Rocktech Displays Limited

LCD Module Specification

Module P/N: RK084MS01

Version: 1.0

Description : 8.4 inch TFT 800*600 Pixels with LED backlight,350 nits brightness

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Revision History

Date	Rev.	Page	Description
2011-03-11	1.0	All	First Issue

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1. General Features

Item	Spec	Remark
Display Mode	Normally White transmissive	
Viewing Direction	12 O'CLOCK	
Input Signals	LVDS 6/8 bits	
Outside Dimensions(mm)	203.00 (W) x142.50(H) x5.70(D)	
Active Area(mm)	170.40mm(W)×127.80mm(H)	
Number of Pixels	800(RGB)×600	
Dot Pitch(mm)	0.213mm(W) ×0.213mm(H)	
Pixel Arrangement	RGB Vertical stripes	

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	-0.5	-	5.0	V	
Input Voltage	V_{IN}	-0.5	-	5.0	V	
Storage Humidity	H_{ST}	10	-		%RH	At 25±5℃
Storage Temperature	T_{ST}	-30	-	80	℃	
Operating Ambient Humidity	H_{OP}	10	-		%RH	
Operating Ambient temperature	T_{OP}	-20	-	70	℃	

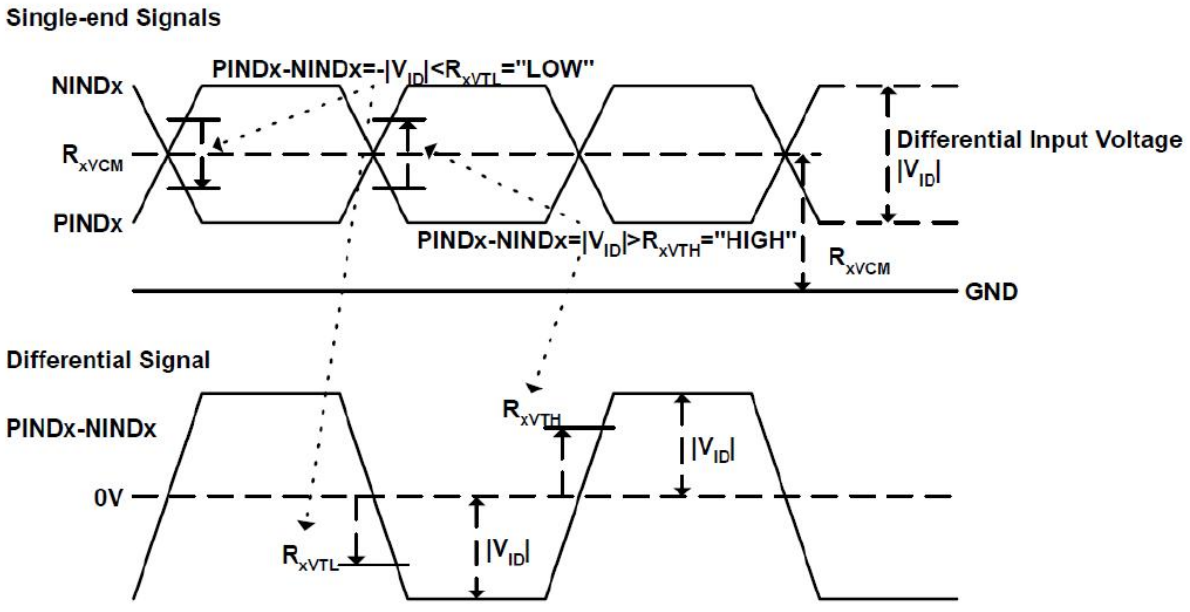
3. Electrical Specification

3.1 Driving TFT LCD Panel

VCC=3.3V，GND=0V，Ta = 25℃

Item	Symbol	Min	Typ	Max	Unit	Remark
POWER Supply Voltage	VDD	3.00	3.30	3.60	V	
Differential input high threshold voltage	R_{xVTH}			+0.1	V	R_{xVCM} =1.2V
Differential input low threshold voltage	R_{xVTL}	-0.1			V	
Input voltage range (singled-end)	R_{xVIN}	0		2.4	V	
Differential input common mode voltage	R_{xVCM}	$\|V_{ID}\|/2$		2.4-$\|V_{ID}\|/2$	V	
Differential input voltage	$\|V_{ID}\|$	0.2		0.6	V	
Current of VDD Power supply	I_{VDD}	-	TBD	TBD	mA	Note1
Power consumption of VDD	W_{VDD}	-	TBD	-	mW	

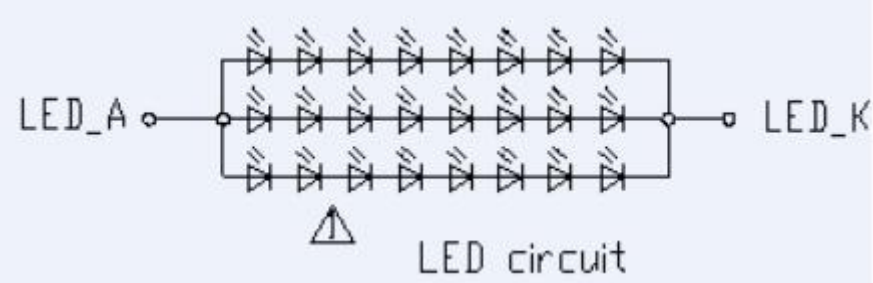
Note1: To test the current dissipation, use “all Black Pattern”.



3.2 Driving Of Backlight

LEDGND=GND=0V, Ta = 25℃

Item		Symbol	Min	Typ	Max	Unit	Remark
Voltage of LED driver circuit		VBL	11.5	12	12.5	V	
Current of LED driver circuit		IBL	-	165	240	mA	
Power Consumption		W_{BL}	-	1980	-	mW	
Dimming Signal frequency		Fdimming	0.1		100	KHz	
Dimming Signal duty	100Hz~10KHz	-	0	-	100	%	
	10KHz~100KHz	-	10	-	100	%	
LED Life time		-	--	(50000)	--	H	



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	400	500	-		FIG.1
2)Module Luminance	L	300	350	-	cd/m^2	FIG.1
3)Response time	Tr+Tf	-	20	-	ms	FIG.2
4)Viewing Angle	θ_T	60	70	-	Degree	FIG.3
	θ_B	50	60	-		
	θ_L	60	70	-		
	θ_R	60	70	-		
5)Chromaticity	Wx	0.27	0.31	0.35		
	Wy	0.29	0.33	0.37		
	Rx	-	-	-		
	Ry	-	-	-		
	Gx	-	-	-		
	Gy	-	-	-		
	Bx	-	-	-		
	By	-	-	-		

◆ Measurement System

Notes:

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

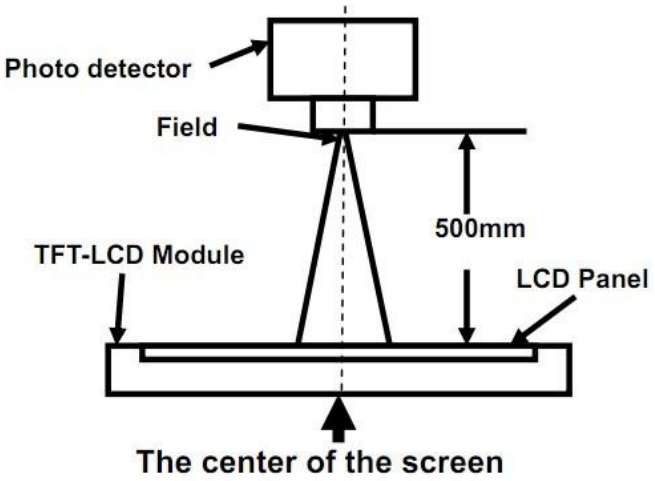
$$\text{Contrast Ratio} = \frac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all black pixels}}$$

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.

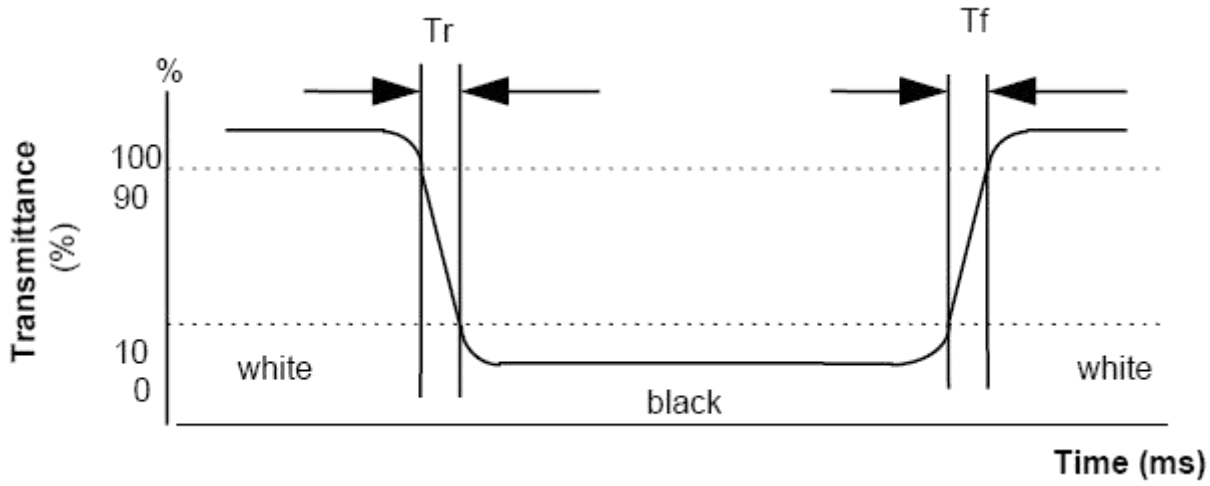
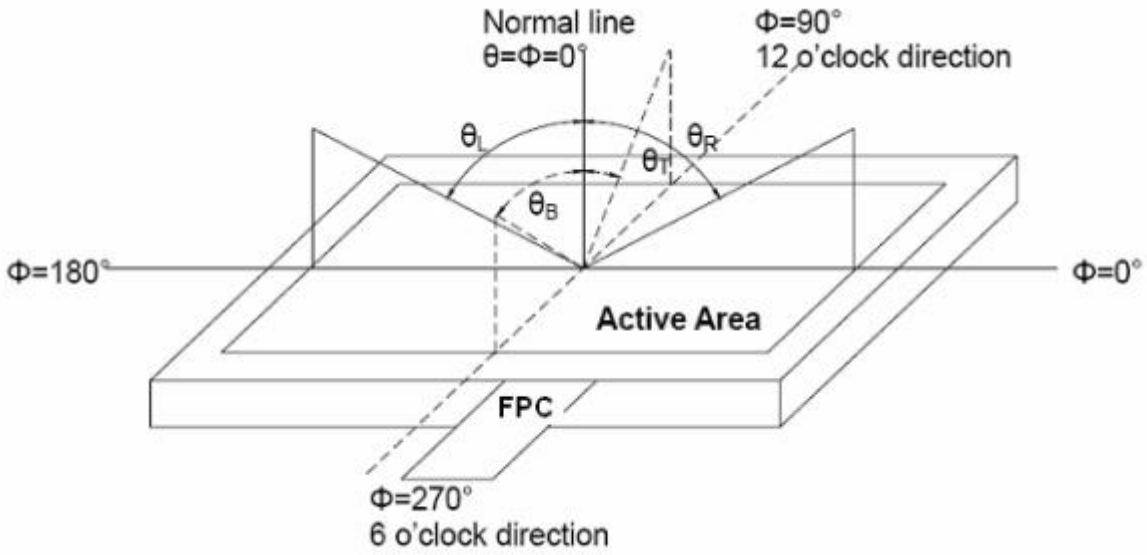
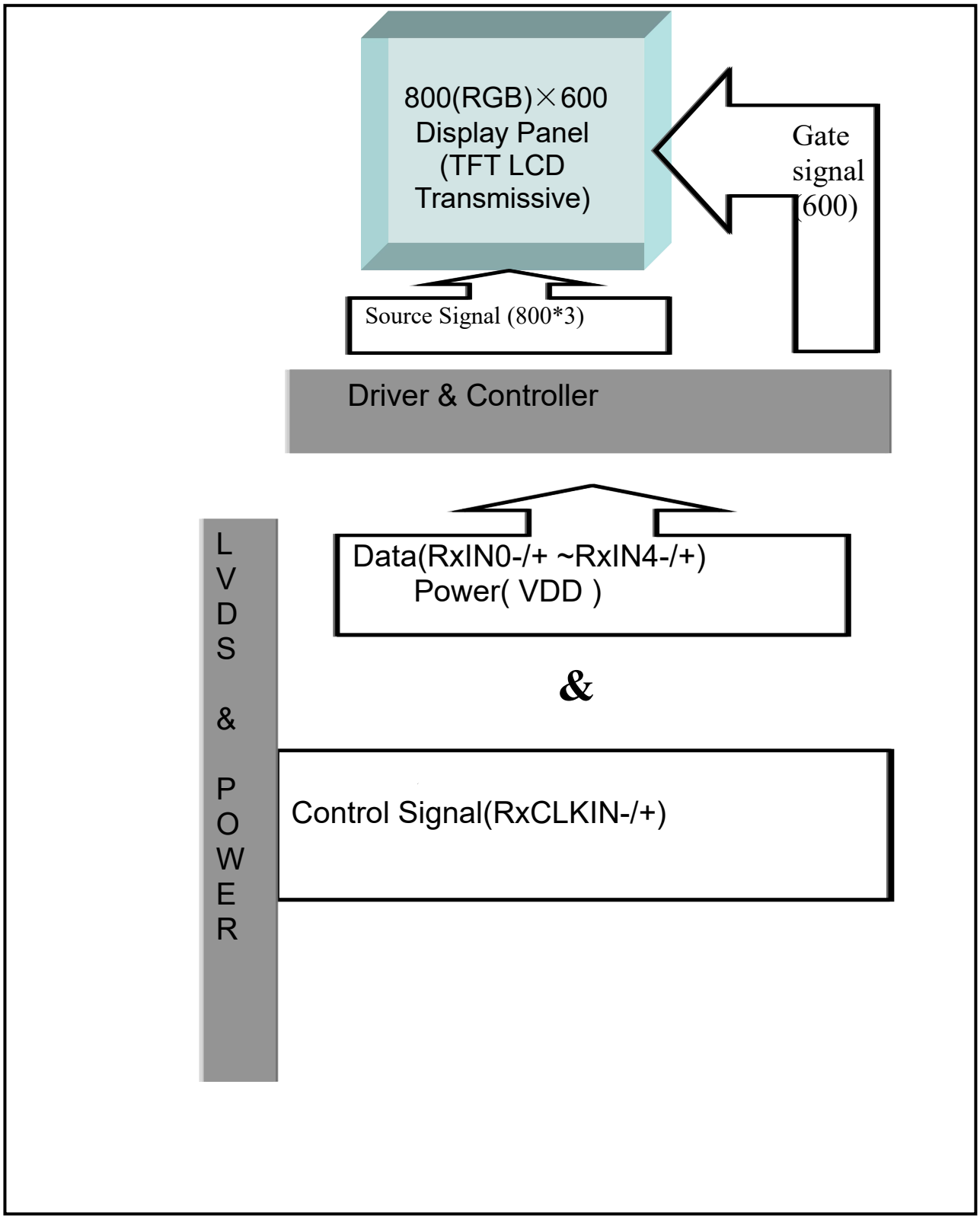


FIG. 3 The definition of Viewing Angle

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

6.1 TFT LCD Panel

Connector type: 107A20-0021RA-G3-R (Hirose)

Pin	Symbol	I/O	Description	Remark
1	VDD	P	Power supply	
2	VDD	P	Power supply	
3	UD	I	Vertical Reverse Scan Control	
4	LR	I	Horizontal Reverse Scan Control	
5	RxIN1-	I	Negative data 1 for LVDS signal input	
6	RxIN1+	I	Positive data 1 for LVDS signal input	
7	GND	P	Ground	
8	RxIN2-	I	Negative data 2 for LVDS signal input	
9	RxIN2+	I	Positive data 2 for LVDS signal input	
10	GND	P	Ground	
11	RxIN3-	I	Negative data 3 for LVDS signal input	
12	RxIN3+	I	Positive data 3 for LVDS signal input	
13	GND	P	Ground	
14	RxCLKIN-	I	negative clock for LVDS signal input	
15	RxCLKIN+	I	Positive clock for LVDS signal input	
16	GND	P	Ground	
17	SEL68	I	LVDS 6/8 bit selection control	
18	NC	I	No connection	
19	RxIN4-	I	Negative data 4 for LVDS signal input	
20	RxIN4+	I	Positive data 4 for LVDS signal input	

I---Input, O---Output, P--- Power/Ground

Note1:Scanning direction description

Scan control input		Scanning direction
UD	LR	
HIGH	HIGH	Down to up, left to right
LOW	LOW	Up to down, right to left
HIGH	LOW	Down to up, right to left
LOW	HIGH	Up to down, left to right

6.2 Backlight Connector

Connector type: 3808K-F04N-02R (Entery)

Pin	Symbol	I/O	Description	Remark
1	VBL	P	Backlight Power supply , 12V input	
2	PGND	P	Ground	
3	BL_EN	I	Enable : 3.3V for backlight on ; 0V for backlight off	
4	Dimming	I	Adjust the luminance of LED's	

Note1: CN2 Matching Connector type: H208K-P04N-02B (Entery)

7.Timing Characteristics

7.1 TFT-LCD Input Timing Parameter

VCC=3.3V, GND=0V, Ta=25℃

Parameter	Symbol	Min	Typ	Max	Unit	Remark
DCLK	Fclk	34.5	39.6	50.4	MHz	Tclk=1/Fclk
	Tclk	16	25.3	30.7	ns	
HSYNC	TH	900	1000	1200	Tclk	
	THD	-	800	-	Tclk	
	Thwh	1	-	40	Tclk	
	Thbp	-	88	-	Tclk	
	Thfp	12	112	312	Tclk	
VSYNC	TV	640	660	700	TH	
	TVD	-	480	-	TH	
	Tvwh	1	-	20	TH	
	Tvbp	-	39	-	TH	
	Tvfp	1	21	61	TH	

Tcon Input Timing(HV Mode)

7.2 Tcon Input Timing at DE Mode

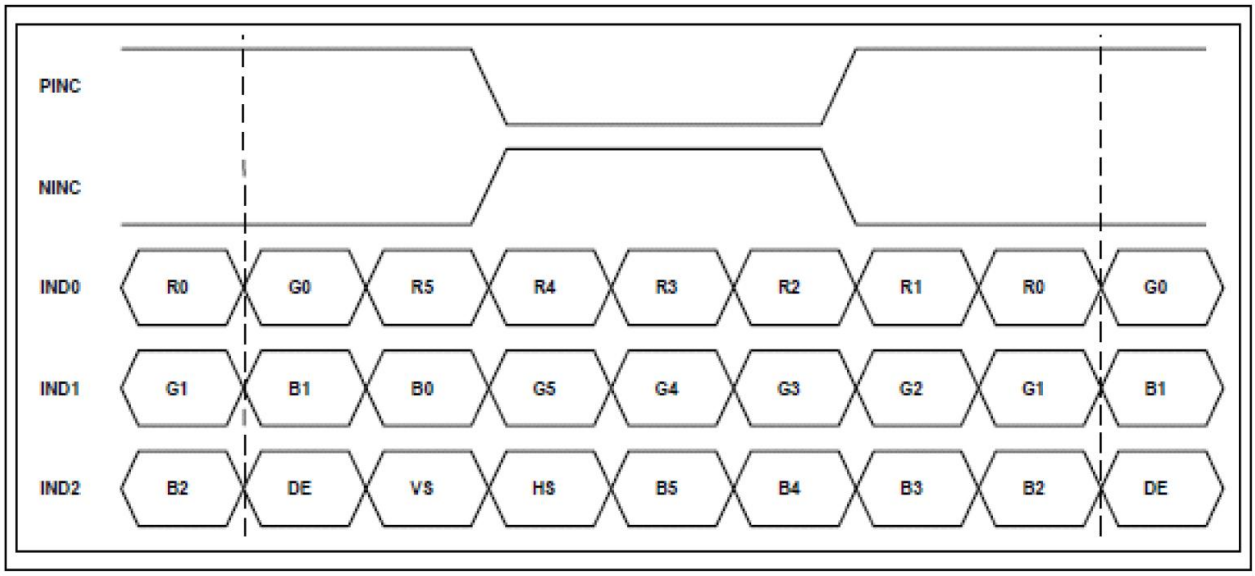
Vcc=3.3V,GND=0V,Ta=25C

	Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Dclk frequency		Fclk	32.6	39.6	62.4	MHz	Tclk=1/Fclk
Horizontal section	Horizontal total	TH	890	1000	1300	Tclk	
	Horizontal blanking	THC	90	200	500	Tclk	
	Valid Data Width	THD	-	800	-	Tclk	
Vertical section	Frame rate	-	-	60	-	Hz	
	Vertical total	TV	610	660	800	TH	
	Vertical blanking	TVC	10	60	200	TH	
	Valid Data Width	TVD	-	600	-	TH	

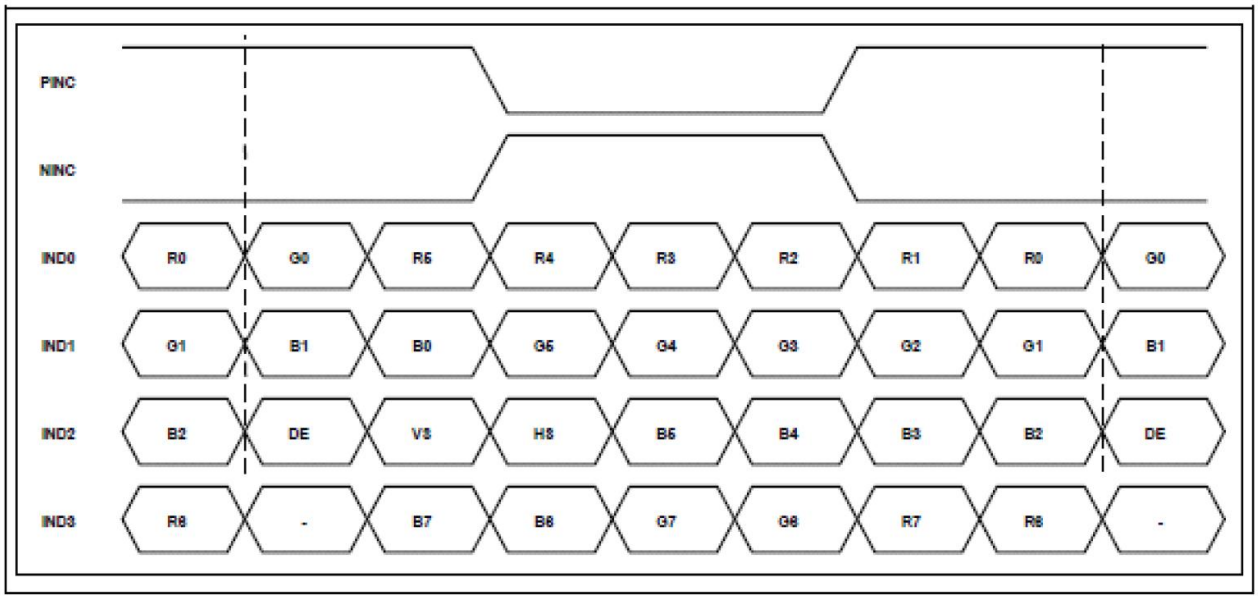
Tcon Input Timing(DE Mode)

7.3 LVDS Input Data Format

6bit LVDS input



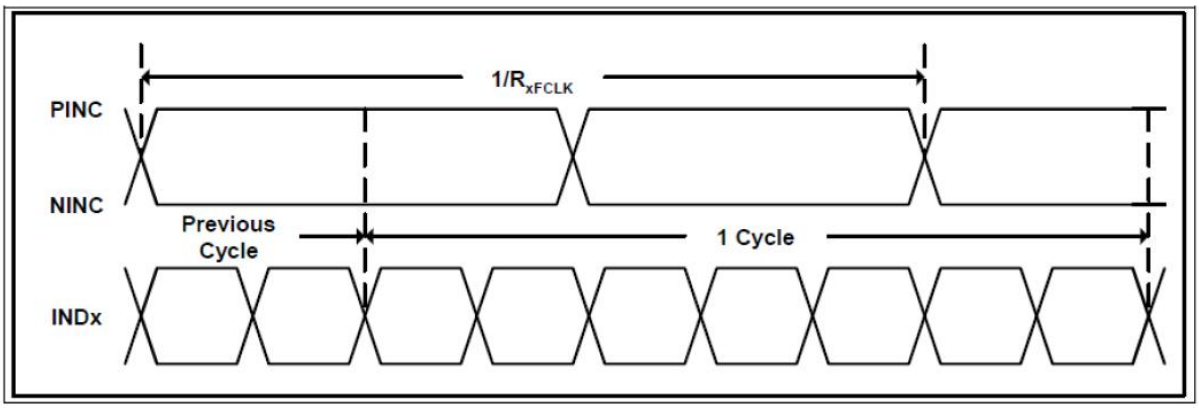
8-bit LVDS input



7.4 Input Signal AC Timing

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Clock frequency	R_{xFCLK}	32.6	39.6	62.4	MHz	
Clock high time	T_{LVCH}		4/(7* R_{xFCLK})		nS	
Clock low time	T_{LVCL}		3/(7* R_{xFCLK})		nS	

LVDS Clock Input Timing

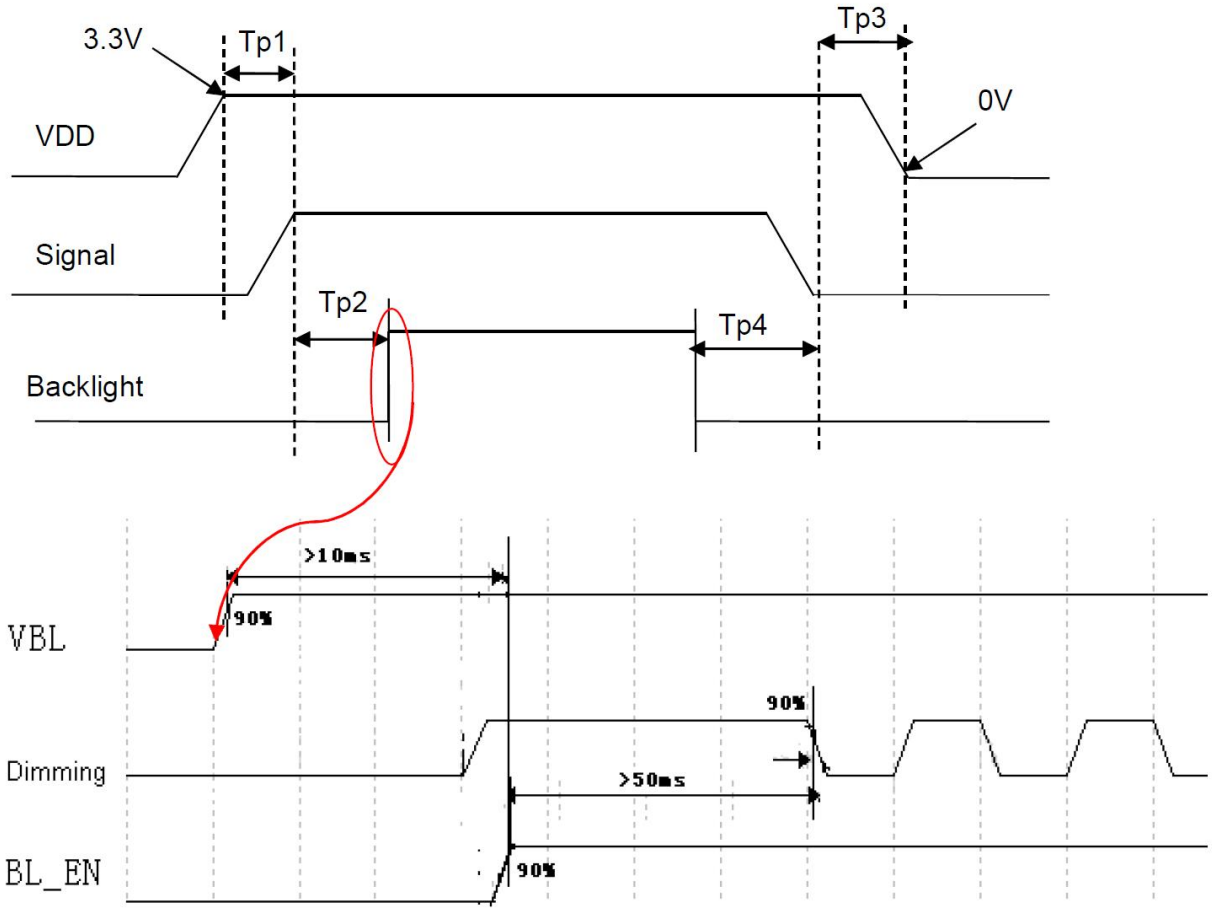


Input Signal AC Timing

7.5 Power On/Off Sequence

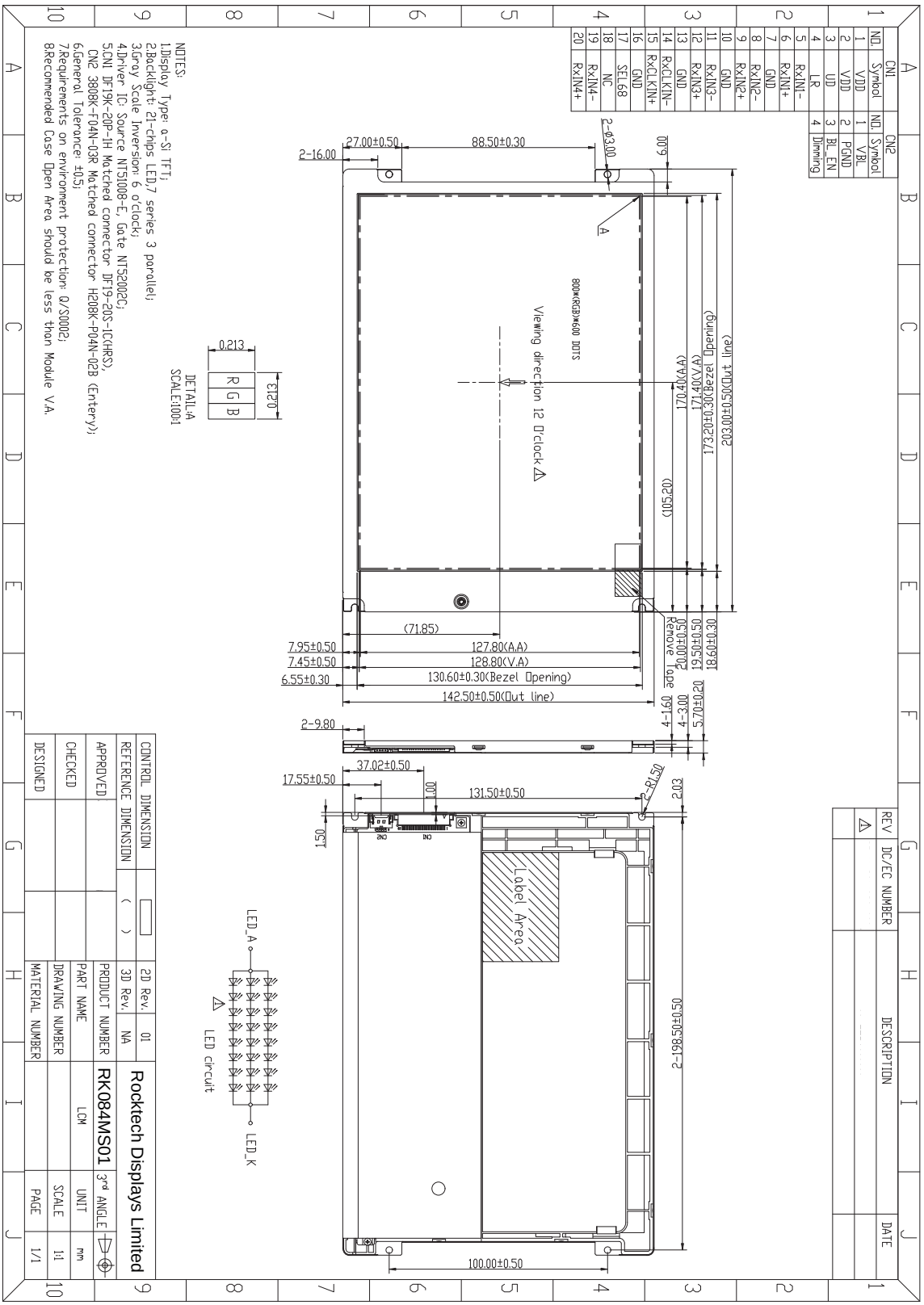
Item	Symbol	Min	Typ	Max	Unit	Remark
VDD 3.3V to signal starting	Tp1	5	-	50	ms	
VDD rising time	Tr	0.1	-	5	ms	
Signal starting to backlight on	Tp2	150	-	-	ms	
Signal off to VDD 0V	Tp3	5	-	50	ms	
Backlight off to signal off	Tp4	150	-	-	ms	

Power On/Off Sequence



Power On/Off Sequence

8.Outline Dimension



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.