Rocktech Displays Limited

LCD Module Specification

Module P/N: RK026IHV066

Version: 1.0

Description : 2.6 inch TFT 320*432 Pixels with LED Backlight,Transflective sunlight readable All viewing angle,200 nits brightness

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Revision History

Date	Rev.	Page	Description
2015-10-26	1.0	All	First issue

CONTENTS

1. General Features

Item	Spec	Remark
Display Mode	Normally Black transflective	
Viewing Direction	FREE	IPS
Input Signals	MIPI	
Outline Dimensions	45.00(W) x62.90(H) x1.60(D)	
Active Area	39.840mm(W)×53.784mm(H)	
Number of Pixels	320(RGB)×432	
Dot Pitch	0.1245mm(W)×0.1245mm(H)	
Pixel Arrangement	RGB Vertical stripes	
Drive IC	ILI9488	

2. Absolute Maximum Ratings

The following are maximum values which, if exceeded may cause operation or damage to the unit.

ITEM	Sym.	Min.	Typ.	Max.	Unit	Remark
Power for Circuit Driving	VDD	-0.3	-	4.5	V	
Power for Circuit Logic	Vt	-0.3	-	VDD+0.3	V	
Storage Humidity	H_{ST}	10	-	40	%RH	At 25±5℃
Storage Temperature	T_{ST}	-30	-	80	℃	
Operating Humidity	H_{OP}	10	-	40	%RH	
Operating temperature	T_{OP}	-20	-	70	℃	

3. Electrical Specification

3.1 Driving TFT LCD Panel

Item		Sym.	Min	Typ.	Max	Unit	Note
Power for Circuit Driving		VDD	2.5	2.8	3.3	V	
Power for Circuit Logic		IOVCC	1.65	1.8	3.3	V	
Logic Input Voltage	Low Voltage	V_{IL}	-0.3	-	0.2VDD	V	
	High Voltage	V_{IH}	0.8VDD	-	VDD	V	
Logic Output Voltage	Low Voltage	V_{OL}	0	-	0.2VDD	V	
	High Voltage	V_{OH}	0.8VDD	-	-	V	

3.2 Driving Backlight For single LED Chip

Item	Sym.	Min	Typ.	Max	Unit	Note
Backlight driving voltage	V_F	-	3.2	-	V	
Backlight driving current	I_F	80	100	120	mA	
Backlight Power Consumption	W_{BL}	-	320	-	mW	
Life Time	-	-	50,000	-		Note 3

Note 1: (Unless specified, the ambient temperature Ta=25℃)
Note 2: The recommended operating conditions refer to a range in which operation of this product is guaranteed. Should this range is exceeded, the operation cannot be guaranteed even if the values may be without the absolute maximum ratings.
Note 3: 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.

4.Optical Specifications

Optical characteristics are determined after the unit has been 'ON' and stable for approximately 30 minutes in a dark environment at 25 ℃. The values specified are at an approximate distance 500mm from the LCD surface at a viewing angle of Φ and θ equal to 0°.

Item	Sym.	Values			Unit	Note
		Min.	Typ.	Max.		
1)Contrast Ratio	C/R	-	80	-		FIG.1
2)Module Luminance	L	150	200	-	cd/m^2	FIG.1
3)Response time	Tr+Tf	-	25	40	ms	FIG.2
4)Viewing Angle	θ_T	60	80	-	Degree	FIG.3
	θ_B	60	80	-		
	θ_L	60	80	-		
	θ_R	60	80	-		
5)Chromaticity	Wx	0.263	0.303	0.343		
	Wy	0.299	0.339	0.379		
	Rx	--	--	--		
	Ry	--	--	--		
	Gx	--	--	--		
	Gy	--	--	--		
	Bx	--	--	--		
	By	--	--	--		

◆ Measurement System

Notes:

1. Contrast Ratio(CR) is defined mathematically as :

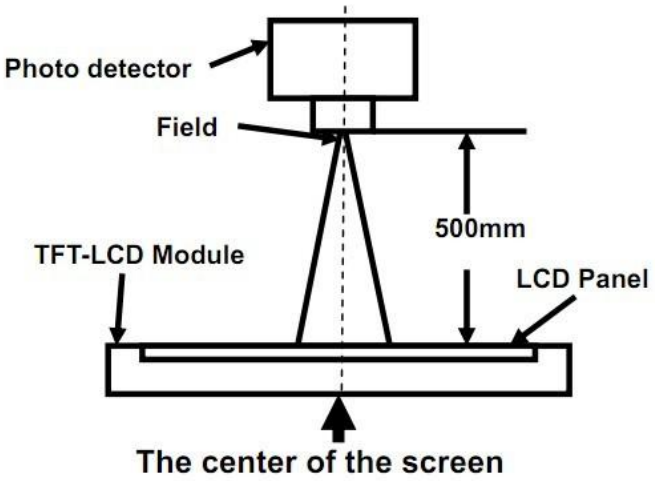
$$\text{Contrast Ratio} = \frac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all black pixels}}$$

2. Surface luminance is the center point across the LCD surface 500mm from the surface with all pixels displaying white. For more information see FIG 1.

3. Response time is the time required for the display to transition from white to black (Rising Time, Tr) and from black to white (Falling Time, Tf). For additional information see FIG 2.

4. Viewing angle is the angle at which the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see FIG 3.

FIG. 1 Optical Characteristic Measurement Equipment and Method



Item	Photo detector	Field
Contrast Ratio	SR-3A	1°
Luminance		
Chromaticity		
Lum Uniformity		
Response Time	BM-7A	2°

FIG. 2 The definition of Response Time

The response time is defined as the following figure and shall be measured by switching the input signal for “black” and “white”.

Response Time = Rising Time(Tr) + Falling Time(Tf)

- Rising Time(Tr) : Full White 90% → Full White 10% Transmittance.
- Falling Time(Tf) : Full White 10% → Full White 90% Transmittance.

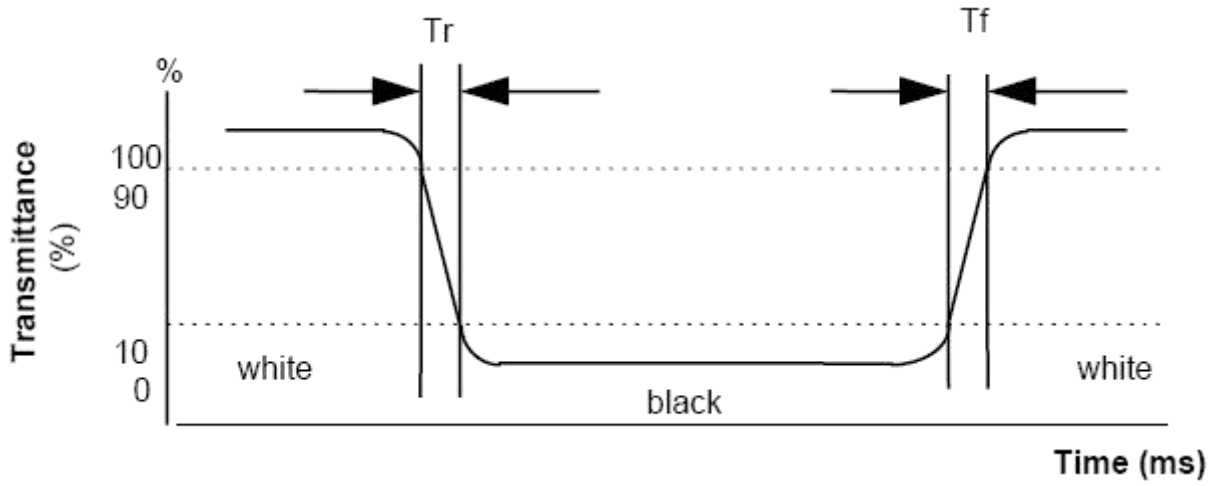
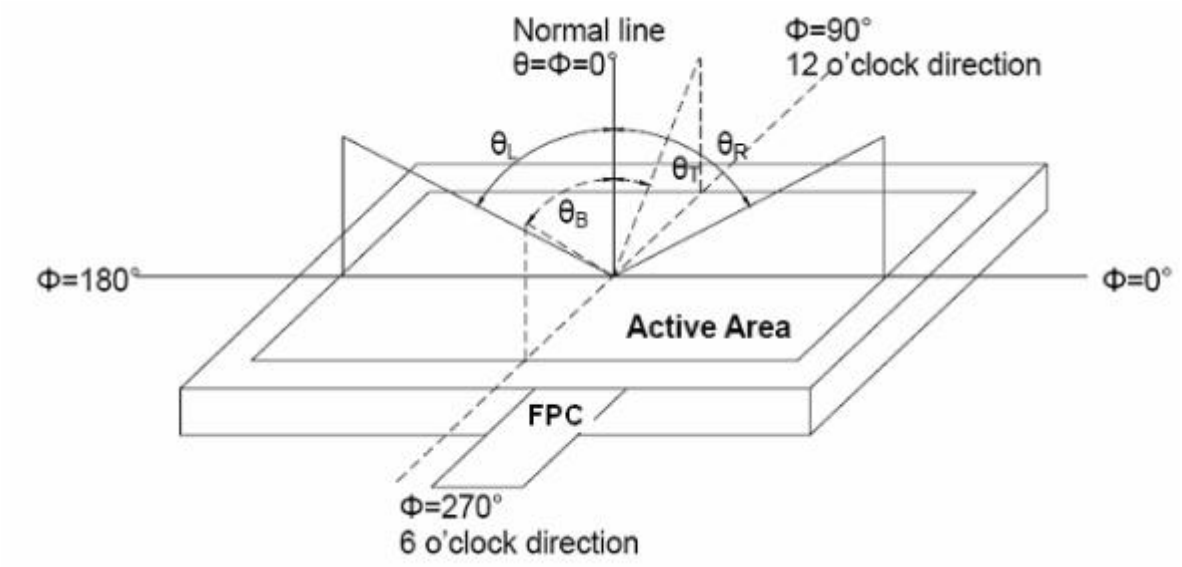
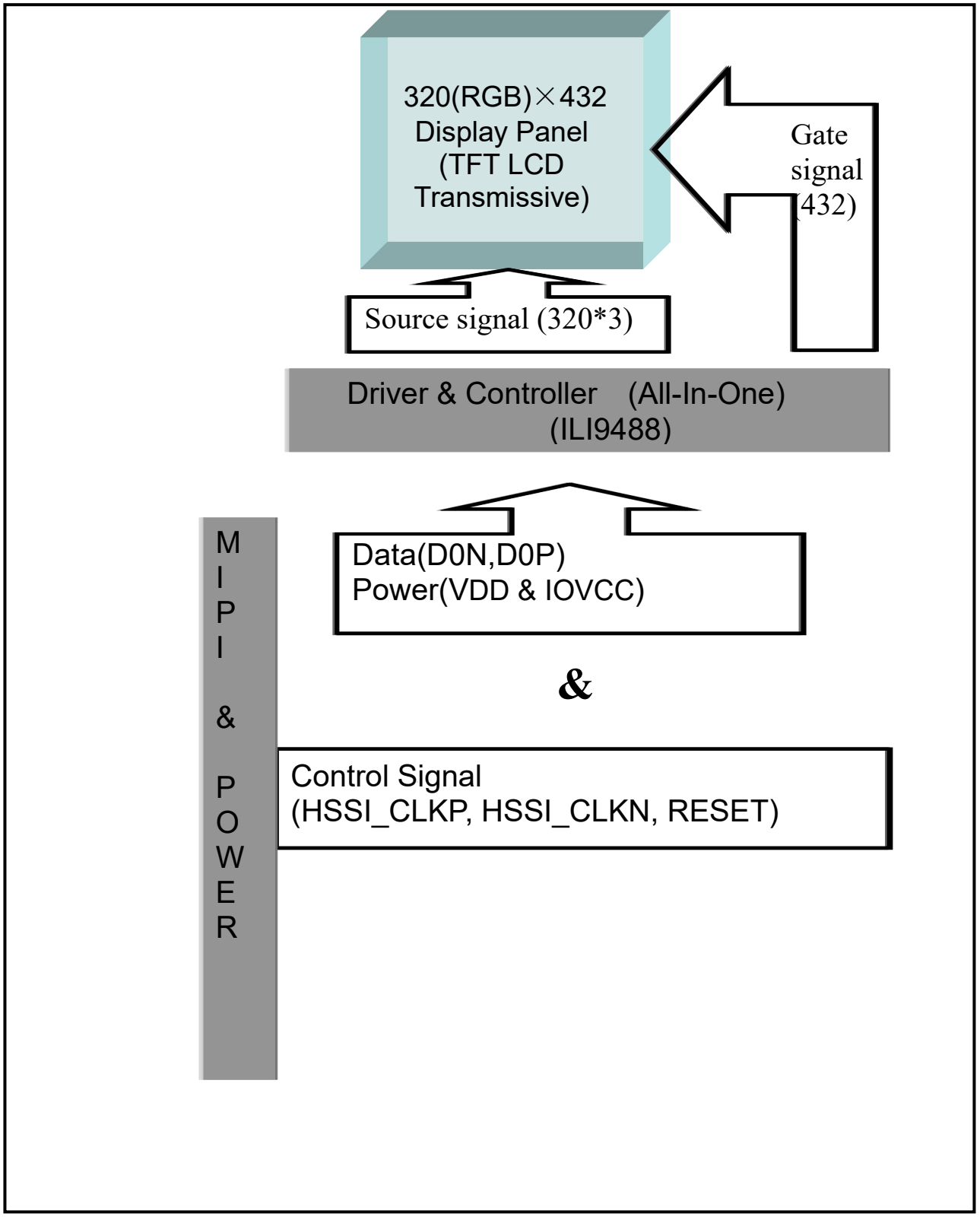


FIG. 3 The definition of Viewing Angle

Use Fig. 1(Test Procedure) under Measurement System to measure the contrast from the measuring direction specified by the conditions as the following figure.



5.Block Diagram



6.Pin Description

Item	Terminal	Functions
1	NC	Not connected
2	LED5-	The cathode of the backlight
3	LED2+	The anode of the backlight
4	GND	Power ground
5	GND	Power ground
6	GND	Power ground
7	LED3-	The cathode of the backlight
8	LED1-	The cathode of the backlight
9	LED1+	The anode of the backlight
10	GND	Power ground
11	GND	Power ground
12	GND	Power ground
13	NC	Not connected
14	NC	Not connected
15	GND	Power ground
16	RESETB	The reset signal pin
17	PVSS	Power ground
18	NC	Not connected
19	VDD	Power supply for internal
20	VDD	Power supply for internal
21	NC	Not connected
22	NC	Not connected
23	NC	Not connected
24	GND	Power ground
25	GND	Power ground
26	GND	Power ground
27	LED4-	The cathode of the backlight
28	LED2-	The cathode of the backlight
29	NC	Not connected

30	GND	Power ground
31	GND	Power ground
32	GND	Power ground
33	DSI_D0P	Positive polarity of low voltage differential data0 signal
34	DSI_D0N	Negative polarity of low voltage differential data0 signal
35	GND	Power ground
36	DSI_CN	Negative polarity of low voltage differential clock signal
37	DSI_CP	positive polarity of low voltage differential clock signal
38	GND	Power ground
39	ID	The pin is used for define the type of different modules
40	VCCIO	Power supply for internal input & output

7.Timing Characteristics (details refers to ILI9488)

7.1. High Speed Mode--Clock Channel Timing

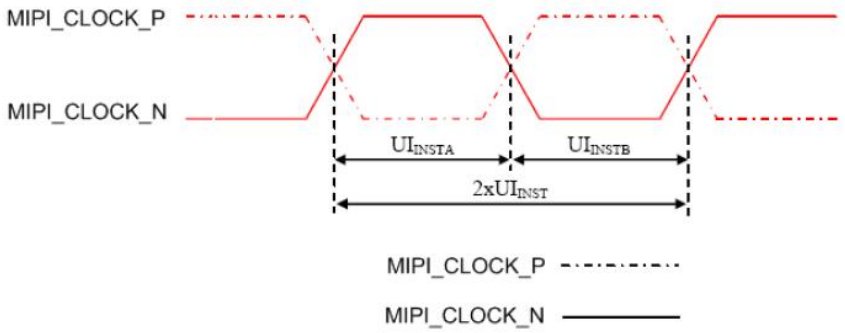


Figure 147: DSI Clock Channel Timing

Table 44: DSI Clock Channel Timing

Signal	Symbol	Parameter	Min	Max	Unit
MIPI_CLOCK_P/N	$2xUI_{INST}$	Double UI instantaneous	4	25	ns
MIPI_CLOCK_P/N	UI_{INSTA}, UI_{INSTB} (Note 1)	UI instantaneous Half	2 (Note 2)	12.5	ns

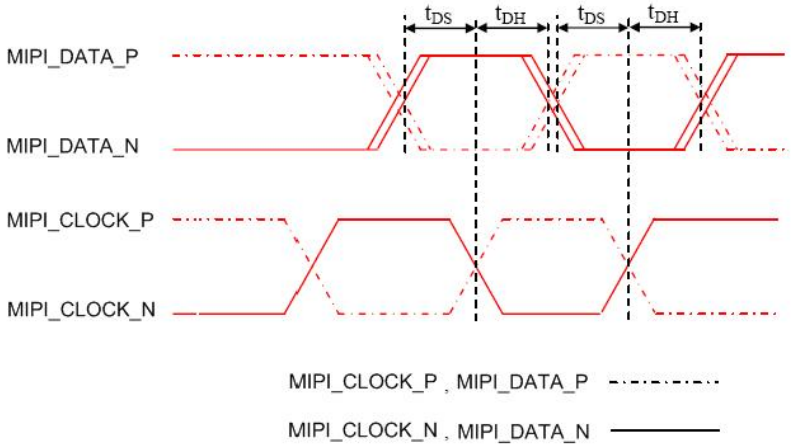
Notes:

1. UI = UIINSTA = UIINSTB
2. See Table 45 for the minimum value of 24 UI per Pixel.

Table 45: Clock Channel Speed Limited

Data type	One Lanes speed	Unit
Data Type = 00 1110 (0Eh), RGB 565, 16 UI per Pixel	500M	bps
Data Type = 01 1110 (1Eh), RGB 666, 18 UI per Pixel	500M	bps
Data Type = 10 1110 (2Eh), RGB 666 Loosely, 24 UI per Pixel	500M	bps
Data Type = 11 1110 (3Eh), RGB 888, 24 UI per Pixel	500M	bps

7.2 High Speed Mode—Data Clock Channel Timing



Signal	Symbol	Parameter	Min	Max	Unit
MIPI_DATA_P/N	t_{DS}	Data to Clock Setup time	0.15xUI	-	ps
MIPI_DATA_P/N	t_{DH}	Clock to Data Hold Time	0.15xUI	-	ps

7.3 High Speed Mode— Rising And Falling Timings

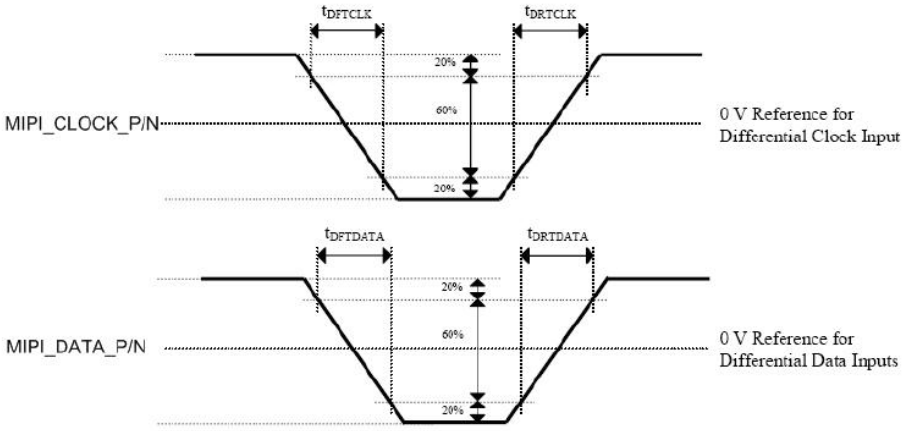


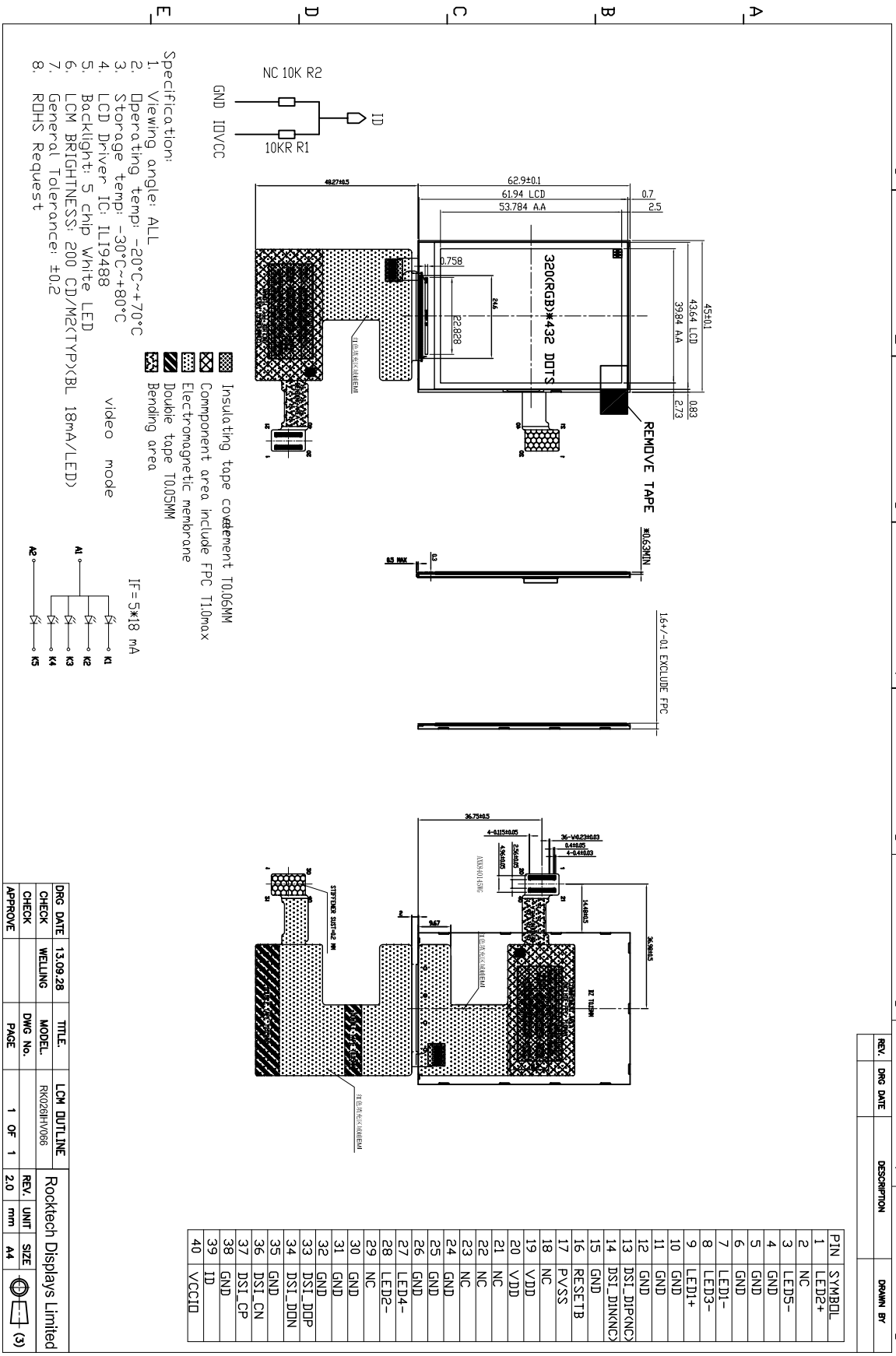
Figure 148: Rising and Falling Timings on Clock and Data Channels

Table 46: Rising and Falling Timings on Clock and Data Channels

Parameter	Symbol	Condition	Specification			
			Min	Typ	Max	Unit
Differential Rise Time for Clock	t_{DRTCLK}	MIPI_CLOCK_P/N	-	-	900	ps
Differential Rise Time for Data	$t_{DRTDATA}$	MIPI_DATA_P/N	-	-	900	ps
Differential Fall Time for Clock	t_{DFTCLK}	MIPI_CLOCK_P/N	-	-	900	ps
Differential Fall Time for Data	$t_{DFTDATA}$	MIPI_DATA_P/N	-	-	900	ps

Note: The display module has to meet timing requirements, which are defined for the transmitter (MCU) on MIPI D-Phy standard.

8.Outline Dimension



PIN	SYMBOL
1	LED2+
2	NC
3	LED5-
4	GND
5	GND
6	GND
7	LED1-
8	LED3-
9	LED1+
10	GND
11	GND
12	GND
13	DSI_DIP(NC)
14	DSI_DIN(NC)
15	GND
16	RESETB
17	PVSS
18	NC
19	VDD
20	VDD
21	NC
22	NC
23	NC
24	GND
25	GND
26	GND
27	LED4-
28	LED2-
29	NC
30	GND
31	GND
32	GND
33	DSI_DDP
34	DSI_DDN
35	GND
36	DSI_CN
37	DSI_CP
38	GND
39	ID
40	VCCIO

REV.	DRG DATE	DESCRIPTION	DRAWN BY

DRG DATE	13.09.28	TITLE.	LCM OUTLINE	Rocktech Displays Limited	
CHECK	WELLING	MODEL.	RK026IHV066		
CHECK		DWG No.			
APPROVE		PAGE	1 OF 1	REV. 2.0	UNIT mm
					SIZE A4

9.Reliability and Inspection Standard

No.	Test Item		Test Conditions	Remark
1	High Temperature	Storage	80℃, 120Hr	Note
		Operation	70℃, 120Hr	Note
2	Low Temperature	Storage	-30℃, 120Hr	Note
		Operation	-20℃, 120Hr	
3	High Temperature and High Humidity		40℃, 90%RH, 120Hr	Note
4	Thermal Cycling Test(No operation)		-20℃ for 30min, 70℃ for 30 min. 100 cycles. Then test at room temperature after 1 hour	Note
5	Vibration Test(No operation)		Frequency :10~55 HZ; Stroke :1.5 mm;Sweep:10HZ~55HZ~10HZ; 2hours for each direction of X, Y, Z(6 hours for total)	
6	Package Drop Test		Height:60 cm,1 corner, 3 edges, 6 surfaces	
7	Electro Static Discharge		±2KV,Human Body Mode, 100pF/1500Ω	

Note:

1) Sample quantity for each test item is 5~10pcs.
2) Note 4: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

10.PRECAUTIONS FOR USING LCD MODULES

Handing Precautions

(1) The display panel is made of glass and polarizer. As glass is fragile, it tends to become or chipped during handling especially on the edges. Please avoid dropping or jarring. Do not subject it to a mechanical shock by dropping it or impact.
(2) If the display panel is damaged and the liquid crystal substance leaks out, be sure not to get any in your mouth. If the substance contacts your skin or clothes, wash it off using soap and water.
(3) Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary. Do not touch the display with bare hands. This will stain the display area and degraded insulation between terminals (some cosmetics are determined to the polarizer).
(4) The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully. Do not touch, push or rub the exposed polarizers with anything harder than an HB pencil lead (glass, tweezers, etc.). Do not put or attach anything on the display area to avoid leaving marks on. Condensation on the surface and contact with terminals due to cold will damage, stain or dirty the polarizer. After products are tested at low temperature they must be warmed up in a container before coming is contacting with room temperature air.
(5) If the display surface becomes contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If it is heavily contaminated, moisten cloth with one of the following solvents
- Isopropyl alcohol
- Ethyl alcohol
Do not scrub hard to avoid damaging the display surface.
(6) Solvents other than those above-mentioned may damage the polarizer. Especially, do not use the following.
- Water
- Ketone
- Aromatic solvents
Wipe off saliva or water drops immediately, contact with water over a long period of time may cause deformation or color fading. Avoid contacting oil and fats.
(7) Exercise care to minimize corrosion of the electrode. Corrosion of the electrodes is accelerated by water droplets, moisture condensation or a current flow in a high-humidity environment.
(8) Install the LCD Module by using the mounting holes. When mounting the LCD module make sure it is free of twisting, warping and distortion. In particular, do not forcibly pull or bend the I/O cable or the backlight cable.
(9) Do not attempt to disassemble or process the LCD module.
(10) NC terminal should be open. Do not connect anything.
(11) If the logic circuit power is off, do not apply the input signals.
(12) Since LCM has been assembled and adjusted with a high degree of precision, avoid applying excessive shocks to the module or making any alterations or modifications to it.
- Do not alter, modify or change the shape of the tab on the metal frame.
- Do not make extra holes on the printed circuit board, modify its shape or change the positions of components to be attached.
- Do not damage or modify the pattern writing on the printed circuit board.
- Absolutely do not modify the zebra rubber strip (conductive rubber) or heat seal

connector.
- Except for soldering the interface, do not make any alterations or modifications with a soldering iron.
- Do not drop, bend or twist LCM.

Storage Precautions

When storing the LCD modules, the following precaution is necessary.
(1) Store them in a sealed polyethylene bag. If properly sealed, there is no need for the dessicant.
(2) Store them in a dark place. Do not expose to sunlight or fluorescent light, keep the temperature between 0°C and 35°C.
(3) The polarizer surface should not come in contact with any other objects. (We advise you to store them in the container in which they were shipped).

Others

Liquid crystals solidify under low temperature (below the storage temperature range) leading to defective orientation or the generation of air bubbles (black or white). Air bubbles may also be generated if the module is subject to a low temperature.
If the LCD modules have been operating for a long time showing the same display patterns, the display patterns may remain on the screen as ghost images and a slight contrast irregularity may also appear. A normal operating status can be regained by suspending use for some time. It should be noted that this phenomenon does not adversely affect performance reliability.
To minimize the performance degradation of the LCD modules resulting from destruction caused by static electricity etc., exercise care to avoid holding the following sections when handling the modules.
- Exposed area of the printed circuit board.
-Terminal electrode sections.