

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



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SPECIFICATION

CUSTOMER : _____

MODULE NO.: **WF70D4SYAUMNG10#**

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: 2025/01/02			

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	2024/09/11		First issue
A	2025/01/02		Modify the Function of PIN15 and Reliability



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1.Module Classification Information

W F 70 D4 S Y A U M N G 1 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 : 7.0” 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 7.0" is a transmissive type color active matrix liquid crystal display (LCD) which uses amorphous thin transistor (TFT) as switching devices. This product is composed of a TFT-LCD panel, driver ICs and a backlight unit.



3.General Specifications

Item	Dimension	Unit
Size	7.0	inch
Dot Matrix	800× RGB ×1280	dots
Module dimension	131.63 x 188.17 x 8.05	mm
Active area	94.2 x 150.72	mm
Pixel pitch	0.11775 x 0.11775	mm
LCD type	TFT, Normally Black, Transmissive	
Viewing angle	85/85/85/85	
TFT Driver IC	ILI9881C or Equivalent	
TFT Interface	2-Lanes MIPI	
Aspect Ratio	16:9	
Backlight Type	LED ,Normally White	
CTP Driver IC	ILI2511 or equivalent	
CTP Interface	I2C	
CTP FW Version	0x06.0x00.0x00.0x00.0x77.0x88.0x00.0x02	
CTP Resolution	16384*16384	
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	°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.		
Supply voltage	V _{CI}	2.5	3.3	3.6	V	
	IOVCC	1.7	1.8	1.9	V	
Supply LCM current	I _{VCI}	-	130	195	mA	Include CTP
	I _{IOVCC}	-	18	30	mA	

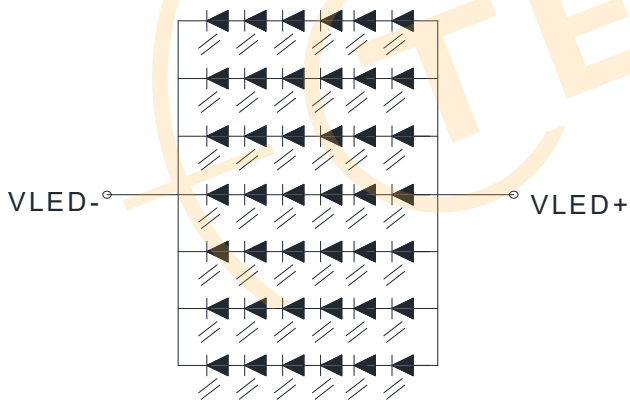
Note 1: All of the voltage listed above are with respect to GND=0V

Note 2: Device is subject to be damaged permanently if stresses beyond those absolute maximum rating listed above.

5.2. Backlight Driving Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
LED current	I _{LED}	-	140	-	mA	
LED voltage	V _{LED+}	16.8	18.0	19.2	V	Note 1
LED Life Time		-	30,000	-	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.DC Characteristics

6.1. Basic Characteristics for Panel Driving

Parameter	Symbol	Rating			Unit	Condition	Note
		Min	Typ	Max			
Logic Low level input voltage	V_{IL}	-0.3	-	$0.3 \cdot IOVCC$	V		Note1
Logic High level input voltage	V_{IH}	$0.7 \cdot IOVCC$	-	$IOVCC$	V		Note1
Logic Low level output voltage (TE)	V_{OL}	0		$0.2 \cdot IOVCC$	V	$I_{OL} = +1.0mA$	Note1
Logic High level output voltage (TE)	V_{OH}	$0.8 \cdot IOVCC$		$IOVCC$	V	$I_{OH} = -1.0mA$	Note1

NOTE1:

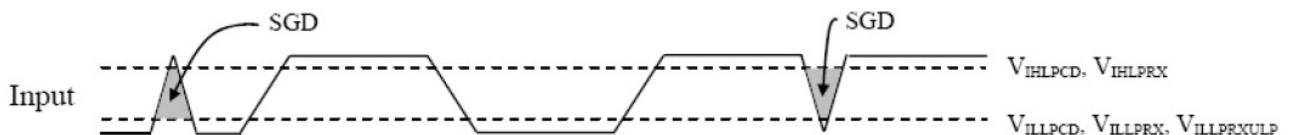
$T_a = -20$ to $70^\circ C$, $V_{CI} = 2.5V$ to $3.6V$, $IOVCC = 1.65V$ to $3.6V$

6.2. DSI DC Characteristics

LP Mode

Parameter	Symbol	Condition	Specification			Unit
			Min.	Typ.	Max.	
Logic 1 input voltage	V_{IHLPCD}	LP-CD	450	-	1350	mV
Logic 0 input voltage	V_{ILLPCD}	LP-CD	0.0	-	200	mV
Logic 1 input voltage	V_{IHLPRX}	LP-RX (CLK, D0, D1, D2, D3)	880	-	1350	mV
Logic 0 input voltage	V_{ILLPRX}	LP-RX (CLK, D0, D1, D2, D3)	0.0	-	550	mV
Logic 0 input voltage	$V_{ILLPRXULP}$	LP-RX (CLK ULP mode)	0.0	-	300	mV
Logic 1 output voltage	V_{OHLPTX}	LP-TX (D0)	1.1	-	1.3	V
Logic 0 output voltage	V_{OLLPTX}	LP-TX (D0)	-50	-	50	mV
Logic 1 input current	I_{IH}	LP-CD, LP-RX	-	-	10	μA
Logic 0 input current	I_{IL}	LP-CD, LP-RX	-10	-	-	μA

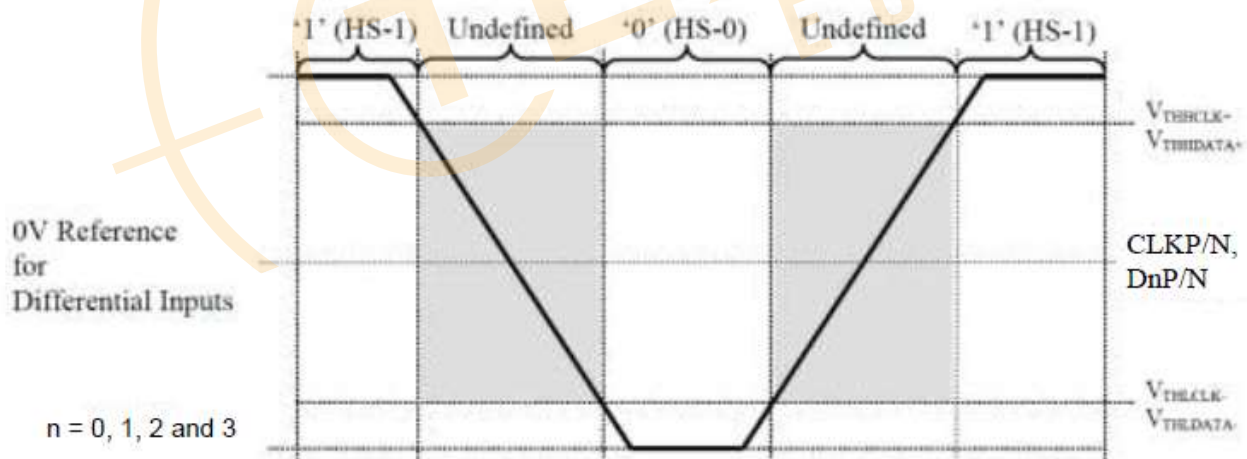
Spike/Glitch Rejection

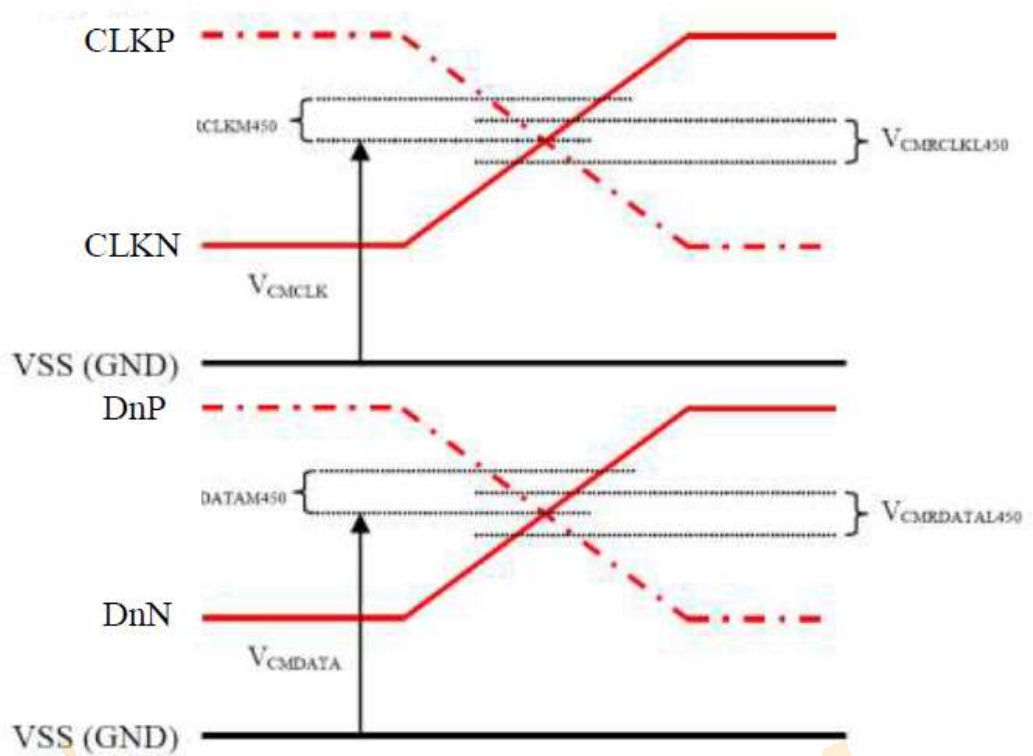


Spike/Glitch Rejection – DSI					
Signal	Symbol	Parameter	Min	Max	Unit
CLKP/N, DnP/N	SGD	Input pulse rejection for DSI	-	300	Vps

High Speed Mode

Parameter	Symbol	Condition	Specification			Unit
Input Common Mode Voltage for Clock	V_{CMCLK}	CLKP/N Note 2, Note 3	70	-	330	mV
Input Common Mode Voltage for Data	V_{CMDATA}	DnP/N Note 2, Note 3, Note 5	70	-	330	mV
Common Mode Ripple for Clock Equal or Less than 450MHz	$V_{CMRCLKL450}$	CLKP/N Note 4	-50	-	50	mV
Common Mode Ripple for Data Equal or Less than 450MHz	$V_{CMRDATAL450}$	DnP/N Note 4, Note 5	-50	-	50	mV
Common Mode Ripple for Clock More than 450MHz (peak sine wave)	$V_{CMRCLKM450}$	CLKP/N	-	-	100	mV
Common Mode Ripple for Data More than 450MHz (peak sine wave)	$V_{CMRDATAM450}$	DnP/N Note 5	-	-	100	mV
Differential Input Low Level Threshold Voltage for Clock	V_{THCLK-}	CLKP/N	-70	-	-	mV
Differential Input Low Level Threshold Voltage for Data	$V_{THDATA-}$	DnP/N Note 5	-70	-	-	mV
Differential Input High Level Threshold Voltage for Clock	V_{THCLK+}	CLKP/N	-	-	70	mV
Differential Input High Level Threshold Voltage for Data	$V_{THDATA+}$	DnP/N Note 5	-	-	70	mV
Single-ended Input Low Voltage	V_{ILHS}	CLKP/N, DnP/N Note 3, Note 5	-40	-	-	mV
Single-ended Input High Voltage	V_{IHHS}	CLKP/N, DnP/N Note 3, Note 5	-	-	460	mV
Differential Termination Resistor	R_{TERM}	CLKP/N, DnP/N Note 5	80	100	125	Ω
Single-ended Threshold Voltage for Termination Enable	V_{TERMEN}	CLKP/N, DnP/N Note 5	-	-	450	mV
Termination Capacitor	C_{TERM}	CLKP/N, DnP/N Note 5, Note 6	-	-	60	pF





Note: $n = 0, 1, 2$ and 3

7.AC Characteristics

7.1. High speed mode-clock channel timing

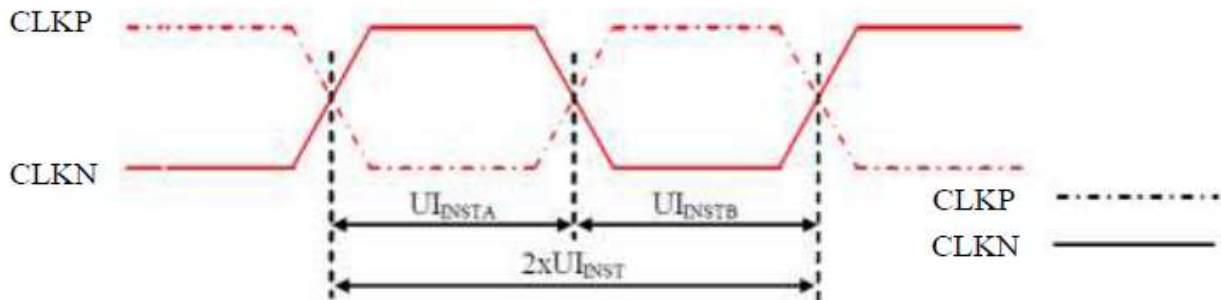


Figure 1: DSI clock channel timing

Table1 : DSI clock channel timing

Signal	Symbol	Parameter	Min	Max	Unit
CLKP/N	$2xUI_{INST}$	Double UI instantaneous	Note 2	25	ns
CLKP/N	UI_{INSTA}, UI_{INSTB} (Note 1)	UI instantaneous Half	Note 2	12.5	ns

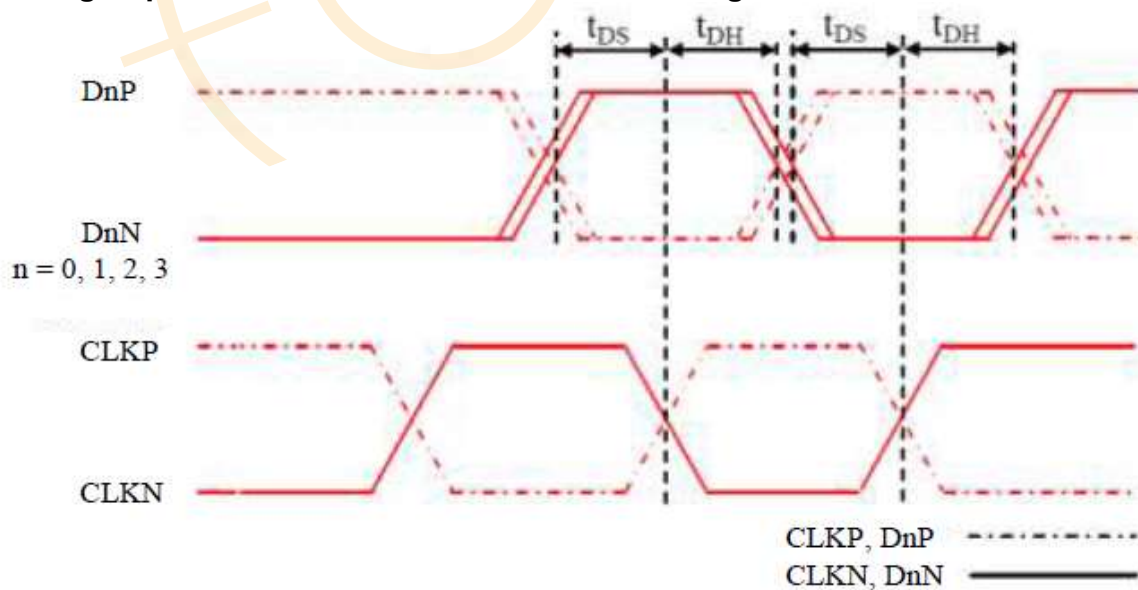
Notes:

1. $UI = UI_{INSTA} = UI_{INSTB}$
2. Define the minimum value, see table 2

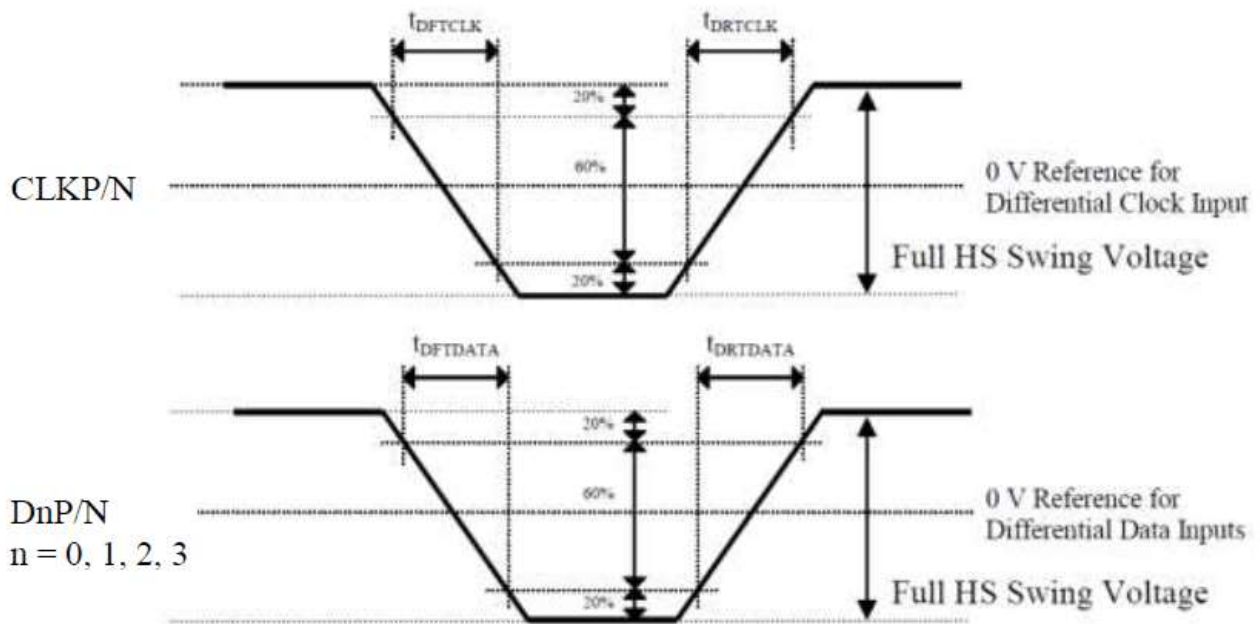
Table2 : Limited clock channel timing

Data type	Two Lanes speed	Three Lanes speed	Four Lanes speed
Data Type = 00 1110 (0Eh), RGB 565, 16 UI per Pixel	566 Mbps	466 Mbps	366 Mbps
Data Type = 01 1110 (1Eh), RGB 666, 18 UI per Pixel	637 Mbps	525 Mbps	412 Mbps
Data Type = 10 1110 (2Eh), RGB 666 Loosely, 24 UI per Pixel	850 Mbps	700 Mbps	550 Mbps
Data Type = 11 1110 (3Eh), RGB 888, 24 UI per Pixel	850 Mbps	700 Mbps	550 Mbps

7.2. High Speed Mode – Data Clock Channel Timing



7.3. High Speed Mode – Rising and Falling Timings



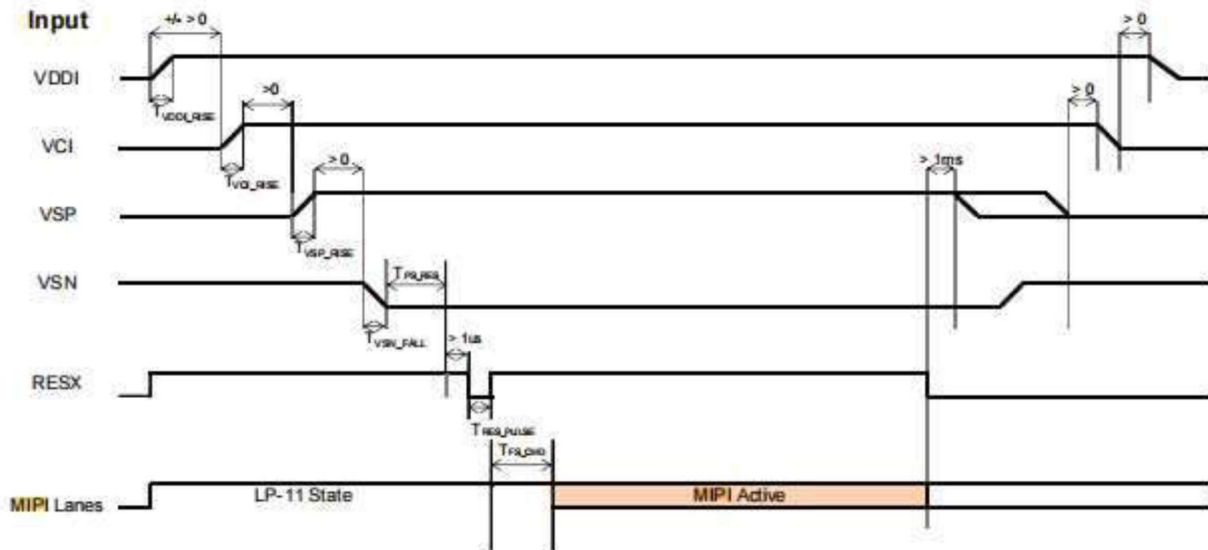
Parameter	Symbol	Condition	Specification		
			Min	Typ	Max
Differential Rise Time for Clock	t_{DRTCLK}	CLKP/N	150 ps	-	0.3UI (Note)
Differential Rise Time for Data	$t_{DRTDATA}$	DnP/N n=0 and 1	150 ps	-	0.3UI (Note)
Differential Fall Time for Clock	t_{DFTCLK}	CLKP/N	150 ps	-	0.3UI (Note)
Differential Fall Time for Data	$t_{DFTDATA}$	DnP/N n=0 and 1	150 ps	-	0.3UI (Note)

Note: The display module has to meet timing requirements, which are defined for the transmitter (MCU) on MIPI D-Phy standard.

8. Power on/off sequence

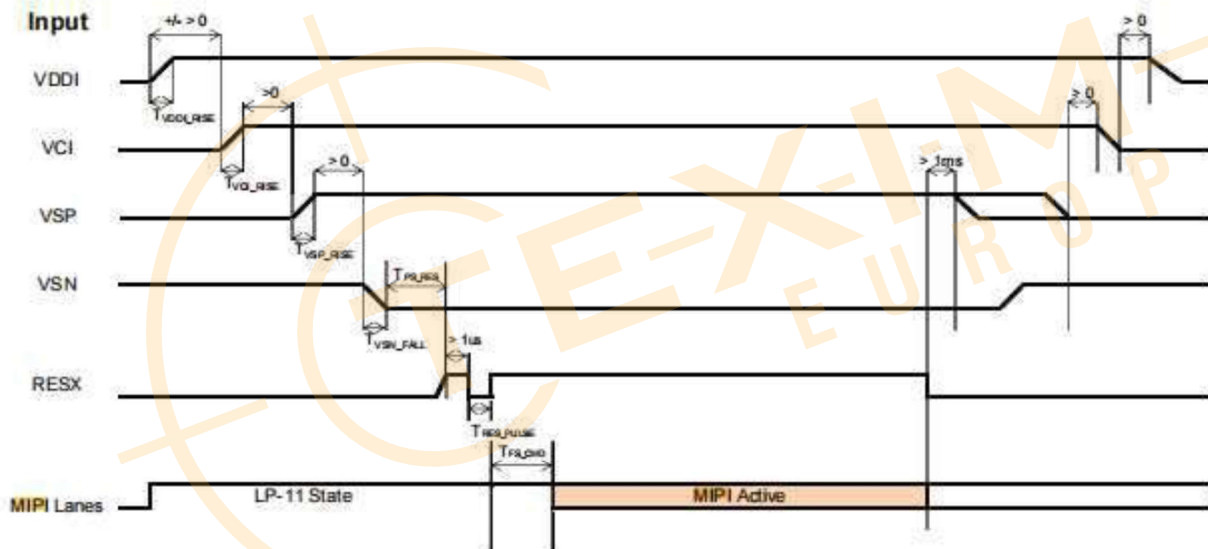
Case A

Input



Case B

Input



Symbol	Characteristics	Min.	Typ.	Max.	Units
T_{VDDI_RISE}	VDDI Rise time	20	-	-	us
T_{VCI_RISE}	Case A: VCI Rise time	200	-	-	us
	Case B: VCI Rise time	40			
T_{VSP_RISE}	VSP Rise time	200	-	-	us
T_{VSN_FALL}	VSN Fall time	200	-	-	us
T_{PS_RES}	VDDI/VCI on to Reset high	5	-	-	ms
T_{RES_PULSE}	Reset low pulse time	10	-	-	us
T_{FS_CMD}	Reset to first command	10	-	-	ms

9. Optical Characteristics

Item		Symbol	Condition.	Min	Typ.	Max.	Unit	Remark
Response time		Tr+ Tf	$\theta=0^{\circ}$ 、 $\Phi=0^{\circ}$	-	25	35	.ms	Note 3
Contrast ratio		CR	At optimized viewing angle	800	1000	-	-	Note 4
Color Chromaticity	White	Wx	$\theta=0^{\circ}$ 、 $\Phi=0$	0.2508	0.2808	0.3108		Note 2,6,7
		Wy		0.268	0.298	0.325		
Viewing angle	Hor.	Θ R	$CR\geq 10$	75	85	-	Deg.	Note 1
		Θ L		75	85	-		
	Ver.	Φ T		75	85	-		
		Φ B		75	85	-		
Brightness		-	-	800	850	-	cd/m ²	Center of display
Uniformity		(U)	-	75	-	-	%	Note 5

Ta=25±2°C

Note 1: Definition of viewing angle range

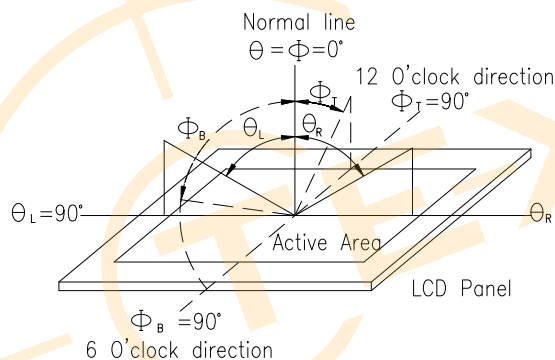


Fig. 9.1. Definition of viewing angle

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.

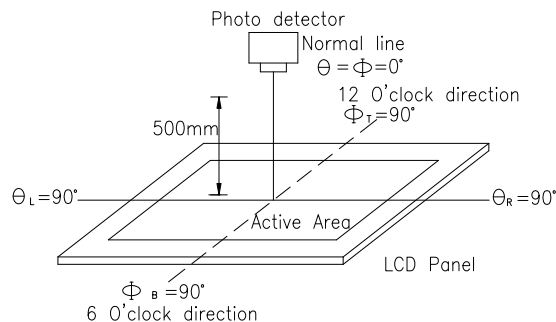
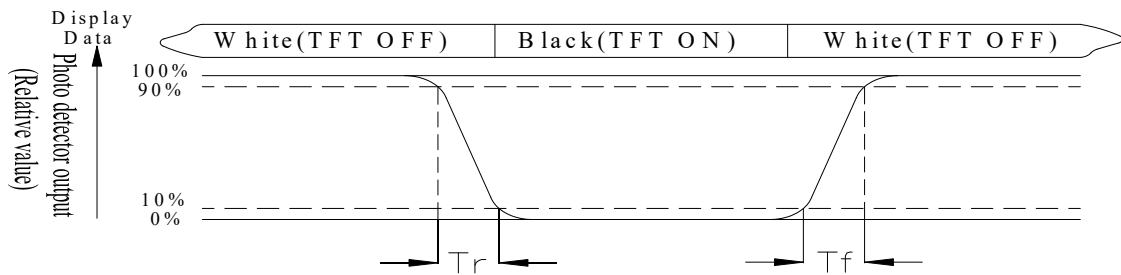


Fig. 9.2. Optical measurement system setup

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.

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

L = Active area length

W = Active area width

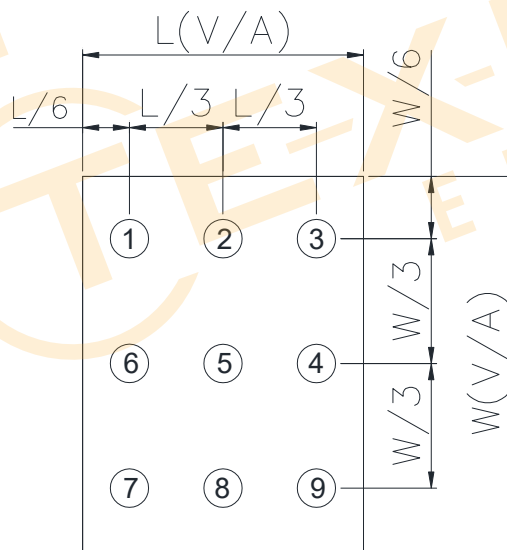


Fig9.3. Definition of uniformity

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.

10.Interface

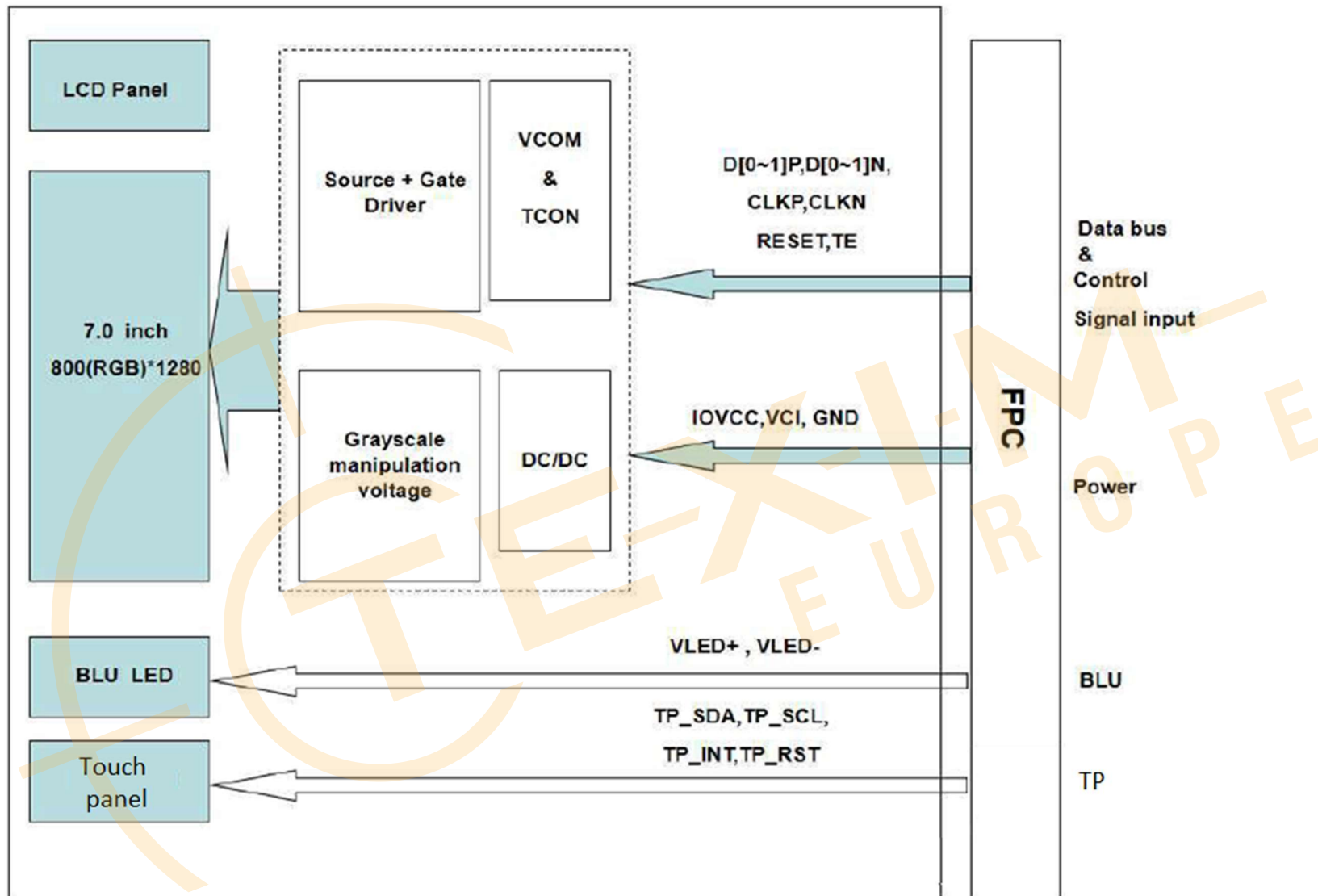
10.1. LCM PIN Definition

Pin	Symbol	Function	Remark
1	TP_GND	Ground	
2	TP_SDA	TP serial interface address and data input/output.	
3	TP_SCL	TP serial interface clock input.	
4	TP_INT	TP indicate coordinate data ready.	
5	TP_RST	System reset signal input, active low.	
6	NC(YU)	No connection	
7	NC(XL)	No connection	
8	NC(YD)	No connection	
9	NC(XR)	No connection	
10-11	VCI	Power for analog circuit.	
12-13	NC	No connection	
14	RESET	Global reset pin.	
15	TE	Tearing effect output pin. Leave the pin open when not in use.	
16	NC	No connection	
17-18	GND	Ground	
19-20	IOVCC	Power supply for I/O system.	
21	GND	Ground	
22-23	NC	No connection	
24	GND	Ground	
25-26	NC	No connection	
27	GND	Ground	
28	CLKP	MIPI DSI differential clock pair leave it open or fix to LVDSVSS level when not in use	
29	CLKN	MIPI DSI differential clock pair leave it open or fix to LVDSVSS level when not in use	
30	GND	Ground	
31	D1P	MIPI DSI differential data pair.	
32	D1N	MIPI DSI differential data pair.	
33	GND	Ground	
34	D0P	MIPI DSI differential data pair.	
35	D0N	MIPI DSI differential data pair.	

36-37	GND	Ground	
38	VLED+	LED input terminal (Anode)	
39-40	VLED-	Ground (Cathode)	

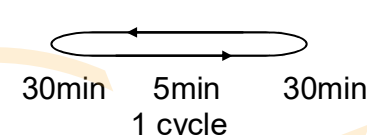


11. Block Diagram



12. 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	2
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-20°C 200hrs	1,2
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 -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

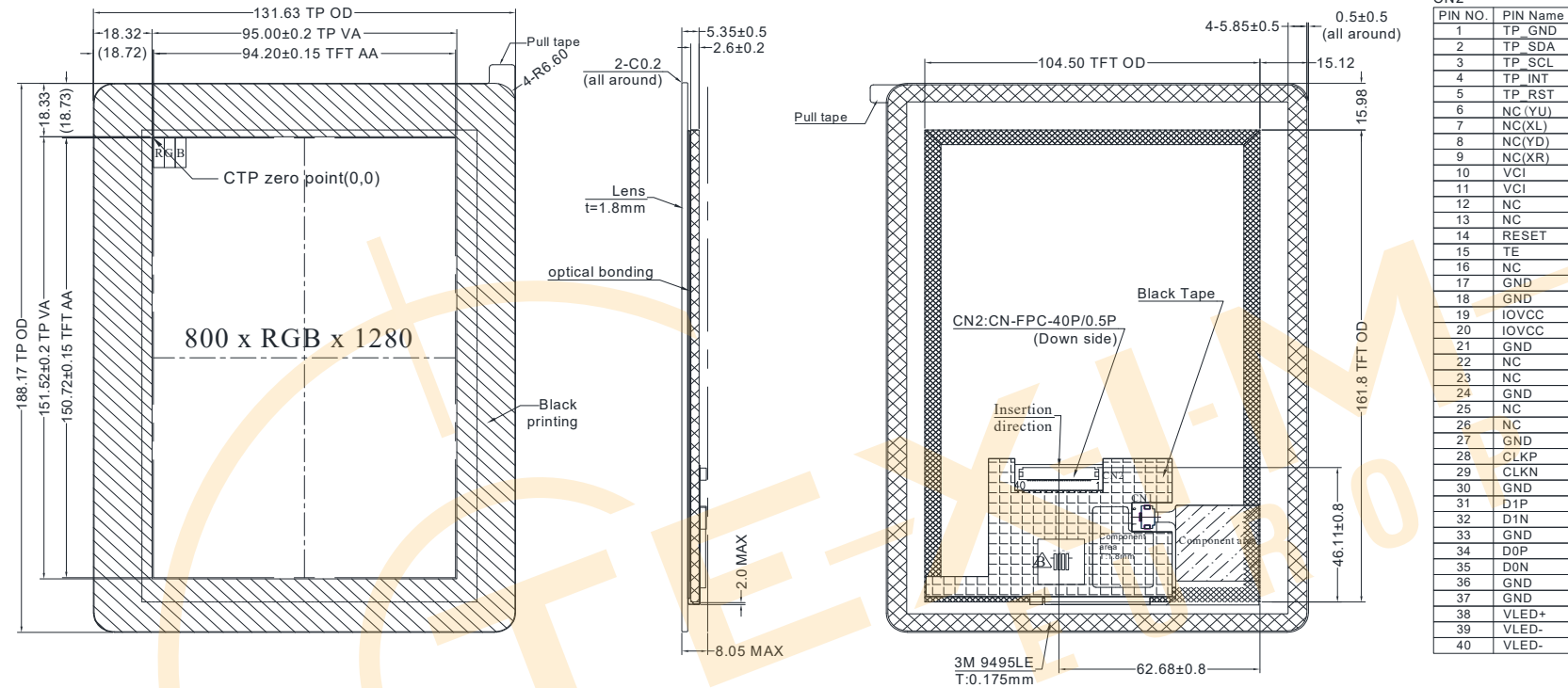
Note1: No dew condensation to be observed.

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

13. Contour Drawing



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



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 , _____ |

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



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 : / /

Disclaimer

ALL PRODUCTS, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

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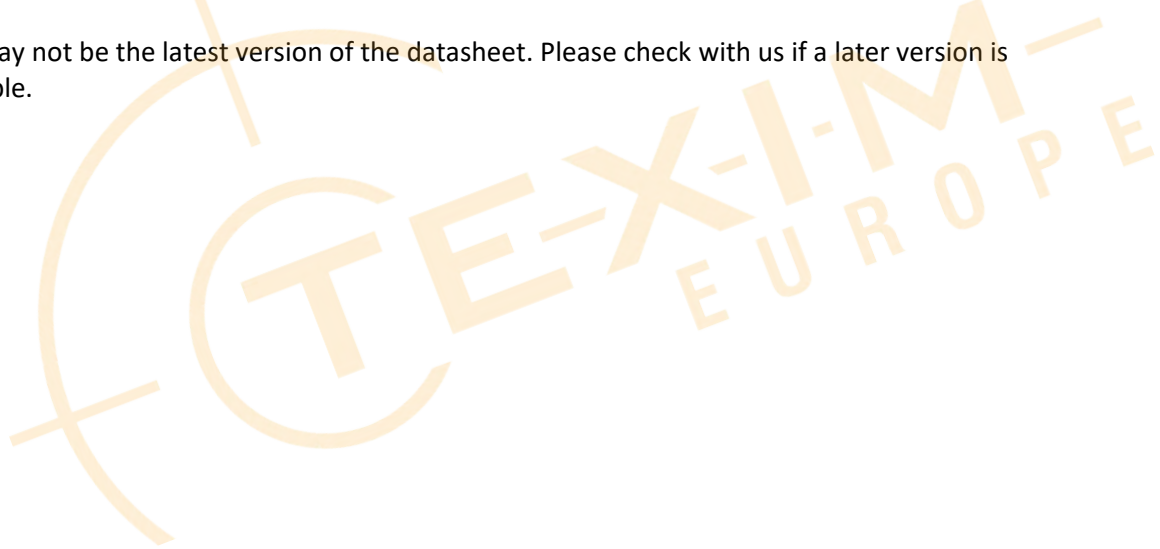
It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application.

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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