FANNAL ELECTRONICS

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FN0399D001A

Product Specification Rev.V0

BUYER	
SUPPLIER	FANNAL Electronics CO., LTD
FG-Code	FN0399D001A

☐ Preliminary Specification
☑ Approval Specification

ITEM	BUYER SIGNATURE	DATE
Quality		
R&D		
Approved		

ITEM	SUPPLIER SIGNATURE	DATE
Prepared	DONG	2023-04-28
Reviewed	XIONG	2023-04-28
Approved	JACK	2023-04-28

REVISION HISTORY

REV.	Page.	DESCRIPTION OF CHANGES	DATE	PREPARED
V0		Initial Release	2023-04-28	JACK

Contents

1.0 General Description

1.1 Application

☑ Industrial ☐ Fitness equipment ☑ POS

☐ Automotive ☐ Rail traffic ☑ Digital & Consumer

☑ Medical ☐ Military-industrial ☐ Outdoor highlight

1.2 General Specification

Parameter	Specification	Unit
LCD size	3.99 (Diagonal)	inch
Resolution Ratio	400(H)×960(V)	pixels
Pixel Pitch	0.09795x0.09795(V)	mm
Active Area	39.18(H)×94.032(V)	mm
Module Size	42.9(W)×102.08(H)×2.15(D)	mm
Display Mode	Normally Black	
Interface	RGB/SPI	
Pixel arrangement	RGB-Stripe	
View Direction	ALL	
Power Supply	2.8	V
Power Consumption	0.7	W
Weight	20	g
Luminance	350 (TYP.)	cd/m²
Driver IC	ST7701SN	

VER.	SYMBOL	AMENDMENT	SIGN	DATE
A		First issue	LCF	2023-04-17
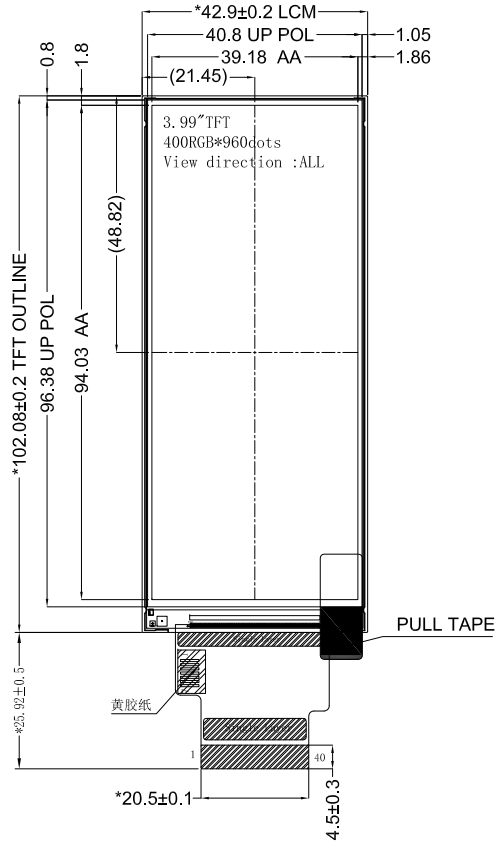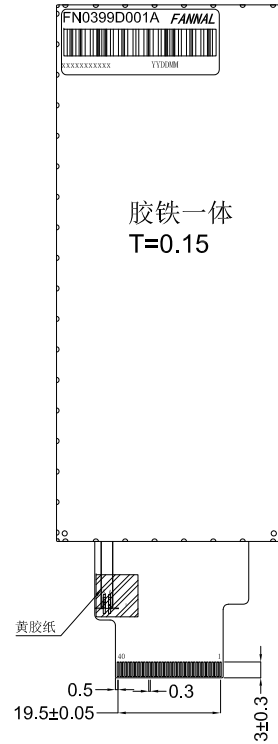
LED CIRCUIT DIAGRAM:
BACKLIGHT:8S1P=8 CHIP-WHITE LED
IF=20mA ; VF=22.4~27.2V

*42.9±0.2 LCM
40.8 UP POL
39.18 AA
(21.45)
1.05
1.86
0.8
1.8

3.99″TFT
400RGB*960dots
View direction :ALL

(48.82)

94.03 AA

96.38 UP POL

*102.08±0.2 TFT OUTLINE

*25.92±0.5

PULL TAPE

黄胶纸

*20.5±0.1
4.5±0.3

1   40

TOP VIEW

*2.15±0.15
0.1(UP POL表面到
胶框表面距离)

*0.3±0.03

SIDE VIEW

FN0399D001A   FANNAL
XXXXXXXXXX   YYDDMM

胶铁一体
T=0.15

黄胶纸

40

0.5   0.3
19.5±0.05
3±0.3

BOTTOM VIEW

A○────○K

SIZE	3.99 Inch	Interface	RGB 18bit+SPI
Resolution Ratio	400x960	Power Supply	2.8V
LCD Type	■Transmissive ☐Tranflective ☐Reflective	Connection Mode	■FPC Plug-in ☐FPC Soldering ☐Connector
Display Mode	■Normally Black ☐Normally White	Driver IC	ST7701SN
Display Direction	☐6 ☐12 ☐3 ☐9 ■Free	Operation Temperature	-20~+70
Contrast Ratio	1500:1	Storage Temperature	-30~+80
Luminance	350(Typ.) 300(Min.)	Environmental Requirements	■RoHS-2.0 ☐REACH
Uniformity	80% Min	Unmarked Tolerance	±0.2mm

PIN	SYMBOL	PIN	SYMBOL	PIN	SYMBOL	PIN	SYMBOL	PIN	SYMBOL
1	LEDA	13	DE	25	DB9	37	TP_SCL	1	GND
2	LEDK1	14	VSYNC	26	DB10	38	TP_RESET	2	TP_INT
3	LEDK2	15	HSYNC	27	DB11	39	TP_VCI	3	TP_SDA
4	GND	16	DB0	28	DB12	40	GND	4	TP_SCL
5	VCI	17	DB1	29	DB13			5	TP_RESET
6	RESET	18	DB2	30	DB14			6	TP_VCI
7	NC	19	DB3	31	DB15			7	GND
8	NC	20	DB4	32	DB16				
9	SDA	21	DB5	33	DB17				
10	SCL	22	DB6	34	GND				
11	CS	23	DB7	35	TP_INT				
12	PCLK	24	DB8	36	TP_SDA				

DRAWN	LCF
CHECKED	DONG
APPROVED	
CSR APPROVED	
Customer No:	

TITLE
MODULE SPEC.

Drawing NO: FN0399D001A
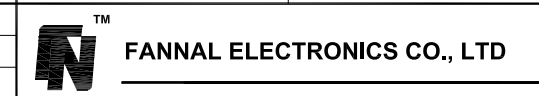
Project No:

SHEET   1 OF 1

FANNAL ELECTRONICS CO., LTD

3.0 ABSOLUTE MAXIMUM RATINGS

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit.

Parameter	Symbol	Min.	Max.	Unit
Supply Voltage	VDD	-0.3	4.6	V
Digital interface supple Voltage	VDDI	-0.3	4.6	V
Operating Temperature	T_{OP}	-20	70	℃
Storage Temperature	T_{ST}	-30	80	℃
Operating Ambient Humidity	H_{OP}	10	60℃ 90%RH	RH
Storage Humidity	H_{ST}	10	60℃ 90%RH	RH

NOTE: If the absolute maximum rating of even is one of the above parameters is exceeded even momentarily, the quality of the product may be degraded. Absolute maximum ratings, therefore, specify the values exceeding which the product may be physically damaged. Be sure to use the product within the range of the absolute maximum ratings.

4.0 ELECTRICAL SPECIFICATIONS
4.1 TFT LCM Module

[Ta =25 ± 2 ℃]

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	VDD	2.5	2.8	3.6	V
Digital interface supple Voltage	VDDI	1.65	1.8	3.3	V
Normal mode Current consumption	IDD	-	-	50	mA
Level input voltage	V$_{IH}$	0.7VDDI		VDDI	V
	V$_{IL}$	GND		0.3VDDI	V
Level output voltage	V$_{OH}$	0.8VDDI		VDDI	V
	V$_{OL}$	GND		0.2VDDI	V

4.2 Backlight Driving Conditions

[Ta =25 ± 2 ℃]

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Forward Current Voltage	VF	22.4	24.8	27.2	V	Note 1
Forward Current	If	-	20	-	mA	
Backlight Power Consumption	Wbl	-	0.496	-	W	
LED Life Time	-	30000	-	-	Hrs	Note 2

Note1: Under LCM operating, the stable forward current should be inputted. And forward voltage is for reference only.

Note2: Optical performance should be evaluated at Ta=25℃. if LED is driven by high current, high ambient temperature & Humidity condition. The life time of LED will be reduced. Operating life means brightness goes down to 50% initial brightness. Typical operating life time is estimated data.

5.0 Interface Description

Connector Name/Designation	Interface Connector/Interface Card
Type Part Number	FPC 40PIN 0.5Pitch
Mating Housing Part Number	FH28-40S-0.5SH

5.1 Pin assignment for LCM module

Pin No.	Symbol	Description	Note.
1	LEDA	LED Anode.	
2	LEDK1	LED Cathode.	
3	LEDK2	LED Cathode.	
4	GND	Power Ground.	
5	VCI	Power Supply.	
6	RESET	Reset Signal, Active Low.	
7-8	NC	No Connection.	
9	SDA	SPI Data signal.	
10	SCL	SPI Clock signal.	
11	CS	SPI Chip select signal.	
12	PCLK	RGB dot clock signal.	
13	DE	RGB data enable signal.	
14	VSYNC	RGB frame synchronizing signal.	
15	HSYNC	RGB line synchronizing signal.	
16-33	DB0-DB17	RGB data signal: DB0:Blue LSB--DB5:Blue MSB; DB6:Green LSB--DB11:Green MSB; DB12:Red LSB--DB17:Red MSB.	
34	GND	Power Ground.	
35	TP_INT	Touch Interrupt, Not connection.	
36	TP_SDA	Touch IIC Data signal, Not connection.	
37	TP_SCL	Touch IIC Clock signal, Not connection.	
38	TP_RESET	Touch Reset signal, Not connection.	
39	TP_VCI	Touch Power supply, Not connection.	
40	GND	Power Ground.	

5.2 AC Characteristic
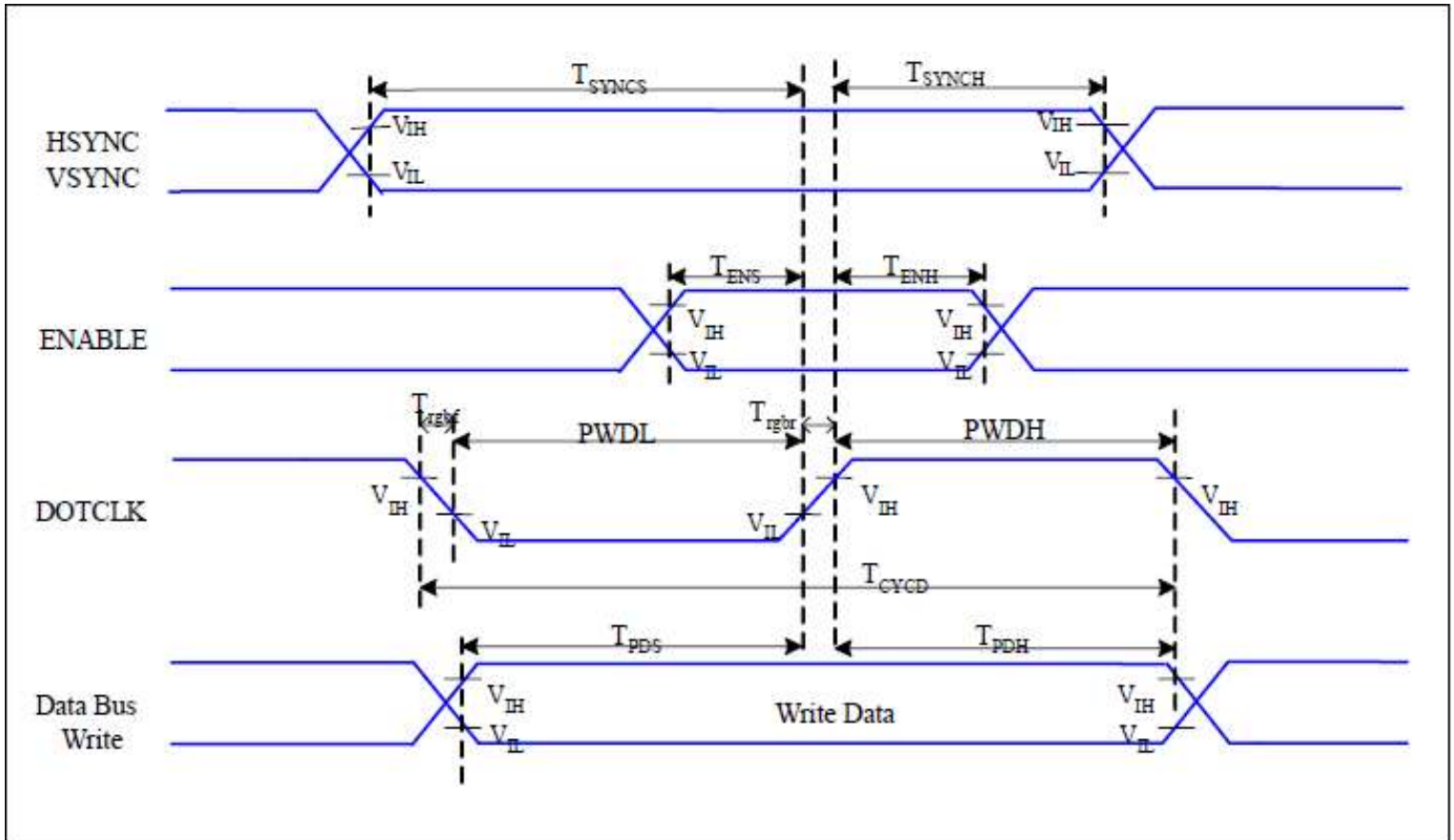
5.2.1 Serial Interface Characteristics (3-line serial):
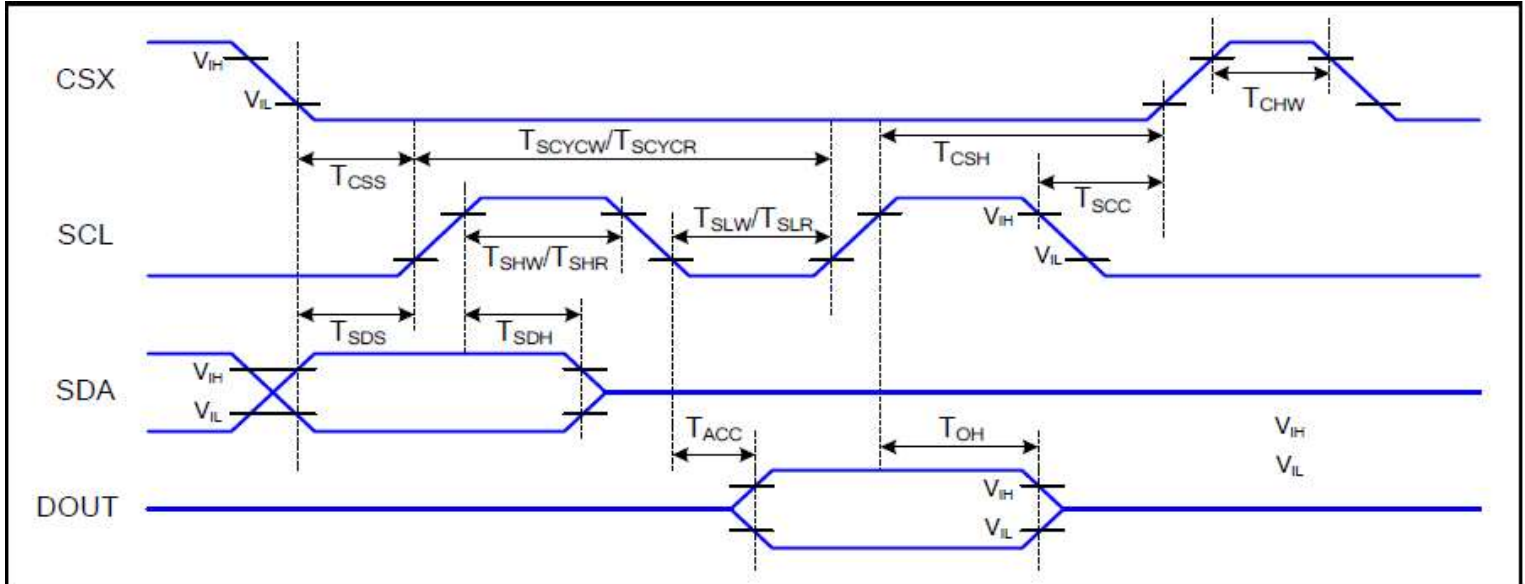
VDDI=1.8, VDD=2.8, AGND=DGND=0V, Ta=25℃

Signal	Symbol	Parameter	Min	Max	Unit	Description
CSX	T_{CSS}	Chip select setup time (write)	15		ns	
	T_{CSH}	Chip select hold time (write)	15		ns	
	T_{CSS}	Chip select setup time (read)	60		ns	
	T_{SCC}	Chip select hold time (read)	60		ns	
	T_{CHW}	Chip select "H" pulse width	40		ns	
SCL	T_{SCYCW}	Serial clock cycle (Write)	66		ns	
	T_{SHW}	SCL "H" pulse width (Write)	15		ns	
	T_{SLW}	SCL "L" pulse width (Write)	15		ns	
	T_{SCYCR}	Serial clock cycle (Read)	150		ns	
	T_{SHR}	SCL "H" pulse width (Read)	60		ns	
	T_{SLR}	SCL "L" pulse width (Read)	60		ns	
SDA (DIN)	T_{SDS}	Data setup time	10		ns	
	T_{SDH}	Data hold time	10		ns	

Note : The rising time and falling time (Tr, Tf) of input signal are specified at 15 ns or less. Logic high and low levels are specified as 30% and 70% of VDDI for Input signals.

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5.2.2 RGB Interface Characteristics:

VDDI=1.8, VDD=2.8, AGND=DGND=0V, Ta=25 ℃

| Signal	Symbol	Parameter	MIN	MAX	Unit	Description
HSYNC, VSYNC	T_{SYNCS}	VSYNC, HSYNC Setup Time	5	-	ns	
ENABLE	T_{ENS}	Enable Setup Time	5	-	ns	
	T_{ENH}	Enable Hold Time	5	-	ns	
DOTCLK	PWDH	DOTCLK High-level Pulse Width	15	-	ns	
	PWDL	DOTCLK Low-level Pulse Width	15	-	ns	
	T_{CYCD}	DOTCLK Cycle Time	33	-	ns	
	Trghr, Trghf	DOTCLK Rise/Fall time	-	15	ns	
DB	T_{PDS}	PD Data Setup Time	5	-	ns	
	T_{PDH}	PD Data Hold Time	5	-	ns	

5.3 RGB Interface Timing:

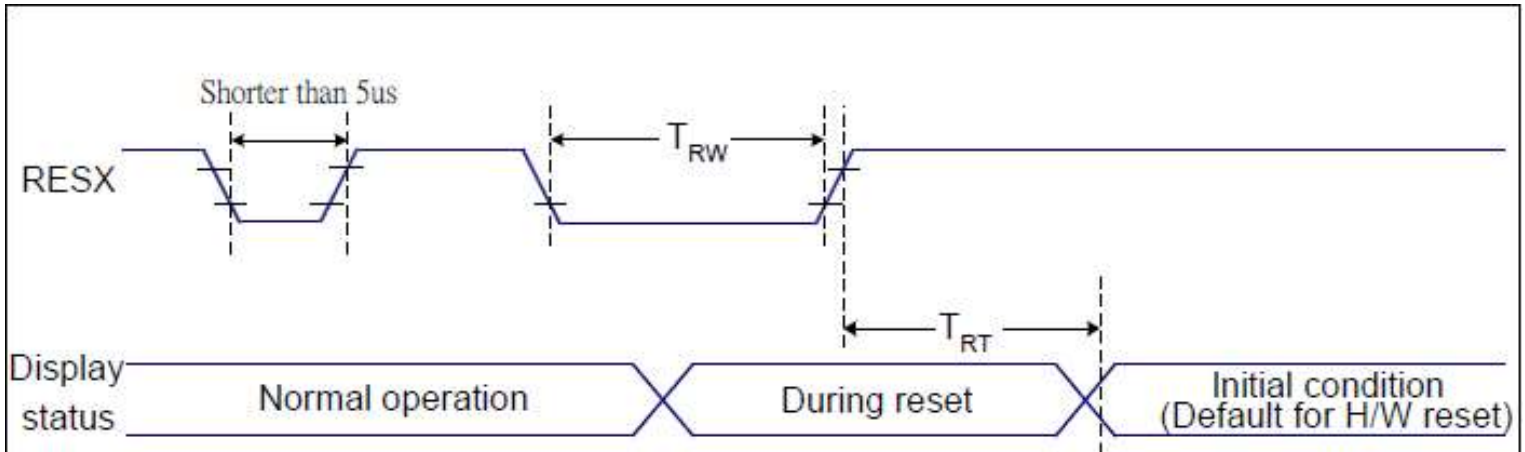The timing chart of RGB interface DE mode is shown as follows.
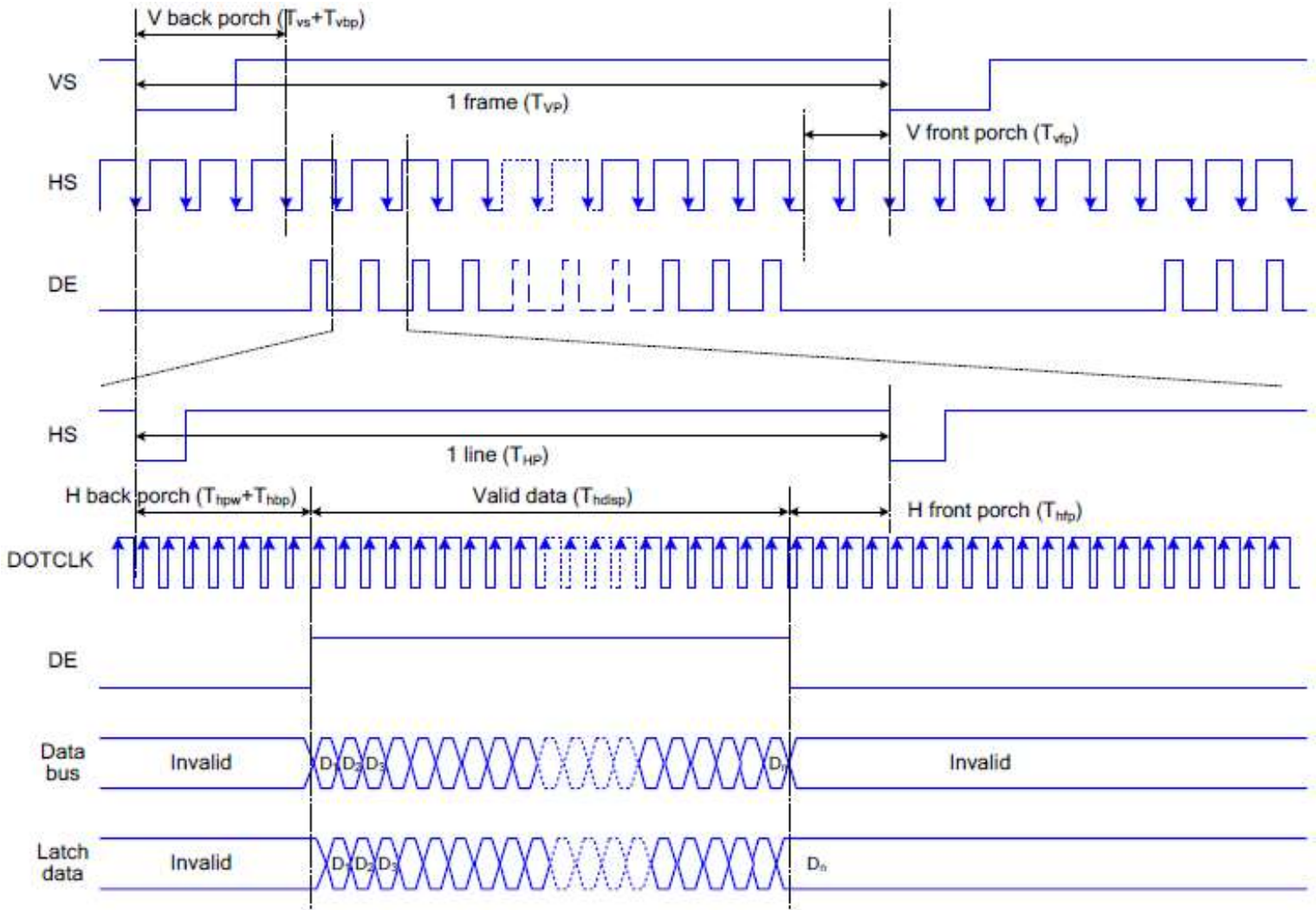
Note: The setting of front porch and back porch in host must match that in IC as this mode.

The timing chart of RGB interface HV mode is shown as follows.
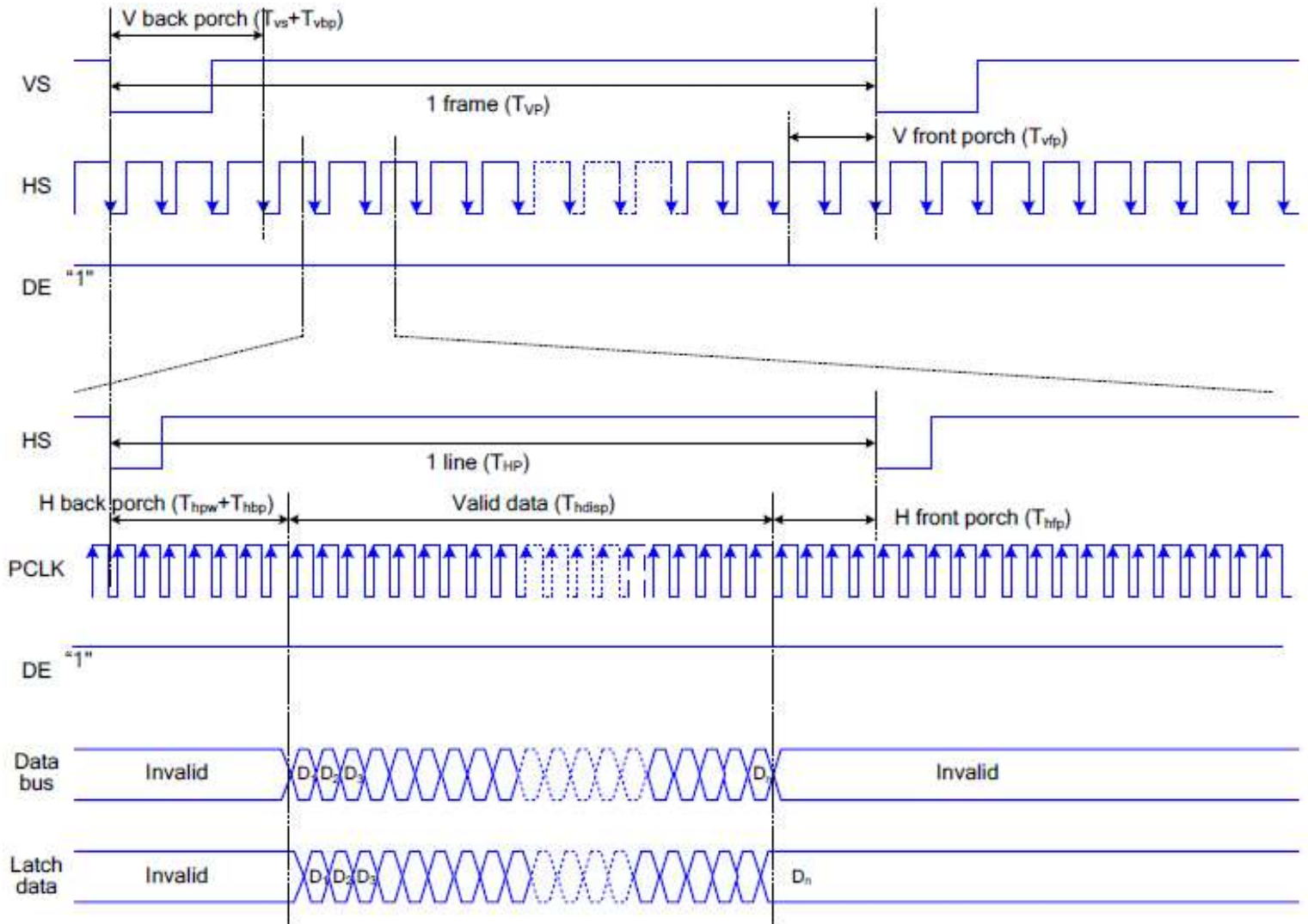
5.4 Reset Timing:

VDDI=1.8, VDD=2.8, AGND=DGND=0V, Ta=25 ℃

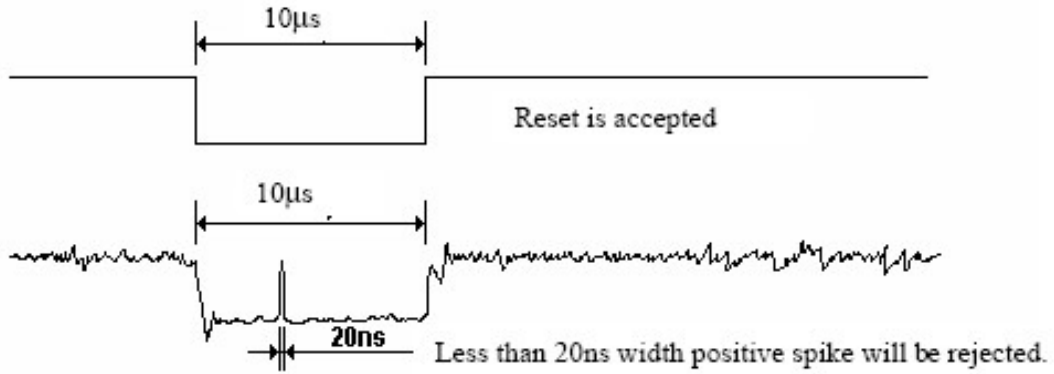| Related Pins	Symbol	Parameter	MIN	MAX	Unit
RESX	TRW	Reset pulse duration	10	-	us
	TRT	Reset cancel	-	5 (Note 1, 5)	ms
				120(Note 1, 6, 7)	ms

Notes:

1. The reset cancel includes also required time for loading ID bytes, VCOM setting and other settings from NVM (or similar device) to registers. This loading is done every time when there is HW reset cancel time (tRT) within 5 ms after a rising edge of RESX.

2. Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below:

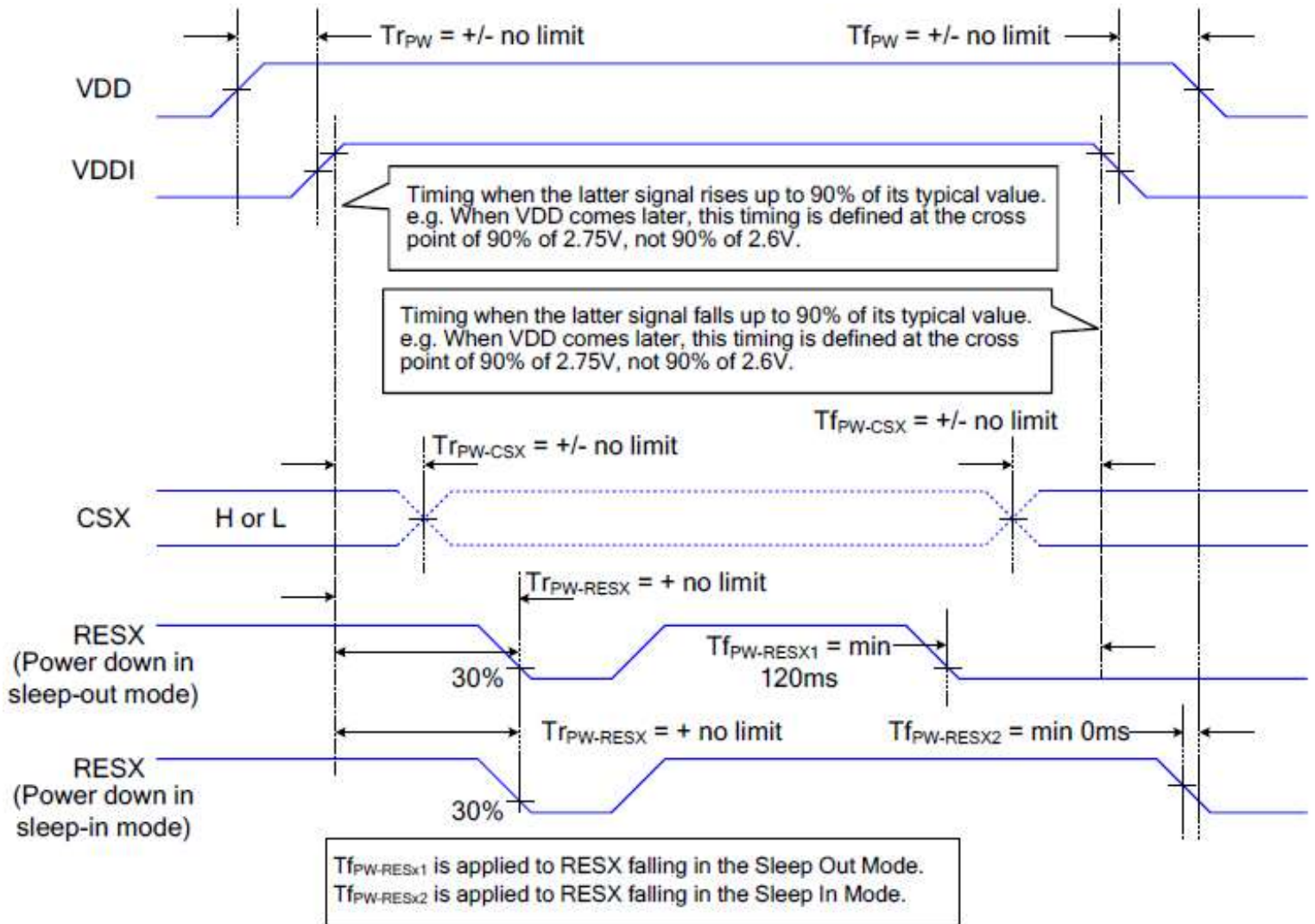| RESX Pulse	Action
Shorter than 5us	Reset Rejected
Longer than 9us	Reset
Between 5us and 9us	Reset starts

3. During the Resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out –mode. The display remains the blank state in Sleep In –mode.) and then return to Default condition for Hardware Reset.

4. Spike Rejection also applies during a valid reset pulse as shown below:

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5. *When Reset applied during Sleep In Mode.*
6. *When Reset applied during Sleep Out Mode.*
7. *It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.*

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5.5 Power On/Off Sequence

6.0 OPTICAL SPECIFICATIONS

6.1 Overview

   The test of optical specifications shall be measured in a dark room (ambient luminance ≤1lux and temperature = 25±2℃) with the equipment of Luminance meter system (Goniometer system and TOPCON BM-5) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of θ and Φ equal to 0°. We refer to θØ=0 (=θ3) as the 3 o'clock direction (the "right"), θØ=90 (= θ12) as the 12 o'clock direction ("upward"), θØ=180 (= θ9) as the 9 o'clock direction ("left") and θØ=270(= θ6) as the 6 o'clock direction ("bottom"). While scanning θ and/or Ø, the center of the measuring spot on the display surface shall stay fixed.

6.2 Optical Specifications

Item	Symbol	Condition	Min	Typ.	Max	Unit	Note
Viewing Angle	θL	Cr≥10	80	85	-	deg	Note 1
	θ$_R$		80	85	-		
	ψ$_T$		80	85	-		
	ψ$_B$		80	85	-		
Contrast Ratio	Cr	θ=0° FF=0°	1000	1500	-	-	Note 2
Response Time	Tr+Tf		--	30	40	ms	Note 3
Color Coordinate of CIE1931	Wx	θ=0°	0.042	0.272	0.302	-	Note 4
	Wy		0.255	0.285	0.315		
	Rx		0.590	0.620	0.650		
	Ry		0.294	0.324	0.354		
	Gx		0.271	0.301	0.331		
	Gy		0.537	0.567	0.597		
	Bx		0.117	0.147	0.177		
	By		0.033	0.063	0.093		
Uniformity	U		80	--	--	%	Note 5
Color Gamut			60	65	--	%	
Luminance	L		300	350	--	cd/m²	Note 6

Note 1:**The definition of Viewing Angle**
Refer to the graph below marked by θ and Φ.
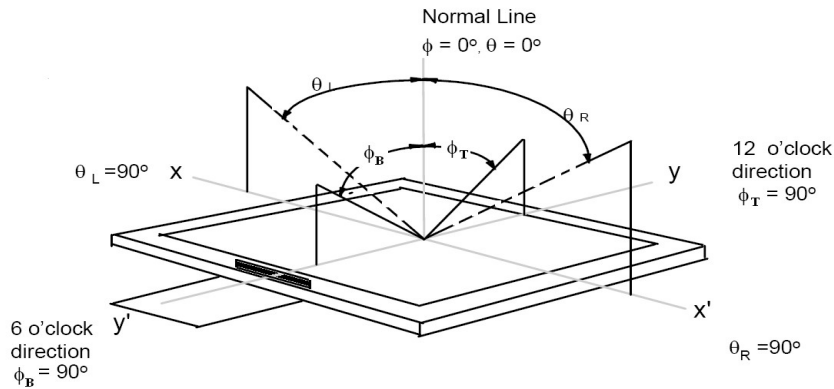
Note2:**ThedefinitionofContrastRatio**

$$Contrast\ Ratio(CR)= \frac{Luminance\ When\ LCD\ is\ at\ "White"\ state}{Luminance\ When\ LCD\ is\ at\ "Black"\ state}$$

(Contrast Ratio is measured in optimum common electrode voltage)

Note3:**DefinitionofResponse time.**(Test LCD using RD80S or similar equipments):
 The output sign also photo detector are measured when the input sign also are changed from "black" to "white" (Voltage falling time)and from "white" to "black" (Voltage rising time), respectively . The response time is defined as the time interval between the 10% and 90% of amplitudes . Refer to fi gures below.

Note 4: Color Coordinates of CIE 1931
The test condition is at ILED=20mA and measured on the surface of LCD module at 25℃.
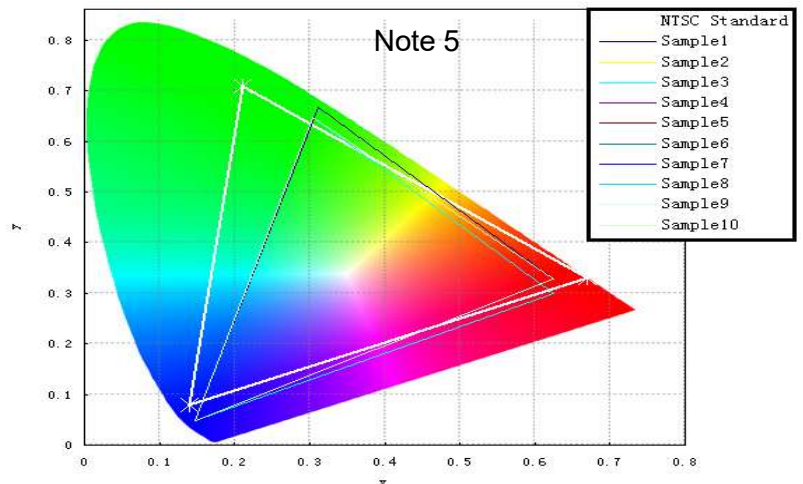Measurement equipment:CS2000 or similar equipments
The Color Coordinate (CIE 1931) is the measurement of the center of the display shown in below figure.

Note 5: Definition of Color of CIE Coordinate and NTSC Ratio.

$$S= \frac{area\ of\ RGB\ triangle}{area\ of\ NTSC\ triangle}\times 100\%$$

Note 3

Note 5
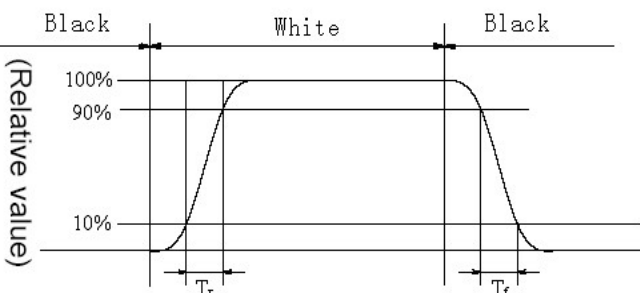
7.0 RELIABLITY TEST

The Reliability test items and its conditions are shown in below.

No	Test Items	Conditions	Testing standard
1	High temperature storage Test	Ta=+80℃, 240 hours	IEC60068-2-1:2007 GB2423.2-2008
2	Low temperature storage Test	Ta=-30℃, 240 hours	IEC60068-2-1:2007 GB2423.1-2008
3	High temperature operation Test	Ta=+70℃, 240 hours	IEC60068-2-1:2007 GB2423.2-2008
4	Low temperature operation Test	Ta=-20℃, 240 hours	IEC60068-2-1:2007 GB2423.1-2008
5	High temperature & humidity (storage Test)	Ta=+60℃, 90%RH max, 240 hours	IEC60068-2-78:2001 GB/T2423.3-2006
6	Thermal shock Test	-30℃ 30min~80℃ 30min, Change time:5min 20cycle	Start with cold temperature End with high temperature IEC60068-2-14:1984,GB2423.22-2002
7	Vibration Test	Frequency range:10Hz-55Hz Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z (6 hours for total)	IEC60068-2-6 GB/T17626.2
8	Mechanical shock	Half Sine Wave 100G 6ms,+X,+Y,+Z 3times for each direction	IEC60068-2-27 GB/T2423.5
9	Dropping Test	Height: 60 cm, 1 corner, 3 edges, 6 surfaces	IEC60068-2-32:1990 GB/T2423.8-1995
10	ESD Test	C=150pF, R=330 Ω, 5 points/panel Air:±8KV, 5 times; Contact: ±4KV, 5times; (Environment:15℃~35℃, 30%~60%RH,86Kpa~106Kpa)	IEC61000-4-2:2001 GB/T17626.2-2006 Class C

Notes:
1、Maximum acceleration 20g, 1g=9.8m/s²
2、Maximum amplitude 5mm
3、Maximum acceleration =0.002 x F² (frequency Hz) x D (amplitude p-pmm)

- ## 8.0 Precautions
- Please pay attention to the followings when you use this TFT LCD Panel.
- ## 8.1 Mounting Precautions
- (1) Use fingerstalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.
- (2) You must mount a module using specified mounting holes (Details refer to the drawings).
- (3) Please make sure to avoid external forces applied to the Source PCB or FPC and D-IC during the process of handling or assembling. If not, It causes panel damage or malfunction.
- (4) Note that polarizers are very fragile and could be easily damaged. Do not touch, push or rub the exposed polarizers with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment.
- (5) Do not pull or fold the source D-IC which connect the source PCB or FPC and the panel.
- Do not pull or fold the LED wire.
- (6) After removing the protective film, when the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with alcohol or purified water.
- Do not strong polar solvent because they cause chemical damage to the polarizer.
- (7) Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading.
- (8) Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.
- (9) Since the LCD is made of glass, do not apply strong mechanical impact or static load onto it. Handling with care since shock, vibration, and careless handling may seriously affect the product. If it f alls from a high place or receives a strong shock, the glass may be broken.
- (10) Do not disassemble the module.
- (11) To determine the optimum mounting angle, refer to the viewing angle range in the specification for each model.
- (12) If the customer's set presses the main parts of the LCD, the LCD may show the abnormal display. But this phenomenon does not mean the malfunction of the LCD and should be pressed by the way of mutual agreement.
- (13)Do not drop water or any chemicals onto the LCD's surface.

8.2 Operating Precautions

- (1) Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.
- (2) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimized the interference.
- (3) The electrochemical reaction caused by DC voltage will lead to LCD degradation, so DC drive should be avoided.
- (4) The LCD modules use C-MOS LSI drivers, so customers are recommended that any unused input terminal would be connected to Vdd or Vss, do not input any signals before power is turn on, and ground you body, work/assembly area, assembly equipments to protect against static electricity.
- (5) Do not exceed the absolute maximum rating value. (supply voltage variation, input voltage variation, variation in part contents and environmental temperature, and so on) Otherwise the Module may be damaged.
- (6) Design the length of cable to connect between the connector for back-light and the converter as short as possible and the shorter cable shall be connected directly.
The longer cable between that of back-light and that of converter may cause the luminance of LED to lower and need a higher startup voltage(Vs).
- (7) Connectors are precise devices for connecting PCB and transmitting electrical signals. Operators should insert and unplug MDL in parallel when assembling MDL.
- (8) Do not connect or disconnect the cable to/ from the module at the "Power On" condition.
- (9) When the module is operating, do not lose CLK, ENAB signals. If any one these signals is lost, the LCD panel would be damaged.
- (10) Obey the supply voltage sequence. If wrong sequence is applied, the module would be damaged.
- (11) Do not re-adjust variable resistor or switch etc.
- (12) For the Q/Single/OC Product, If the LED designed side view, LED bar should be putted in the L ong/short side；Otherwise, its reliability and function may not be guaranteed.

注:
①(1)涉及到Pol相关条目适用于OC/MDL出货产品,
②(6)(7)涉及到connector相关适用于OC/MDL出货产品
③ (12) 涉及到客户进行BLU设计，LED Bar位置需要避开GOA位置；

8.3 Electrostatic Discharge Control

- (1) Since a module is composed of electronic circuits, it is not strong to electrostatic discharge. Make certain that treatment persons are connected to ground through wrist band etc. And don't touch interface pin directly. Keep products as far away from static electricity as possible.
- (2) Avoid the use work clothing made of synthetic fibers. We recommend cotton clothing or other conductivity-treated fibers.

8.4 Precautions for Strong Light Exposure

It is not allowed to store or run directly in strong light or in high temperature and humidity for a long time; Strong light exposure causes degradation of polarizer and color filter.

8.5 Storage Precautions

When storing modules as spares for a long time, the following precautions are necessary.

•(1) The polarizer surface should not come in contact with any other object.
   It is recommended that they be stored in the container in which they were shipped.
   Temperature : 5 ~ 40 ℃

•(2) Humidity : 35 ~ 75 %RH

•(3) Period : 6 months

•(4) Control of ventilation and temperature is necessary.

•(5) Please make sure to protect the product from strong light exposure, water or moisture.
   Be careful for condensation.

•(6) Store in a polyethylene bag with sealed so as not to enter fresh air outside in it.

•(7)Do not store the LCD near organic solvents or corrosive gasses.

•(8) Please keep the Modules/OC/FOG at a circumstance shown below Fig.

No Baking	50℃, 10%, 24hr	50℃, 10%, 48hr
2 month	3 month	6 month
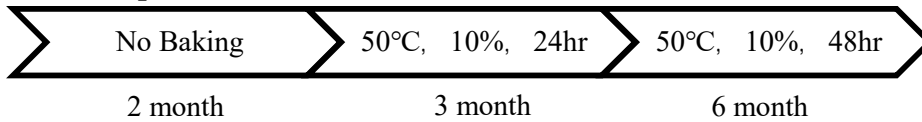
8.6 Precautions for Protection Film

• (1) Remove the protective film slowly, keeping the removing direction approximate
30-degree not vertical from panel surface, If possible, under ESD control device like ion blower, and the humidity of working room should be kept over 50%RH to reduce the risk of static charge.

• (2) In handling the LCD, wear non-charged material gloves. And the conducting wrist to the earth and the conducting shoes to the earth are necessary.

8.7 Appropriate Condition for Display

•(1) Normal operating condition
   - Temperature: 0 ~ 40℃
   - Operating Ambient Humidity : 10 ~ 90 %
   - Display pattern: dynamic pattern (Real display)
   - Suitable operating time: under 12 hours a day.

•(2) Special operating condition
If the product will be used in extreme conditions such as high temperature, humidity, display patterns or 7*24hrs operation time etc.., It is strongly recommended to contact us for Application engineering advice. Otherwise, its reliability and function may not be guaranteed.

•(3)Black image or moving image is strongly recommended as a screen save.

- (4) Lifetime in this spec. is guaranteed only when commercial display is used according to operating usages.

- (5) Please contact us in advance when you display the same pattern for a long time.

- (6) If the Module keeps displaying the same pattern for a long period of time, the image may be "sticked" or "turn off" to the screen. To avoid image sticking, it is recommended to use a screen saver.

- (7) Do not exceed the absolute maximum rating value. (supply voltage variation, input voltage variation, variation in part contents and environmental temperature, and so on) Otherwise the Module may be damaged.

- (8) Dew drop atmosphere should be avoided.

- (9) The storage room should be equipped with a good ventilation facility and avoid to expose to corrosive gas , which has a temperature controlling system.

- (10) The LCD should be avoided to expose to corrosive gas for long time, ,the LCD may be affected by the gas as SO2 ,H2S etc.

- (11) When expose to drastic fluctuation of temperature (hot to cold or cold to hot) ,the LCD may be affected; Specifically, drastic temperature fluctuation from cold to hot ,produces dew on the LCD's surface which may affect the operation of the polarizer and the LCD.

- (12) Response time will be extremely delayed at lower temperature than the operating temperature range and on the other hand at higher temperature LCD may turn black at temperature above its operational range. However those phenomena do not mean malfunction or out of order with the LCD. The LCD will revert to normal operation once the temperature returns to the recommended temperature range for normal operation

8.8 Others
A. LC Leak

- If the liquid crystal material leaks from the panel, it is recommended to wash the LC with acetone or ethanol and then burn it.

- In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.

- If LC in mouth, mouth need to be washed, drink plenty of water to induce vomiting and follow medical advice.

- If LC touch eyes, eyes need to be washed with running water at least 15 minutes.

B. Rework

- When returning the module for repair or etc., Please pack the module not to be broken. We recommend to use the original shipping packages.

C. In order to prevent potential problems, flicker should be adjusted by optimizing the Vcom value in customer LCM Line (适用于Q/Single/OC出货产品)

9.0 PACKING INFORMATION

LCM MODEL	LCM Qty. in the Box	Carton Size(mm)	LCM Qty. in the Pallet
TBD			

PE BAG包折到Panel面   PE BAG: FHXXXXXXXXX001A

2片叠放，Panel对立

EPE: FN070AM01-ZZ-V5.0

BOX: FN070AM01-ZX-V1.0

FN070AM01-MT
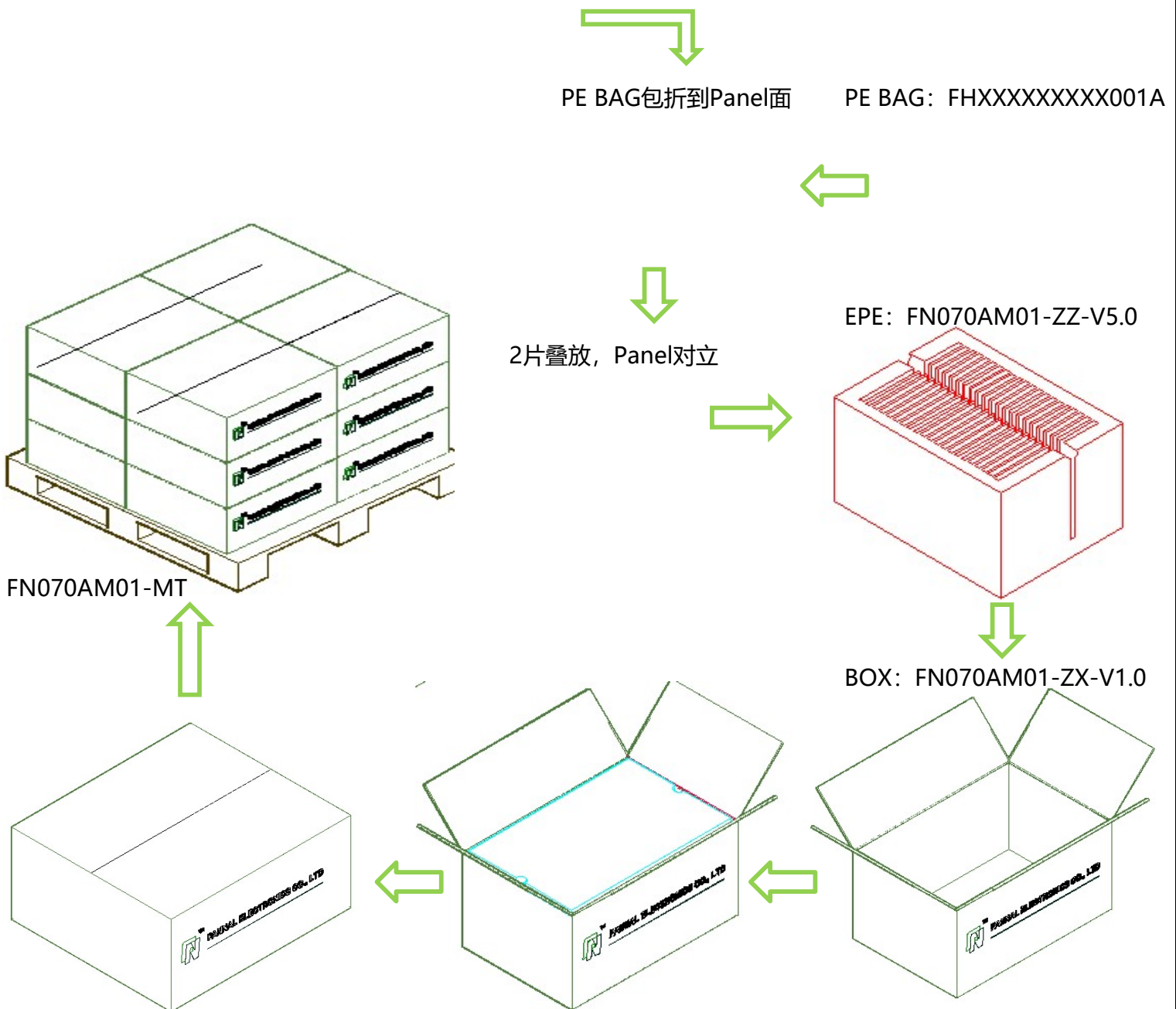
10.0 VISUAL INSPECTION CRITERIA FOR ALL CUSTMERS

10.1 Sampling Method

Unless otherwise agreed upon in writing, the sampling insepction shall be applied to the Customers incoming inspection.

10.1.1 Lot size：1 pallet per same model
10.1.2 Sampling type：Random sampling
10.1.3 Inspection level：II
10.1.4 Sampling table：MIL-STD-105E

30CM~50CM

TFT-LCM MODULE

10.2 Inspection Environment

10.2.1 Ambient conditions
a. Ambient Temperature:25±3℃
b. Relative Humidity:65±20%RH
c. Ambient Illumination:300-700LUX(Normal:500LUX)

10.2.2 Viewing Distance
The distance between the LCM and the inspector's eyes shall be at least 30cm-50cm

10.2.3 Viewing Angle
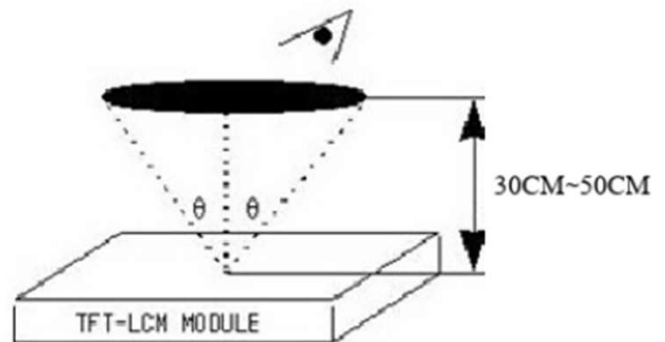performing in front of the panel
[Vertical]：±25degree
[Horizontal]：±40degree

10.2.4 Inspection Area:
Display Area(Active Area)

10.3 Definitions

10.3.1 Dark / Bright Spots
Points on display which appear dark/bright and usually result form the contamination.
These defects do not vary in size or intensity(contrast)when contrast is varied.

10.3.2 Dark / Bright Lines
Lines on display which appear dark/bright and usually result from the contamination.

10.3.3 Polarizer Scratch
Lines on display which are seen across a darker background and do not vary in size.

10.3.4 Polarizer Dent
White spots on display which appear againse a darker backgound and do not vary in size.

103.5 Bright Dot Defects
Dots(sub-pixels)on display which appear bright in the display area and visible through the 5%ND filter at Black Pattern.

10.3.6 Dark Dot Defects

Dots(sub-pixels)on display which appear dark in the display area at R.G.B Color Pattern.

10.3.7 Line Defects

All line defects on display which appear brigh/dark such as vertical,horizontal,or cross lines.

10.3.8 Mura

Mura on display which appears darker/brighter against background birghtness on parts of display area.

10.3.9 BM Defects

Bright(white)Points on display which are off BM(Black Matrix).

10.3.10 Visual Inspection

Inspection for LCM when the unit turns on.

10.3.11 Appearance Inspection

External inspection for LCM when the unit turns off.

10.3.12 Other

Defects which cannot be classified into the above defect definitions.

Note 1: Bright& Dark dots are not smaller than a sub-pixel(Dots smaller than a sub-pixel are not counted as defect dots)

10.4 Inspectin Criteria

Refer to 《TFT LCM general inspection standard》

10.5 Verification

The supplier can verify the defective LCMs to segregate the responsibilities at customer's facility or can request the Customer to ship the defective LCMs to assigned place for verification

This verificatin result shall be agreed mutually buy the Customer and Supplier. This result can be corrected/changed after detail failure analysis at Supplier's facilities.

10.6 Supplier Induced Defects

All of the Supplier induced defective LCMs shall be returned to the Supplier for repair or replacement.

Bfore return the defective LCMs, the Customer needs Supplier's confirmatin with RMA Number.

All of the returned LCMs shall be returned to the Customer within agreed time period.

10.7 Customer Induced Defects

The Customer can return the custmoer induced defective LCMs to the Supplier for repair.
The repair cost for Customer induced defective LCMs shall be agreed with both parties, Customer and Supplier.

10.8 Warranty Period

In-warranty period is Eighteen(18)Months from manufacturing month of LCM
Note：
a. Eighteen months are composed of twelfth months in-warranty period and sixth months distribution period
b. The manufacturing Month is on the LCMs as Supplier's serial No.

10.9 Repair Warranty

Repair warranty is Twelve(12)Months from repaired month for repaired LCMs
Note：a. The Label for repair will be added after repairing.

10.10 Warranty avoidance

The warranty will be avoided in cases of below:
a. When the warranty period is expired.
b. The Customer induced defective LCMs.
c. When the LCMs were repaired by 3rd party without Suppolier's approval.
d.When the LCMs were treated like Disassemble and Rework by the Customer and/or Customer's representatives without Supplier's approval.

10.11 Others

If any problems arise with the LCMs supplied by supplier, the customer and supplier will coopeate and make ettorts to solve it with mutual contidence and respect