



# Specification for Approval

Customer: \_\_\_\_\_

Model Name: \_\_\_\_\_

Supplier Approval			Customer approval
R&D Designed	R&D Approved	QC Approved	
<i>Peter</i>	Peng Jun		



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## 1. Scope

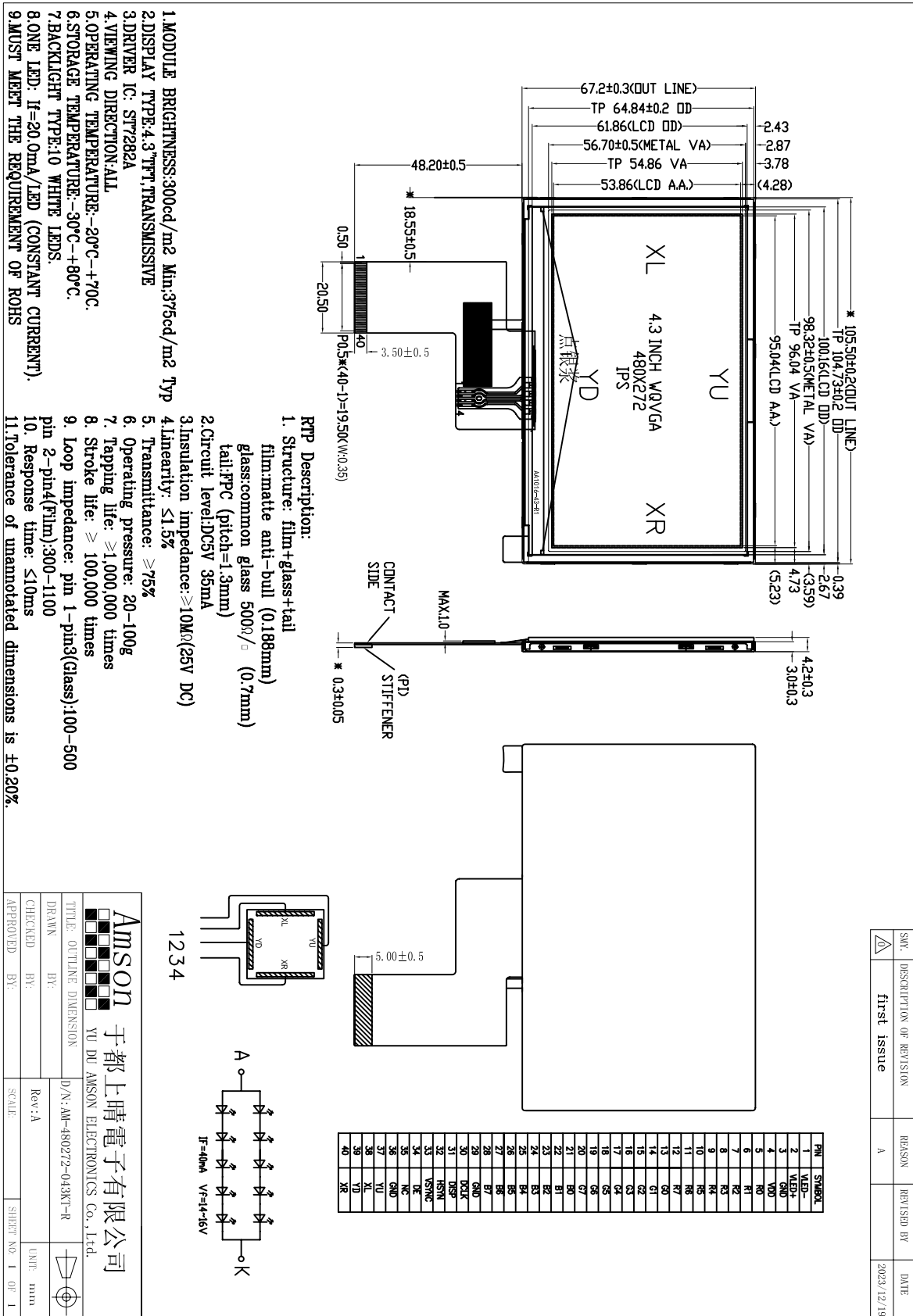
This specification defines general provisions as well as inspection standards for TFT module supplied by AMSON electronics.

If the event of unforeseen problem or unspecified items may occur, naturally shall negotiate and agree to solution.

## 2. General Information

ITEM	STANDARD VALUES	UNITS
LCD type	4.3" TFT	--
Dot arrangement	480(RGB) × 272	dots
Color filter array	RGB vertical stripe	--
Display mode	Transmissive / Normally Black	--
Viewing Direction	ALL	--
Driver IC	ST7282A	--
Module size	105.5(W) × 67.2(H) × 4.2	mm
Active area	95.04(W) × 53.86(H)	mm
Pixel pitch	0.198(W) × 0.198(H)	mm
Interface	24 bits RGB	--
Operating temperature	-20 ~ +70	°C
Storage temperature	-30 ~ +80	°C
Back Light	10 White LEDs	--
Weight	TBD	g

## 3. External Dimensions



## 4. Interface Description

PIN NO.	PIN NAME	DESCRIPTION
1	VLED-	LED backlight cathode
2	VLED+	LED backlight anode
3	GND	Ground
4	VDD	Power supply
5-12	R0-R7	Red Data
13-20	G0-G7	Green Data
21-28	B0-B7	Blue Data
29	GND	Ground
30	DCLK	Clock signal
31	DISP	Display on/off
32	HSYN	Horizontal sync input in RGB mode(short to GND if not used)
33	VSYNC	Vertical sync input in RGB mode(short to GND if not used)
34	DE	Data Enable
35	NC	NC
36	GND	Ground
37	YU	Touch panel up side
38	XL	Touch panel left side
39	YD	Touch panel down side
40	XR	Touch panel right side

## 5. Absolute Maximum Ratings

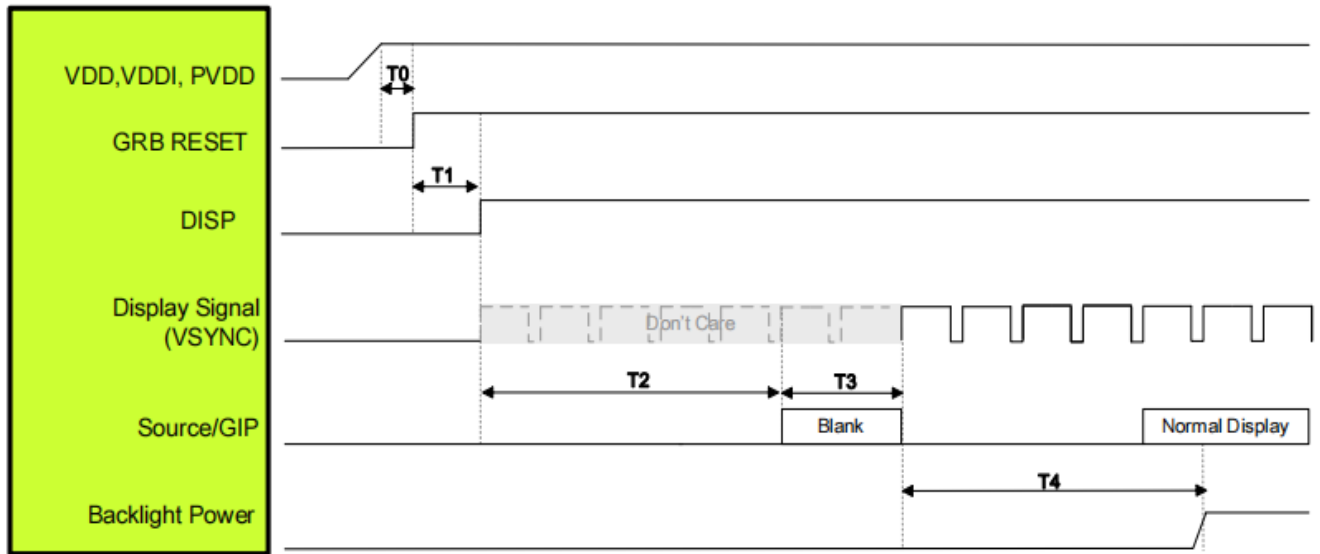
Item	Symbol	Min	Type	Max	Unit
Power Supply	VDD	-0.3	-	4.0	V
Operating Temperature	TOPR	-20	-	70	°C
Storage Temperature	TSTG	-30	-	80	°C

## 6. DC Characteristics

Item	Symbol	Min.	Type	Max.	Unit	
Power supply	VDD	3.0	3.3	3.5	V	
Input High Voltage	V <sub>IH</sub>	0.7VDD	--	VDD	V	Digital input pins
Input Low Voltage	V <sub>IL</sub>	GND	--	0.3VDD	V	Digital input pins
Output High Voltage	V <sub>OH</sub>	VDD-0.4	--	VDD	V	Digital output pins
Output Low Voltage	V <sub>OL</sub>	GND	--	GND+0.4	V	Digital output pins
I/O Leak Current	I <sub>LI</sub>	--	--	±1.0	uA	

## 7. Timing Characteristics

### 7.1 Power ON Sequence



Symbol	Description	Time	Unit
T0	System power stability to GRB RESET signal	$\geq 1$	ms
T1	GRB RESET= "High" to DISP="High"	$\geq 10$	ms
T2	DISP="High" to Source/GIP scan blank	85	ms
T3	IC scan blanking signal	$\geq 33$	ms
T4	Display signal input to Backlight power on (base on Display Signal Frame Rate 60Hz)	$\geq 100$	ms

Note: 1. When DISP pull "H" or "L", IC will execute the internal power on or power off procedures .Please be careful about the timing of

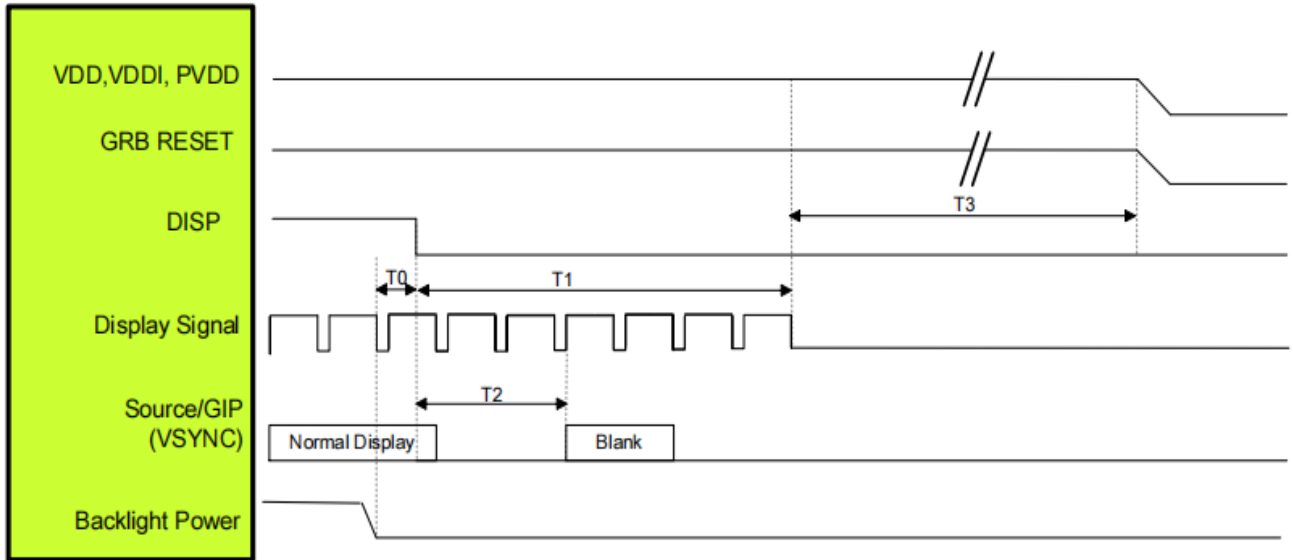
DISP and do not interrupt it during power on or power off procedure, otherwise unexpected errors will occur.

2. RGB interface Display signal: DCLK; VSYNC; HSYNC; DE; DR[7:0]; DG[7:0]; DB[7:0].

3. LVDS interface Display signal: DCLK P/N; RX[3:0] P/N



## 7.2 Power OFF Sequence



Symbol	Description	Time	Unit
T0	Backlight Power off to DISP="Low"	≥1	ms
T1	DISP="Low" to IC internal voltage discharge complete	≥100	ms
T2	DISP="Low" to Source/GIP scan blank (base on Display Signal Frame Rate 60Hz)	≤50	ms
T3	IC internal voltage discharge is completed to VDD/VDDI/PVDD off	≥0	ms

Note: 1. When DISP pull "H" or "L", IC will execute the internal power on or power off procedures. Please be careful about the timing of

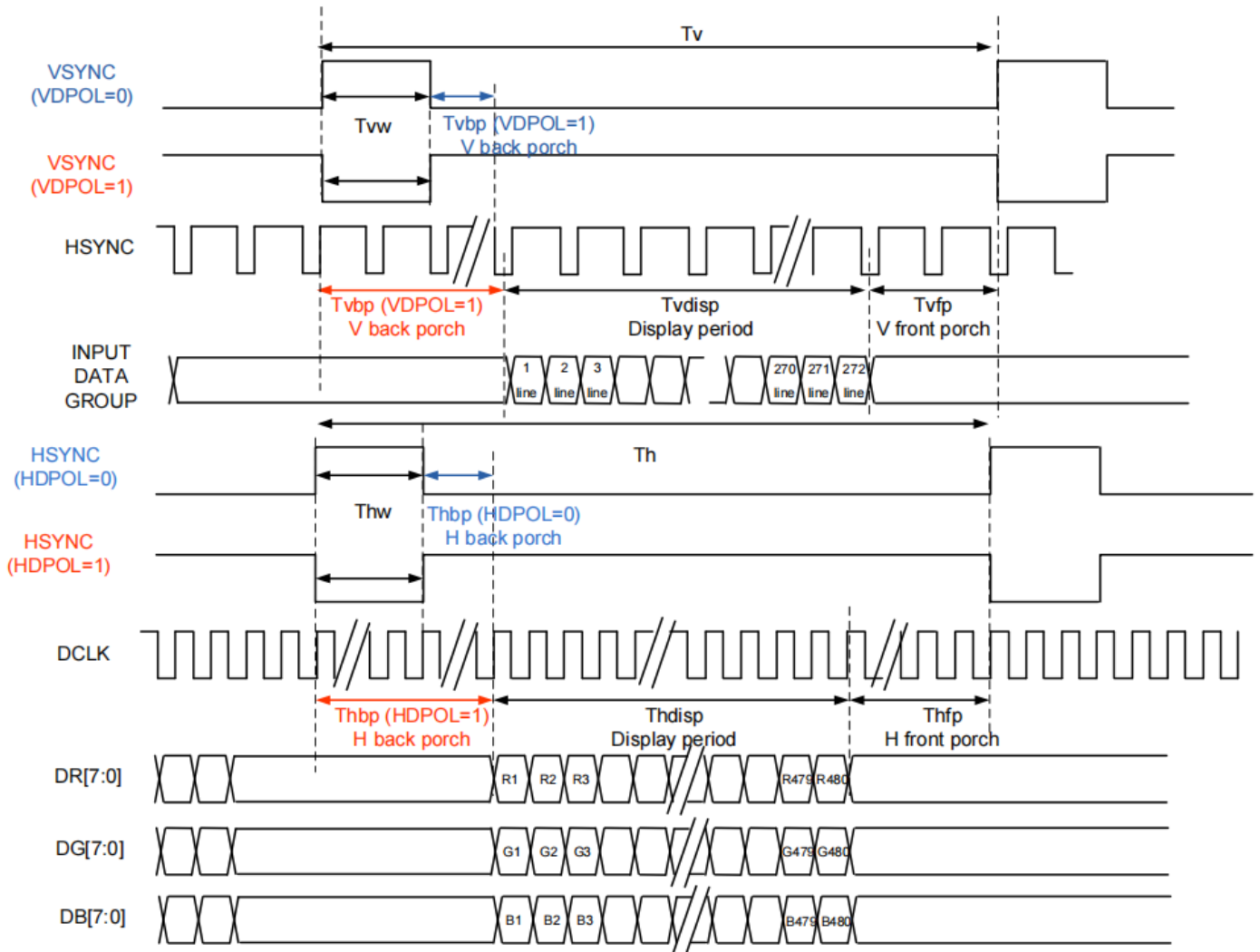
DISP and do not interrupt it during power on or power off procedure, otherwise unexpected errors will occur.

2. RGB interface Display signal: DCLK; VSYNC; HSYNC; DE; DR[7:0]; DG[7:0]; DB[7:0].

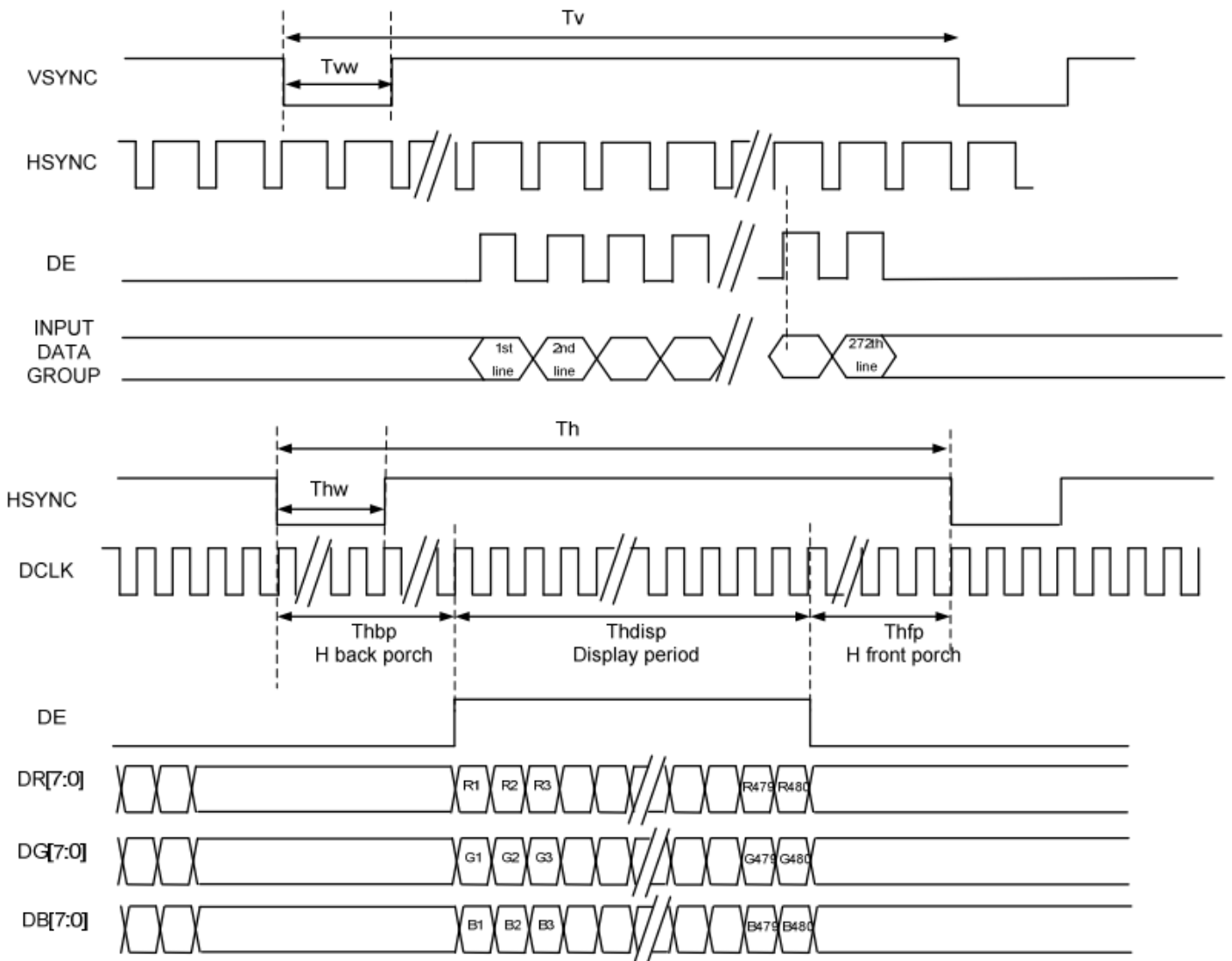
3. LVDS interface Display signal: DCLK P/N; RX[3:0] P/N.

## 7.3 Timing characteristics

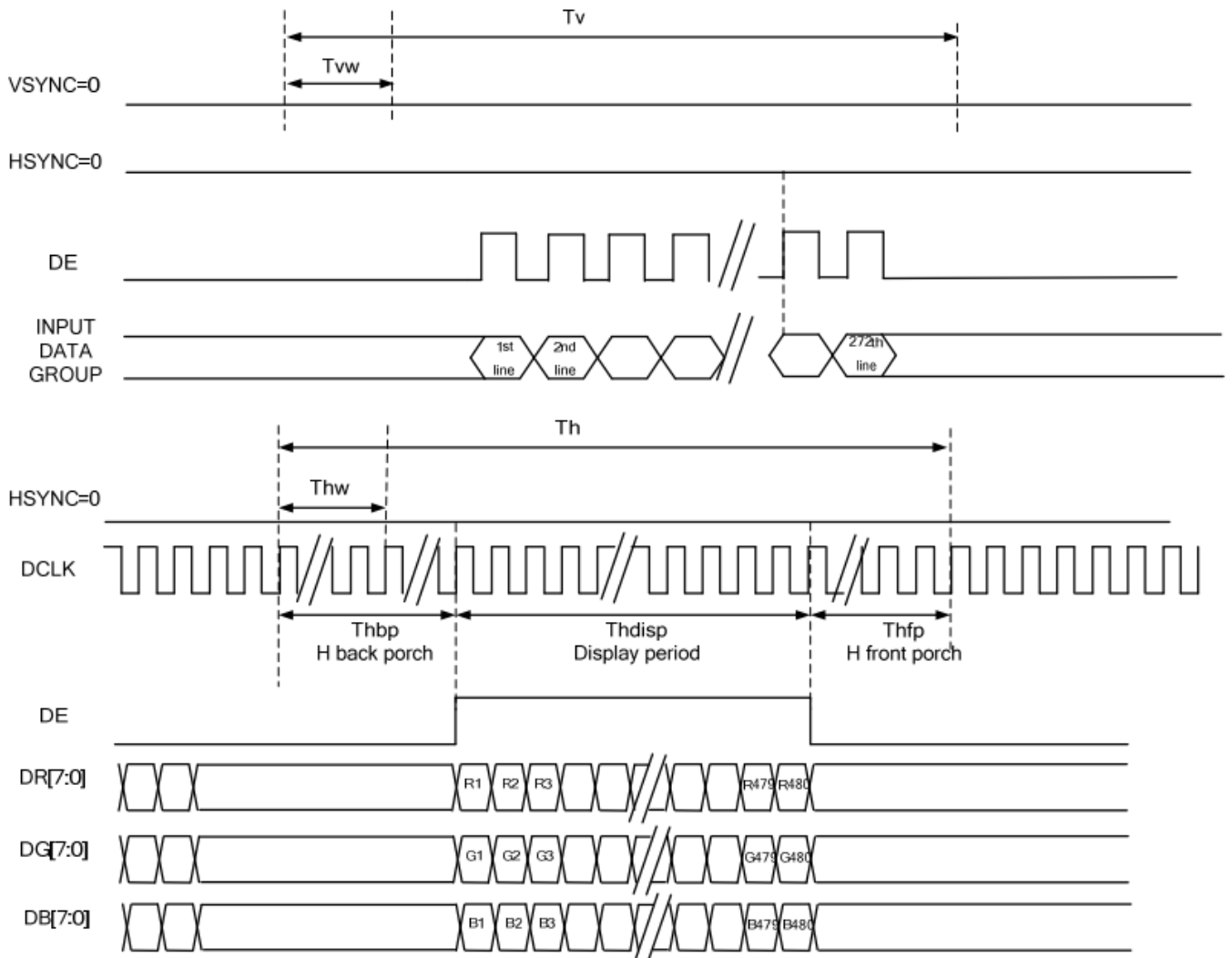
### 7.3.1 SYNC Mode Timing Diagram



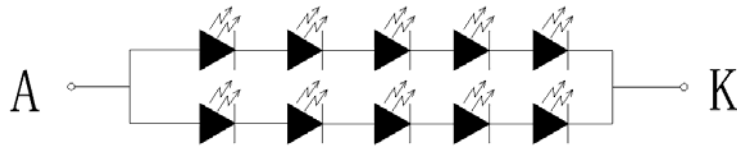
### 7.3.2 SYNC-DE Mode Timing Diagram



### 7.3.3 DE Mode Timing Diagram



## 8. Backlight Characteristics

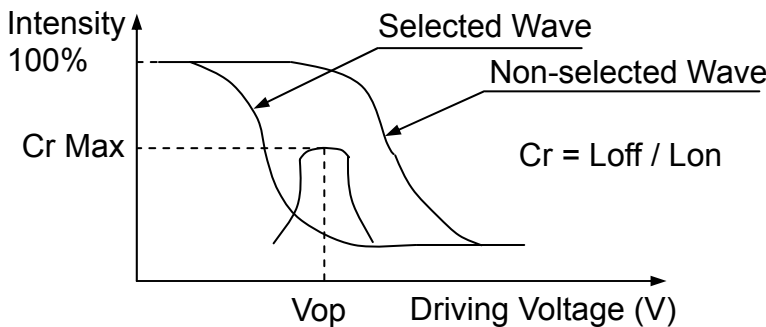


Item	Symbol	MIN	TYP	MAX	UNIT	Test Condition
Supply Voltage	Vf	14.0	15.0	16.0	V	If=40mA
Supply Current	If	-	40	-	mA	
Luminous Intensity for LCM	Lv	300	375	-	cd/m <sup>2</sup>	If=40mA
Uniformity(with L/G)	△Bp				%	If=40mA
Life Time		20000			Hr	If=40mA
Backlight Color	White					

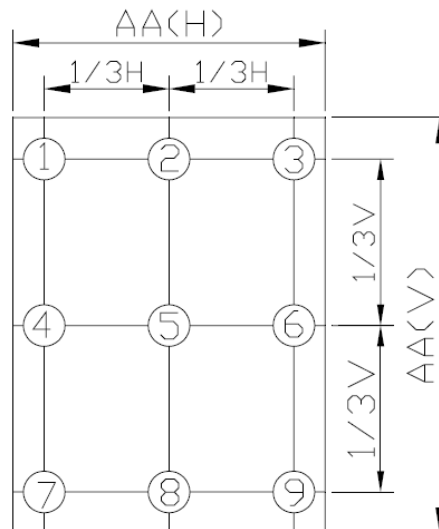
## 9. Optical Characteristics

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK		
Response Time	Tr+Tf	25°C	--	30	35	msec			
Contrast Ratio	CR		800	1000	--		Note 3		
Viewing Angle	Upper	$\theta$	$CR \geq 2$	-	80	--	Deg	Note 5	
	Down			-	80	--	Deg		
	Right			$\phi$	-	80	--		Deg
	Left				-	80	--		Deg
Color Filter Chromaticity	White	X y	$\theta = \phi = 0^\circ$	-	0.305	-	--	Note 6	
				-	0.336	-	--		
	Red	X y	$\theta = \phi = 0^\circ$	-	-	-	--		
				-	-	-	--		
	Green	X y	$\theta = \phi = 0^\circ$	-	-	-	--		
				-	-	-	--		
	Blue	X y	$\theta = \phi = 0^\circ$	-	-	-	--		
				-	-	-	--		

Note1: Definition of Operation Voltage (Vop)



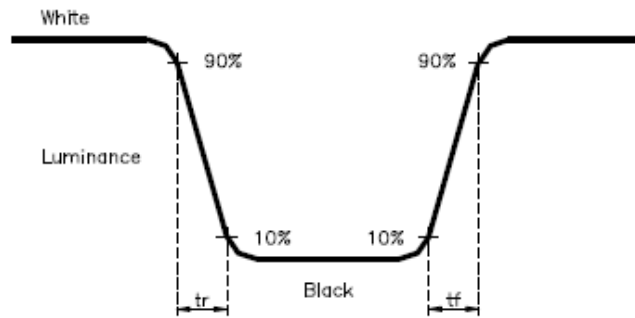
Note2: Definition of Luminance Uniformity :  $L = L(\text{MIN}) / L(\text{MAX}) \times 100\%$



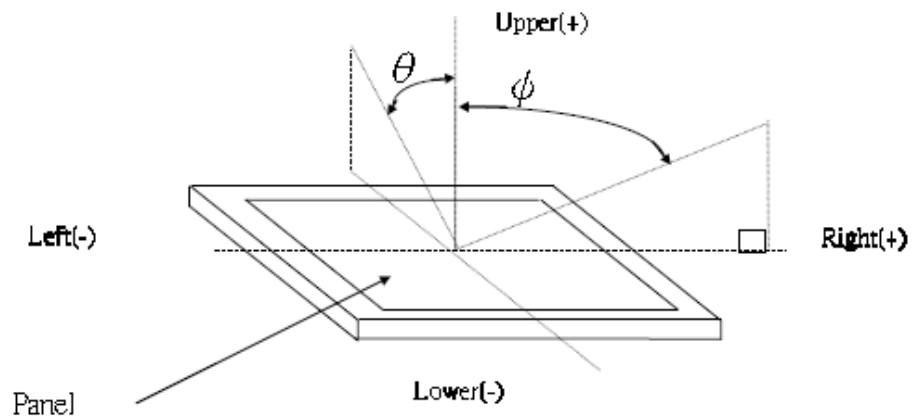
Note 3. Definition of Contrast Ratio :

$$CR = \text{White Luminance (ON)} / \text{Black Luminance (OFF)}$$

Note 4. Definition of response time : The response time is defined as the time interval between the 10% and 90% amplitudes.



Note 5. Definition of view angle( $\theta$  ·  $\psi$ ) :



Note 6. Light source: C light.

## 10. Reliability Test Conditions and Methods

NO.	TEST ITEMS	TEST CONDITION	INSPECTION AFTER TEST
①	High Temperature Storage	80°C±2°C×96Hours	Inspection after 2~4hours storage at room temperature, the samples should be free from defects: 1, Air bubble in the LCD. 2, Seal leak. 3, Non-display. 4, Missing segments. 5, Glass crack. 6, Current IDD is twice higher than initial value. 7, The surface shall be free from damage. 8, The electric characteristic requirements shall be satisfied.
②	Low Temperature Storage	-30°C±2°C×96Hours	
③	High Temperature Operating	70°C±2°C×96Hours	
④	Low Temperature Operating	-20°C±2°C×96Hours	
⑤	Temperature Cycle(Storage)	$  \begin{array}{ccccc}  -30^{\circ}\text{C} & \longleftrightarrow & 25^{\circ}\text{C} & \longleftrightarrow & 80^{\circ}\text{C} \\  (30\text{min}) & & (5\text{min}) & & (30\text{min}) \\  & & \longleftarrow & & \longrightarrow \\  & & 1\text{cycle} & & \\  & & \text{Total 20cycle} & &   \end{array}  $	
⑥	High Temperature & Humidity operating	60°C±5°C×90%RH×96Hours	
⑦	Vibration Test	Frequency:10Hz~55Hz~10Hz Amplitude:1.5M X,Y,Z direction for total 3hours (Packing Condition)	
⑧	Drooping Test	Drop to the ground from 1M height one time every side of carton. (Packing Condition)	
⑨	ESD Test	Voltage:±8KV,R:330Ω,C:150PF,Air Mode,10times	

**REMARK:**

- 1, The Test samples should be applied to only one test item.
- 2, Sample side for each test item is 2~5pcs.
- 3, For Damp Proof Test, Pure water(Resistance > 10MΩ) should be used.
- 4, In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judge as a good part.
- 5, EL evaluation should be accepted from reliability test with humidity and temperature: Some defects such as black spot/blemish can happen by natural chemical reaction with humidity and Fluorescence EL has.
- 6, Failure Judgment Criterion: Basic Specification Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.



## 11. Handling Precautions

### 11.1 Mounting method

The LCD panel of AMSON TFT module consists of two thin glass plates with polarizers which easily be damaged. And since the module is so constructed as to be fixed by utilizing fitting holes in the printed circuit board.

Extreme care should be needed when handling the LCD modules.

### 11.2 Caution of LCD handling and cleaning

When cleaning the display surface, Use soft cloth with solvent [Recommended below] and wipe lightly

- Isopropyl alcohol
- Ethyl alcohol

Do not wipe the display surface with dry or hard materials that will damage the polarizer surface.

Do not use the following solvent:

- Water
- Aromatics

Do not wipe ITO pad area with the dry or hard materials that will damage the ITO patterns

Do not use the following solvent on the pad or prevent it from being contaminated:

- Soldering flux
- Chlorine (Cl) , Sulfur (S)

If goods were sent without being silicon coated on the pad, ITO patterns could be damaged due to the corrosion as time goes on.

If ITO corrosion happens by miss-handling or using some materials such as Chlorine (Cl), Sulfur (S) from customer, Responsibility is on customer.

### 11.3 Caution against static charge

The LCD module uses C-MOS LSI drivers, so we recommend that you:

Connect any unused input terminal to VDDIO or GND, do not input any signals before power is turned on, and ground your body, work/assembly areas, and assembly equipment to protect against static electricity.

### 11.4 packing

- Module employs LCD elements and must be treated as such.
- Avoid intense shock and falls from a height.
- To prevent modules from degradation, do not operate or store them exposed directly to sunshine or high temperature/humidity

### 11.5 Caution for operation

- It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage than the limit causes the shorter LCD life.
- An electrochemical reaction due to direct current causes LCD's undesirable deterioration, so that the use of direct current drive should be avoided.
- Response time will be extremely delayed at lower temperature than the operating temperature range and on the other hand at higher temperature LCD's show dark color in them. However those phenomena do not mean malfunction or out of order with LCD's, which will come back in the specified operation temperature.
- If the display area is pushed hard during operation, some font will be abnormally displayed but it resumes normal condition after turning off once.
- Slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit.

Usage under the maximum operating temperature, 50%Rh or less is required.

### 11.6 storing

In the case of storing for a long period of time for instance, for years for the purpose or replacement use, the following ways are recommended.

- Storage in a polyethylene bag with the opening sealed so as not to enter fresh air outside in it. And with no desiccant.
- Placing in a dark place where neither exposure to direct sunlight nor light's keeping the storage temperature range.
- Storing with no touch on polarizer surface by the anything else.  
[It is recommended to store them as they have been contained in the inner container at the time of delivery from us.]

### 11.7 Safety

- It is recommendable to crash damaged or unnecessary LCD's into pieces and wash off liquid crystal by either of solvents such as acetone and ethanol, which should be burned up later.
- When any liquid leaked out of a damaged glass cell comes in contact with your hands, please wash it off well with soap and water.

## 12. Precaution for Use

### 12.1

A limit sample should be provided by the both parties on an occasion when the both parties agreed its necessity. Judgment by a limit sample shall take effect after the limit sample has been established and confirmed by the both parties.

### 12.2

On the following occasions, the handing of problem should be decided through discussion and agreement between responsible of the both parties.

- When a question is arisen in this specification.
- When a new problem is arisen this is not specified in this specification.
- When an inspection specifications change or operating condition change in customer is reported to AMSON TFT and some problem is arisen in this specification due to the change.
- When a new problem is arisen at the customer's operating set for sample evaluation in the customer site.

## 13. Packing Method

TBD