



PRODUCT SPECIFICATIONS

Module No.: NTD-10.4S1024768L150G

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

General Specification

- 10.4 inch Diagonal
- 1024xRGBx768 resolution
- 6/8 bit LVDS interface
- LED Backlight (1000cd/m²)
Built In-LED Driver
PWM Brightness Control
- 262K/16.7 M colors
- Wide Viewing Angles
- RoHS Compliant

For Customer's Acceptance:

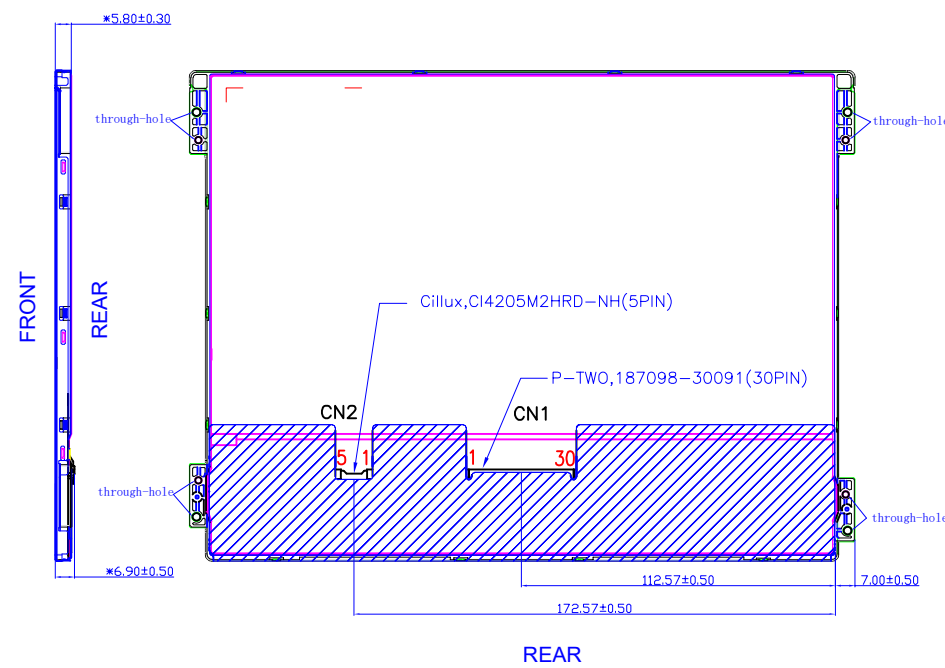
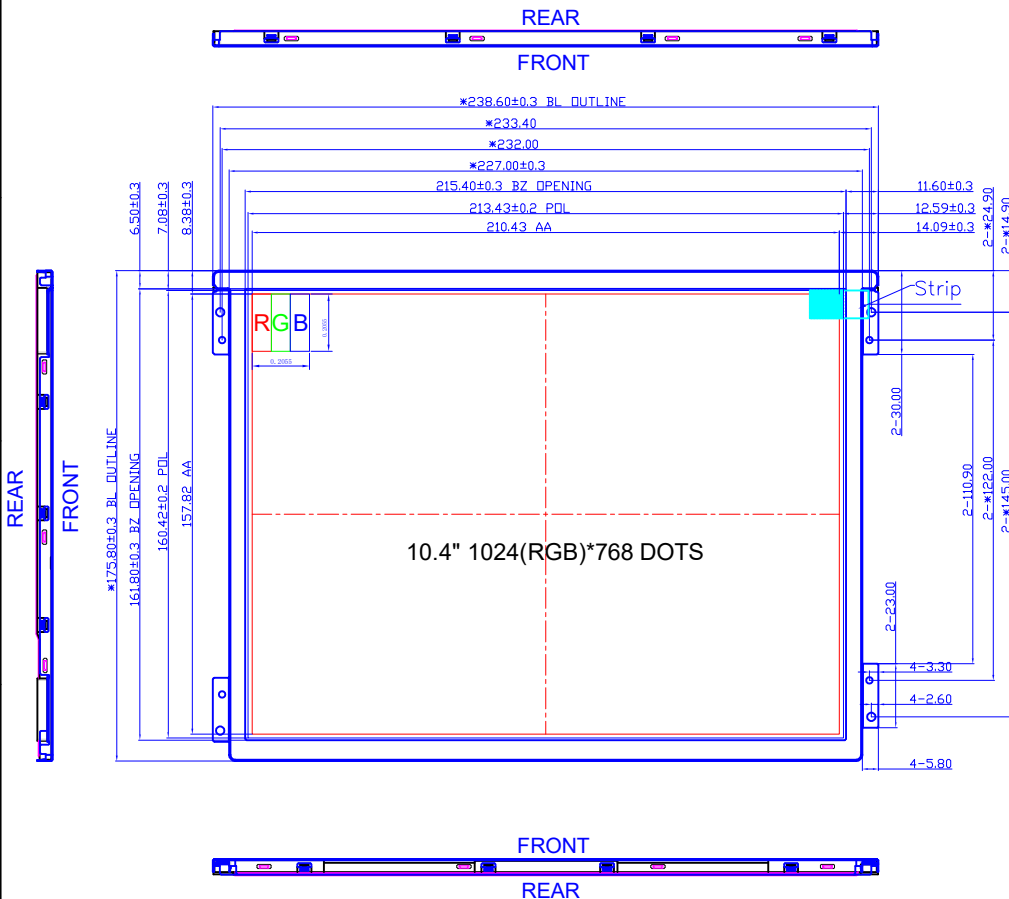
Approved By	Comment

From: NewTrend Display Technology Co., Ltd.

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Outline Drawing

SYMBOL	REVISION	DATE
V0	First	

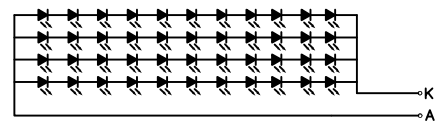


CN1: TFT Interface

PIN	SYMBOL
1	NC
2	GND
3	RIN3+
4	RIN3-
5	GND
6	CLK+
7	CLK-
8	GND
9	RIN2+
10	RIN2-
11	GND
12	RIN1+
13	RIN1-
14	GND
15	RINO+
16	RINO-
17	GND
18	NC
19	GND
20	SEL6/8
21	NC
22	NC
23	NC
24	REVERSE
25	GND
26	GND
27	GND
28	VDD
29	VDD
30	VDD

CN2: BL Interface

PIN	SYMBOL
1	LED_VCCS
2	LED_VCCS
3	GND
4	LED_PWM
5	LED_EN



LED_VCCS=12.0V;li<0.8A,0.52A Typ(duty=100%);

NOTES:

1. DISPLAY TYPE: 10.4" IPS TFT,NORMALLY BLACK
2. VIEWING DIRECTION : U/L/D/R 80/80/80/80
3. TFT Interface :6/8-bit LVDS, VDD=3.3V±0.3V.
4. Top: -30°C~+80°C, Tst: -30°C~+80°C
5. LCM Luminance:LED/1000CD/m² (TYP)
6. ROHS

UNLESS OTHERWISE SPECIFIED Unit:mm THIRD ANGLE PROJECTION:		NewTrend Display Technology	
UNLESS OTHERWISE NOTED TOLERANCES :±0.2mm			
SCALE	SHEET	DRAWN BY:	APPROVED BY:
1:1	1 OF 1		

Pin Description:

TFT Display:

Pin No.	Symbol	Function Description	Remark
1	NC	Reserved as BIST function for test	Note1
2	GND	Ground	
3	RIN 3+	+LVDS differential data input	
4	RIN 3-	-LVDS differential data input	
5	GND	Ground	
6	CLK+	+LVDS differential data input	
7	CLK-	-LVDS differential data input	
8	GND	Ground	
9	RIN 2+	+LVDS differential data input	
10	RIN 2-	-LVDS differential data input	
11	GND	Ground	
12	RIN 1+	+LVDS differential data input	
13	RIN 1-	-LVDS differential data input	
14	GND	Ground	
15	RIN0 +	+LVDS differential data input	
16	RIN0 -	-LVDS differential data input	
17	GND	Ground	
18	NC	No connection	
19	GND	Ground	
20	SEL6/8	Selection for 6 bits/8bit LVDS data input Low or NC : 8 bit input mode High : 6 bit input mode	Note2
21	NC	Reversed as EE_WP for OTP function	Note3
22	NC	Reversed as EE_SDA for OTP function	Note3
23	NC	Reversed as EE_SCL for OTP function	Note3
24	REVERSE	Reverse panel function (Display rotation)	Note4
25-27	GND	Ground	
28-30	VDD	Supply voltage for LCD (+3.3V)	

Note:

1. Pin1 is reversed as BIST function for test, don't connect signal to this pin, keep floating.
2. SEL6/8 is used for selecting 6bit/8bit LVDS data input, L or NC: 8bit; High:6bit.
3. Pin21,22,23 are used as SPI interface for OTP function, don't connect any signal to these pin, and don't short them, keep floating.
4. Reverse pin is used for selecting scanning direction.

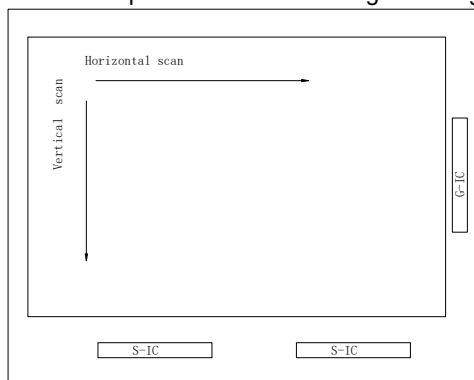


Fig. 1 Normal scan (Pin24, Reverse = Low or NC)

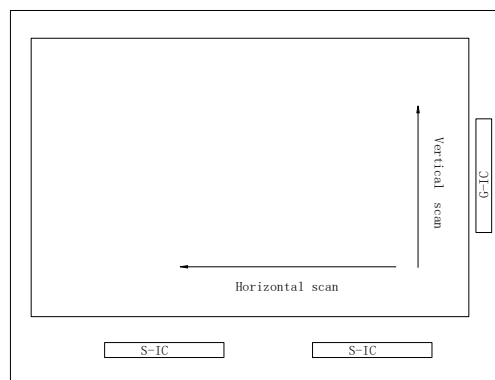


Fig. 2 Reverse scan (Pin24, Reverse = High)

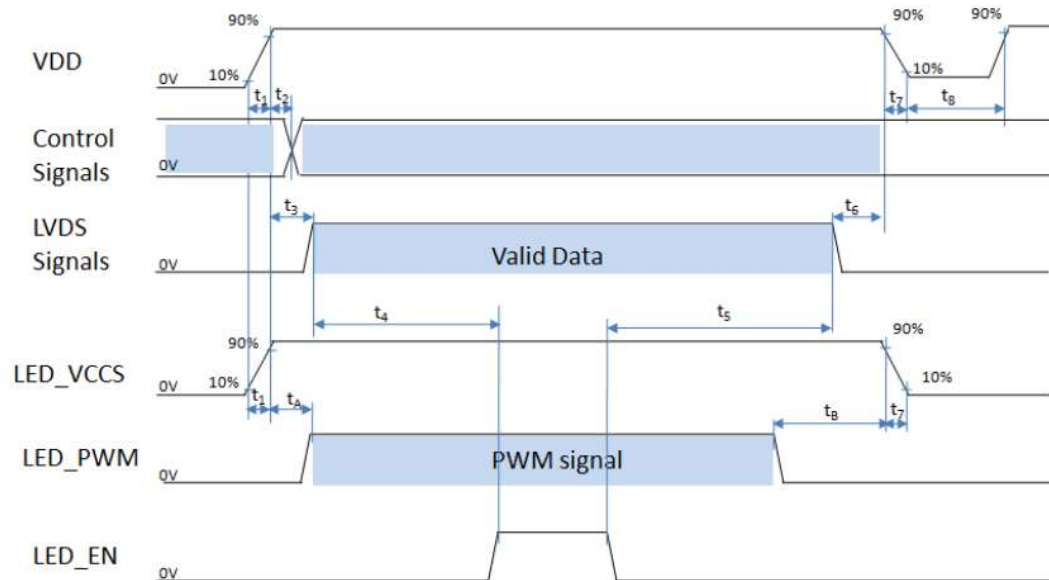
Backlight:

PIN	PIN NAME	DESCRIPTION	Remark
1	LED_VCCS	Supply Voltage for Backlight Driver (+12V TYP)	
2	LED_VCCS	Supply Voltage for Backlight Driver (+12V TYP)	
3	GND	Ground	
4	LED_PWM	Backlight PWM signal input	
5	LED_EN	Backlight enable H: Backlight on, L: Backlight off	

Power Supply For LCM

The power sequence specifications are shown as the following table and diagram.

Symbol	Value		Unit
	Min.	Max.	
t_1	1	20	ms
t_2	1	5	ms
t_3	10	50	ms
t_4	200	500	ms
t_5	200	500	ms
t_6	50	200	ms
t_7	0	20	ms
t_8	500	-	ms
t_A	0	50	ms
t_B	0	50	ms



Note 1: Please don't plug the interface cable of on when system is turned on.

Note 2: Please avoid floating state of the interface signal during signal invalid period.

Note 3: It is recommended that the backlight power must be turned on after the power supply for LCD and the interface signal is valid.

Note 4: Control signals include SEL6/8 & Reverse.

DC Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Temperature Range	Top	Absolute Max	-30	-	+80	°C
Storage Temperature Range	T _{ST}	Absolute Max	-30	-	+80	°C
Digital Supply Voltage	V _{DD}	-	3.0	3.3	3.6	V
Supply Current	I _{DD}	V _{DD} =3.3V @ frame 60 Hz, White pattern	-	385	424	mA
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 : Input signal: sel6/8 & Reverse

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Backlight Supply Voltage	LED_VCCS	Top=25°C	11.0	12.0	13.0	
Backlight Supply Current	I _{LED}	LED_VCCS =12V DUTY=100%	-	520	800	mA
Backlight Enable Voltage LEVEL	BL_ON		3.0		5	V
	BL_OFF		0		0.3	
Backlight PWM Voltage LEVEL	PWM HIGH LEVEL	-	3.0		5	V
	PWM LOW LEVEL		0		0.3	
PWM Frequency Range	LED_PWM		1000		20000	HZ
Backlight Lifetime	-	Top=25°C	50000			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. LED_PWM DUTY>10%

Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	
Operating Viewing Angles	Top	-	CR≥10	80	-	-	Deg
	Bottom	-		80	-	-	
	Left	-		80	-	-	
	Right	-		80	-	-	
Contrast Ratio	CR	Center	700	1000	-	-	
Luminance	L _v	PWM DUTY=100%	800	1000		cd/m ²	
Response Time	Rise	T _r	Top=25°C	-	14	19	ms
	Fall	T _f		-	11	16	ms
Chromaticity	Red	X _R	-	TYP- 0.05	0.651	TYP+0.05	-
		Y _R			0.345		
	Green	X _G	-		0.315		
		Y _G			0.611		
	Blue	X _B	-		0.145		
		Y _B			0.093		
	White	X _w	-		0.326		
		Y _w	-		0.383		

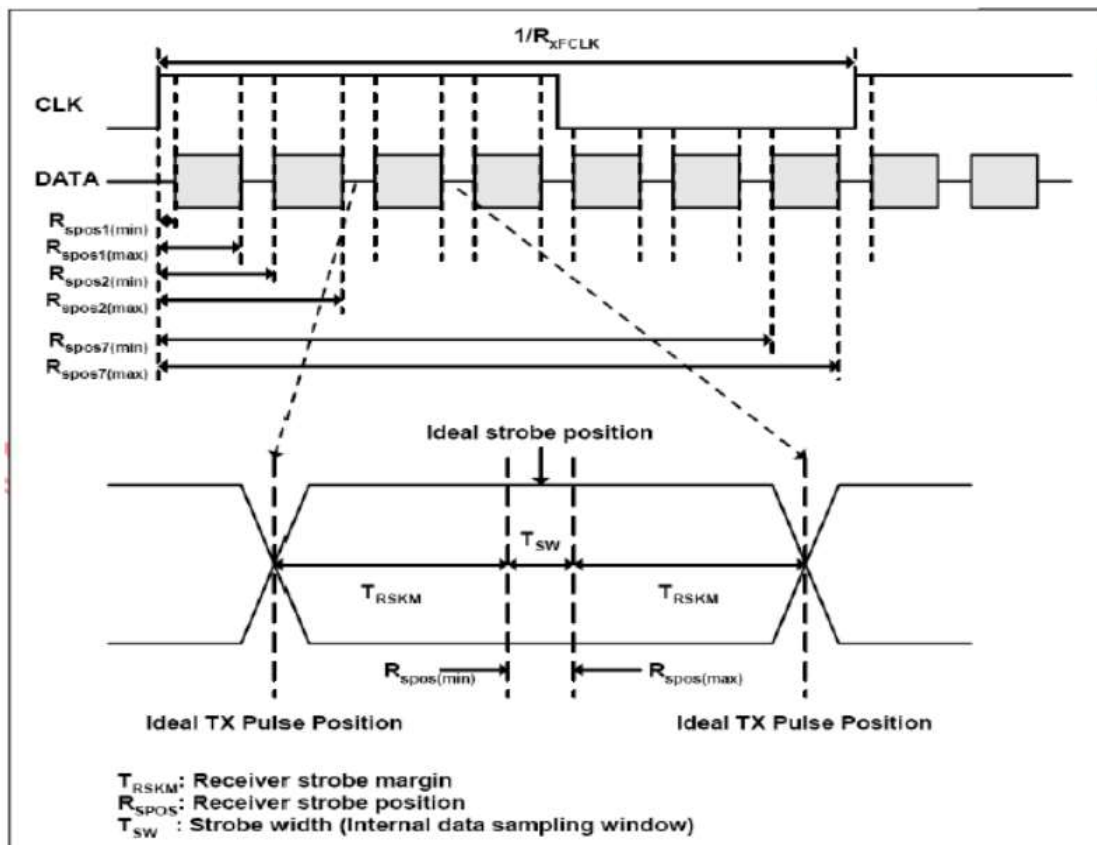
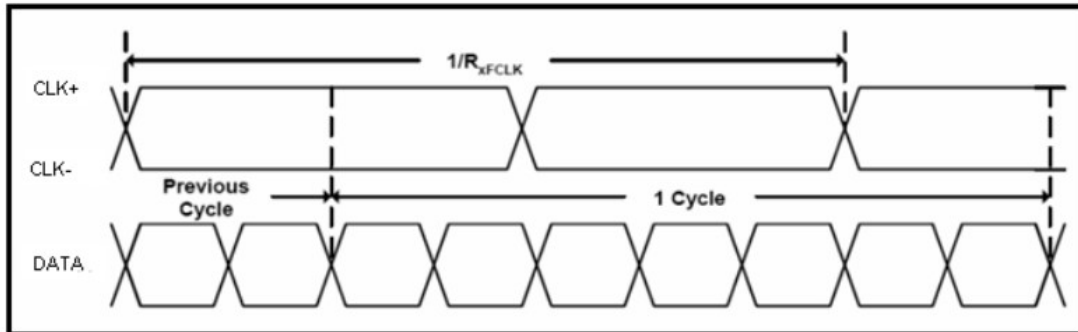
Note (1) Measurement Setup: The LCD module should be stabilized at given temp. 25°C for 15 minutes

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.

Timing Characteristics

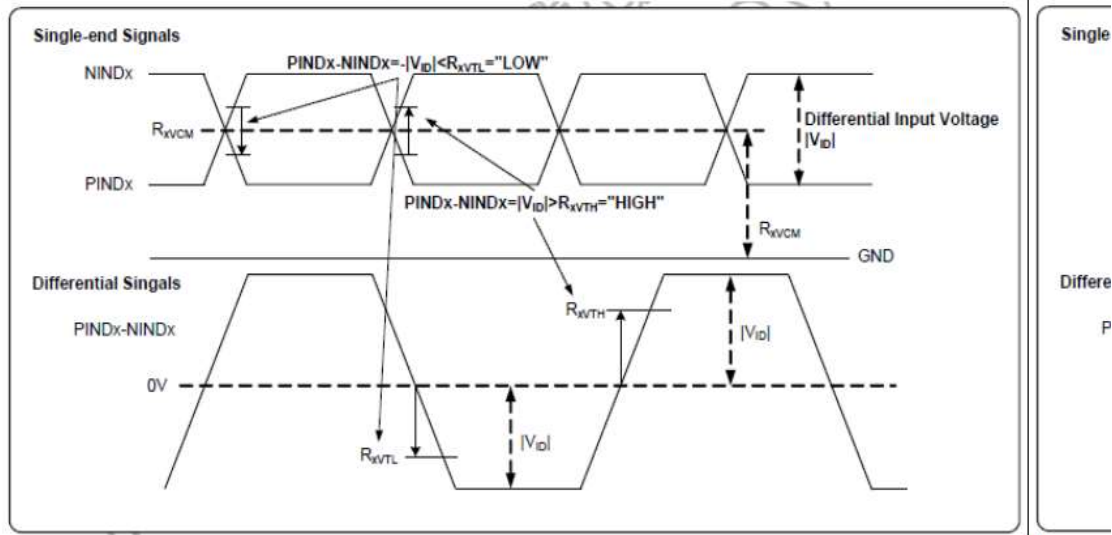
Input clock and data timing diagram

Parameter	Symbol	Min	Typ	Max	Units	Condition
Clock frequency	RxFCLK	26.2	51.2	71	MHz	
Input data skew margin	TRSKM	500	500	$1/(2 \times RxFCLK)$	ps	Typical value for 1024*600 resolution
Clock high time	TLVCH		$4/(7 \times RxFCLK)$		ns	$ VID =400\text{mv}$ $RxVCM=1.2\text{V}$ $RxFCLK=71\text{MHz}$ $VDD_LVDS=3.3\text{V}$
Clock low time	TLVCL		$3/(7 \times RxFCLK)$		ns	
VSD setup time	TenPLL	0	TenPLL	150	us	



LVDS Signal DC Characteristics

Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
LVDS Differential input high Threshold voltage	R_{xVTH}	-	-	+100	mV	$R_{xVCM}=1.2V$
LVDS Differential input low Threshold voltage	R_{xVTL}	-100	-	-	mV	
Input Voltage range (Singed-end)	R_{xVIN}	0	-	$VDD-1.2+$ $ V_{ID} /2$	V	
LVDS Differential input common mode voltage	R_{xVCM}	$ V_{ID} /2$	-	$VDD-1.2$	V	
LVDS Differential voltage	$ V_{ID} $	0.2	-	0.6	V	

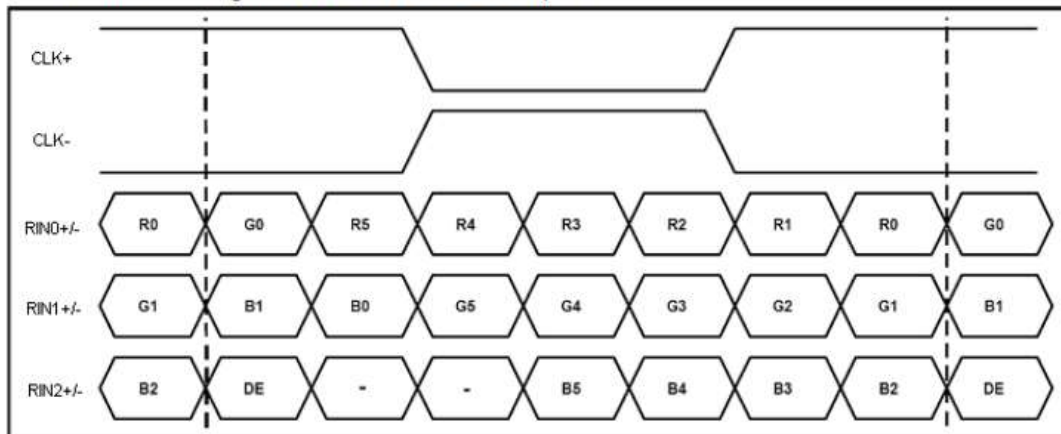


Data Timing

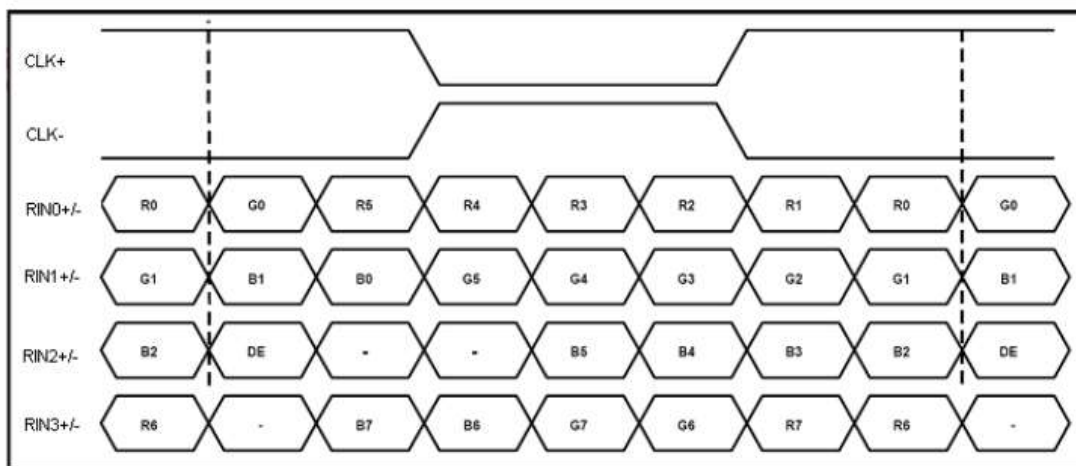
Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK frequency	fclk	52	65	71	MHz
Horizontal display area	thd	1024			DCLK
HSD period	th	1114	1344	1400	DCLK
HSD blanking	thb+thfp	90	320	376	DCLK
Vertical display area	tvd	768			T_H
VSD period	tv	778	806	845	T_H
VSD blanking	tvbp+tvfp	10	38	77	T_H

LVDS Date Input Format

SEL6/8 = "High" for 6 bits LVDS Input



SEL6/8 = "Low" or "NC" for 8 bits LVDS Input



Reliability Test Items and Criteria

No	Test Item	Test condition	Criterion
1	High Temperature Storage	80°C±2°C 96H Restore 4H at 25°C, 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°C±2°C 96H Restore 4H at 25°C, Power off	
3	High Temperature Operation	80°C±2°C 96H Restore 4H at 25°C, Power on	
4	Low Temperature Operation	-30°C±2°C 96H Restore 4H at 25°C, Power on	
5	High Temperature/Humidity Storage	60°C±2°C 90%RH 96H Power off	
6	Temperature Cycle	$\begin{array}{ccccccc} -30^{\circ}\text{C} & \rightarrow & +25^{\circ}\text{C} & \rightarrow & 80^{\circ}\text{C} & \rightarrow & +25^{\circ}\text{C} \\ (30\text{mins}) & & (5\text{mins}) & & (30\text{mins}) & & (5\text{mins}) \\ \leftarrow & & & & & & \rightarrow \\ & & & & \text{5 Cycle} & & \\ \text{Restore 4H at 25}^{\circ}\text{C, Power off} & & & & & & \end{array}$	

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°C ~ 40°C

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.