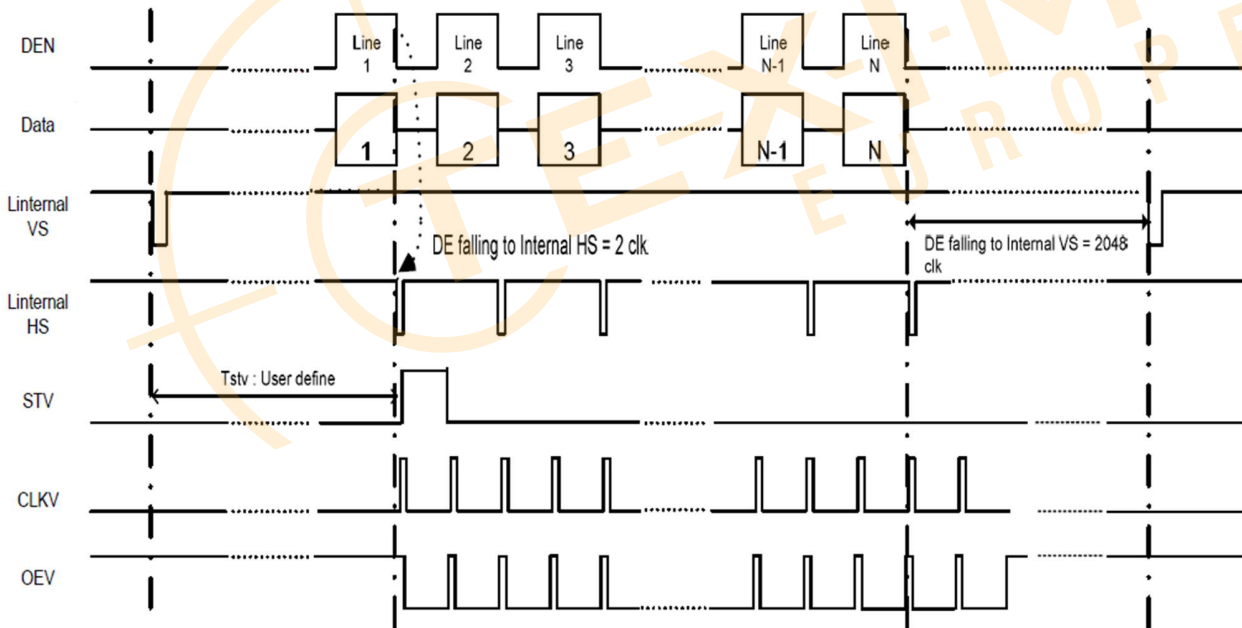
Vertical input timing					
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Vertical display area	tvd	600			H
VSYNC period time	tv	624	635	750	H
VSYNC pulse width	tvpw	1	-	20	H
VSYNC back porch	tvb	23	23	23	H
VSYNC front porch	tvfp	1	12	127	H

1. Vertical Timing Diagram HV mode



Vertical Timing Diagram HV mode

2. Vertical Timing Diagram DE mode



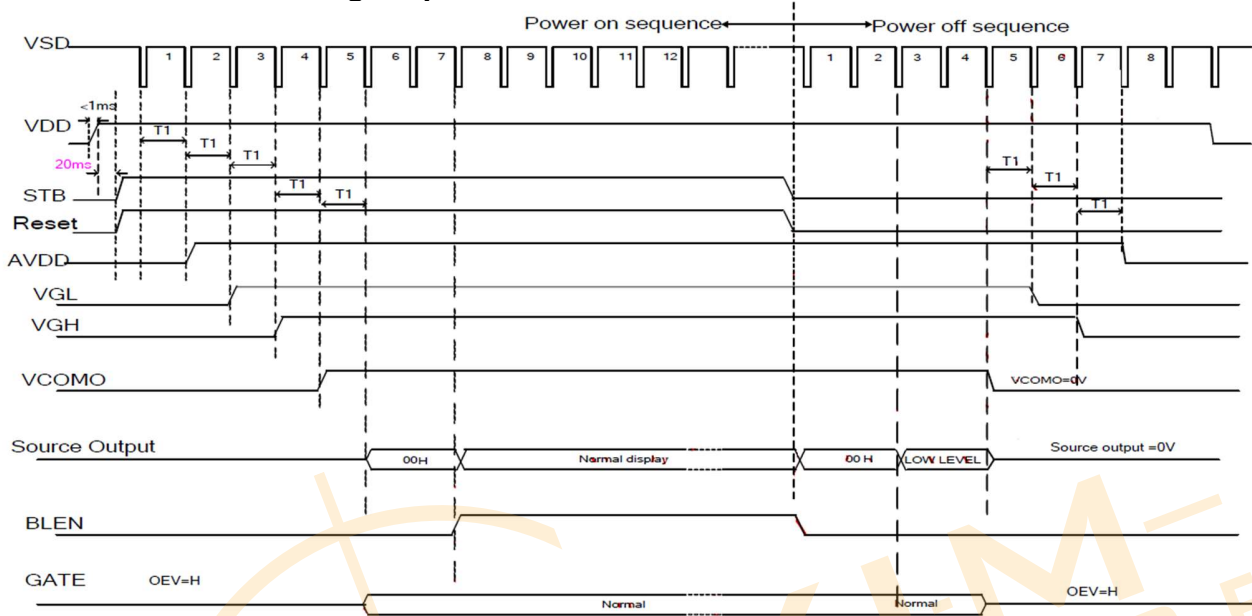
Vertical Timing Diagram DE mode

7. Function Description

7.1. Power On/Off Sequence

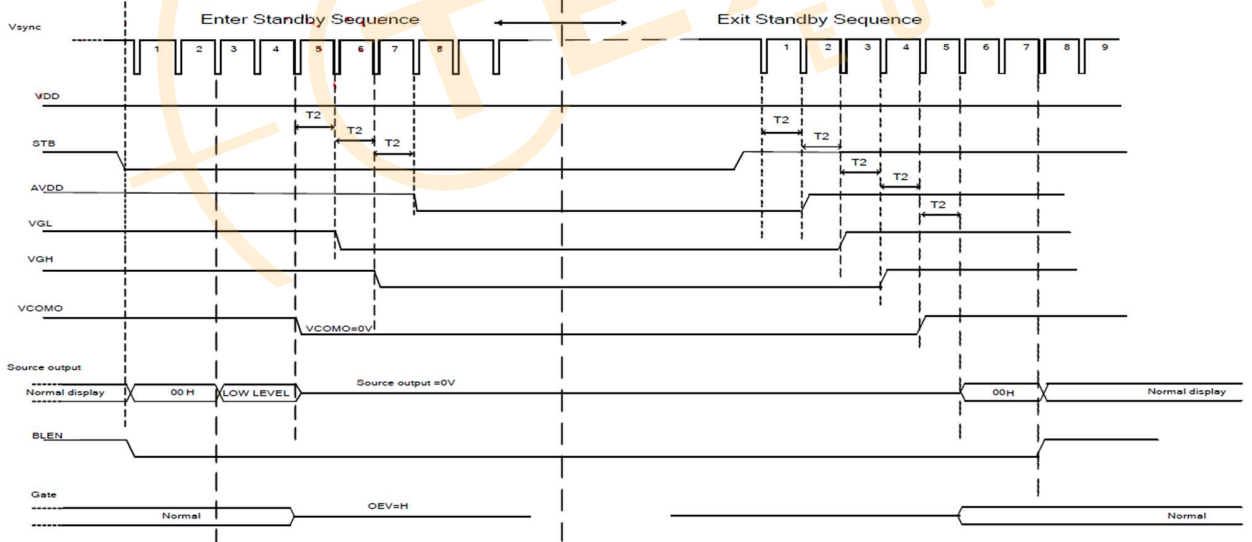
In order to prevent IC from power on reset fail, the rising time (TPOR) of the digital power supply VDD should be maintained within the given specifications. Refer to “AC Characteristics” for more detail on timing.

7.2. Power-On/Off Timing Sequence



Note : $1\text{Frame} \geq T1 \geq 2\text{ms}$.

Power On/Off timing chart



Note : $1\text{Frame} \geq T2 \geq 2\text{ms}$.

Enter and Exit Standby Mode timing chart

Note: Low level=3Fh, when NBW=L(Normally white)

Low level=00h, when NBW=H(Normally black)

8. Optical Characteristics

Item	Symbol	Condition.	Min	Typ.	Max.	Unit	Remark	
Response time	Tr	$\theta=0^\circ$ 、 $\Phi=0^\circ$	-	10	20	.ms	Note 3	
	Tf		-	20	25	.ms		
Contrast ratio	CR	At optimized viewing angle	600	800	-	-	Note 4	
Color Chromaticity	White	Wx	$\theta=0^\circ$ 、 $\Phi=0^\circ$	0.252	0.302	0.352	-	Note 2,6,7
		Wy		0.274	0.324	0.374	-	
Viewing angle	Hor.	Θ_R	$CR \geq 10$	80	85	-	Deg.	Note 1
		Θ_L		80	85	-		
	Ver.	Φ_T		80	85	-		
		Φ_B		80	85	-		
Brightness	-	-	1000	1100	-	cd/m ²	Center of display	
Uniformity	(U)	-	70	-	-	%	Note 5	

Ta=25±2°C

Note 1: Definition of viewing angle range

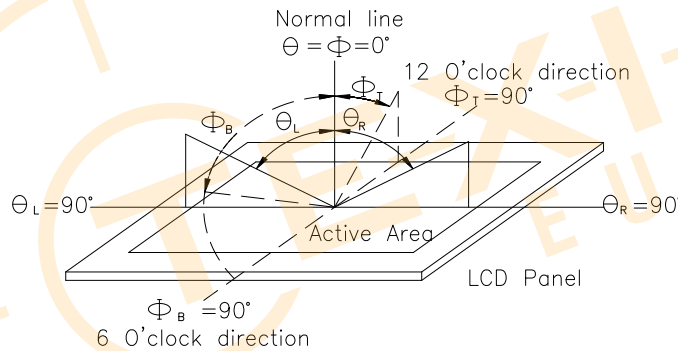


Fig. 8.1. Definition of viewing angle

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.

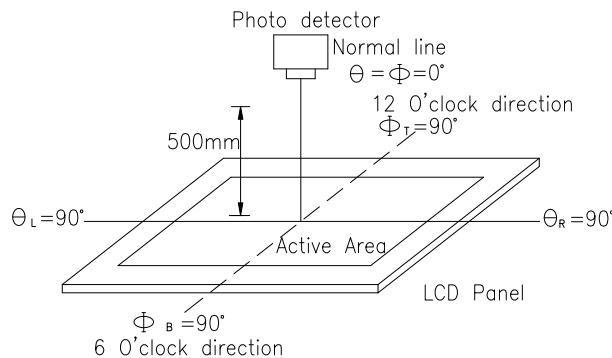
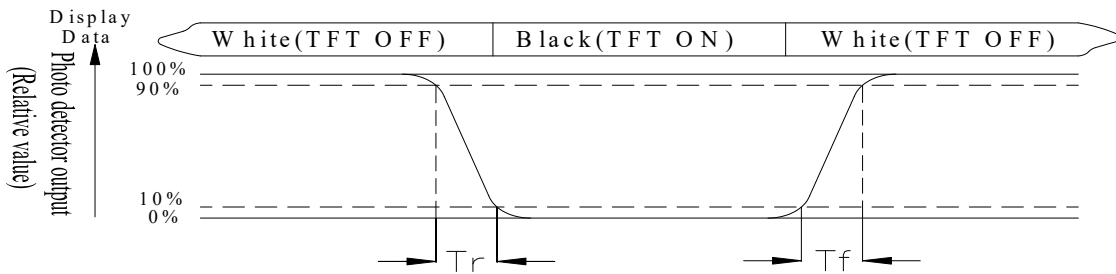


Fig. 8.2. Optical measurement system setup

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.

$$\text{Luminance Uniformity (U)} = \text{Lmin/Lmax} \times 100\%$$

L = Active area length

W = Active area width

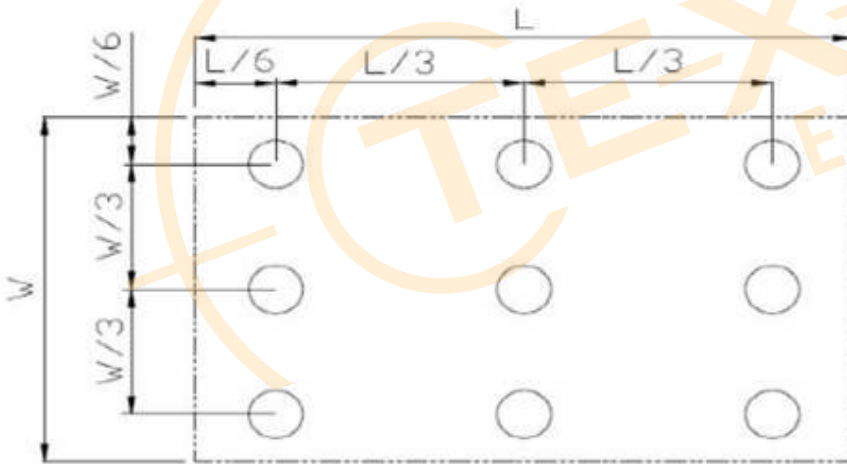


Fig 8.3. Definition of uniformity

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. TFT LCD MODULE

Pin No.	Symbol	Function	Remark
1	VLED+	LED Anode	
2	VLED+	LED Anode	
3	VLED-	LED Cathode	
4	VLED-	LED Cathode	
5	GND	Ground	
6	VCOM	Common voltage	
7	VCC	Power for Digital Circuit	
8	MODE	DE/SYNC mode select	Note 1
9	DE	Data Input Enable (DEN)	
10	VS	Vertical Sync Input (VSD)	
11	HS	Horizontal Sync Input (HSD)	
12	B7	Blue data(MSB)	
13	B6	Blue data	
14	B5	Blue data	
15	B4	Blue data	
16	B3	Blue data	
17	B2	Blue data	
18	B1	Blue data	
19	B0	Blue data(LSB)	
20	G7	Green data(MSB)	
21	G6	Green data	
22	G5	Green data	
23	G4	Green data	
24	G3	Green data	
25	G2	Green data	
26	G1	Green data	
27	G0	Green data(LSB)	
28	R7	Red data(MSB)	
29	R6	Red data	
30	R5	Red data	
31	R4	Red data	
32	R3	Red data	

33	R2	Red data	
34	R1	Red data	
35	R0	Red data(LSB)	
36	GND	Power Ground	
37	DCLK	Sample clock (CLK)	Note 2
38	GND	Power Ground	
39	L/R	Left / right selection	Note 3,4
40	U/D	Up/down selection	Note 3,4
41	VGH	Gate ON Voltage	
42	VGL	Gate OFF Voltage	
43	AVDD	Power for Analog Circuit	
44	RESET	Global reset pin.	Note 5
45	NC(BIST)	No connection	
46	VCOM	Common Voltage	
47	DITHB	Dithering function	Note 6
48	GND	Power Ground	
49	NC(FGND)	No connection	
50	NC(FGND)	No connection	

Note 1: When select DE mode, MODE="1", VS and HS must pull high.

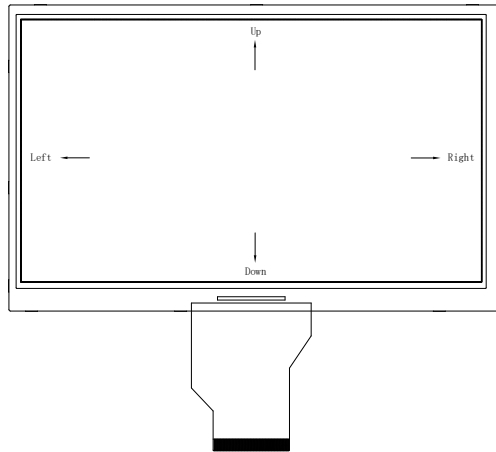
When select SYNC mode, MODE="0", DE must be grounded.

Note 2: Data shall be latched at the falling edge of DCLK.

Note 3: Selection of scanning mode

Setting of scan control input		Scanning direction
U/D	L/R	
Low	High	Up to down, left to right
High	Low	Down to up, right to left
Low	Low	Up to down, right to left
High	High	Down to up, left to right

Note 4: Definition of scanning direction.
Refer to the figure as below:



Note 5: Global reset pin. Active low to enter reset state . Suggest to connect with an RC reset circuit for stability. Normally pull high.

Note 6: Dithering function enable control, normally pull low.
When DITHB="0", Disable internal dithering function,
When DITHB="1", Enable internal dithering function,



10. Reliability

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

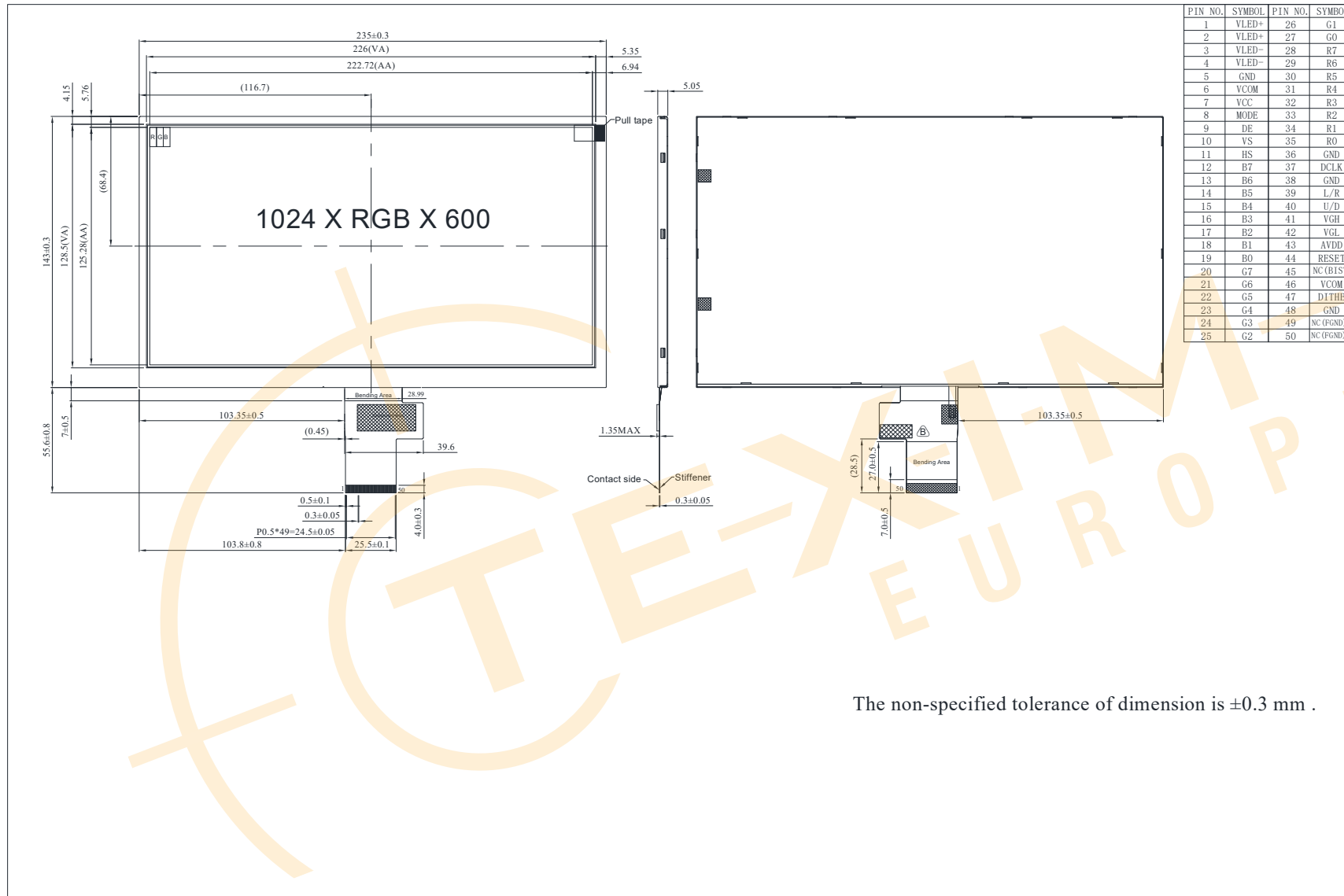
Environmental Test			
Test Item	Content of Test	Test Condition	Note
High Temperature storage	Endurance test applying the high storage temperature for a long time.	80°C 200hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30°C 200hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	70°C 200hrs	—
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-20°C 200hrs	1
High Temperature/ Humidity Operation	The module should be allowed to stand at 60°C,90%RH max	60°C,90%RH 96hrs	1,2
Thermal shock resistance	The sample should be allowed stand the following 10 cycles of operation <div style="text-align: center;"> <p style="margin: 0;">-20°C 25°C 70°C</p> <p style="margin: 0;">30min 5min 30min</p> <p style="margin: 0;">1 cycle</p> </div>	-20°C/70°C 10 cycles	—
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=±6KV(contact), ±8KV(air), RS=330Ω CS=150pF 10 times	—

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.

11. Contour Drawing



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



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 , _____

>> **Go to page 2** <<



Winstar Module Number : _____

Page: 2

5、Electronic Characteristics of Module :

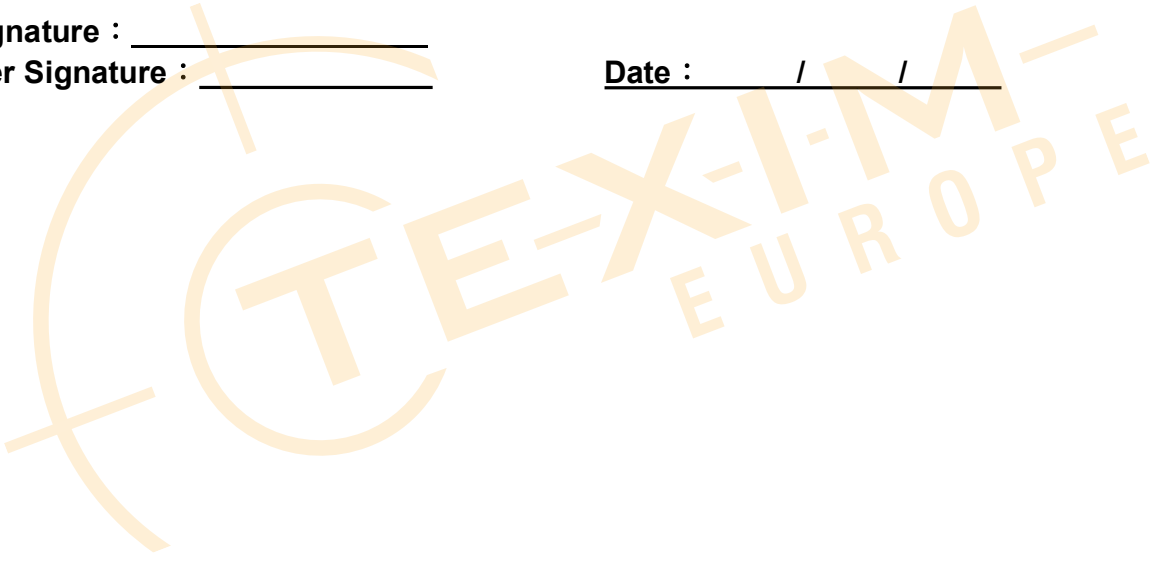
- | | | | |
|------------------------------|-------------------------------|-------------------------------|-------|
| 1. Input Voltage : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , | _____ |
| 2. Supply Current : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , | _____ |
| 3. Driving Voltage for LCD : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , | _____ |
| 4. Contrast for LCD : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , | _____ |
| 5. B/L Driving Method : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , | _____ |
| 6. Negative Voltage Output : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , | _____ |
| 7. Interface Function : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , | _____ |
| 8. LCD Uniformity : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , | _____ |
| 9. ESD test : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , | _____ |
| 10. Others : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , | _____ |

6、Summary :

Sales signature : _____

Customer Signature : _____

Date : / /



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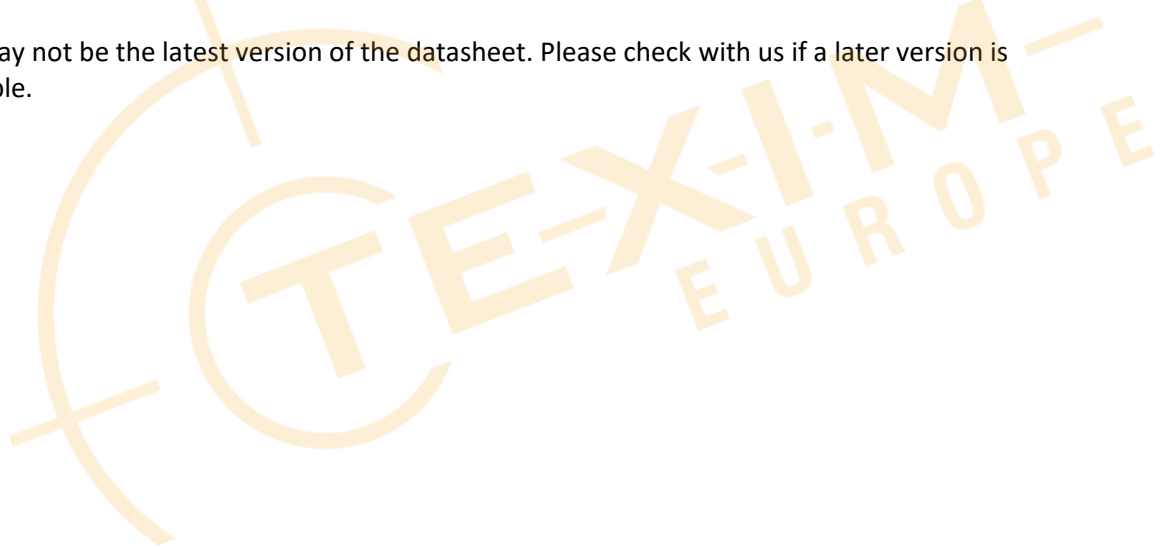
It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application.

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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