

ALC-070031-01-1

~ 7" High Brightness TFT LCD

2016/6/28

Engineering Specifications v.1.0

() Preliminary Specifications

(√) Final Specifications

[This specification is subject to change without notice.]

Company Confidential



Customer Name		Customer Approval
CIVUE Optotech Inc.		
Approved by	Checked by	Prepared by
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RECORD OF REVISION

Version	Date	Page	Original Description	New Description	ECN#
1.0	2016/6/28	All	First draft	All	N/A

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1. GENERAL DESCRIPTION

1.1 Description

This specification is for model ALC-070031-01-1, a color active matrix thin film transistor (TFT) liquid crystal display (LCD), which uses amorphous silicon TFT as a switching device. This model is composed of a TFT LCD panel, a driving circuit, and a backlight system. This TFT LCD has a 7.0 (16:9) inch diagonally measured active display area with WVGA (800 horizontal by 480 vertical pixels) resolution.

1.2 Features:

No.	Item	Specification	Unit
1	Panel Size	7.0"	Inch
2	Number of Pixels	800 (W) x RGB x 480 (H)	Pixels
3	Active Area	153.6 (W) x 86.64 (H)	mm
4	Pixel Pitch	0.192 (W) x 0.1805(H)	mm
5	Outline Dimension	165 (W) x 104 (H) x 5.05 (T)	mm
6	Number of Colors	262K	- -
7	Display Mode	TN / Normally White / Transmissive	- -
8	View Direction	6 o'clock (Gray Inversion)	
9	Display Format	RGB vertical stripe	- -
10	Surface Treatment	Anti-Glare	- -
11	Contrast Ratio	500 (Typ.)	- -
12	Luminance (cd/m ²)	2200 (Typ.)	cd/m ²
13	Interface	LVDS 6 bit Interface	- -
14	Backlight	White LED	- -
15	Operation Temperature	-20 ~ 70	°C
16	Storage Temperature	-30 ~ 80	°C
17	Weight	(TBD)	g

2. MECHANICAL SPECIFICATION

Rev. NO.	Revision note	Date
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165
156.6(Bezel opening)
153.6(AA)
7.77
5.85
6.17
89.83(Bezel opening)
104
4.95
86.64(AA)
(49.49)
7.0" TFT
800 X RGB X 480dots
Viewing direction
(5 o'clock/Gray Inversion)
component area
date code
5.05(DL)
5.80(DL & PCB)
2.4
(75.27)
(25.47)
50±0.5
(49.95)
CN1
Grounding Taper
CN2

CN1 MSB24013P20HA or equivalent
CN2 JST BHSR-02VS-1 or compatible

420mA/(12.8V)

No.	PIN	NAME
1	VCC	
2	VCC	
3	VSS	
4	VSS	
5	R1M0-	
6	R1M0+	
7	VSS	
8	R1M1-	
9	R1M1+	
10	VSS	
11	R1M2-	
12	R1M2+	
13	VSS	
14	R1K-	
15	R1K+	
16	VSS	
17	NC	
18	NC	
19	NC	
20	NC	

Part Number	ALC-070031-01-1	Scale	1 : 1	Unit	mm	Projection	
Part Description	7" High Brightness TFT LCD	Check	Design	Design	Drawn	Revision	A
Approved		Date		Reviewed		Page	1
Form NC		Form NC		Form NC		Form NC	

FQ-PD-006-D

3. PIN DESCRIPTION

3.1 TFT LCD Module

Pin No.	Symbol	I/O	Function	Note
1	VCC	P	Power Supply +3.3V	
2	VCC	P	Power Supply +3.3V	
3	GND	P	Ground	
4	GND	P	Ground	
5	RXIN0-	I	Negative LVDS differential data input	
6	RXIN0+	I	Positive LVDS differential data input	
7	GND	P	Ground	
8	RXIN1-	I	Negative LVDS differential data input	
9	RXIN1+	I	Positive LVDS differential data input	
10	GND	P	Ground	
11	RXIN2-	I	Negative LVDS differential data input	
12	RXIN2+	I	Positive LVDS differential data input	
13	GND	P	Ground	
14	CLK-	I	Negative LVDS differential clock input	
15	CLK+	I	Positive LVDS differential clock input	
16	GND	P	Ground	
17	NC	-	No connect	
18	NC	-	No connect	
19	NC	-	No connect	
20	NC	-	No connect	

NOTE:

1. NC Pin must be floating, VSS=GND

3.2 Backlight Unit

Pin No.	Symbol	Function	Remark
1	LEDA	Power Supply for LED backlight	RED
2	LEDK	GND for LED backlight	BLACK

4. ABSOLUTE MAXIMUM RATINGS

4.1 Electrical Absolute Rating

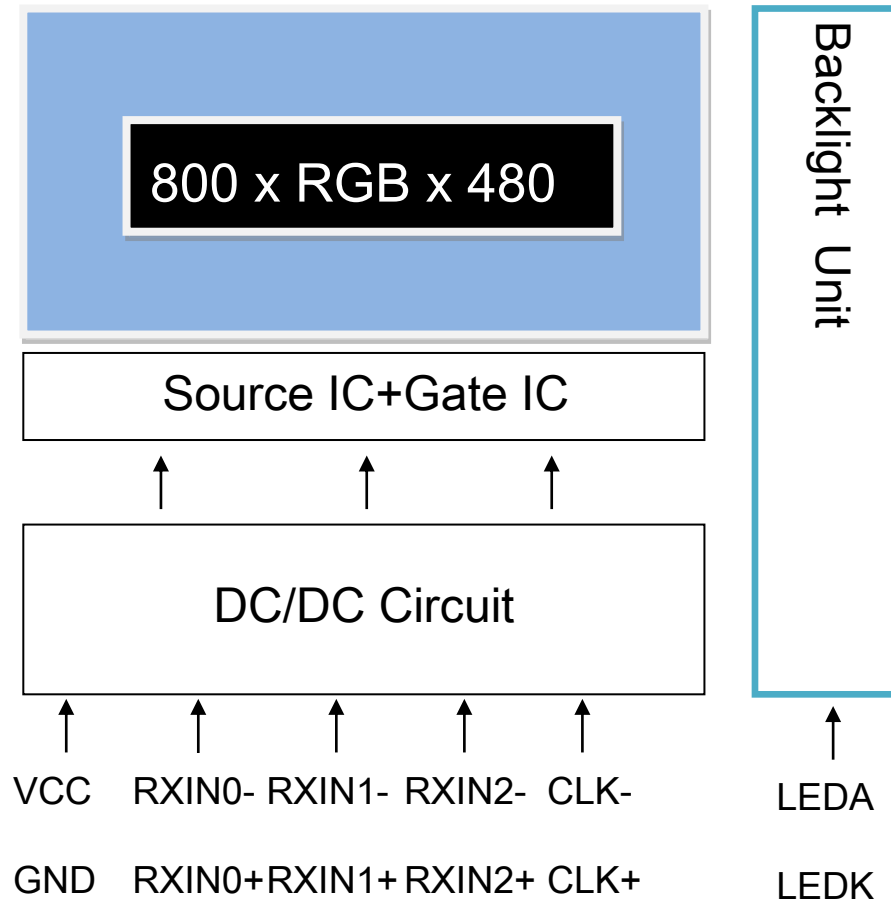
4.1.1 TFT LCD Module

Item	Symbol	Values		Unit	Note
		Min	Max.		
Power supply voltage	VCC	-0.3	4.0	V	

4.1.2 Environment Absolute Rating

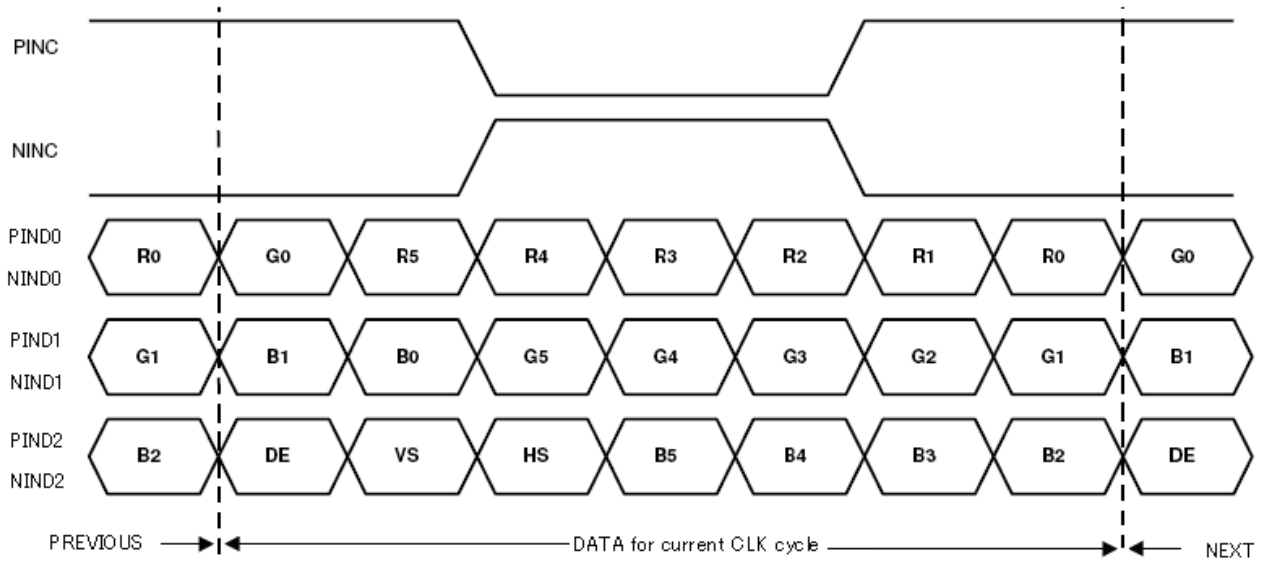
Item	Symbol	Values			Unit	Note
		Min	Typ	Max.		
Operating Temperature	Topa	-20		70	°C	Ambient temperature
Storage Temperature	Tstg	-30		80	°C	

5. BLOCK DIAGRAM
5.1 TFT LCD Module



6. Relationship Between Displayed Color and Input

6.1 Data Mapping



6.2 6 bit

	Color & Gray Scale	Data Signal																	
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
Basic Color	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Red	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(31)	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Green	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(31)	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	Green(63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Blue	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(31)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	Blue(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

0 : Low level voltage, 1 :High level voltage

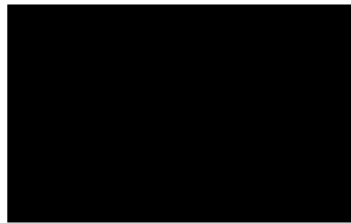
Each basic color can be displayed in 64 gray scales from 6 bit data signals. With the combination of total 18 bit data signals, the 262K-color display can be achieved on the screen.

7. ELECTRICAL CHARACTERISTICS

7.1 TFT LCD Module

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Power supply	VCC	3.0	3.3	3.6	V	
Input Voltage for logic	Differential Input High Threshold			+100	mV	
	Differential Input Low Threshold		-100		mV	
Power Supply current	ICC	-	(150)	(200)	mA	Note 1

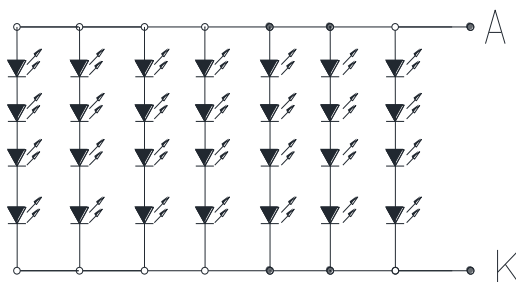
Note 1: frame =60Hz , Ta=25°C , Display pattern : Black pattern



7.2 Backlight Unit

Item	Symbol	Value			Unit	Condition
		Min.	Typ.	Max.		
LED Voltage	VL	(12)	(12.8)	(13.2)	V	
LED Current	If	-	420	-	mA	4S7P
Power Consumption	PBL	-	5.376	-	W	
LED Life Time (25°C)	-	-	(50000)	-	hr	(1)

Note 1: The "LED life time" is defined as the module brightness decrease to 50% Original brightness that the ambient temperature is 25°C 60% RH.

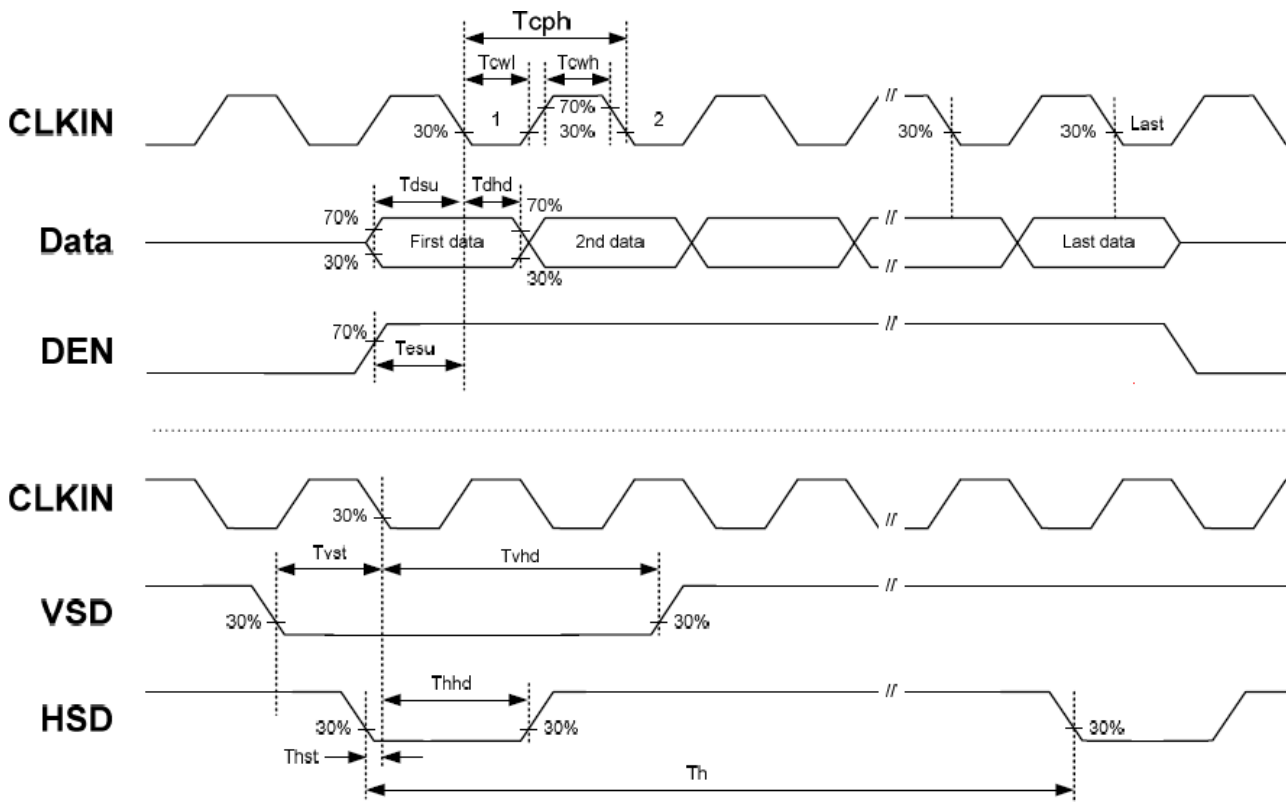


$$420\text{mA}/(12.8\text{V})$$

7.3 INTERFACE SPECIFICATIONS

7.3.1 AC Timing characteristics

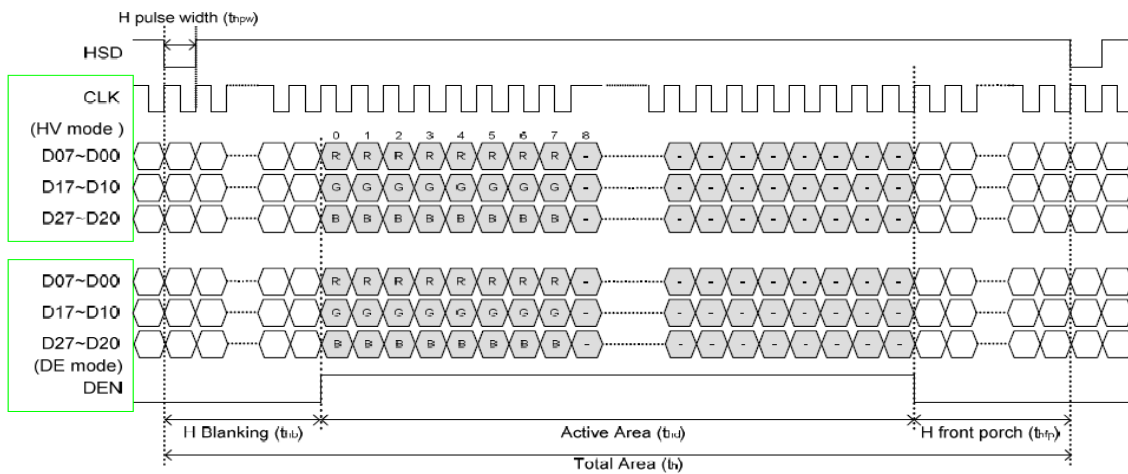
Signal	Parameter	Symbol	Min.	Typ.	Max.	Unit.	Note
HSYNC	HS setup time	Thst	8	-	-	ns	
	HS hold time	Thhd	8	-	-	ns	
VSYNC	VS setup time	Tvst	8	-	-	ns	
	VS hold time	Tvhd	8	-	-	ns	
Data	Data setup time	Tdsu	8	-	-	ns	
	Data hold time	Tdhd	8	-	-	ns	
DE	DEN setup time	Tvpw	8	-	-	ns	
	DEN hold time	Tvb	8	-	-	ns	



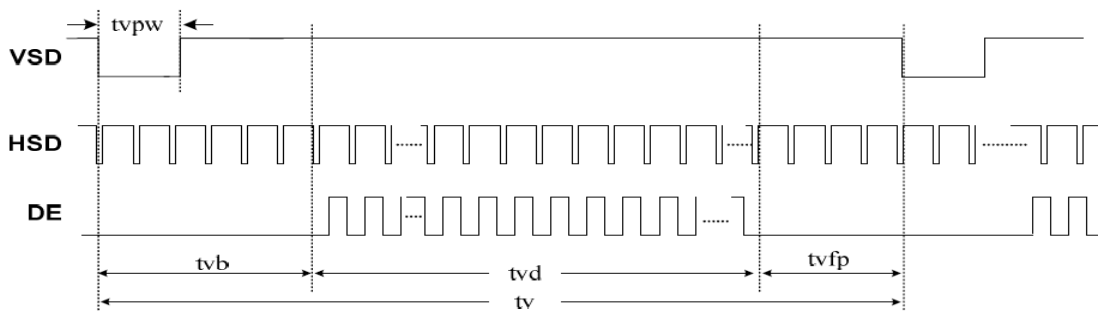
7.3.2 DE Mode Input Timing Table

Signal	Parameter	Symbol	Min.	Typ.	Max.	Unit.	Note
DCLK	CLK frequency	Fclk	-	30	50	MHz	
	CLK period	Tcph	20	-	-	ns	
	CLK pulse duty	Tcwh	40	50	60	%	
HSYNC	Horizontal Line	Th	862	1056	1200	CLK	
	HS Display Area	Thd	-	800	-	CLK	
	HS Pulse Width	Thpw	1	-	40	CLK	
	HS Back Porch	Thb	-	46	-	CLK	
	HS Front Porch	Thfp	16	210	354	CLK	
DE	DE Mode Blanking	Th-Thd	85	256	400	CLK	
VSYNC	VS Display Area	Tvd	-	480	-	th	
	VS Period Time	Tv	513	525	650	th	
	VS Pulse Width	Tvpw	3	-	20	th	
	VS Back Porch	Tvb	-	23	-	th	
	VS Front Porch	Tvfp	1	12	77	th	
DE	DE Mode Blanking	Tv-Tvd	30	45	170	th	

Horizontal input timing



Vertical input timing

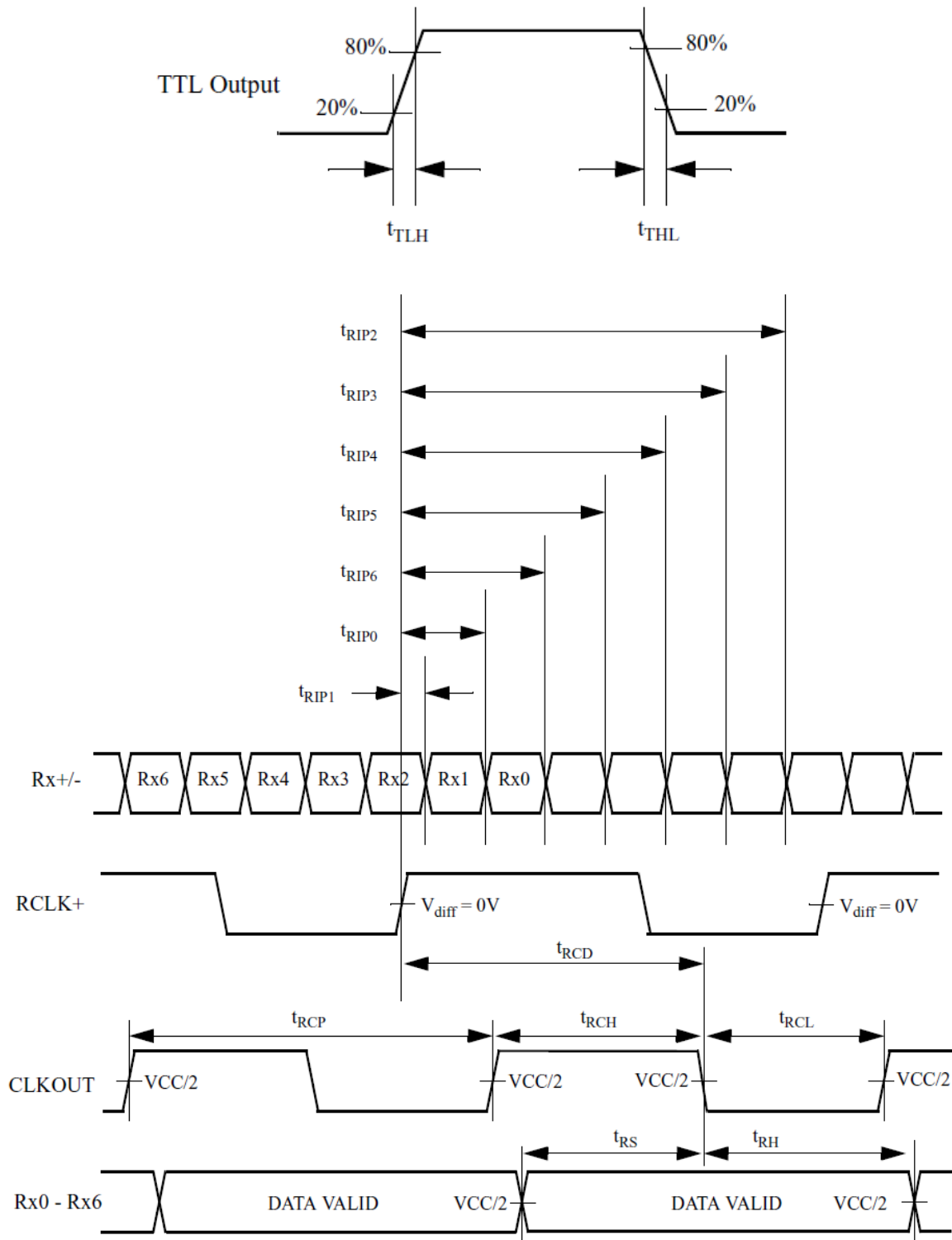


7.4 LVDS Switching Characteristics

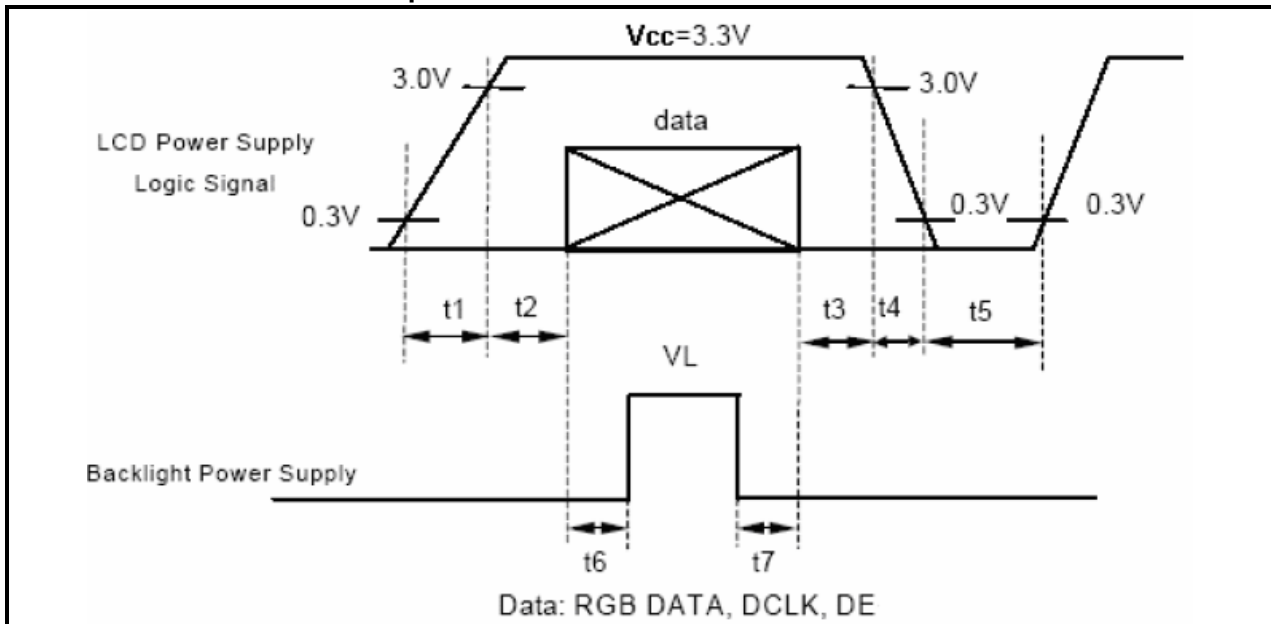
7.4.1 LVDS Timing Condition

Symbol	Parameter		Min.	Typ.	Max.	Unit	Note
tRCP	CLK OUT Period	VCC = 3.0 - 3.6V	11.76	T	50.0	ns	
		VCC = 2.5 - 3.6V	14.28	T	50.0	ns	
tRCH	CLK OUT High Time		-	4T/7	-	ns	
tRCL	CLK OUT Low Time		-	3T/7	-	ns	
tRCD	RCLK +/- to CLK OUT Delay		-	5T/7	-	ns	
tRS	TTL Data Setup to CLK OUT		0.35T-0.3	-	-	ns	
tRH	TTL Data Hold from CKL OUT		0.45T-1.6	-	-	ns	
tTLH	TTL Low to High Transition Time		-	2.0	3.0	ns	
tTHL	TTL High to Low Transition Time		-	1.8	3.0	ns	
tRIP1	Input Data Position0 (T = 11.76ns)		-0.4	0.0	0.4	ns	
tRIP0	Input Data Position1 (T = 11.76ns)		T/7-0.4	T/7	T/7+0.4	ns	
tRIP6	Input Data Position2 (T = 11.76ns)		2T/7-0.4	2T/7	2T/7+0.4	ns	
tRIP5	Input Data Position3 (T = 11.76ns)		3T/7-0.4	3T/7	3T/7+0.4	ns	
tRIP4	Input Data Position4 (T = 11.76ns)		4T/7-0.4	4T/7	4T/7+0.4	ns	
tRIP3	Input Data Position5 (T = 11.76ns)		5T/7-0.4	5T/7	5T/7+0.4	ns	
tRIP2	Input Data Position6 (T = 11.76ns)		6T/7-0.4	6T/7	6T/7+0.4	ns	
tRPLL	Phase Lock Loop Set				10.0	ms	

7.4.2 LVDS AC Timing



7.5 Power On / Off Sequence



Data: RGB DATA, DCLK, DE

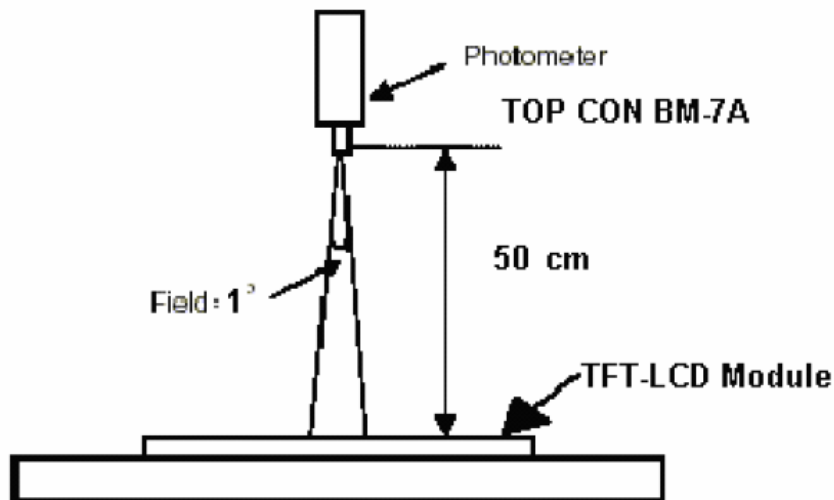
- $t1 \leq 10\text{ms} : 1 \text{ sec} \leq t5$
- $50\text{ms} \leq t2 : 200\text{ms} \leq t6$
- $0 < t3 \leq 50\text{ms} : 200\text{ms} \leq t7$
- $0 < t4 \leq 10\text{ms}$

8. OPTICAL CHARACTERISTICS

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Brightness	--	Note1, Note 3, ($\theta = 0^\circ$; Normal Viewing Angle)	1760	2200	--	cd/m ²
Uniformity	B-uni		70	75	-	%
Contrast Ratio	CR		400	500	--	--
Response Time	Tr		--	10	--	ms
	Tf	--	15	--	ms	
Color Chromaticity	White	Wx	0.260	0.310	0.360	--
		Wy	0.280	0.330	0.380	--
View angle	Horizontal	$\theta x+$	50	60	--	
		$\theta x-$	50	60	--	
	Vertical	$\theta Y+$	40	50	--	
		$\theta Y-$	50	60	--	

Note : The following optical specifications shall be measured in a darkroom or equivalent state (ambient luminance ≤ 1 lux, and at room temperature). The operation temperature is $25^\circ\text{C} \pm 2^\circ\text{C}$. The measurement method is shown in Note1.

Note1: The method of optical measurement:

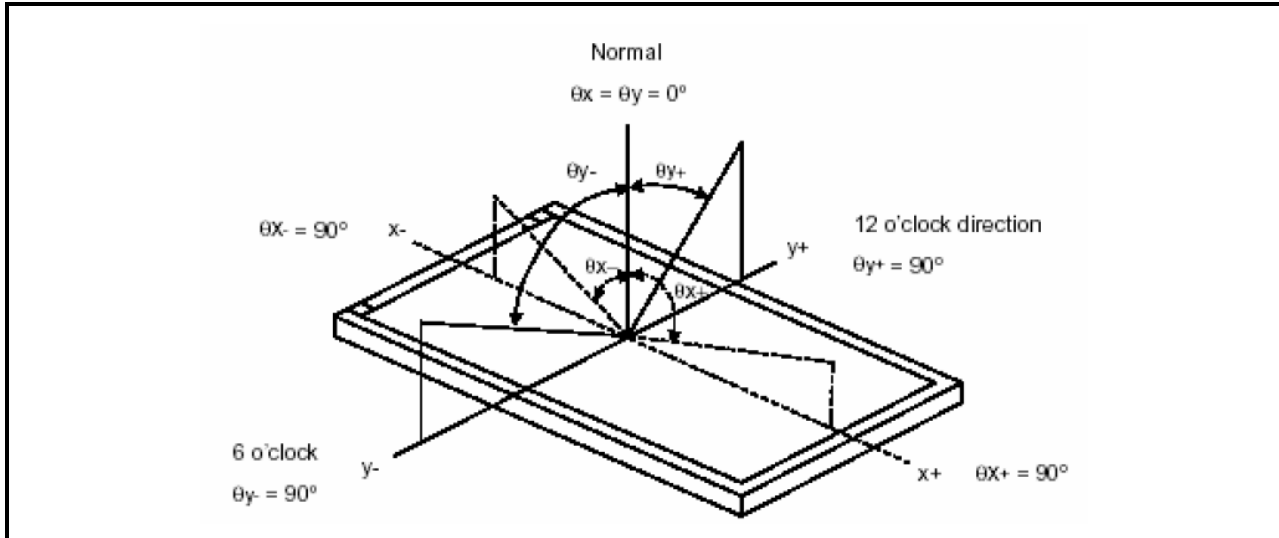


Note2: Measured at the center area of the panel and at the viewing angle of the $\theta x = \theta y = 0^\circ$

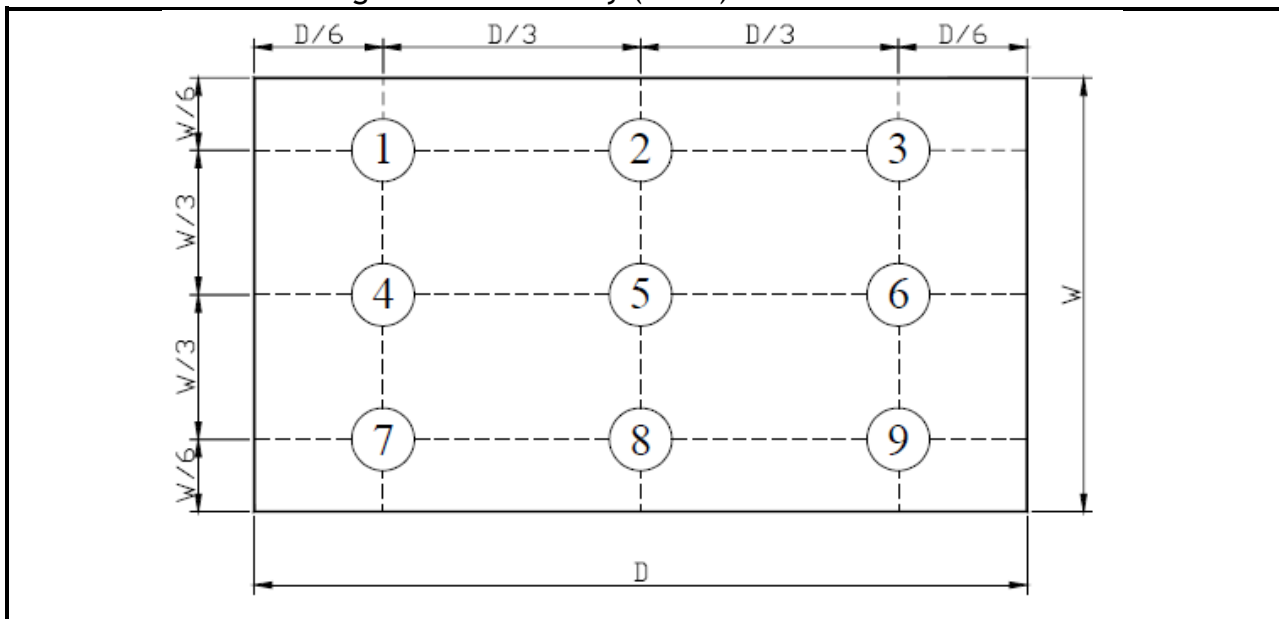
Note3: Definition of Contrast Ratio (CR):

CR = Luminance with all pixels in white state \div Luminance with all pixels in Black state

Note 4: Definition of Viewing Angle:



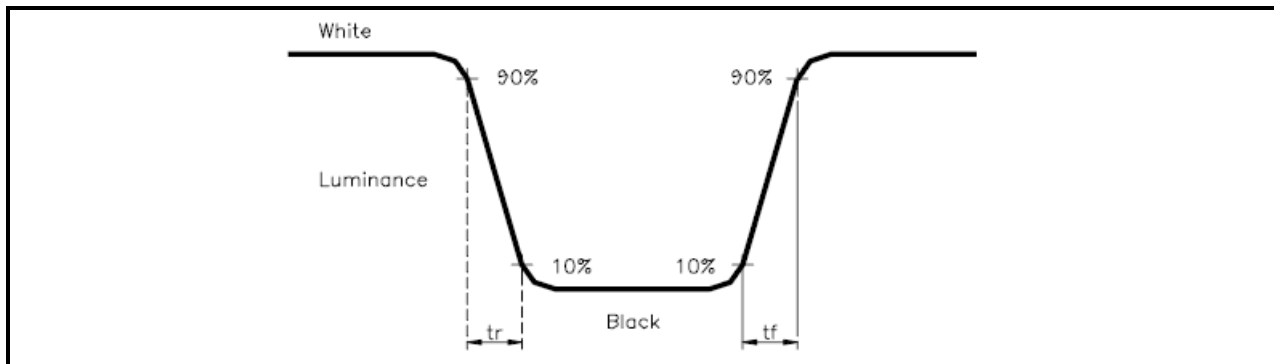
Note 5: Definition of Brightness Uniformity (B-uni):



$B\text{-uni} = (\text{Minimum luminance of 9 points} \div \text{Maximum luminance of 9 points}) \times 100\%$

Note 6: Definition of Response Time:

The Response Time is set initially by defining the “Rising Time (T_r)” and the “Falling Time (T_f)” respectively. T_r and T_f are defined as following figure



Note 7: Definition of Chromaticity:

The color coordinates (W_x, W_y) , (R_x, R_y) , (G_x, G_y) , and (B_x, B_y) are obtained with all pixels in the viewing field at white, red, green, and blue states, respectively.

9. RELIABILITY

9.1 Test Condition

9.1.1 Temperature and Humidity(Ambient Temperature)

Temperature : $25 \pm 5^{\circ}\text{C}$

Humidity : $65 \pm 5\%$

9.1.2 Operation

Unless specified otherwise, test will be conducted under function state.

9.1.3 Container

Unless specified otherwise, vibration test will be conducted to the product itself without putting it in a container.

9.1.4 Test Frequency

In case of related to deterioration such as shock test. It will be conducted only once.

9.2 TESTS

No.	ITEM	CONDITION CRITERION
1	High Temperature Storage	80°C, 120 hrs
2	Low Temperature Storage	-30°C, 120 hrs
3	High Temperature Operating	70°C, 120 hrs
4	Low Temperature Operating	-20°C, 120 hrs
5	High Temperature/Humidity Non-Operating	60°C, 90%RH, 120 hrs
6	Temperature Shock Non-Operating	-30°C \leftrightarrow 80°C (0.5hr each), 25 cycles
7	Vibration Test Non-Operating	Frequency:0 ~ 55 Hz Amplitude:1.5 mm Sweep Time:11min Test Period:6 Cycles for each Direction of X,Y,Z
8	Electro-static Discharge Non-Operating	150pF, 330Ω Air:± 8KV;Contact: ±4KV 10 times/point;4 points/panel face

Note1: The test sample have recovery time for 24 hours at room temperature before the function check. In the standard conditions, there is no any touch panel function NG issue occurred.

10. PRECAUTION RELATING PRODUCT HANDLING**10.1 SAFETY**

10.1.1 If the LCD panel breaks, be careful not to get the liquid crystal to touch your skin.

10.1.2 If the liquid crystal touches your skin or clothes, please wash it off immediately by using soap and water.

10.2 HANDLING

10.2.1 Avoid any strong mechanical shock which can break the glass.

10.2.2 Avoid static electricity which can damage the CMOS LSI—When working with the module, be sure to ground your body and any electrical equipment you may be using.

10.2.3 Do not remove the panel or frame from the module.

10.2.4 The polarizing plate of the display is very fragile. So, please handle it very carefully, Do not touch, push or rub the exposed polarizing with anything harder than an HB pencil lead (glass, tweezers , etc.)

10.2.5 Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.

10.2.6 Do not touch the display area with bare hands, this will stain the display area.

10.2.7 Do not use ketonics solvent & aromatic solvent. Use with a soft cloth soaked with a cleaning naphtha solvent.

10.2.8 To control temperature and time of soldering is $280 \pm 10^{\circ}\text{C}$ and 3-5 sec.

10.2.9 To avoid liquid (include organic solvent) stained on LCM.

10.3 STORAGE

10.3.1 Store the panel or module in a dark place where the temperature is $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ and the humidity is below 65% RH.

10.3.2 Do not place the module near organics solvents or corrosive gases.

10.3.3 Do not crush, shake, or jolt the module.

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