晶采光電科技股份有限公司
AMPIRE CO., LTD.

SPECIFICATIONS FOR
LCD MODULE

CUSTOMER	
CUSTOMER PART NO.	
AMPIRE PART NO.	**AM-1024768Y7HZQW-ABH**
APPROVED BY	
DATE	

☐ **Preliminary Specification**
☑ **Formal Specification**

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Approved by	Checked by	Organized by
Patrick	*Mark*	*Tank*

*This specification is subject to change without notice.

RECORD OF REVISION

| Revision Date	Page	Contents	Editor
2023/10/12	-	New Release	Tank

1. General specification

AM-1024768Y7HZQW-ABH is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT LCD panel, a driving circuit and a back light system. This TFT LCD has a 10.4 inch diagonally measured active display area with HD (1024 horizontal by 768 vertical pixels) resolution.

(1) Construction: 10.4" a-Si TFT active matrix, White LED Backlight.
(2) Resolution (pixel): 1024(R.G.B) X 768
(3) Number of the Colors : 16.2M (R , G , B 8 bit digital each)
(4) LCD type : Normally black
(5) Interface : 24 Bit LVDS interface
(6) ROHS compliant

1.1 Display Characteristics

Item		Specification	Unit
Outline Dimension		236.0(H) x 174.3(V) x 10.06(D) (Typ.)	mm
Display Area		211.2(H) x 158.4(V) (10.4" diagonal)	mm
Number of Pixel		1024(H) x 768(V)	pixels
Pixel Pitch		0.20625(H) x 0.20625(V)	mm
Pixel Arrangement		RGB Vertical Stripe	
Display Mode		Normally Black	
NTSC		70(Typ.)	%
Back-light		Single LED (Side-Light type)	
Power Consumption	Logic System (White Pattern)	TBD(max) @VDVDD=3.3V	W
	B/L System	TBD	W
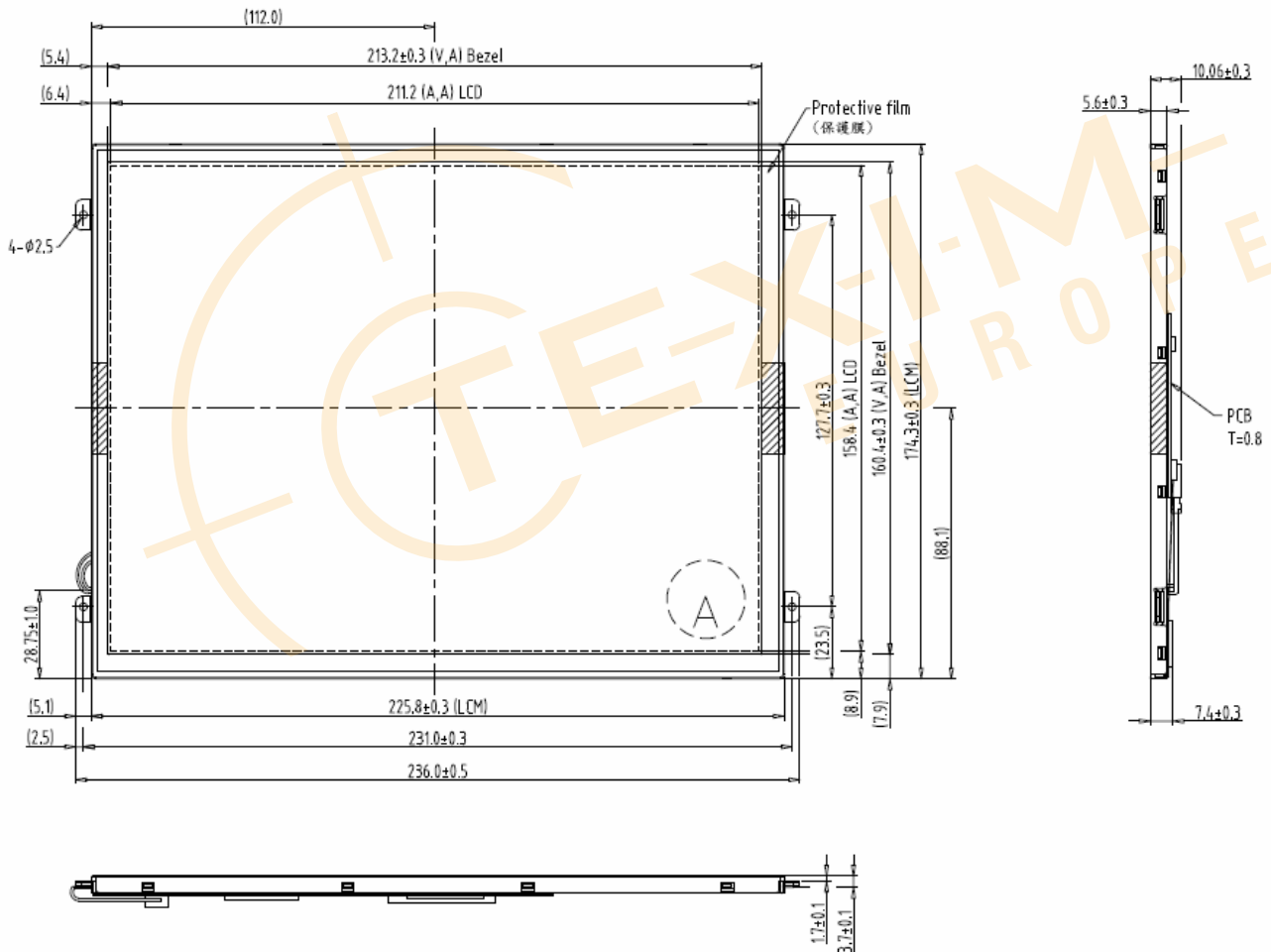
2. Optical Characteristics

| Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast		CR		600	900	—		(1)(2)
Response time	Rising	TR+TF		—	30	40	msec	(1)(3)
	Falling							
White luminance (Center)		YL		**480**	**600**	—	cd/m2	(1)(4) (IL=120mA)
Color chromaticity (CIE1931)	White	Wx	Θ=0 Normal viewing angle	0.263	0.313	0.363		(1)(4)
		Wy		0.279	0.329	0.379		
	Red	Rx			TBD			
		Ry			TBD			
	Green	Gx			TBD			
		Gy			TBD			
	Blue	Bx			TBD			
		By			TBD			
Viewing angle	Hor.	ΘL	CR>10	80	85	—		
		ΘR		80	85	—		
	Ver.	ΘU		80	85	—		
		ΘD		80	85	—		
Brightness uniformity		BUNI	Θ=0	70	80		%	(5)
Optima View Direction			Free					(6)

Measuring Condition

■ Measuring surrounding：Dark room

■ LED current IL：=120mA

■ Ambient temperature：25±2℃

■ 15min. warm-up time.

Measuring Equipment

- ■ FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.
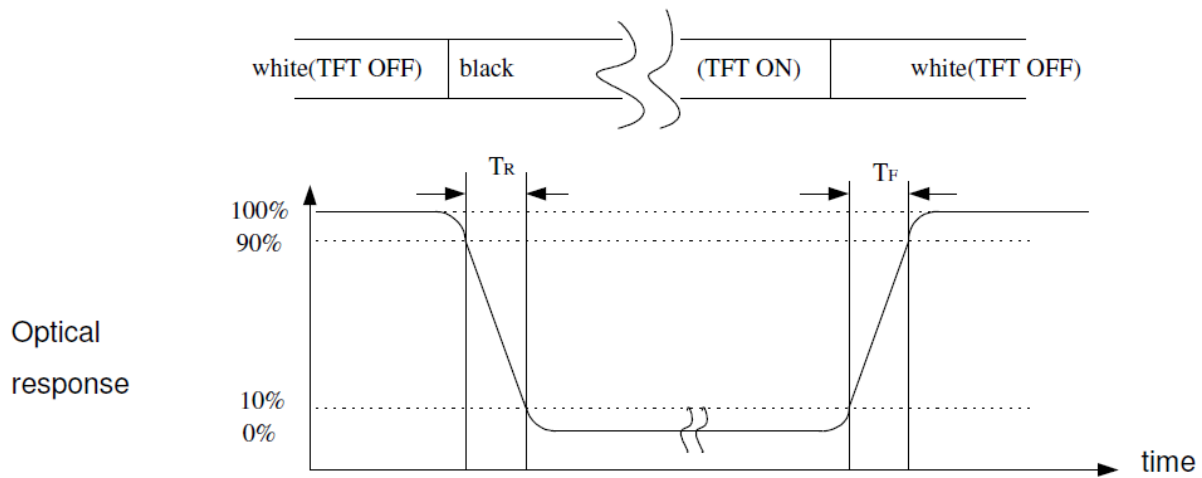- ■ Measuring spot size : 20 ~ 21 mm

Note (1) Definition of Viewing Angle:

Θ_U

12' o'clock
$\Phi=90^o$

Θ_L Θ_R

$\Phi=180^o$ $\Phi=0^o$
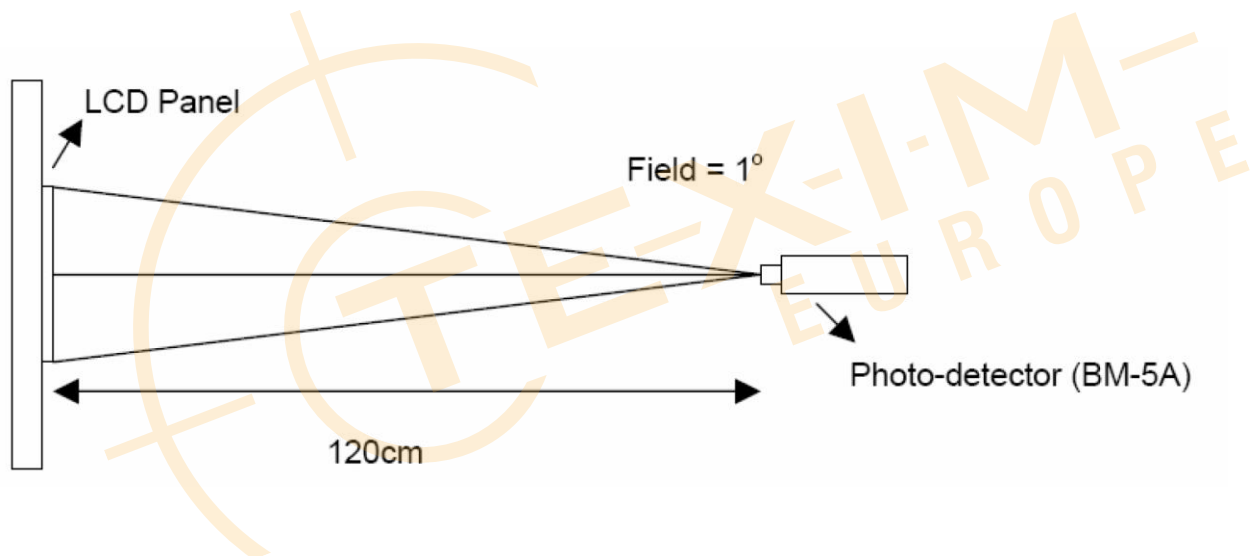
Θ_D

6' o'clock
$\Phi=270^o$
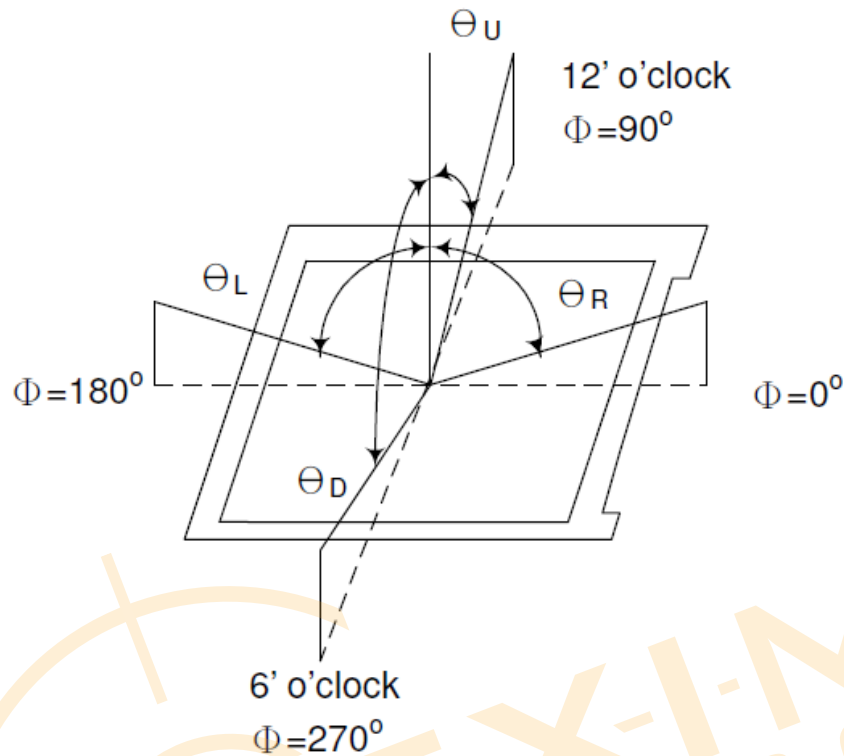
Note (2) Definition of Contrast Ratio (CR) :
measured at the center point of panel

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$
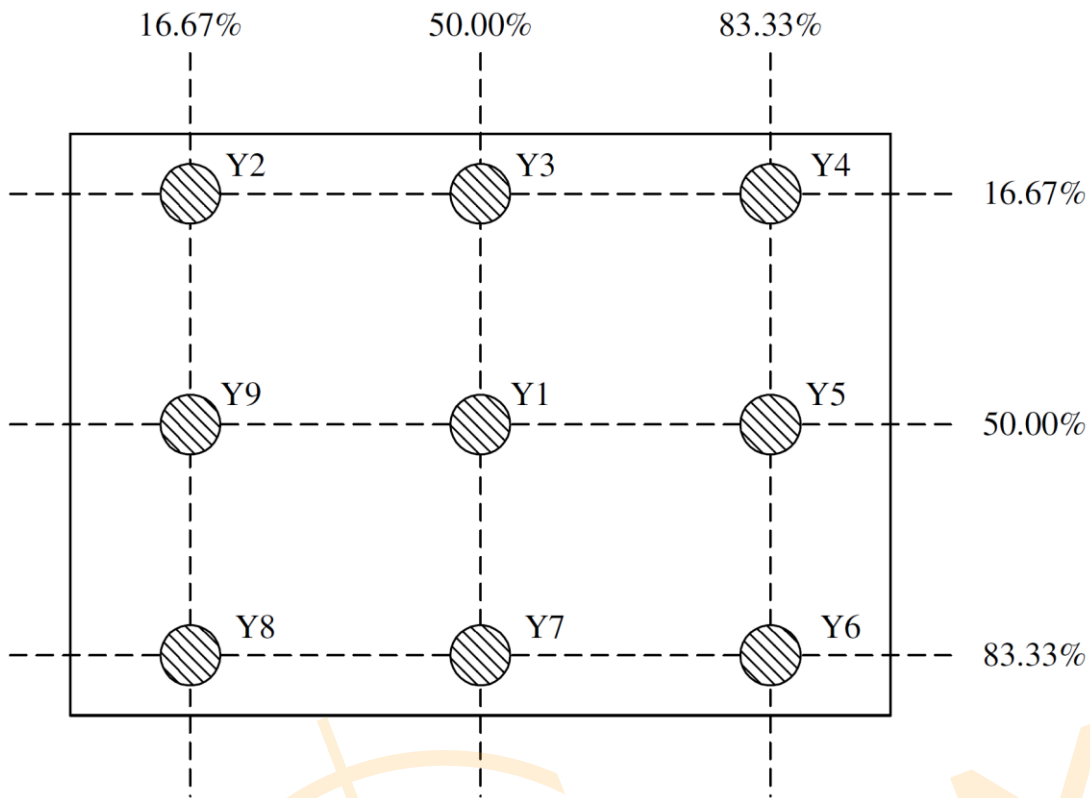
Note (3) Definition of Response Time : Sum of T_R and T_F

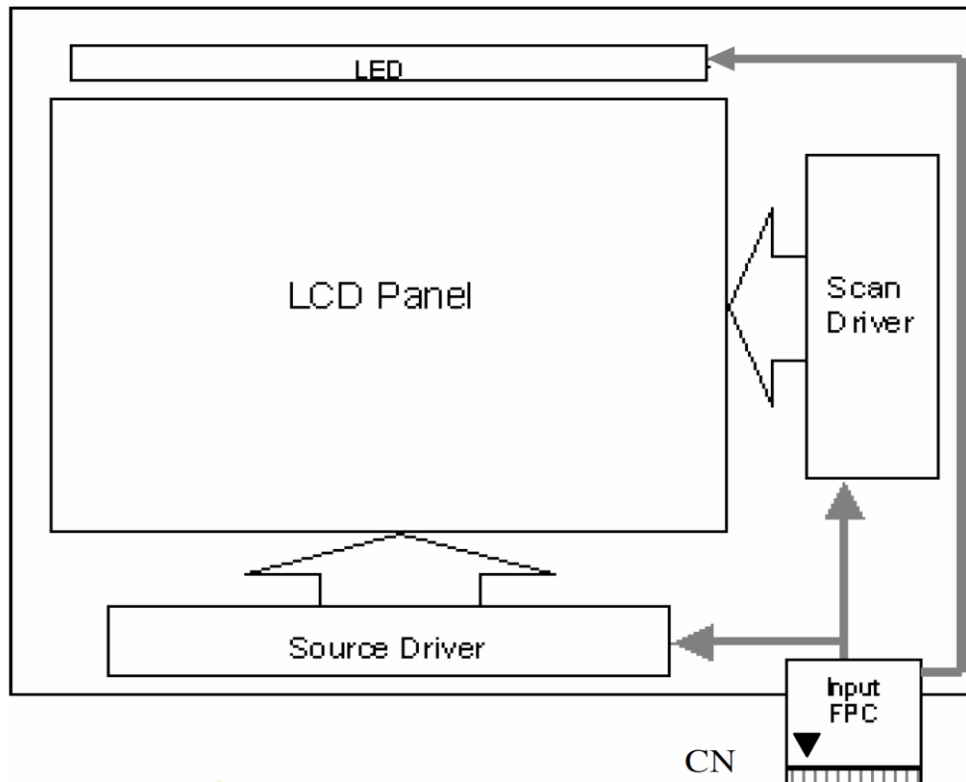**Note (4)** Definition of optical measurement setup

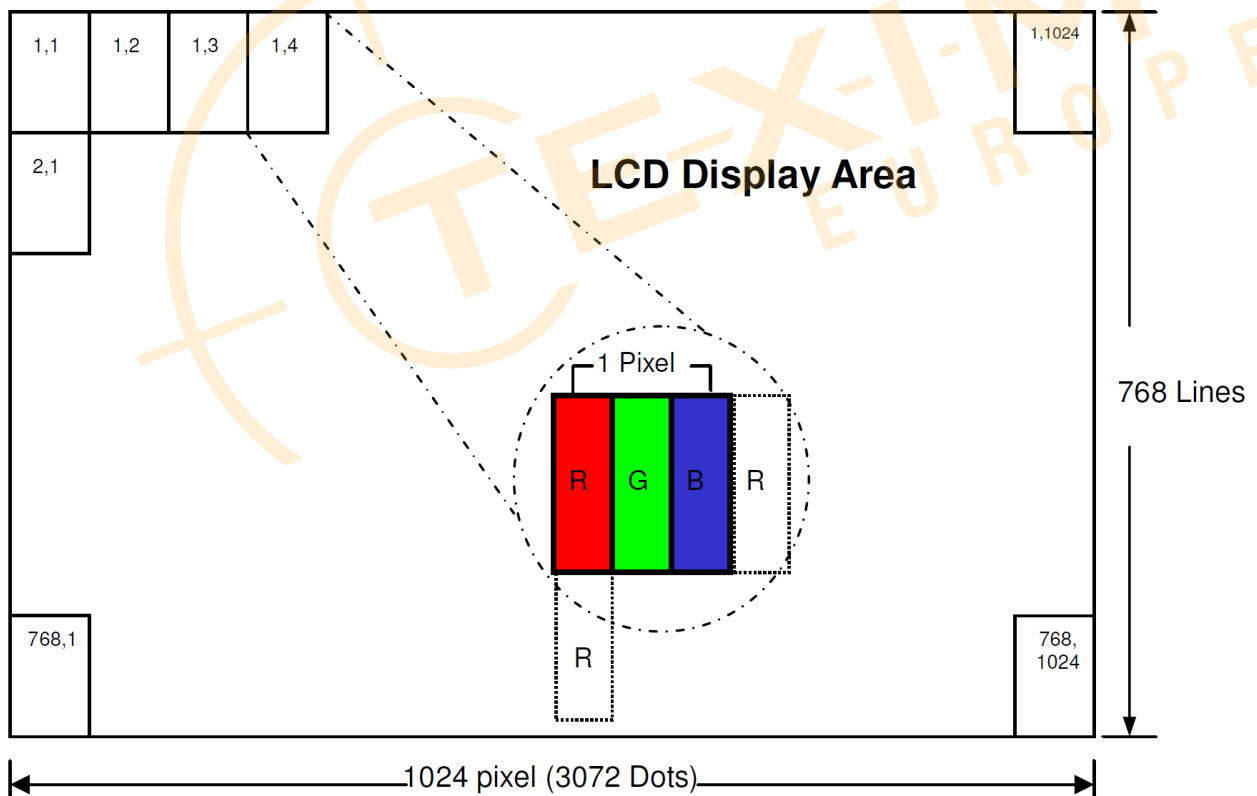**Note (5)** Definition of brightness uniformity

$$\text{Luminance uniformity} = \frac{(\text{Min Luminance of 9 points})}{(\text{Max Luminance of 9 points})} \times 100\%$$

Note (6)：Rubbing Direction (The different Rubbing Direction will cause the different optima view direction.

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3. Functional Block Diagram

Pixel Format

3.1 Relationship between Displayed Color and Input

	Display	MSB R7 R6 R5 R4 R3 R2 R1 R0 LSB	MSB G7 G6 G5 G4 G3 G2 G1 G0 LSB	MSB B7 B6 B5 B4 B3 B2 B1 B0 LSB	Gray scale Level
Basic color	Black	L L L L L L L L	L L L L L L L L	L L L L L L L L	-
	Blue	L L L L L L L L	L L L L L L L L	H H H H H H H H	-
	Green	L L L L L L L L	H H H H H H H H	L L L L L L L L	-
	Light Blue	L L L L L L L L	H H H H H H H H	H H H H H H H H	-
	Red	H H H H H H H H	L L L L L L L L	L L L L L L L L	-
	Purple	H H H H H H H H	L L L L L L L L	H H H H H H H H	-
	Yellow	H H H H H H H H	H H H H H H H H	L L L L L L L L	-
	White	H H H H H H H H	H H H H H H H H	H H H H H H H H	-
Gray scale of Red	Black	L L L L L L L L	L L L L L L L L	L L L L L L L L	L0
	Dark	L L L L L L L H	L L L L L L L L	L L L L L L L L	L1
		L L L L L L H L	L L L L L L L L	L L L L L L L L	L2
	↑	:	:	:	L3···L251
	↓	H H H H H H L L	L L L L L L L L	L L L L L L L L	L252
	Light	H H H H H H L H	L L L L L L L L	L L L L L L L L	L253
		H H H H H H H L	L L L L L L L L	L L L L L L L L	L254
	Red	H H H H H H H H	L L L L L L L L	L L L L L L L L	Red L255
Gray scale of Green	Black	L L L L L L L L	L L L L L L L L	L L L L L L L L	L0
	Dark	L L L L L L L L	L L L L L L L H	L L L L L L L L	L1
		L L L L L L L L	L L L L L L H L	L L L L L L L L	L2
	↑	:	:	:	L3···L251
	↓	L L L L L L L L	H H H H H H L L	L L L L L L L L	L252
	Light	L L L L L L L L	H H H H H H L H	L L L L L L L L	L253
		L L L L L L L L	H H H H H H H L	L L L L L L L L	L254
	Green	L L L L L L L L	H H H H H H H H	L L L L L L L L	Green L255
Gray scale of Blue	Black	L L L L L L L L	L L L L L L L L	L L L L L L L L	L0
	Dark	L L L L L L L L	L L L L L L L L	L L L L L L L H	L1
		L L L L L L L L	L L L L L L L L	L L L L L L H L	L2
	↑	:	:	:	L3···L251
	↓	L L L L L L L L	L L L L L L L L	H H H H H H L L	L252
	Light	L L L L L L L L	L L L L L L L L	H H H H H H L H	L253
		L L L L L L L L	L L L L L L L L	H H H H H H H L	L254
	Blue	L L L L L L L L	L L L L L L L L	H H H H H H H H	Blue L255
Gray scale of White & Black	Black	L L L L L L L L	L L L L L L L L	L L L L L L L L	L0
	Dark	L L L L L L L H	L L L L L L L H	L L L L L L L H	L1
		L L L L L L H L	L L L L L L H L	L L L L L L H L	L2
	↑	:	:	:	L3···L251
	↓	H H H H H H L L	H H H H H H L L	H H H H H H L L	L252
	Light	H H H H H H L H	H H H H H H L H	H H H H H H L H	L253
		H H H H H H H L	H H H H H H H L	H H H H H H H L	L254
	White	H H H H H H H H	H H H H H H H H	H H H H H H H H	White L255

4. ABSOLUTE MAXIMUM RATINGS

4.1 Absolute Ratings of TFT LCD Module

Item	Symbol	Min.	Max.	Unit	Note
Power supply voltage	VDD	-0.3	5	V	
Logic Signal Input Level	VDVDD VDVDD_LVDS	-0.3	5	V	

4.2 Absolute Ratings of Environment

Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	T_{opa}	-20	70	℃	
Storage Temperature	T_{stg}	-30	80	℃	

5. ELECTRICAL CHARACTERISTICS
5.1 TFT LCD Module

Item	Symbol	Min.	Typ.	Max.	Unit	Note
LCD Supply Voltage	VDD	3	3.3	3.6	V	
LCD Signal Logic High	VIH	0.8*VDD		VDD	V	
LCD Signal Logic Low	VIL	0	--	0.2VDD	V	
LED Driver Supply Voltage	VLED	11.5	12	12.5	V	
Input Current	ILED	--	420	--	mA	ADJ :100% PWM duty
ADJ Frequency	Fpwm	100	--	20K	Hz	
ADJ Signal Logic High	VIH	2.4	--	5	V	
ADJ signal logic Low	VIL	0	--	0.7	V	
LED Forward Current	IL	--	120	--	mA	Ta=25℃
LED Forward Voltage	VL	--	33	--	V	IL=120mA, Ta=25℃

ADJ : LED Back-light brightness Adjust.

F=100~20K Hz

Duty=100% Brightness=100%

Duty=75% Brightness=75%

Duty=50% Brightness=50%

Duty=25% Brightness=25%

Duty=0% Brightness=0%
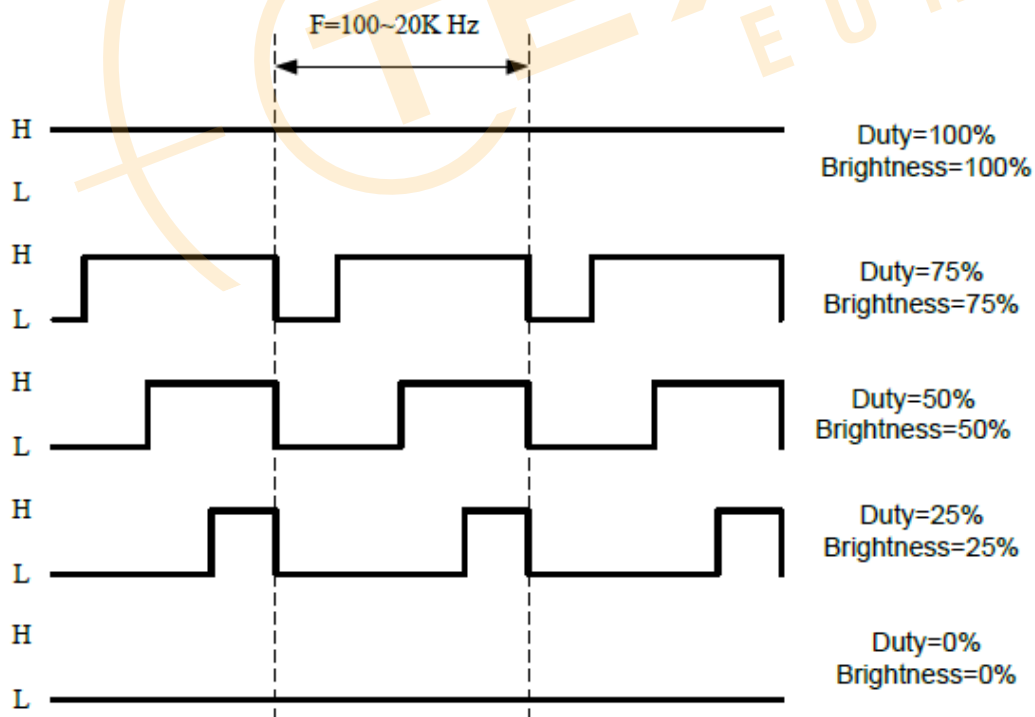
5.2 Switching Characteristics for LVDS Receiver

Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
Differential Input High Threshold	V_{th}			100	mV	V_{CM}=1.2V
Differential Input Low Threshold	V_{tl}	-100			mV	
Input Current	I_{IN}	-10		10	uA	
Differential input Voltage	$|V_{ID}|$	0.1		0.6	V	
Common Mode Voltage Offset	V_{CM}	0.7	1.2	1.6	V	

5.3 Bit LVDS input
5.3.1 8Bit LVDS input
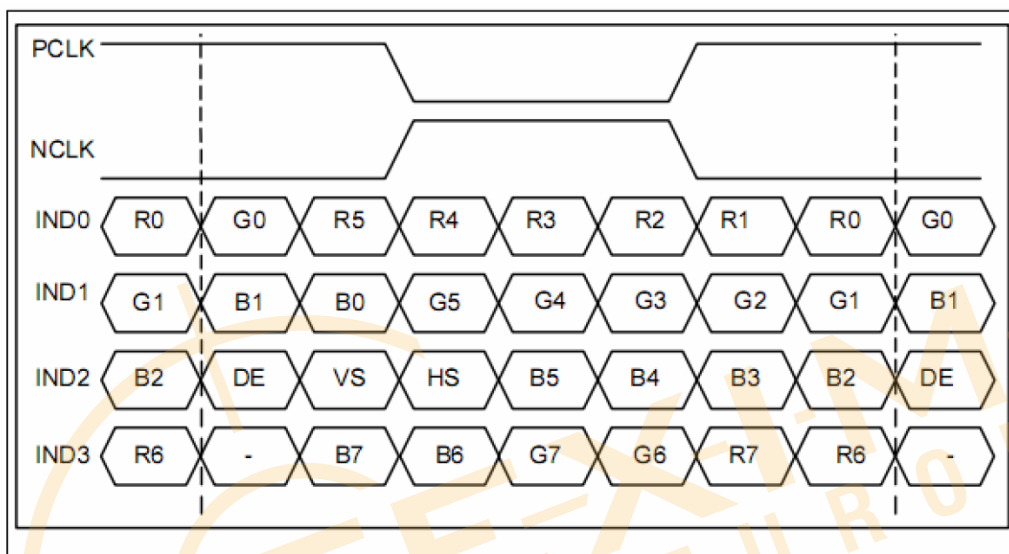
5.4 Interface Timing (DE mode)

DE mode					
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency @Frame rate=60hz	fclk	52	65	71	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		768		H
VSYNC period time	tv	778	806	845	H
VSYNC blanking	tvb+tvfp	10	38	77	H

Timing Diagram of Interface Signal (DE mode)

(1). Vertical input timing
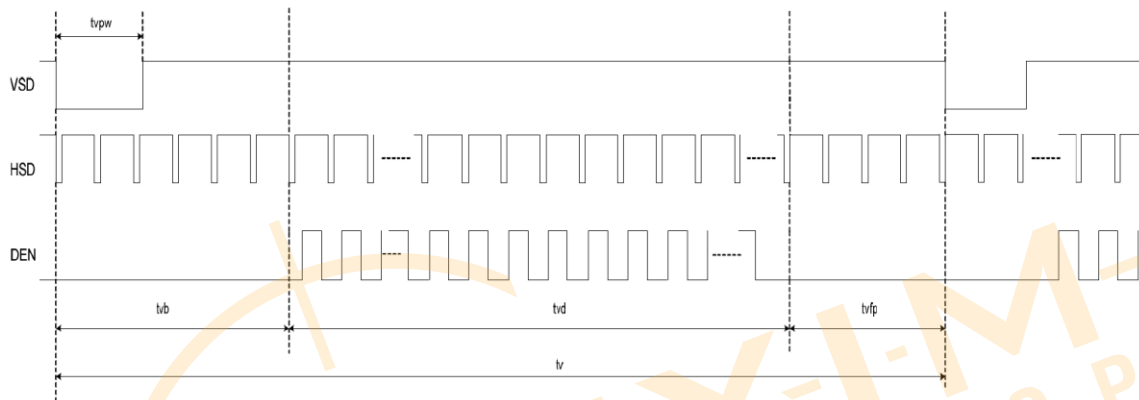
(2). Horizontal input timing
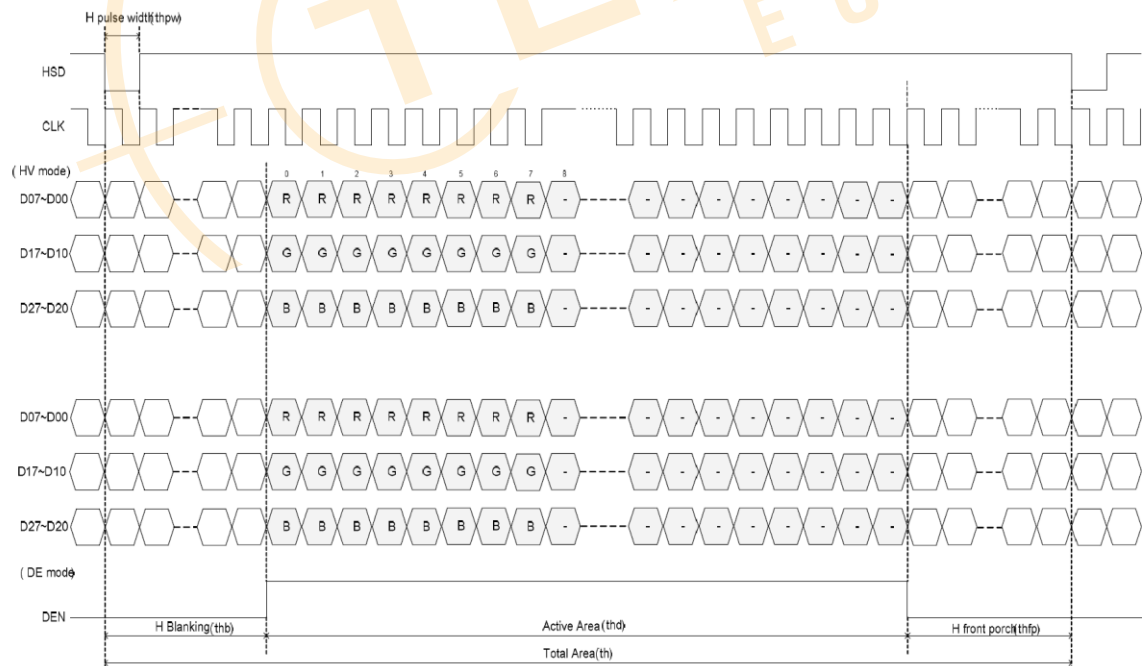
5.5 Power On / Off Sequence
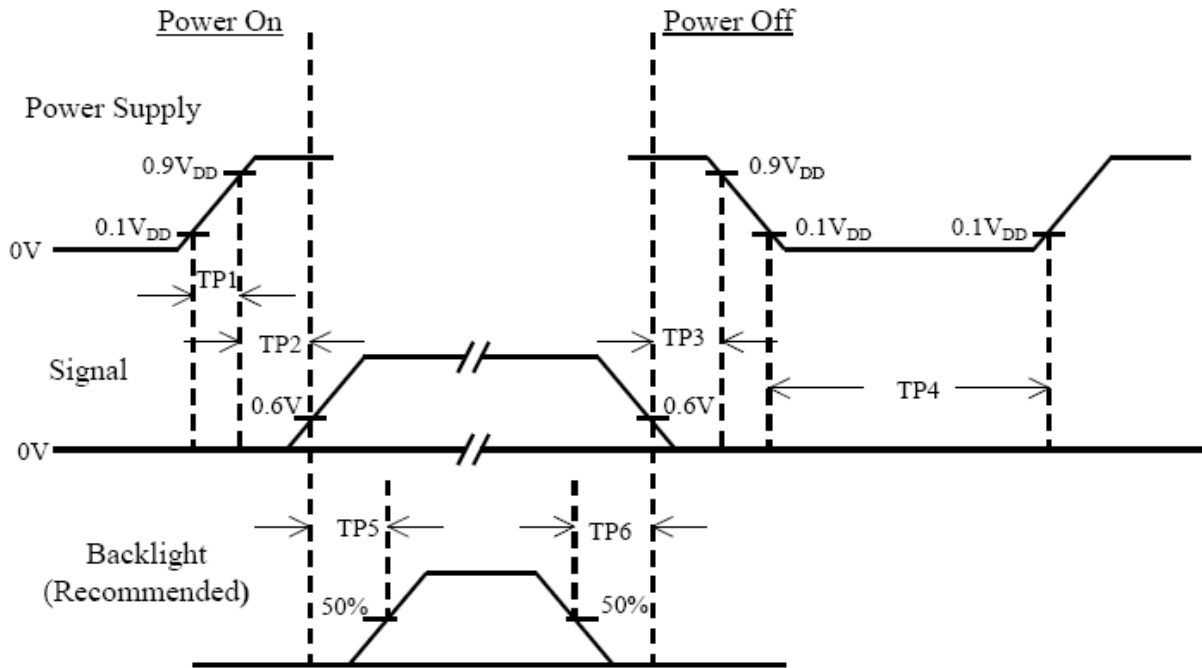
Item	Min.	Typ.	Max.	Unit	Remark
TP1	0.5	--	10	msec	
TP2	0	--	50	msec	
TP3	0	--	50	msec	
TP4	500	--	--	msec	
TP5	200	--	--	msec	
TP6	200	--	--	msec	

Note(1) The supply voltage of the external system for the module input should be the same as the definition of VDD.

Note(2) Apply the lamp voltage within the LCD operation range. When the back-light turns on before the LCD operation or the LCD turns off before the back-light turns off, the display may momentarily become white.

Note(3) In case of VDD = off level, please keep the level of input signal on the low or keep a high impedance.

Note(4) TP4 should be measured after the module has been fully discharged between power off and on period.

Note(5) Interface signal shall not be kept at high impedance when the power is on.

5.6 Backlight Unit

Parameter	Symbol	Min.	Typ.	Max.	Units	Condition
LED Current	IL	--	**120**	--	mA	Ta=25℃
LED Voltage	VL	--	33		Volt	Ta=25℃
LED Life-Time	N/A	**50K**	--	--	Hour	Ta=25℃ Note (2)

Note(1) LED life time (Hrs.) can be defined as the time in which it continues to operate under the condition: Ta=25±3℃, typical IL value indicated in the above table until the brightness becomes less than 50%.

Note(2) The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25℃and IL=120mA. The LED lifetime could be decreased if operating IL is larger than 120mA. The constant current driving method is suggested.

Note(3) LED Light Bar Circuit is 11S2P.

Note(4) When LCM is operated over 40℃ ambient temperature, the IL should be follow :
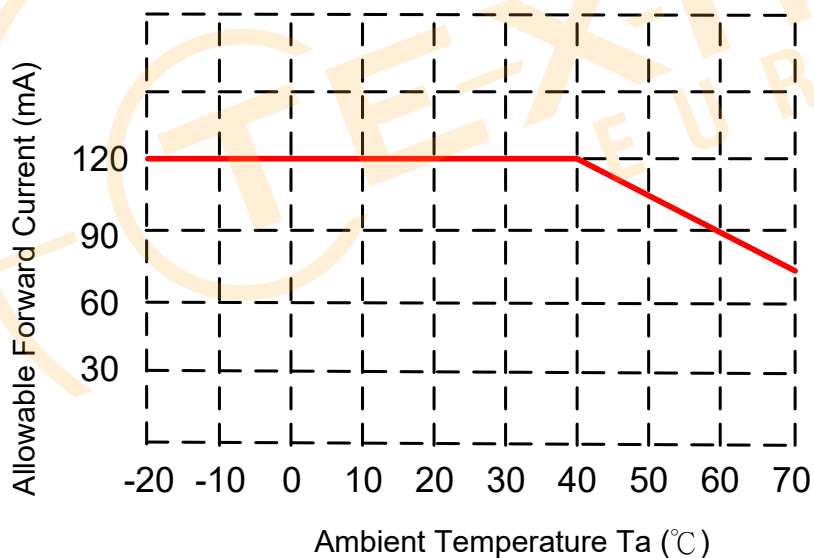
6. INTERFACE PIN CONNECTION

CN2 LVDS connector: P1.0 20pin/CP100-S20G-H16

Pin No.	Symbol	I/O	Description	Note
1	VDD	P	Power Voltage for Logic: 3.3V	
2	VDD	P	Power Voltage for Logic: 3.3V	
3	GND	P	Ground	
4	GND	P	Ground	
5	IN0-	I	- LVDS differential data input	
6	IN0+	I	+ LVDS differential data input	
7	GND	P	Ground	
8	IN1-	I	- LVDS differential data input	
9	IN1+	I	+ LVDS differential data input	
10	GND	P	Ground	
11	IN2-	I	- LVDS differential data input	
12	IN2+	I	+ LVDS differential data input	
13	GND	P	Ground	
14	CLK-	I	- LVDS differential clock input	
15	CLK+	I	+ LVDS differential clock input	
16	GND	P	Ground	
17	IN3-	I	- LVDS differential data input	
18	IN3+	I	+ LVDS differential data input	
19	VLED	P	Power Supply Voltage for LED Driver.	
20	ADJ	I	LED Back-light Brightness Adjust	

7. Reliability Test Criteria

Test Item	Test Conditions	Note
High Temperature Operation	70±3°C , t=240 hrs	
Low Temperature Operation	-20±3°C , t=240 hrs	
High Temperature Storage	80±3°C , t=240 hrs	1,2
Low Temperature Storage	-30±3°C , t=240 hrs	1,2
Storage at High Temperature and Humidity	60°C, 90% RH , 240 hrs	1,2
Thermal Shock Test	-20°C (30min) ~ 70°C (30min) 100 cycles	1,2
Vibration Test (Packing)	Sweep frequency : 10 ~ 55 ~ 10 Hz/1min Amplitude : 0.75mm Test direction : X.Y.Z/3 axis Duration : 30min/each axis	2

Note(1) Condensation of water is not permitted on the module.

Note(2) The module should be inspected after 1 hour storage in normal conditions (15-35°C, 45-65%RH)

Note(3) The module shouldn't be tested over one condition, and all the tests are independent.

Note(4) All reliability tests should be done without the protective film.

Definitions of life end point:

● Current drain should be smaller than the specific value.

● Function of the module should be maintained.

● Appearance and display quality should not have degraded noticeably.

● Contrast ratio should be greater than 50% of the initial value.

8. Use Precautions

8.1 Handling precautions

1) The polarizing plate may break easily so be careful when handling it. Do not touch, press or rub it with a hard-material tool like tweezers.

2) Do not touch the polarizing plate surface with bare hands so as not to make it dirty. If the surface or other related part of the polarizing plate is dirty, soak a soft cotton cloth or chamois leather in benzine and wipe off with it. Do not use chemical liquids such as acetone, toluene and isopropyl alcohol. Failure to do so may bring chemical reaction phenomena and deteriorations.

3) Remove any spit or water immediately. If it is left for hours, the suffered part may deform or decolorize.

4) If the LCD element breaks and any LC stuff leaks, do not suck or lick it. Also if LC stuff is stuck on your skin or clothing, wash thoroughly with soap and water immediately.

8.2 Installing precautions

1) The PCB has many ICs that may be damaged easily by static electricity. To prevent breaking by static electricity from the human body and clothing, earth the human body properly using the high resistance and discharge static electricity during the operation. In this case, however, the resistance value should be approx. 1MΩ and the resistance should be placed near the human body rather than the ground surface. When the indoor space is dry, static electricity may occur easily so be careful. We recommend the indoor space should be kept with humidity of 60% or more. When a soldering iron or other similar tool is used for assembly, be sure to earth it.

2) When installing the module and ICs, do not bend or twist them. Failure to do so may crack LC element and cause circuit failure.

3) To protect LC element, especially polarizing plate, use a transparent protective plate (e.g., acrylic plate, glass etc) for the product case.

4) Do not use an adhesive like a both-side adhesive tape to make LCD surface (polarizing plate) and product case stick together. Failure to do so may cause the polarizing plate to peel off.

8.3 Storage precautions

1) Avoid a high temperature and humidity area. Keep the temperature between 0°C and 35°C and also the humidity under 60%.

2) Choose the dark spaces where the product is not exposed to direct sunlight or fluorescent light.

3) Store the products as they are put in the boxes provided from us or in the same conditions as we recommend.

8.4 Operating precautions

1) Do not boost the applied drive voltage abnormally. Failure to do so may break ICs. When applying power voltage, check the electrical features beforehand and be careful. Always turn off the power to the LC module controller before removing or inserting the LC module input connector. If the input connector is removed or inserted while the power is turned on, the LC module internal circuit may break.

2) The display response may be late if the operating temperature is under the normal standard, and the display may be out of order if it is above the normal standard. But this is not a failure; this will be restored if it is within the normal standard.

3) The LCD contrast varies depending on the visual angle, ambient temperature, power voltage etc. Obtain the optimum contrast by adjusting the LC dive voltage.

4) When carrying out the test, do not take the module out of the low-temperature space suddenly. Failure to do so will cause the module condensing, leading to malfunctions.

5) Make certain that each signal noise level is within the standard (L level: 0.2Vdd or less and H level: 0.8Vdd or more) even if the module has functioned properly. If it is beyond the standard, the module may often malfunction. In addition, always connect the module when making noise level measurements.

6) The CMOS ICs are incorporated in the module and the pull-up and pull-down function is not adopted for the input so avoid putting the input signal open while the power is ON.

7) The characteristic of the semiconductor element changes when it is exposed to light emissions, therefore ICs on the LCD may malfunction if they receive light emissions. To prevent these malfunctions, design and assemble ICs so that they are shielded from light emissions.

8) Crosstalk occurs because of characteristics of the LCD. In general, crosstalk occurs when the regularized display is maintained. Also, crosstalk is affected by the LC drive voltage. Design the contents of the display, considering crosstalk.

8.5 Mechanical

1) Please hold the LCD module properly when you use or store it.

8.6 Other

1) Do not disassemble or take the LC module into pieces. The LC modules once disassembled or taken into pieces are not the guarantee articles.

2) Do not keep the LCD at the same display pattern continually. The residual image will happen and it will damage the LCD. Please use screen saver.

3) AMIPRE will provide one year warranty for all products and three months warrantee for all repairing products.

9. Outline Dimension

CN2

1	VDD	11	IN2−
2	VDD	12	IN2+
3	GND	13	GND
4	GND	14	CLK−
5	IN0−	15	CLK+
6	IN0+	16	GND
7	GND	17	GND
8	IN1−	18	IN3−
9	IN1+	19	VLED
10	GND	20	ADJ

Note:
1. Unless indicated, Tolerance "±0.3"
2. UV Glue For OLB Protection.
3. LCD 1024x768 (R.G.B) TFT LCD=>10.4" TFT LCD

Back View

	1	1024768Y7H-A2 (1000nits)	7	
	2	TFT-1024768-125-0	8	
	3		9	
	4		10	
	5		11	
	6		12	

TOLERANCE GRADE(±)	A	B	DIM.	IE NO.	MN	PARTS NO. LCM-1 1024768Y7H-A2

DWN. SNOW	CHK.	APPD.
DATE 05-29-23'	DATE	DATE

TITLE 1024768Y7H-A2 (10.4") IPS LVDS 1000nits

DWG. NO. *230591MA

SHEET 1 OF 1

AMPIRE 晶采光電科技

10. Package

Note:
1. Bag = 1 PCS LCM
2. Big Box= 1x 25 = 25 PCS LCM

TF800600-41-0

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

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Texim Europe - contact details
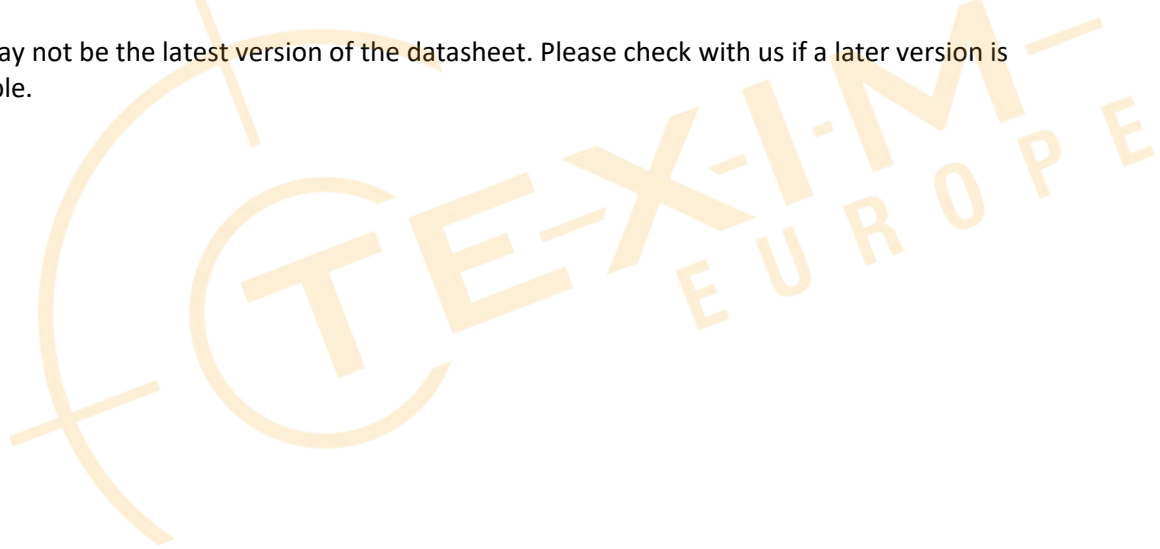
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