

8.4” SVGA
High brightness color TFT-LCD module

Model: VM08B5 V1

Date: Oct. 26th, 2023

**Note: This specification is subject to change without
notice**

Customer : _____
Date : _____

Approved	Prepared
Date:	Date:

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RECORD OF REVISION

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0.1 2012/08/15	All	First Edition for customer																																																																																																																																																																									
0.2 2019/02/12	All		New TFT cell design																																																																																																																																																																								
0.3 2023/10/26	11	<table border="1"> <thead> <tr> <th rowspan="2">Item</th> <th rowspan="2">Symbol</th> <th colspan="3">Value</th> <th rowspan="2">Unit</th> <th rowspan="2">Note</th> </tr> <tr> <th>Min</th> <th>Typ</th> <th>Max</th> </tr> </thead> <tbody> <tr> <td>Power Supply to LCD</td> <td>V_{CC}</td> <td>3.0</td> <td>3.3</td> <td>3.6</td> <td>V</td> <td></td> </tr> <tr> <td>Power Supply to LED Backlight (V)</td> <td>V_{LB}</td> <td>4.7</td> <td>5.0</td> <td>5.5</td> <td>V</td> <td></td> </tr> <tr> <td>Power Supply to LED Backlight (I)</td> <td>I_{LB}</td> <td>1.04</td> <td>1.3</td> <td>1.65</td> <td>A</td> <td>V_{LB}=5.0V I_{LB}max=19.5V I_{LB}min=130mA</td> </tr> <tr> <td>Forward Current of LED String I</td> <td>I_{LED}</td> <td>-</td> <td>100</td> <td>-</td> <td>mA</td> <td></td> </tr> <tr> <td>Differential Input High Threshold</td> <td>V_{TH}(V_{OH})</td> <td>-</td> <td>-</td> <td>100</td> <td>mV</td> <td></td> </tr> <tr> <td>Differential Input Low Threshold</td> <td>V_{TH}(V_{OL})</td> <td>-100</td> <td>-</td> <td>-</td> <td>mV</td> <td>Note 1</td> </tr> <tr> <td>Digital Current Consumption</td> <td>I_{CC}</td> <td>-</td> <td>100</td> <td>120</td> <td>mA</td> <td></td> </tr> <tr> <td>Threshold Enable</td> <td>V_{TH}(en)</td> <td>2.0</td> <td>-</td> <td>-</td> <td>V</td> <td></td> </tr> <tr> <td>Threshold Disable</td> <td>V_{TH}(dis)</td> <td>-</td> <td>-</td> <td>0.6</td> <td>V</td> <td></td> </tr> <tr> <td>PWM Dimming Range</td> <td>D</td> <td>10</td> <td>-</td> <td>100</td> <td>%</td> <td>When Duty Ratio = 0%, the backlight will be turned off.</td> </tr> </tbody> </table>	Item	Symbol	Value			Unit	Note	Min	Typ	Max	Power Supply to LCD	V _{CC}	3.0	3.3	3.6	V		Power Supply to LED Backlight (V)	V _{LB}	4.7	5.0	5.5	V		Power Supply to LED Backlight (I)	I _{LB}	1.04	1.3	1.65	A	V _{LB} =5.0V I _{LB} max=19.5V I _{LB} min=130mA	Forward Current of LED String I	I _{LED}	-	100	-	mA		Differential Input High Threshold	V _{TH} (V _{OH})	-	-	100	mV		Differential Input Low Threshold	V _{TH} (V _{OL})	-100	-	-	mV	Note 1	Digital Current Consumption	I _{CC}	-	100	120	mA		Threshold Enable	V _{TH} (en)	2.0	-	-	V		Threshold Disable	V _{TH} (dis)	-	-	0.6	V		PWM Dimming Range	D	10	-	100	%	When Duty Ratio = 0%, the backlight will be turned off.	<table border="1"> <thead> <tr> <th rowspan="2">Item</th> <th rowspan="2">Symbol</th> <th colspan="3">Value</th> <th rowspan="2">Unit</th> <th rowspan="2">Note</th> </tr> <tr> <th>Min</th> <th>Typ</th> <th>Max</th> </tr> </thead> <tbody> <tr> <td>Power Supply to LCD</td> <td>V_{CC}</td> <td>3.0</td> <td>3.3</td> <td>3.6</td> <td>V</td> <td></td> </tr> <tr> <td>Power Supply to LED Backlight (V)</td> <td>V_{LB}</td> <td>4.7</td> <td>5.0</td> <td>5.5</td> <td>V</td> <td></td> </tr> <tr> <td>Power Supply to LED Backlight (I)</td> <td>I_{LB}</td> <td>1.04</td> <td>1.3</td> <td>1.65</td> <td>A</td> <td>V_{LB}=5.0V I_{LB}max=19.5V I_{LB}min=130mA</td> </tr> <tr> <td>Forward Current of LED String I</td> <td>I_{LED}</td> <td>-</td> <td>100</td> <td>-</td> <td>mA</td> <td></td> </tr> <tr> <td>Differential Input High Threshold</td> <td>V_{TH}(V_{OH})</td> <td>-</td> <td>-</td> <td>100</td> <td>mV</td> <td></td> </tr> <tr> <td>Differential Input Low Threshold</td> <td>V_{TH}(V_{OL})</td> <td>-100</td> <td>-</td> <td>-</td> <td>mV</td> <td>Note 1</td> </tr> <tr> <td>Digital Current Consumption</td> <td>I_{CC}</td> <td>-</td> <td>100</td> <td>120</td> <td>mA</td> <td></td> </tr> <tr> <td>Threshold Enable</td> <td>V_{TH}(en)</td> <td>2.0</td> <td>-</td> <td>-</td> <td>V</td> <td></td> </tr> <tr> <td>Threshold Disable</td> <td>V_{TH}(dis)</td> <td>-</td> <td>-</td> <td>0.6</td> <td>V</td> <td></td> </tr> <tr> <td>PWM Dimming Range</td> <td>D</td> <td>10</td> <td>-</td> <td>100</td> <td>%</td> <td>When Duty Ratio = 0%, the backlight will be turned off.</td> </tr> <tr> <td>LED backlight life (MTBF)</td> <td>Hours</td> <td>-</td> <td>80,000</td> <td>-</td> <td>-</td> <td></td> </tr> </tbody> </table>	Item	Symbol	Value			Unit	Note	Min	Typ	Max	Power Supply to LCD	V _{CC}	3.0	3.3	3.6	V		Power Supply to LED Backlight (V)	V _{LB}	4.7	5.0	5.5	V		Power Supply to LED Backlight (I)	I _{LB}	1.04	1.3	1.65	A	V _{LB} =5.0V I _{LB} max=19.5V I _{LB} min=130mA	Forward Current of LED String I	I _{LED}	-	100	-	mA		Differential Input High Threshold	V _{TH} (V _{OH})	-	-	100	mV		Differential Input Low Threshold	V _{TH} (V _{OL})	-100	-	-	mV	Note 1	Digital Current Consumption	I _{CC}	-	100	120	mA		Threshold Enable	V _{TH} (en)	2.0	-	-	V		Threshold Disable	V _{TH} (dis)	-	-	0.6	V		PWM Dimming Range	D	10	-	100	%	When Duty Ratio = 0%, the backlight will be turned off.	LED backlight life (MTBF)	Hours	-	80,000	-	-		
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1. Handling Precautions

- 1) Since front polarizer is easily damaged, pay attention not to scratch it.
- 2) Be sure to turn off power supply when inserting or disconnecting from input connector.
- 3) Wipe off water drop immediately. Long contact with water may cause discoloration or spots.
- 4) When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.
- 5) Since the panel is made of glass, it may break or crack if dropped or bumped on hard surface.
- 6) Since CMOS LSI is used in this module, take care of static electricity and insure human earth when handling.
- 7) Do not open or modify the Module Assembly.
- 8) Do not press the reflector sheet at the back of the module to any directions.
- 9) At the insertion or removal of the Signal Interface Connector, be sure not to rotate nor tilt the Interface Connector of the TFT Module.
- 10) After installation of the TFT Module into an enclosure, do not twist nor bend the TFT Module even momentary. At designing the enclosure, it should be taken into consideration that no bending/twisting forces are applied to the TFT Module from outside. Otherwise the TFT Module may be damaged.

2. General Description

2.1 Overview

This specification applies to the 8.4" Color Active Matrix Liquid Crystal Display composed of a TFT-LCD display a LED backlight system. The screen format is intended to support SVGA (800(H) x 600(V)) 16.2M colors.

LED driving board for backlight unit is not included.

2.2 Features

- Sunlight readable display, 1000nits by LED backlight.
- LVDS interface with LED backlight driver integration
- Wide viewing angle
- Low power consumption
- Wide operation temperature
- RoHS Compliance

2.3 Application

Industrial Application; especial kiosk and digital signage display.

2.4 Display specifications

Items	Unit	Specification
Screen Diagonal	inch	8.4
Active Area	mm	170.4 (H) x 127.8 (V)
Pixels H x V	pixels	800 x3(RGB) x 600
Pixels Pitch	um	213 (per one triad) x 213
Pixel Arrangement		RGB Vertical stripe
Display mode		Normally white
White luminance (center)	Cd/m ²	1000 (Typ.)
Contrast ratio		600 (Typ.)
Optical Response Time	msec	8 ms (Typ. on/off)
Normal Input Voltage Vcc	Volt	3.3
Power Consumption (Vcc Line + LED backlight)	Watt	7W (Vcc line=0.5W , LED line=6.5 W)
Weight	Grams	TBD
Physical size	mm	203.0(H) x 143.5(V) x 8.0(D) (typ)
Electrical Interface		One Chanel LVDS
Support Colors		16.2 M colors
Surface Treatment		Anti-Glare, 3H
Temperature range		
Operating	°C	-20~ 70 (TFT surface)
Storage (Shipping)	°C	-30 ~ 80
RoHS Compliance		RoHS Compliance

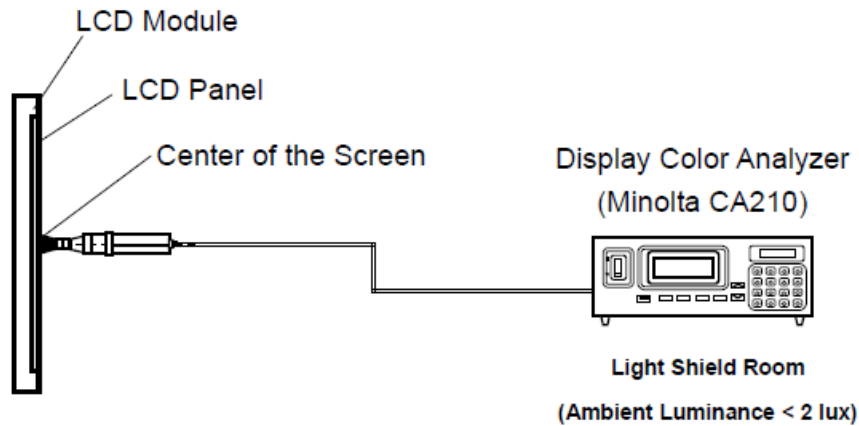
2.5 Optical characteristics

The following optical characteristics are measured under stable condition at 25 °C

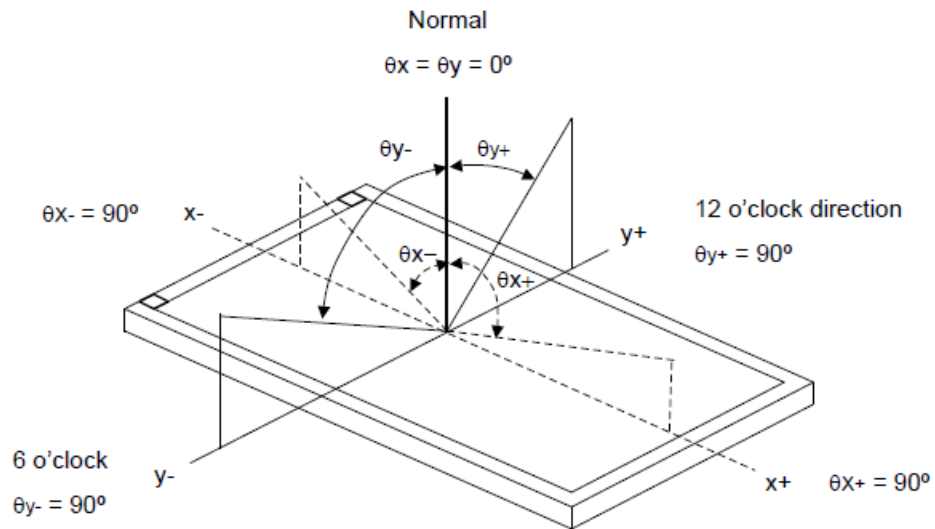
Items	Unit	Conditions	Min.	Typ.	Max.	Note
Viewing angle	Deg.	Horizontal (Right)	65	75		2
		CR=10 (Left)	65	75		
		Vertical (Up)	50	60		
		CR=10 (Down)	60	70		
Contrast Ratio		Normal Direction	480	600		3
Response Time	msec	Raising + Falling		8		4
Color coordinates (CIE) White		White x	-0.05	0.290	+0.05	5
		White y		0.300		
Center Luminance	Cd/m ²		800	1000		6
Luminance Uniformity	%		70	75		7
Crosstalk (in 60 Hz)	%				1.5	
Flicker	dB				-20	

Note 1: Measurement method

The LCD module should be stabilized at given temperature for 0.5 hour to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 1 hour in a windless room.



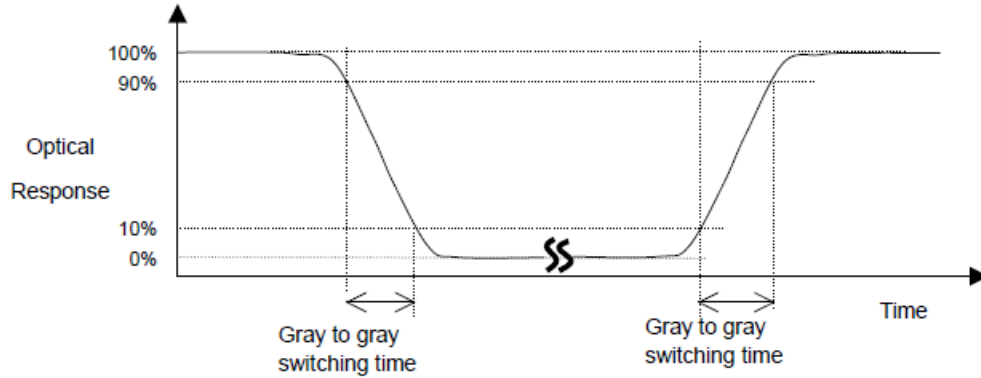
Note 2: Definition of viewing angle



Note 3: Contrast ratio is measured by Minolta CA 210

Note 4: Definition of Response time

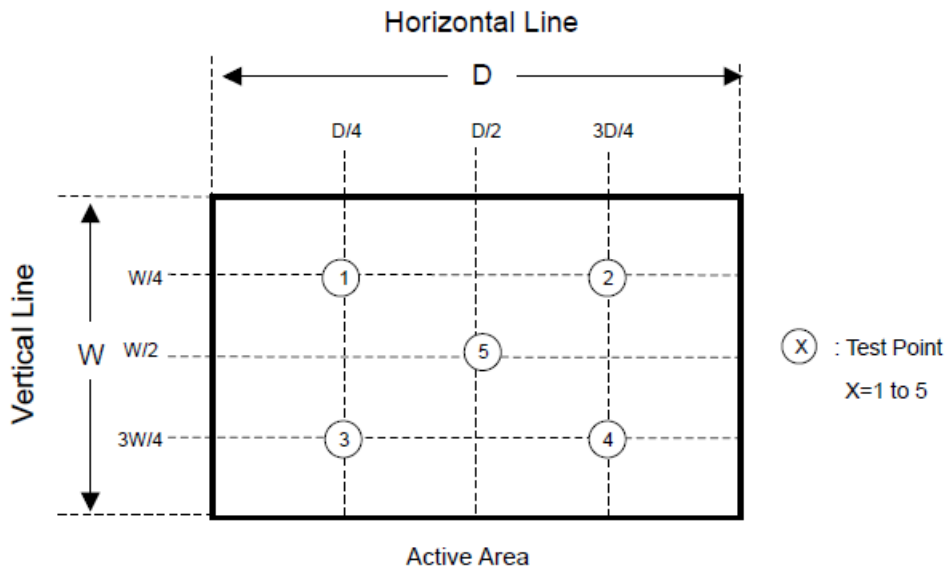
The output signals of photo detector are measured when the input signals are changed from “Full Black” to “Full White” (rising time), and from “Full White” to “Full Black” (falling time), respectively. The response time is interval between the 10% and 90% of amplitudes. Please refer to the figure as below.



Note 5: Color chromaticity and coordinates (CIE) is measured by Minolta CA 210

Note 6: Center luminance is measured by Minolta CA 210

Note 7: Luminance uniformity of these 5 points is defined as below and measured by Minolta CA 210



$$\text{Uniformity} = (\text{Min. Luminance of 5 points}) / (\text{Max. Luminance of 5 points})$$

3. Absolute Maximum Ratings

Absolute maximum ratings of the module are as following:

3.1 TFT LCD module

Items	Symbol	Min	Max	Unit	Conditions
Logic input voltage	V _{DD}	-	4.6	Volt	
Input BLU power	V _{LED}	-	5.5	Volt	

3.2 Environment

Items	Symbol	Values			Unit	Conditions
		Min.	Typ.	Max.		
Operation temperature	T _{OP}	-20	-	70	°C	Note 3
Operation Humidity	H _{OP}	20		80	%	
Storage temperature	T _{ST}	-30		80	°C	
Storage Humidity	H _{ST}	30		80	%	

Note 1: With in Ta= 25°C

Note 2: Permanent damage to the device may occur if exceed maximum values

Note 3: For quality performance, please refer to IIS (Incoming Inspection Standard).

4. Electrical Characteristics

4.1 TFT LCD module

4.1.1 Power Specification

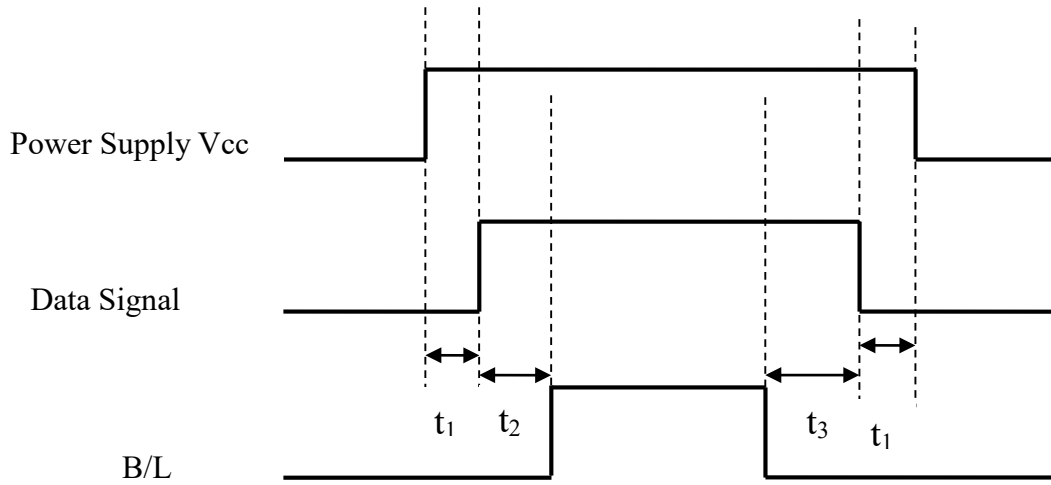
Item	Symbol	Value			Unit	Note
		Min	Typ.	Max		
Power Supply to LCD	V _{CC}	3.0	3.3	3.6	V	
Power Supply to LED Backlight (V)	V _{LB}	4.7	5.0	5.5	V	
Power Supply to LED Backlight (I)	I _{LB}	1.04	1.3	1.65	A	V _{LB} =5.0V V _{F(LED)} =19.5V I _{F(LED)} =330mA
Forward Current of LED String t	I _{F(LED)}		190		mA	
Differential Input High Threshold	V _{THLVDS}	—	—	100	mV	Note 1
Differential Input Low Threshold	V _{TLLVDS}	-100	—	—	mV	
Digital Current Consumption	I _{CC}	-	100	120	mA	
Threshold Enable	V _{DIMH}	2.0	-	-	V	
Threshold Disable	V _{DIML}	-	-	0.6	V	
PWM Dimming Range	D	10	-	100	%	When Duty Ratio = 0%, the backlight will be turned off.
LED backlight life (MTBF)	Hours		80,000			

4.2 Interface connection

CN1: Hirose DF19G-20P-1.25H or equivalent

Pin No	Symbol	Description	Remark
1	VCC	Power supply +3.3V	
2	VCC	Power supply +3.3V	
3	GND	Power ground	
4	GND	Power ground	
5	IN0-	Negative LVDS differential data input	
6	IN0+	Positive LVDS differential data input	
7	GND	Power ground	
8	IN1-	Negative LVDS differential data input	
9	IN1+	Positive LVDS differential data input	
10	GND	Power ground	
11	IN2-	Negative LVDS differential data input	
12	IN2+	Positive LVDS differential data input	
13	GND	Power ground	
14	CLK-	Negative LVDS differential clock input	
15	CLK+	Positive LVDS differential clock input	
16	GND	Power ground	
17	VLED	LED Power supply +5V	
18	VLED	LED Power supply +5V	
19	Enable	Backlight Enable	
20	ADJ	Backlight Dimming (Analog)	

4.3 Power sequence



- Note 1. $t_1 > 50\text{mSec}$
- $t_2 > 200\text{mSec}$
- $t_3 > 200\text{mSec}$

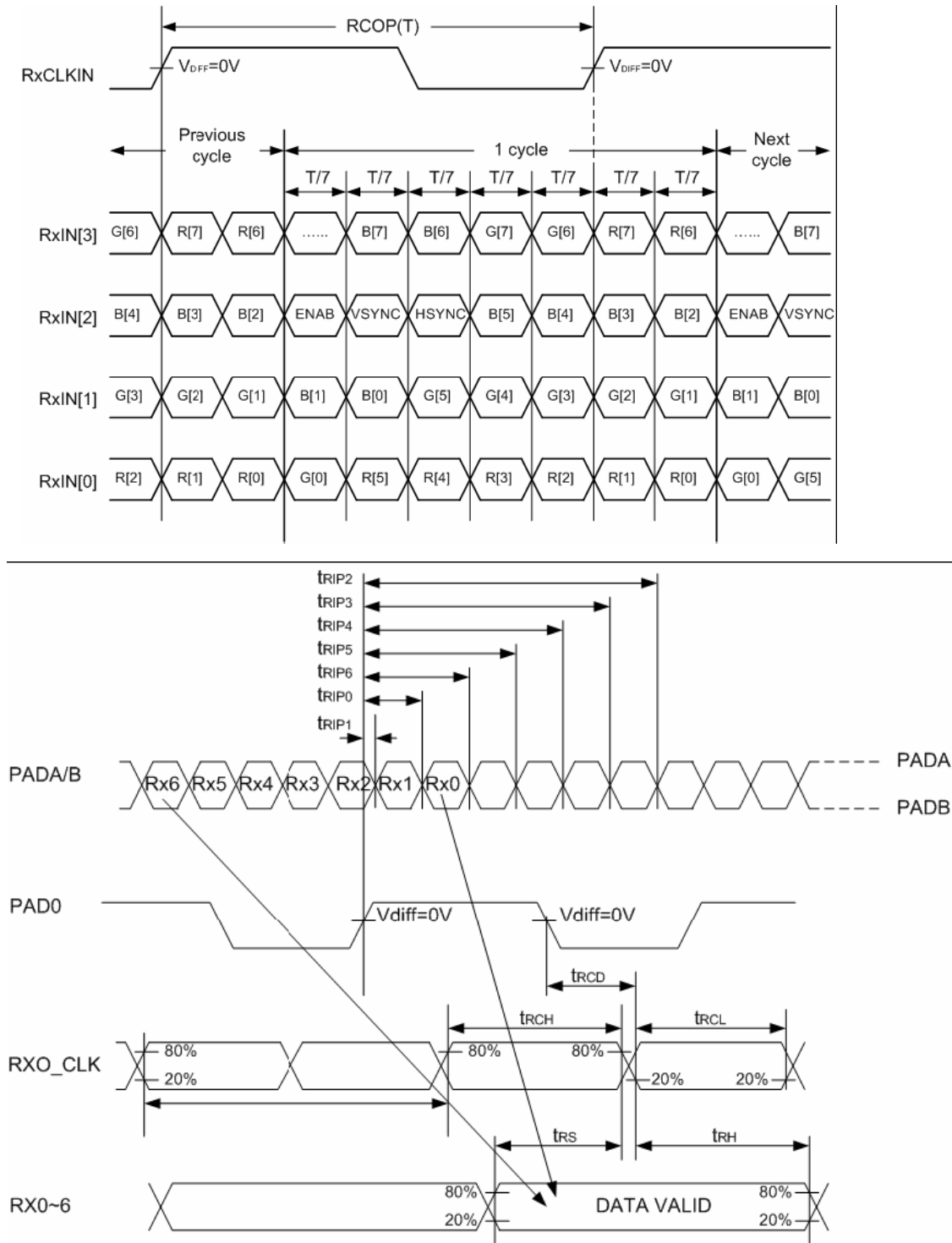
Note2. Data Signals include Rin0+, Rin0-, Rin1+, Rin1-, Rin2+, Rin2-, Rin3+, Rin3-, CLKIN+,CLKIN-,

5. Timing conditions

Item	Symbol	Min.	Typ.	Max.	Unit	Note
RxCLKIN Period	t_{RCP}	11.76	T	50	ns	
RxCLKIN High Time	t_{RCH}	—	T/2	—	ns	
RxCLKIN Low Time	t_{RCL}	—	T/2	—	ns	
PAD0/1 to RxCLKIN Delay	t_{RCD}	—	3T/7	—	ns	
Data Setup to RxCLKIN	t_{RS}	1.9	—	—	ns	
Data Hold from RxCLKIN	t_{RH}	3.0	—	—	ns	
Input Data Position0 (T=11.76ns)	T_{RIP1}	-0.4	0	0.4	ns	
Input Data Position1 (T=11.76ns)	T_{RIP2}	T/7-0.4	T/7	T/7+0.4	ns	
Input Data Position2 (T=11.76ns)	T_{RIP3}	2T/7-0.4	2T/7	2T/7+0.4	ns	
Input Data Position3 (T=11.76ns)	T_{RIP4}	3T/7-0.4	3T/7	3T/7+0.4	ns	
Input Data Position4 (T=11.76ns)	T_{RIP5}	4T/7-0.4	4T/7	4T/7+0.4	ns	
Input Data Position5 (T=11.76ns)	T_{RIP6}	5T/7-0.4	5T/7	5T/7+0.4	ns	
Input Data Position6 (T=11.76ns)	T_{RIP7}	6T/7-0.4	6T/7	6T/7+0.4	ns	

6. Timing diagram

R/G/B[7]s are MSBs and R/G/B[0]s are LSBs



7. Reliability Test

Environment test conditions are listed as following table.

Items	Required Condition	Note
Temperature Humidity Bias (THB)	Ta= 50°C, 80%RH, 240hours	
High Temperature Operation (HTO)	Ta= 70°C, 240hours	3
Low Temperature Operation (LTO)	Ta= -20°C, 240hours	
High Temperature Storage (HTS)	Ta= 80°C, 240hours	
Low Temperature Storage (LTS)	Ta= -30°C, 240hours	
Thermal Shock Test (TST)	-10°C/30min, 60°C/30min, 100 cycles	
On/Off Test	On/10sec, Off/10sec, 30,000 cycles	
ESD (ElectroStatic Discharge)	Contact Discharge: ± 4KV, 150pF(330Ω) 1sec/cycle	
	Air Discharge: ± 8KV, 150pF(330Ω) 1sec/cycle	

Note 1: The TFT-LCD module will not sustain damage after being subjected to 100 cycles of rapid temperature change. A cycle of rapid temperature change consists of varying the temperature from -20°C to 60°C, and back again. Power is not applied during the test. After temperature cycling, the unit is placed in normal room ambient for at least 4 hours before power on.

Note 2: According to EN61000-4-2 , ESD class B: Some performance degradation allowed. No data lost. Self-recoverable. No hardware failures.

Note 3: TFT surface.

Note 4: There should be no condensation on the surface of panel during test.

Note 5: In the standard conditions, there is no function failure issue occurred. All the cosmetic specification is judged before reliability test.

Note 6: Before cosmetic and function test, the product must have enough recovery time, at least 4 hours at room temperature.

**8. Shipping package
(TBD)**

9. Mechanical Characteristics

