PRODUCT SPECIFICATIONS

Module No.: NTD-10.1S1024600R100B

TFT(Thin-Film-Transistor) Color Liquid Crystal Display Module

General Specification

- 10.1inch Diagonal
- 1024xRGBx600 resolution
- 24bit RGB interface
- LED Blacklight (350cd/m^2)
- 16.7 M colors
- Wide Viewing Angles
- RoHS Compliant

For Customer's Acceptance:

Approved By	Comment

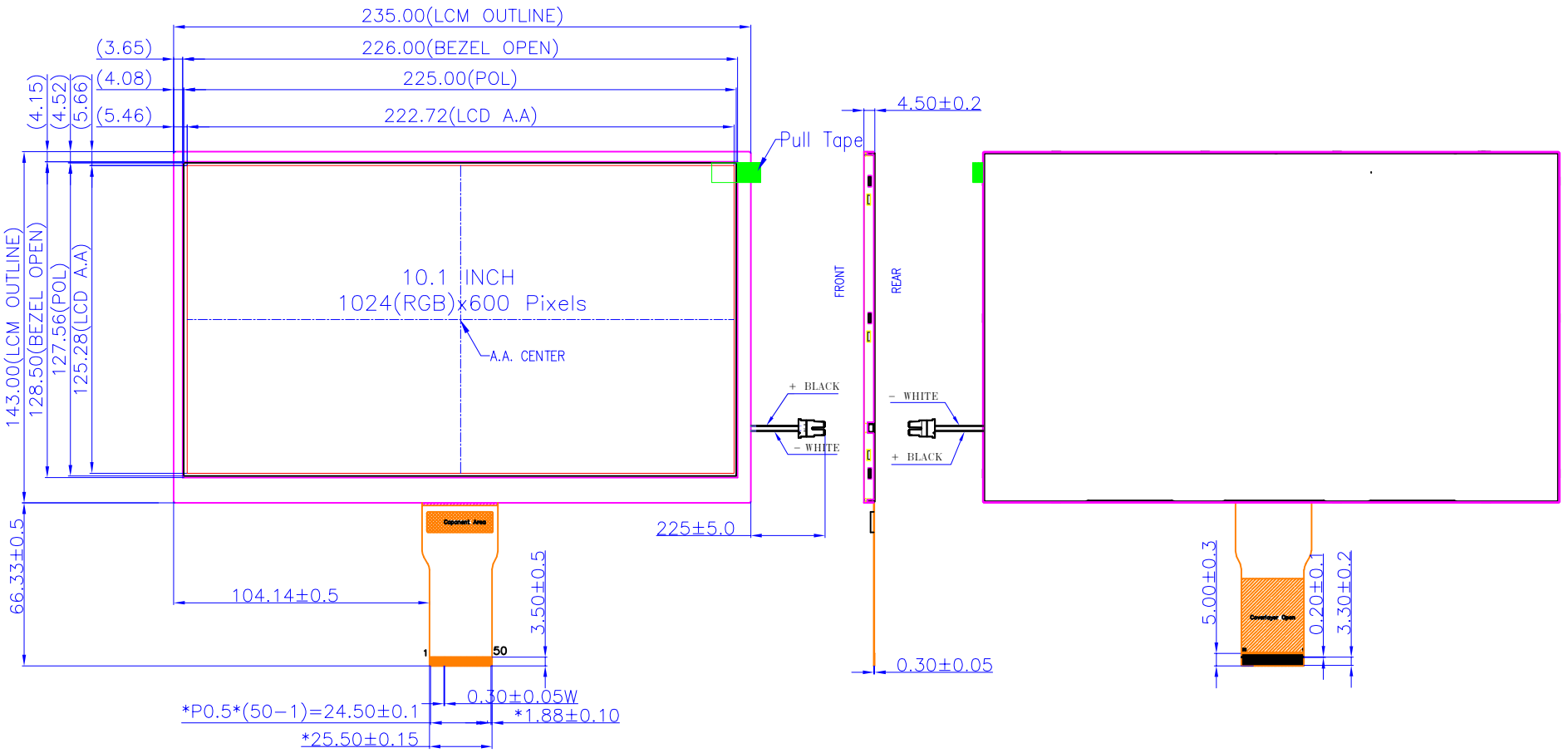
From: NewTrend Display Technology Co., Ltd.

Document Revision History

Revision	Date	Description	Changed by
0		Initial Release	

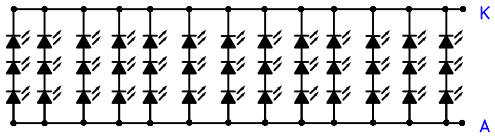
Outline Drawing

SYMBOL	REVISION	DATE
V0	First	



TFT Interface:

PIN	ASSIGNMENT
1	LEDA(NC)
2	LEDA(NC)
3	LEDK(NC)
4	LEDK(NC)
5	GND
6	VCOM(NC)
7	VDD
8	MODE
9	DE
10	VS
11	HS
12~19	B7~B0
20~27	G7~G0
28~35	R7~R0
36	GND
37	DCLK
38	GND
39	LR
40	UD
41	VGH
42	VGL
43	AVDD
44	RESET
45	NC
46	VCOM(NC)
47	DITHB
48	GND
49	NC
50	NC



NOTES:

1. DISPLAY TYPE: 10.1″ TFT,Normally Black
2. VIEWING DIRECTION: U/L/D/R 85/85/85/85
3. Top: −20°C~+70°C, Tst: −30°C~+80°C
4. TFT Interface :24-bit RGB Interace, VDD=3.3±0.3V
5. LCM Luminance:LED/350cd/m² (TYP) VLED:260mA,9.6V(TYP)
6. RoHS

UNLESS OTHERWISE SPECIFIED Unit:mm THIRD ANGLE PROJECTION:		**NewTrend Display Technology**	
UNLESS OTHERWISE NOTED TOLERANCES :±0.2mm		DRAWING_NO. NTD-10.1S1024600R100B	
SCALE	SHEET	DRAWN BY:	APPROVED BY:
1:1	1 OF 1		

Pin Description:

Pin No.	Symbol	Function Description	Remark
1~2	LEDA	LED backlight (Anode).	
3~4	LEDK	LED backlight (Cathode).	
5	GND	Ground.	
6	VCOM	Common Voltage.	
7	VDD	Digital Power.	
8	MODE	DE/SYNC mode select. Normally pull high. H: DE mode. L: HSD/VSD mode.	
9	DE	Data enable input. Active high to enable the input data bus.	
10	VS	Vertical sync input. Negative polarity.	
11	HS	Horizontal sync input. Negative polarity.	
12~19	B7~B0	Blue Data Input	
20~27	G7~G0	Green Data Input	
28~35	R7~R0	Red Data Input	
36	GND	Ground	
37	DCLK	Clock Input	
38	GND	Ground	
39	L/R	Left or Right Display Control.	NOTE1
40	U/D	Up / Down Display Control.	NOTE1
41	VGH	Positive Power for TFT.	
42	VGL	Negative Power for TFT.	
43	AVDD	Analog Power.	
44	RESET	Global reset pin. Active low to enter reset state. Suggest to connecting with an RC reset circuit for stability. Normally pull high.(R=10KΩ, C=1μF)	
45	NC	No connection	
46	VCOM	Common Voltage.	
47	DIHTB	Dithering function enable control. (Normally pull high) DITHB="L", to enable internal dithering function. DITHB="H", to disable internal dithering function.	
48	GND	Ground.	
49~50	NC	No connection.	

【Note1】L/R：left or right setting
U/D：up or down setting

L/R	U/D	Data shifting
DVDD	GND	Left → Right，Up → Down(default)
GND	GND	Right → Left，Up → Down
DVDD	DVDD	Left → Right，Down → Up
GND	DVDD	Right → Left，Down → Up

Definition of scanning direction:

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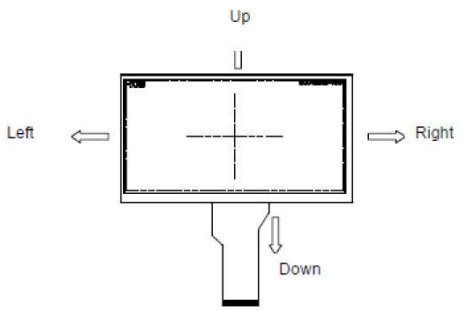


DC Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Temperature Range	Top	Absolute Max	-20	-	+70	℃
Storage Temperature Range	Tst	Absolute Max	-30	-	+80	℃
Digital Supply Voltage	V_{DD}	-	3.0	3.3	3.6	V
Analog Supply Voltage	AVDD	-	11.7	12.2	12.7	V
Gate On Voltage	VGH	-	19.0	22.0	25.0	V
Gate Off Voltage	VGL	-	-13.0	-10.0	-7.0	V
Common Voltage	VCOM		4.39	5.39	6.39	V
Input logic high voltage	V_{IH}	-	0.7*V_{DD}	-	V_{DD}	V
Input logic low voltage	V_{IL}	-	GND	-	0.3*V_{DD}	V

Note 1: The VCOM voltage is based on the actual effect of the customer motherboard

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Backlight Supply Voltage	Vf	Top=25°C If=260mA	9.0	9.6	10.5	V
Backlight Supply Current	If		-	260		mA
Backlight Lifetime	-	Top=25°C If=260mA	30000			Hrs

*Backlight lifetime is rated as Hours until half-brightness, under normal operating conditions. The LED of the backlight is driven by current drain, drive voltage is for reference only. Drive voltage must be selected to ensure backlight current drain is below MAX level stated.

Optical Characteristics

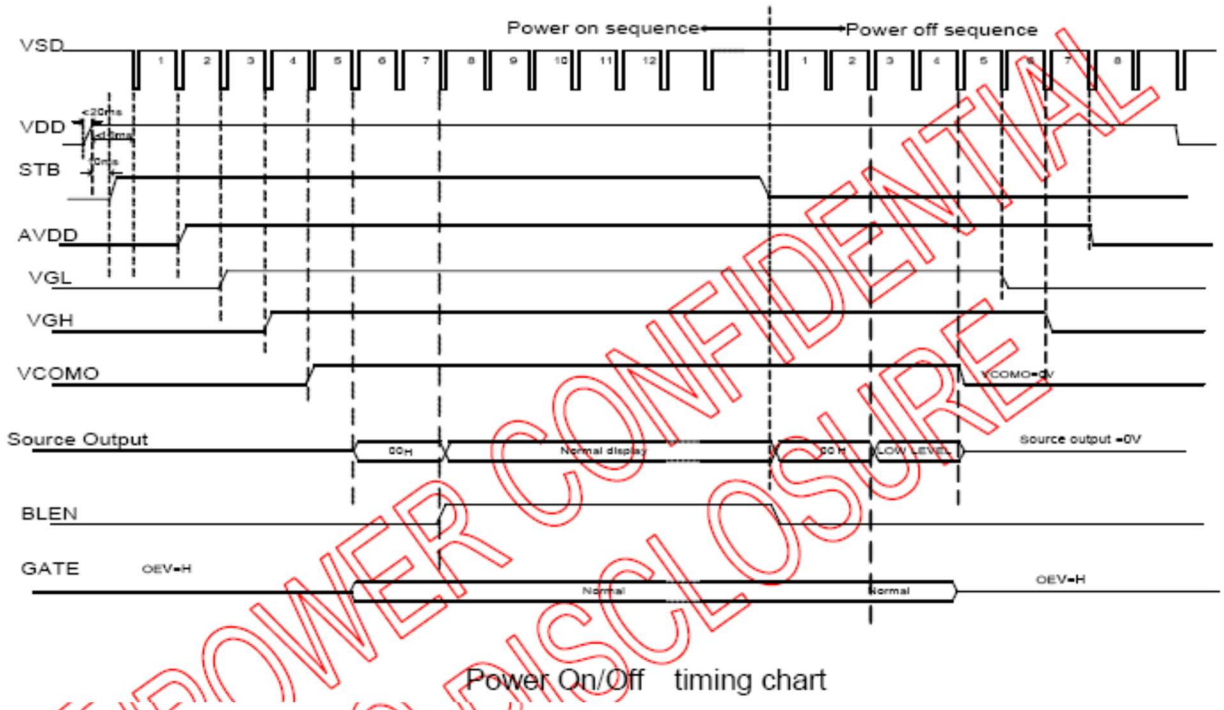
Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Viewing Angles	Top	-	CR≥10		85	-	Deg
	Bottom	-			85	-	
	Left	-			85	-	
	Right	-			85	-	
Contrast Ratio		CR	Center	600	800	-	-
Luminance		Lv		300	350		cd/m^2
Response Time		Tr+Tf		-	30	45	ms
Chromaticity	Red	X_R	-	TYP-0.05	0.601	TYP+0.05	-
		Y_R			0.328		
	Green	X_G	-		0.288		-
		Y_G			0.517		
	Blue	X_B	-		0.150		-
		Y_B			0.144		
	White	X_W	-		0.302		-
		Y_W	-		0.324		-

Note (1) Measurement Setup: The LCD module should be stabilized at given temp. 25°C for 15 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 15 minutes in a windless room.

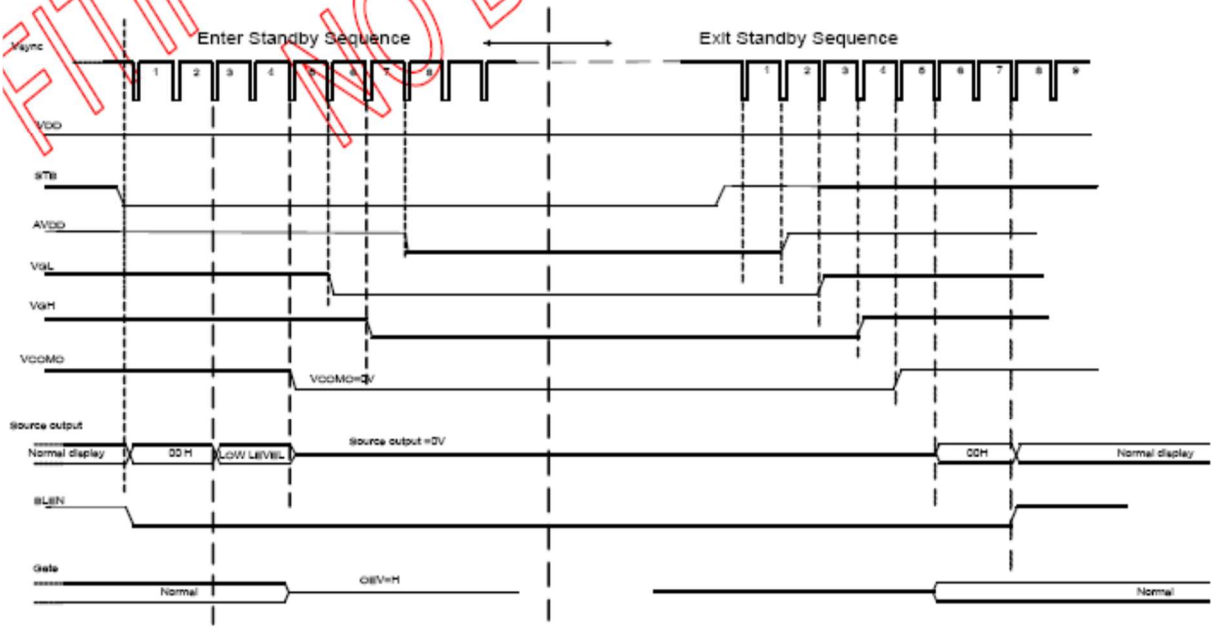
Power On/Off Sequence

In order to prevent IC from power on reset fail, the rising time (TPOR) of the digital power supply VDD should be maintained within the given specifications. Refer to “AC Characteristics” for more detail on timing.

Power on/off timing sequence



Power On/Off timing chart



Enter and Exit Standby Mode timing chart

AC Electrical Characteristics

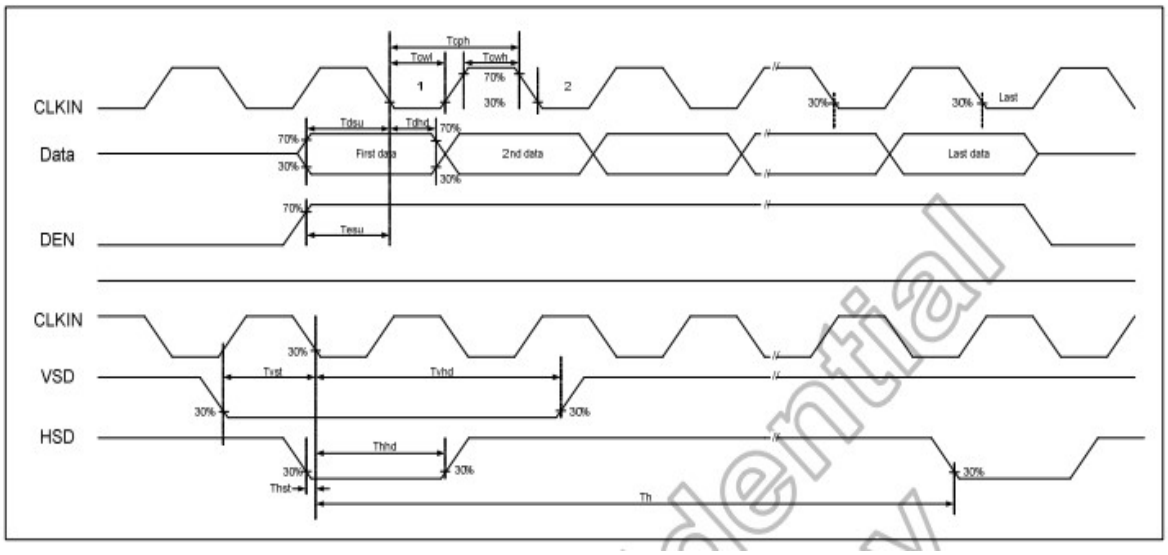
TTL mode AC electrical characteristics

(TA = -20 to 85°C, VDD = 2.3 to 3.6V, AVDD = 8 to 13.5V, GND = AGND = 0V)

TTL mode

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
VDD Power On Slew rate	TPOR	From 0V to 90% VDD	1	-	20	ms
RST pulse width	TRST	DCLK = 65MHz	50	-	-	us
DCLK cycle time	Tcph	-	14	-	-	ns
DCLK pulse duty	Tcwh	-	40	50	60	%
VSD setup time	Tvst	-	5	-	-	ns
VSD hold time	Tvhd	-	5	-	-	ns
HSD setup time	Thst	-	5	-	-	ns
HSD hold time	Thhd	-	5	-	-	ns
Data set-up time	Tdsu	D0[7:0], D1[7:0], D2[7:0] to DCLK	5	-	-	ns
Data hold time	Tdhd	D0[7:0], D1[7:0], D2[7:0] to DCLK	5	-	-	ns
DE setup time	Tesu	-	5	-	-	ns
DE hold time	Tehd	-	5	-	-	ns
Output stable time	Tsst	Dual gate	-	-	3	us

Input clock and data timing diagram



TTL mode data input format

(TA = -20 to 85°C, VDD = 2.3 to 3.6V, AVDD = 8 to 13.5V, GND = AGND = 0V)

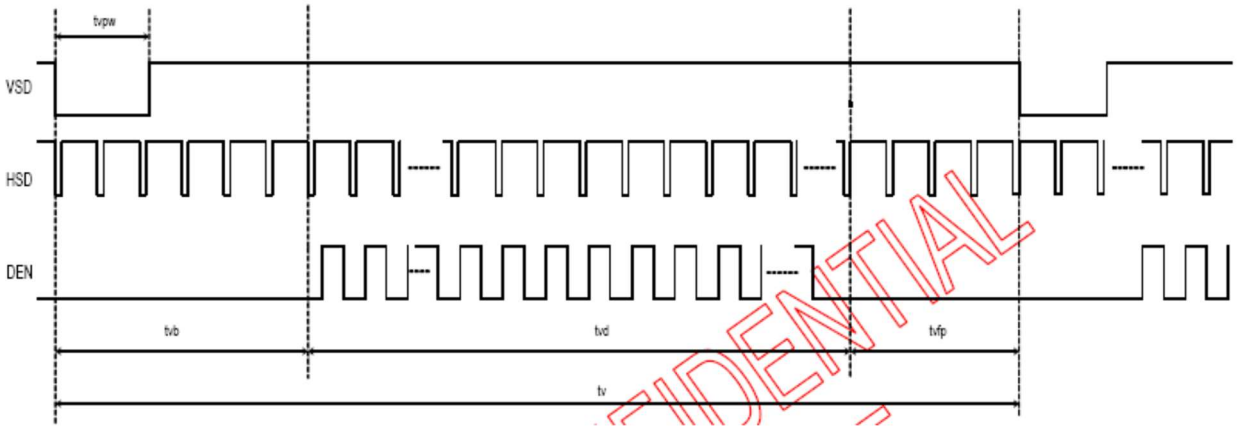
TTL mode

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
VDD Power On Slew rate	TPOR	From 0V to 90% VDD	1	-	20	ms
RST pulse width	TRST	DCLK = 65MHz	50	-	-	us
DCLK cycle time	Tcph	-	14	-	-	ns
DCLK pulse duty	Tcwh	-	40	50	60	%
VSD setup time	Tvst	-	5	-	-	ns
VSD hold time	Tvhd	-	5	-	-	ns
HSD setup time	Thst	-	5	-	-	ns
HSD hold time	Thhd	-	5	-	-	ns
Data set-up time	Tdsu	D0[7:0], D1[7:0], D2[7:0] to DCLK	5	-	-	ns
Data hold time	Tdhd	D0[7:0], D1[7:0], D2[7:0] to DCLK	5	-	-	ns
DE setup time	Tesu	-	5	-	-	ns
DE hold time	Tehd	-	5	-	-	ns
Output stable time	Tsst	Dual gate	-	-	3	us

Parallel RGB input timing table

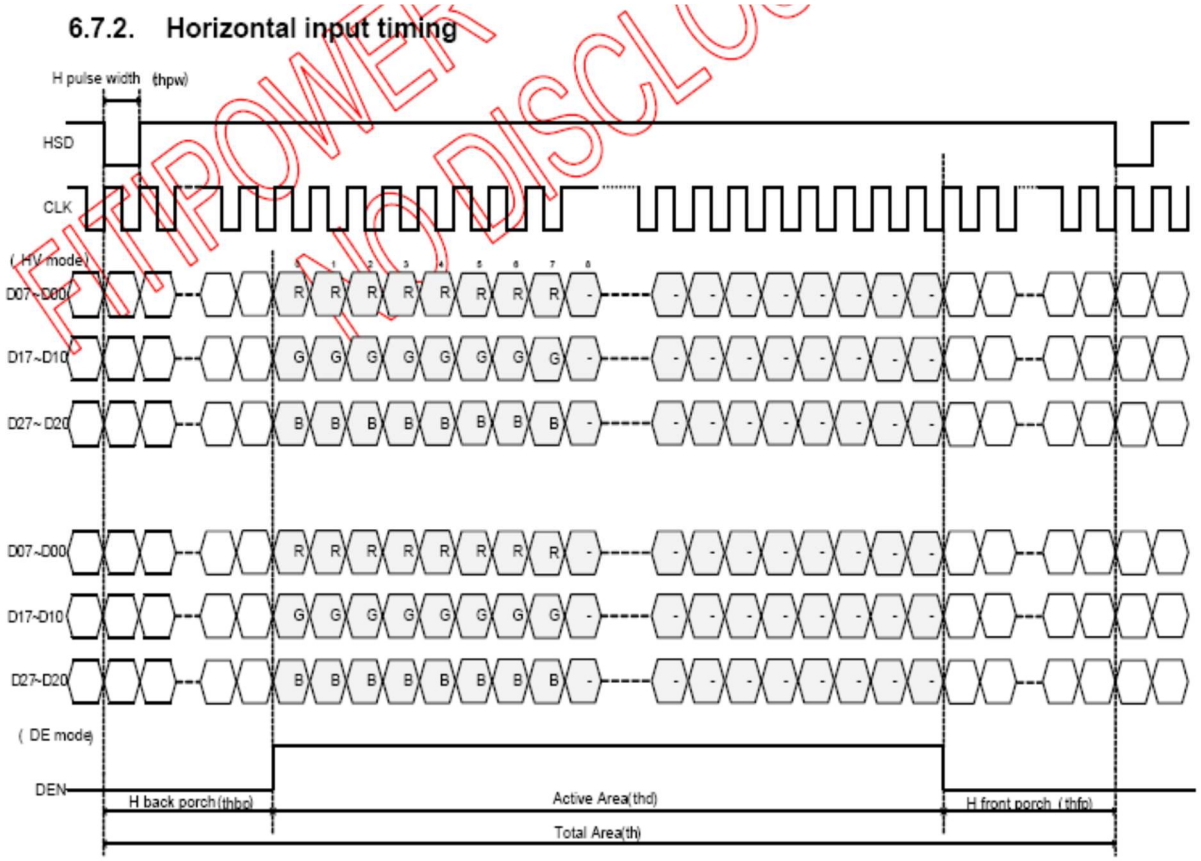
Vertical input timing

6.7.1. Vertical input timing



Horizontal input timing

6.7.2. Horizontal input timing



DE mode

DE mode					
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency @Frame rate=60hz	fclk	40.8	51.2	67.2	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		600		H
VSYNC period time	tv	610	635	800	H
VSYNC blanking	tvb+tvfp	10	35	200	H

HV mode(1)

HV mode Horizontal input timing						
Parameter		Symbol	Value			Unit
Horizontal display area		thd	1024			DCLK
DCLK frequency@ Frame rate=60hz		fclk	Min.	Typ.	Max.	
			44.9	51.2	63	Mhz
1 Horizontal Line		th	1200	1344	1400	DCLK
HSYNC pulse width	Min.	thpw	1			
	Typ.		–			
	Max.		140			
HSYNC back porch		thbp	160	160	160	
HSYNC front porch		thfp	16	160	216	

HV mode(2)

Vertical input timing					
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Vertical display area	tvd		600		H
VSYNC period time	tv	624	635	750	H
VSYNC pulse width	tvpw	1	–	20	H
VSYNC back porch	tvb	23	23	23	H
VSYNC front porch	tvfp	1	12	127	H

Reliability Test Items and Criteria

No	Test Item	Test condition	Criterion
1	High Temperature Storage	80℃±2℃ 96H Restore 4H at 25℃, Power off	1. After testing, cosmetic and electrical defects should not happen. 2. Total current consumption should not be more than twice of initial value.
2	Low Temperature Storage	-30℃±2℃ 96H Restore 4H at 25℃, Power off	
3	High Temperature Operation	70℃±2℃ 96H Restore 4H at 25℃, Power on	
4	Low Temperature Operation	-20℃±2℃ 96H Restore 4H at 25℃, Power on	
5	High Temperature/Humidity Storage	60℃±2℃ 90%RH 96H Power off	
6	Temperature Cycle	-30°C → +25℃ → 80°C → +25℃ (30mins) (5mins) (30mins) (5mins) 5 Cycle Restore 4H at 25℃, Power off	

Precautions for Use of LCD Modules

1． Handling Precautions

1.1 The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

1.2 If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.

1.3 Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

1.4 The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

1.5 If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

— Isopropyl alcohol — Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

— Water — Ketone — Aromatic solvents

1.6 Do not attempt to disassemble the LCD Module.

1.7 If the logic circuit power is off, do not apply the input signals.

1.8 To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

a. Be sure to ground the body when handling the LCD Modules.

b. Tools required for assembly, such as soldering irons, must be properly ground.

c. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

d. The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

2． Storage precautions

2.1 When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.
2.2 The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:

Temperature : 10℃ ~ 40℃

Relatively humidity: ≤60%

2.3 The LCD modules should be stored in the room without acid, alkali and harmful gas.

3． The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.