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.: WF70C6TYAB5MNN0#

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

SALES BY	APPROVED BY	CHECKED BY	PREPARED BY
			葉虹蘭
ISSUED DATE: 2023/12/20			

This TFT Display item is for Economical Version TFT LCM 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	2023/12/20		First issue	

Contents

1.Module Classification Information

W	F	70	C6	T	Y	A	B5	M	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：7.0" TFT
④	Model serials no.

⑤	Backlight Type：	F→CCFL, White		T→LED, White	
		S→LED, High Light White		Z→Nichia LED, White	

⑥	LCD Polarize Type/ Temperature range/ Gray Scale Inversion Direction	A→Transmissive, N.T, IPS TFT	Q→Transmissive, Super W.T, 12:00
		C→Transmissive, N. T, 6:00 ;	R→Transmissive, Super W.T, O-TFT
		F→Transmissive, N.T,12:00 ;	V→Transmissive, Super W.T, VA TFT
		I→Transmissive, W. T, 6:00	W→Transmissive, Super W.T, IPS TFT
		K→Transflective, W.T,12:00	X→Transmissive, W.T, VA TFT
		L→Transmissive, W.T,12:00	Y→Transmissive, W.T, IPS TFT
		N→Transmissive, Super W.T, 6:00	Z→Transmissive, W.T, O-TFT

⑦	A：TFT LCD	F：TFT+CONTROL BOARD
	B：TFT+SCREW HOLES+CONTROL BOARD	G：TFT+ SCREW HOLES
	C：TFT+ SCREW HOLES +A/D BOARD	H：TFT+D/V BOARD
	D：TFT+ SCREW HOLES +A/D BOARD+CONTROL BOARD	I：TFT+ SCREW HOLES +D/V BOARD
	E：TFT+ SCREW HOLES +POWER BOARD	J：TFT+POWER BD

⑧	Resolution:									
	M	1024768	N	128128	P	1280800	Q	480800	R	640320	S	480128
	T	800320	U	8001280	V	176220	W	1280398	X	1024250	Y	1920720
	A5	19201080	A6	480480	A7	10801920	A8	135240	A9	480640	B2	122250
	B3	340800	B4	2801424	B5	12001920	B6	4801280	B7	800800	B8	40160

⑨	D: Digital	L:LVDS	M:MIPI	E:eDP	

⑩	Interface:							
	N	Without control board	A	8Bit	B	16Bit	E	eDP	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	V: Raspberry pi 3B+	

⑬	Special Code	#:Fit in with ROHS directive regulations

2.Summary

The TFT 7.0" is a color active matrix a-Si CD FOG, using a-Si (amorphous silicon)TFTs (Thin Film Transistors) as an active switching devices. The FOG has a 7.02 inch diagonally measured active area with 1200×1920resolutions (1200 horizontal by 1920 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this FOG can display 16.7M colors.

3.General Specifications

Item	Dimension	Unit
Size	7.0	inch
Dot Matrix	1200 x RGB x 1920 (TFT)	dots
Module dimension	112.1 x 163.75 x 2.4	mm
Active area	94.5 x 151.2	mm
Pixel Pitch	0.07875 X 0.07875	mm
LCD type	TFT, Normally Black, Transmissive	
Viewing Angle	80/80/80/80	
Aspect Ratio	10:16	
Color arrangement	RGB-STRIPE	
TFT Driver IC	HX8279-D01*2 Cascade or equivalent	
TFT Interface	4-Lanes MIPI	
Backlight Type	LED ,Normally White	
With /Without TP	Without TP	
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	Notes
Power Supply Input Voltage		IOVCC	1.7	1.8	2.0	V	Ta=25º Note 1
		VSP	4.5	-	6.0	V	
		VSN	-6	-	-4.5	V	
Current Consumption	Operating	IOVCC	39.4	40.3	41.3	mA	
		VSP	16.8	17.2	17.7	mA	
		VSN	12.9	13.3	13.7	mA	
	Sleep in	IOVCC	1.58	1.59	1.61	mA	
		VSP	2.04	2.05	2.06	mA	
		VSN	0.045	0.05	0.052	mA	

Note 1:

1.This is the voltage range of the IC. In this range, when the voltage is too low, the brightness of LCD may decrease

2.If the product needs to use the H1line screen, the power needs to be greater than or equal to 1w

5.2. LED driving conditions

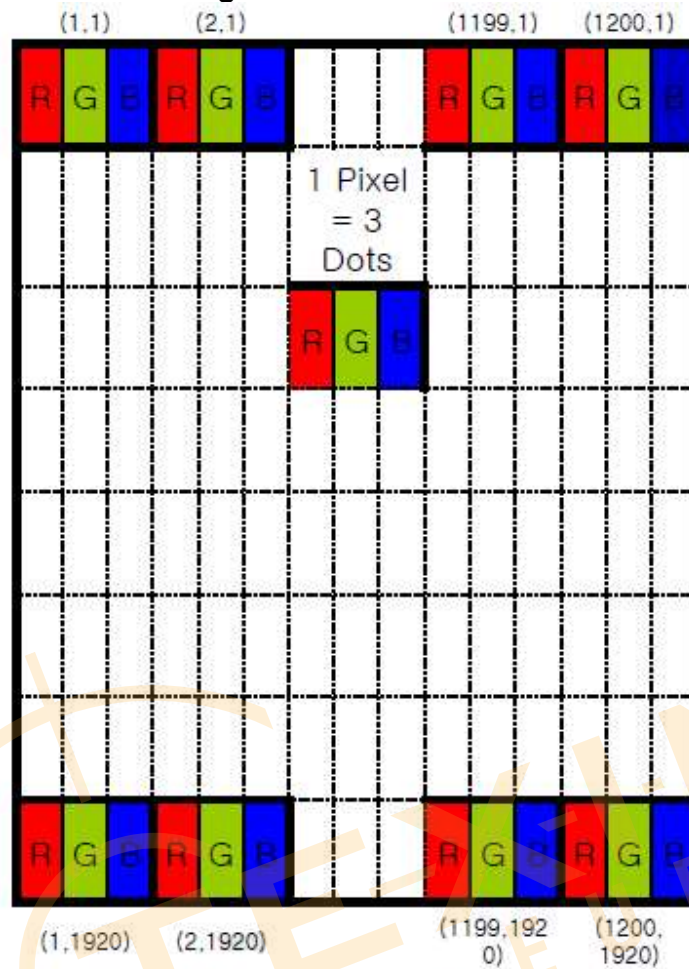| Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
LED current	-	-	440	-	mA	-
LED voltage	A	5.2	6.0	6.8	V	Note 1
LED Life Time	-	-	50K	-	Hr	Note 2,3,4

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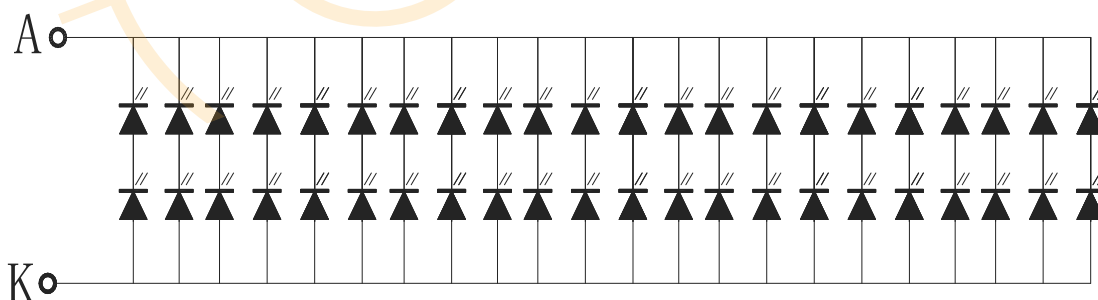
Note 2 : Ta = 25 ℃
Note 3 : Brightness to be decreased to 50% of the initial value
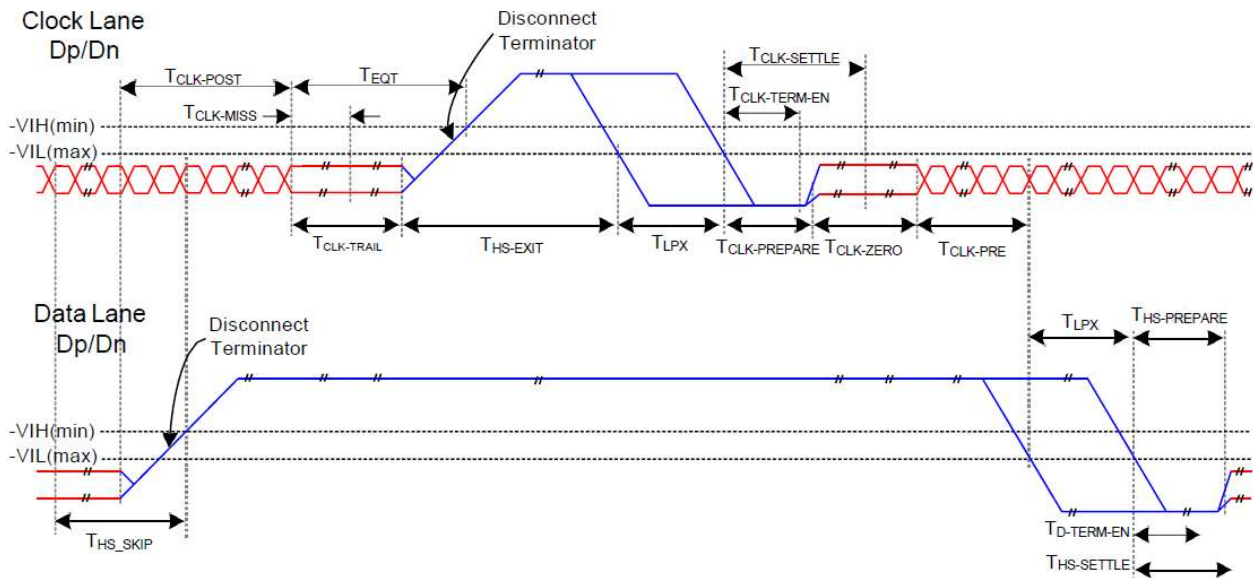Note 4 : The single LED lamp case

6.Data Input Format
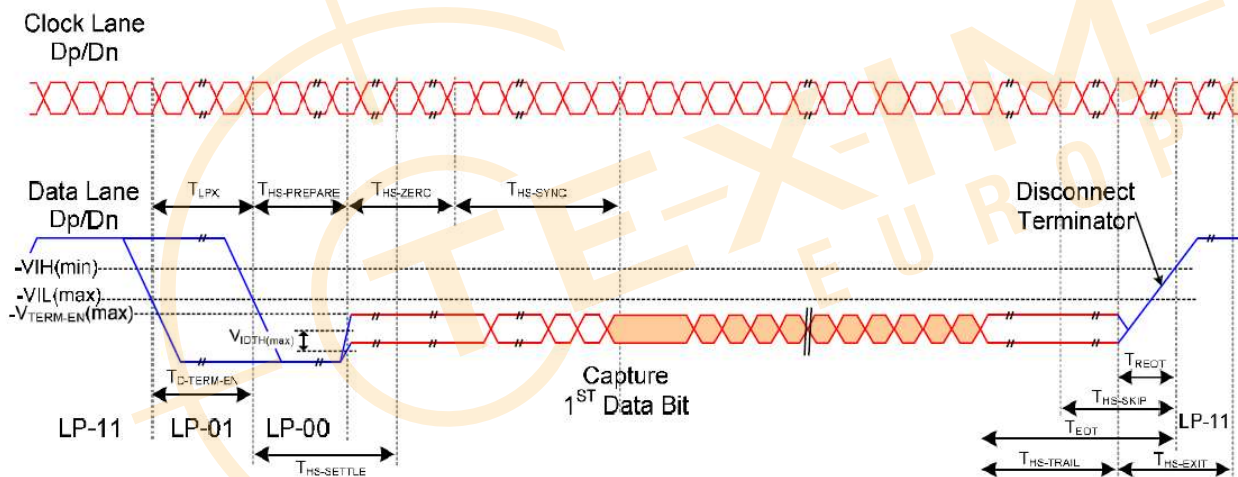
Figure 1. Pixel Format

Display Position of Input Data (V-H)
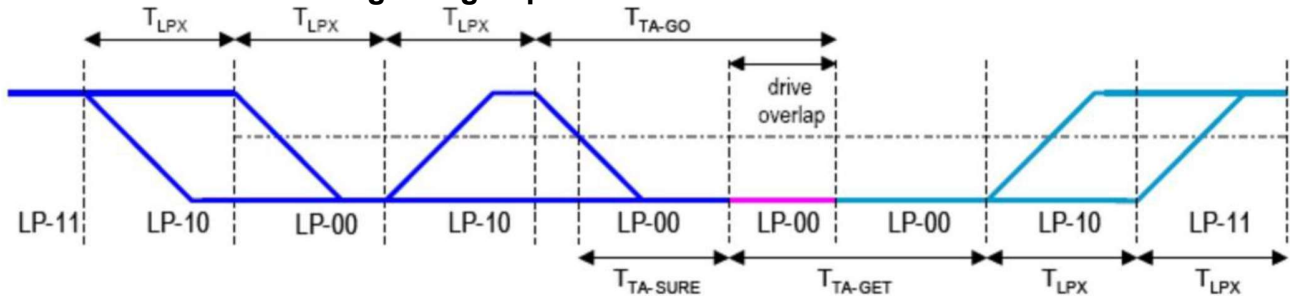
7.MIPI Interface Timing

Figure 2. Timing Chart of Signals in MIPI Interface

Switching the clock lane between clock transmission and low-power mode

Timing of high-speed data transmission in bursts

Turnaround Procedure

MIPI Interface Timing

Parameter	Description	Min.	Typ.	Max.	Unit
T_{REOT}	30%-85% rise time and fall time	-	-	35	ns
$T_{CLK-MISS}$	Timeout for receiver to detect absence of Clock transitions and disable the Clock Lane HS-RX.	-	-	60	ns
$T_{CLK-POST}$*1	Time that the transmitter continues to send HS clock after the last associated Data Lane has transitioned to LP Mode. Interval is defined as the period from the end of THS-TRAIL to the beginning of $T_{CLK-TRAIL}$.	60 ns + 52*UI (For DCS)	-	-	ns
$T_{CLK-PRE}$	Time that the HS clock shall be driven by the transmitter prior to any associated Data Lane beginning the transition from LP to HS mode.	8	-	-	ns
$T_{CLK-SETTLE}$	Time interval during which the HS receiver shall ignore any Clock Lane HS transitions, starting from the beginning of $T_{CLK-PRE}$.	95	-	300	ns
$T_{CLK-TERM-EN}$	Time for the Clock Lane receiver to enable the HS line termination, starting from the time point when Dn crosses $V_{IL,MAX}$.	Time for Dn to reach $V_{TERM-EN}$	-	38	ns
$T_{HS-SETTLE}$	Time interval during which the HS receiver shall ignore any Data Lane HS transitions, starting from the beginning of $T_{HSPREPARE}$.	85 ns + 6*UI	-	145 ns + 10*UI	ns
T_{EOT}	Time from start of $T_{HS-TRAIL}$ or $T_{CLK-TRAIL}$ period to start of LP-11 state	-	-	105ns+48*UI	-
$T_{HS-EXIT}$[1]	time to drive LP-11 after HS burst	100	-	-	ns
$T_{HS-PREPARE}$	Time to drive LP-00 to prepare for HS transmission	40ns + 4*UI	-	85ns+6*UI	ns
$T_{HS-PREPARE}$ + $T_{HS-ZERO}$	$T_{HS-PREPARE}$ + Time to drive HS-0 before the Sync sequence	145ns + 10*UI	-	-	ns
$T_{HS-SKIP}$	Time-out at RX to ignore transition period of EoT	40	-	55ns+4*UI	ns
$T_{HS-TRAIL}$	Time to drive flipped differential state after last payload data bit of a HS transmission burst	60 + 4*UI	-	-	ns
T_{LPX}	Length of any Low-Power state period	50	-	-	ns
Ratio T_{LPX}	Ratio of $T_{LPX(MASTERY}$/$T_{LPS(SLAVE)}$ between Master and Slave side	2/3	-	3/2	-
T_{TA-GET}	Time to drive LP-00 by new TX		5*T_{LPX}		ns
T_{TA-GO}	Time to drive LP-00 after Turnaround Request		4*T_{LPX}		ns
$T_{TA-SURE}$	Time-out before new TX side starts driving	T_{LPX}	-	2*T_{LPX}	ns

Note: (1) For image transmission:
TCLK-POST min value =164 when MIPI max frequency per lane = 0.53Gbps. TCLK-POST min value =112 when MIPI max frequency per lane =1Gbps

8.Porch setting & Reset Timing

8.1. Porch setting

Parameter	Symbol	Min.	Typ.	Max.	Unit
Horizontal Sync. Width	hpw	10	24	-	Clock
Horizontal Sync. Back Porch	hbp	50	80	-	Clock
Horizontal Sync. Front Porch	hfp	20	60	-	Clock
Vertical Sync. Width	vs	-	2	-	Line
Vertical Sync. Back Porch	vbp	-	10	-	Line
Vertical Sync. Front Porch	vfp	-	14	-	Line

8.2. Reset Timing:

When RESETB of the reset pin equals to Low, it will be in the condition of reset. When it is in the condition of reset, it will make the device recover the initial set.

However, in order to avoid the reset noise cause reset, there is a mechanism to judge about whether the reset is needed or not.

The closed interval of low can be shown as the following.

(IOVCC=1.7V~2.0V, VSS=0V, TOPR=-20℃~+85℃)

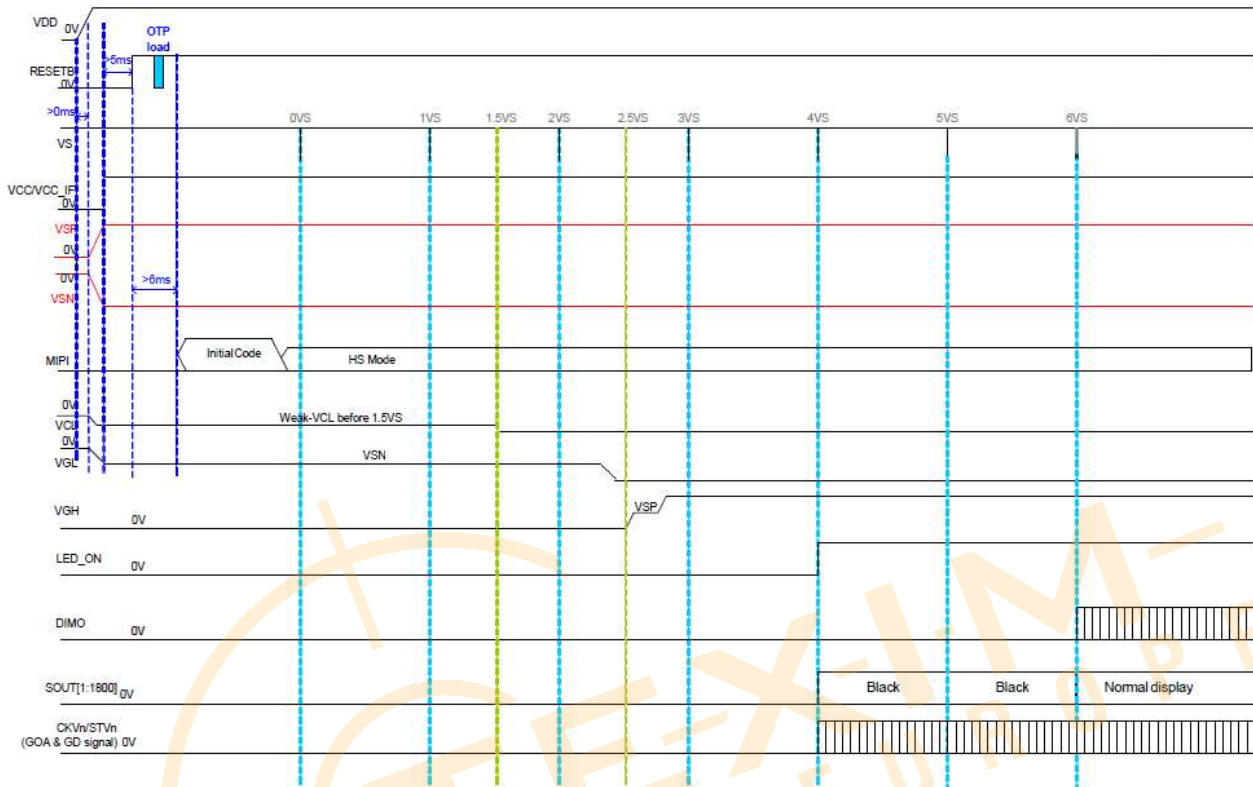| Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Reset low pulse width	Trst	-	20	-	-	us

Reset timing
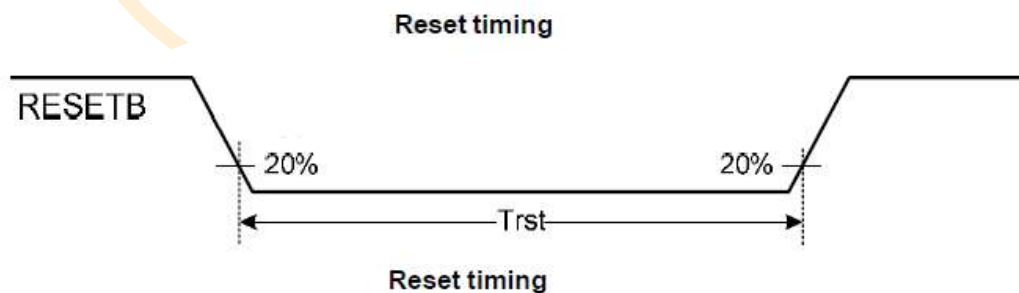
Reset timing

9.Power Sequence
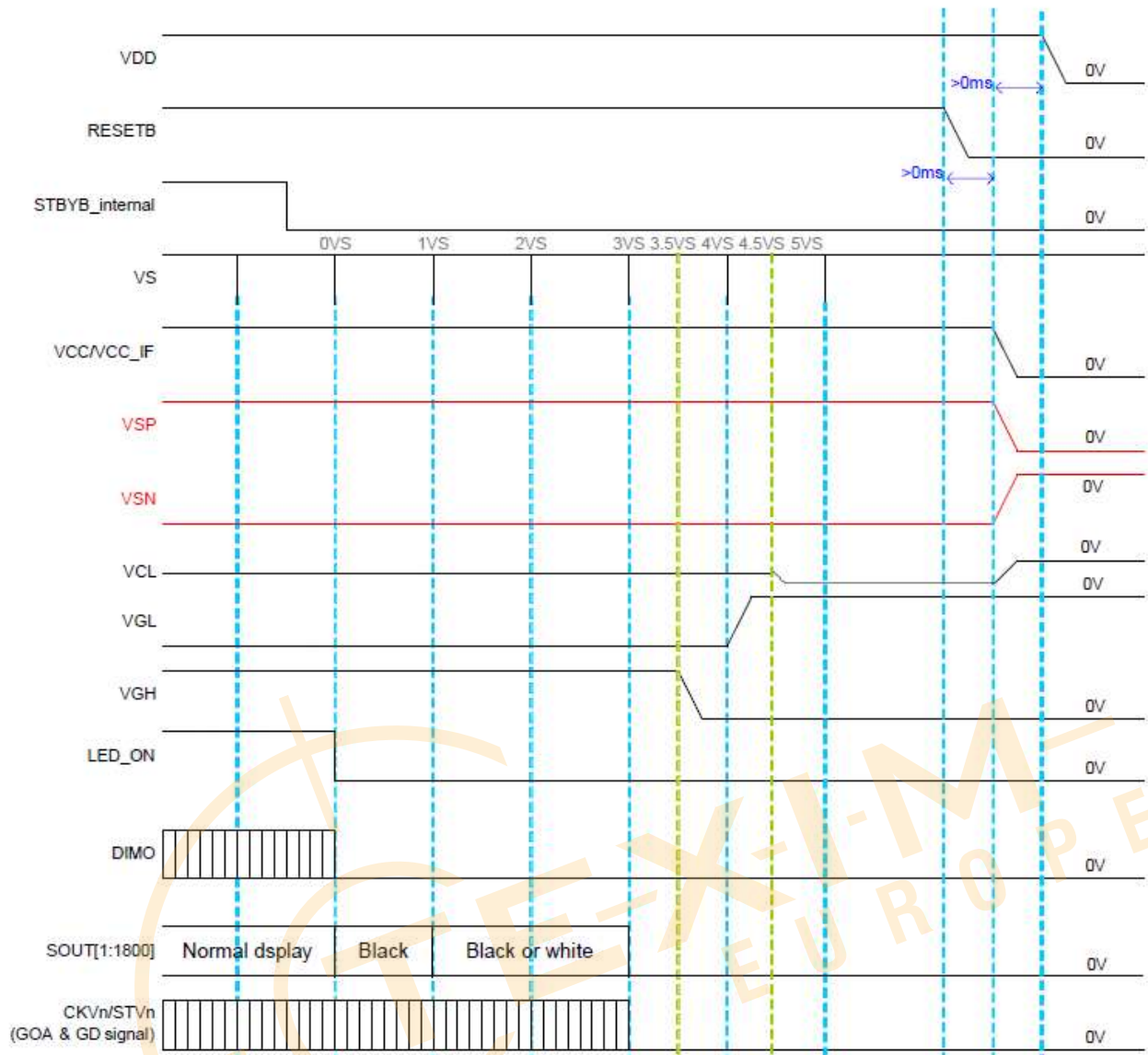
9.1. Power ON/OFF Sequence

To prevent a latch-up or DC operation of the LCD FOG, the power on/off sequence shall be as shown in below

Figure 3. Power on/off

Note: (1) Finish to write the GOA MUX (page1 registers) and GOA timing setting (page3 registers) within 50ms after reset pulls to high.

Power on sequence with PWRMD=0 and repair OP disable

Power off sequence with PWRMD=0

10.Optical Characteristics

Item		Symbol	Condition.	Min	Typ.	Max.	Unit	Remark
Response time		Tr+ Tf	θ=0°、Φ=0°	-	30	40	.ms	Note 3
Contrast ratio		CR	At optimized viewing angle	1000	1200	-	-	Note 4
Color Chromaticity	White	Wx	θ=0°、Φ=0	0.235	0.285	0.335	-	Note 2,5,6
		Wy		0.269	0.319	0.369	-	
Viewing angle	Hor.	ΘR	CR≧10	75	80	-	Deg.	Note 1
		ΘL		75	80	-		
	Ver.	ΦT		75	80	-		
		ΦB		75	80	-		
Brightness		-	-	400	500	-	cd/m²	Center of display
Uniformity		(U)	-	70	-	-	%	Note 5

Ta=25±2℃, IL=440mA

Note 1: Definition of viewing angle range
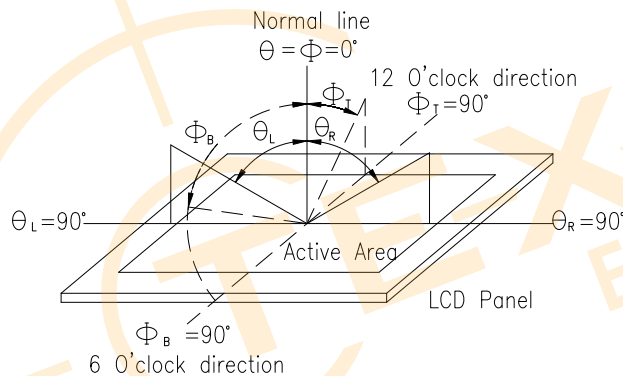
Fig. 10.1. Definition of viewing angle

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.
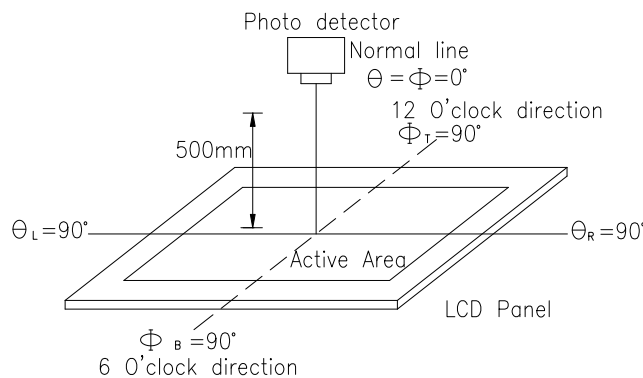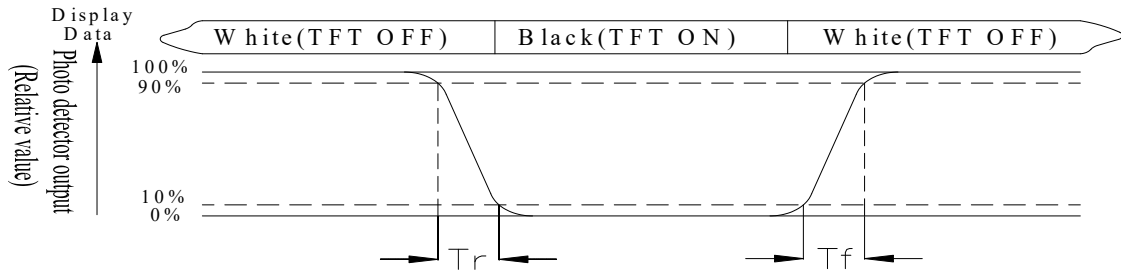
Fig. 10.2. Optical measurement system setup

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
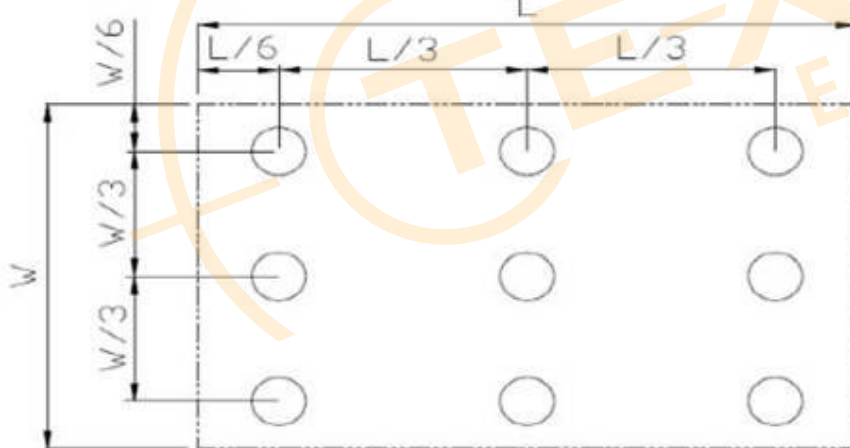
W = Active area width

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.

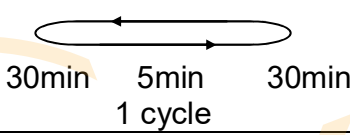# 11.Interface

11.1. LCM PIN Definition

Pin	Symbol	Function	Remark
1	NC	No connection	
2	IOVCC	Power supply for system ,IOVCC=1.8V	
3	IOVCC		
4	GND	Ground	
5	RESET	Device reset signal	
6	NC	No connection	
7	GND	Ground	
8	D0N	MIPI Negative data signal (-)	
9	D0P	MIPI Positive data signal (+)	
10	GND	Ground	
11	D1N	MIPI Negative data signal (-)	
12	D1P	MIPI Positive data signal (+)	
13	GND	Ground	
14	CLKN	MIPI Negative clock signal (-)	
15	CLKP	MIPI Positive clock signal (+)	
16	GND	Ground	
17	D2N	MIPI Negative data signal (-)	
18	D2P	MIPI Positive data signal (+)	
19	GND	Ground	
20	D3N	MIPI Negative data signal (-)	
21	D3P	MIPI Positive data signal (+)	
22	GND	Ground	
23	NC	No connection	
24	NC	No connection	
25	GND	Ground	
26	NC/TE	Sync signal for touch panel. Float it if not used.	
27	PWMO	PWM control signal for LED driver	
28	NC/BIST	Enable the Test Image Generation function, if connect to ground. Float it if not used.	
29	NC	No connection	
30	GND	Ground	

31	VLED-	LED cathode	
32	VLED-		
33	NC	No connection	
34	VSN	Analog supply negative voltage	
35	VSN		
36	NC	No connection	
37	VSP	Analog supply positive voltage	
38	VSP		
39	VLED+	LED anode	
40	VLED+		

12.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 : 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=±600V(contact), ±800v(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.

13.Contour Drawing

CN	
PIN NO.	SYMBOL
1	NC
2	IOVCC
3	IOVCC
4	GND
5	RESET
6	NC
7	GND
8	D0N
9	D0P
10	GND
11	D1N
12	D1P
13	GND
14	CLKN
15	CLKP
16	GND
17	D2N
18	D2P
19	GND
20	D3N
21	D3P
22	GND
23	NC
24	NC
25	GND
26	NC/TE
27	PWMO
28	NC/BIST
29	NC
30	GND
31	VLED-
32	VLED-
33	NC
34	VSN
35	VSN
36	NC
37	VSP
38	VSP
39	VLED+
40	VLED+

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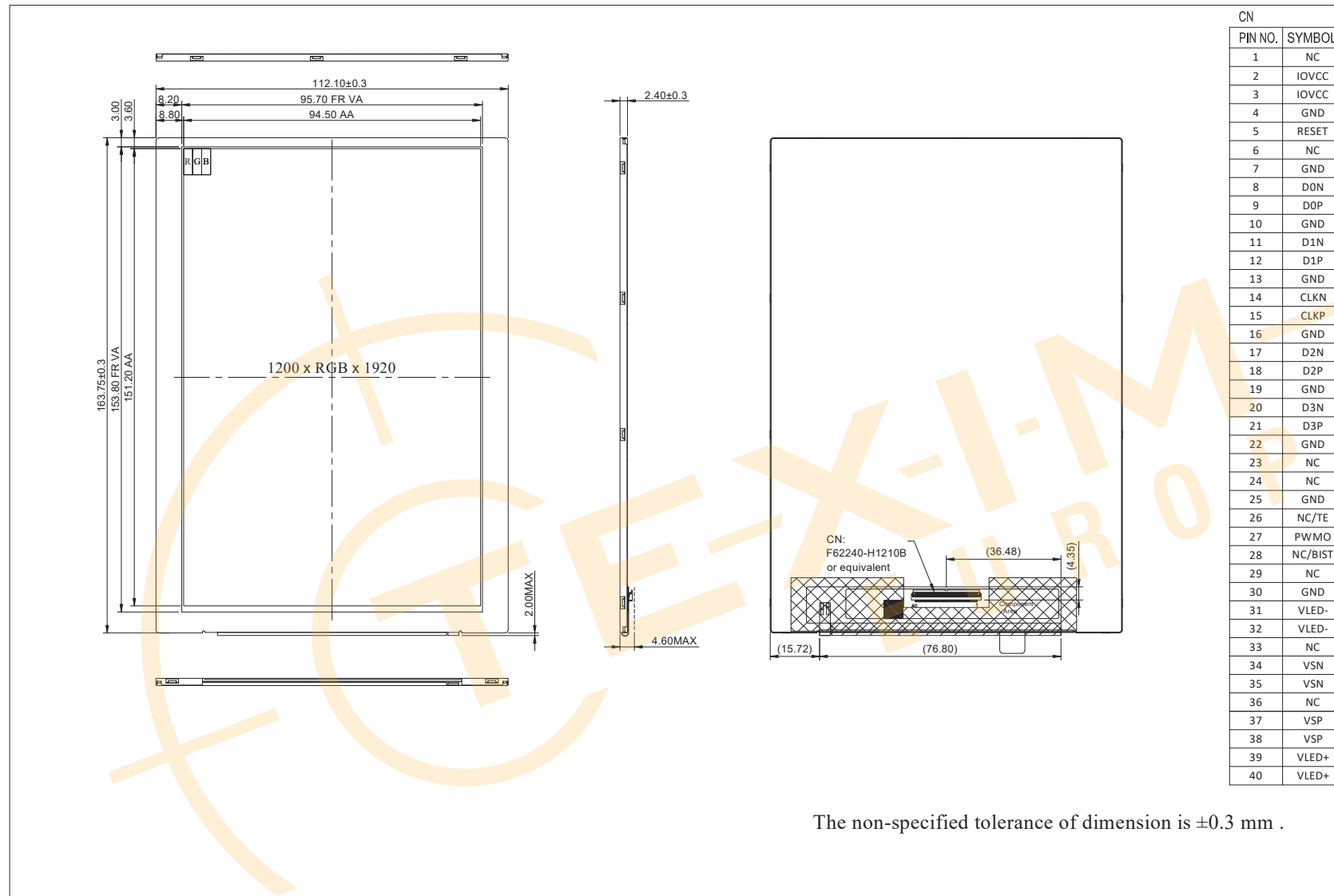
winstar

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 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 ,_____

＞＞ **Go to page 2** ＜＜

Winstar   **Module Number**：＿＿＿＿＿＿＿＿＿＿＿＿   **Page: 2**

5、<u>Electronic Characteristics of Module</u>：

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、<u>Summary</u>：

Sales signature：＿＿＿＿＿＿＿＿＿＿

Customer Signature：＿＿＿＿＿＿＿＿   **Date**：＿＿＿ / ＿＿＿ / ＿＿＿

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

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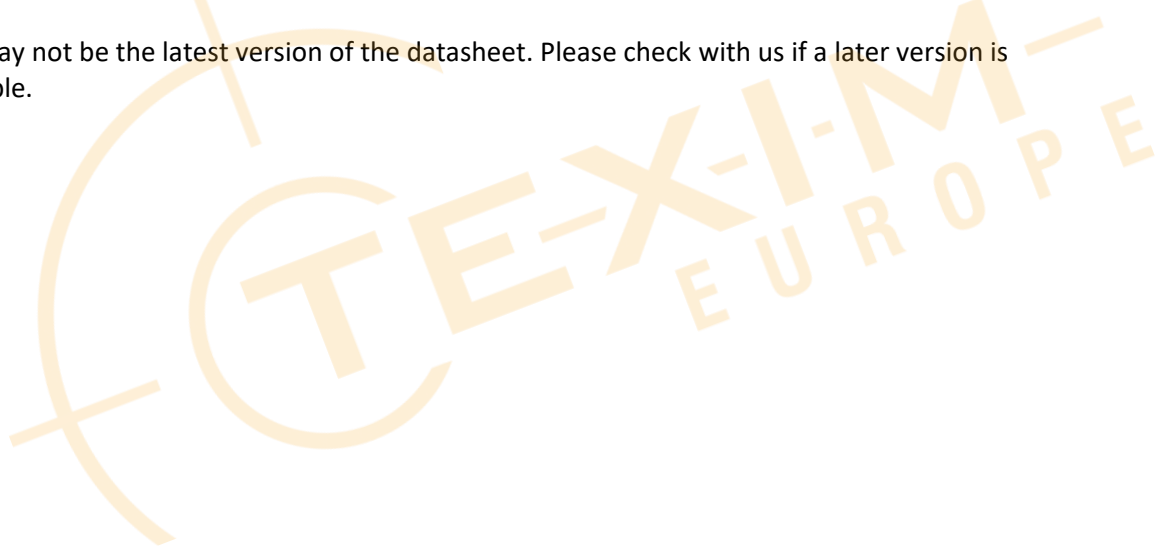
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