



7.5"

High brightness color TFT-LCD module

Model: 7.5" HBM

Date: 8th, 2011

Note: This specification is subject to change without notice

Customer : _____

Date : _____

Approved

Prepared

Date:

Date:

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RECORD OF REVISION

Version and Date	Page	Old description	New description	Remark
0.1 2011/12/08	All	First Edition for customer		

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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.

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2. General Description

2.1, Overview

This specification applies to the 10.4 inch color TFT-LCD module with brightness enhanced backlight and 1-ch LVDS interface. The screen format is intended to support SVGA (800(H) x 600(V)) screen and 262K colors (RGB 6-bits). All input signals are LVDS interface compatible.

2.2 Features

- Sunlight readable display, 1000nits.
- LED backlight
- Wide operation temperature
- RoHS Compliance

2.3 Application

Industrial Application; especial kiosk and digital signage display.

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2.4 Display Specifications

Items	Unit	Specification
Screen Diagonal	inch	10.4
Active Area	mm	211.2 (H) x 158.4 (V)
Pixels H x V	pixels	800x3(RGB) x 600
Pixels Pitch	um	264 (per one triad) x 264
Pixel Arrangement		RGB Vertical stripe
Display mode		TN mode, normally white
White luminance (center)	Cd/m ²	1000 (Typ.)
Contrast ratio		400 (Typ.)
Optical Response Time	msec	25 ms (Typ. on/off)
Normal Input Voltage VDD	Volt	3.3
Power Consumption (VDD Line + LED backlight)	Watt	6.204 (Typ.)
Weight	Grams	288 (Typ.)
Physical size	mm	236.0(H)x 176.9(V) x 5.6 (D) (typ.)
Electrical Interface		One Chanel LVDS
Support Colors		262k colors
Surface Treatment		Anti-Glare, 3H
Temperature range		
Operating	°C	-20 ~ 70(LCD surface temperature)
Storage (Shipping)	°C	-30 ~ 80
RoHS Compliance		RoHS Compliance

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2.5 Optical Characteristics

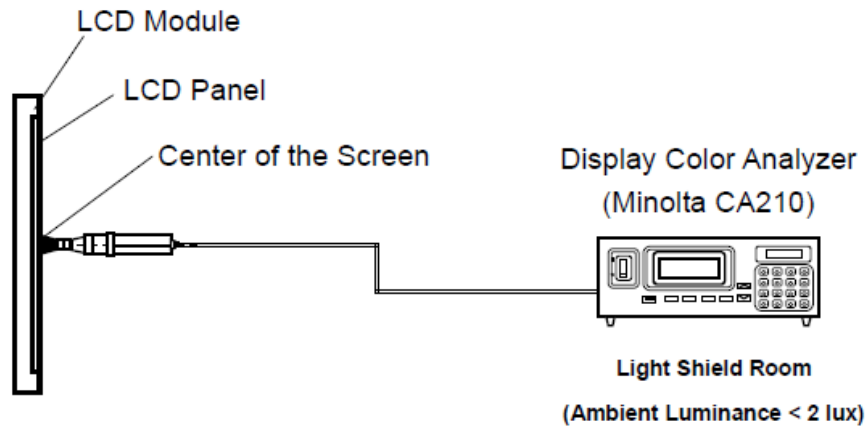
The following optical characteristics are measured under stable condition at 25 °C

Items	Unit	Conditions	Min.	Typ.	Max.	Note
Viewing angle	Deg.	Horizontal (Right)	55	65		2
		CR \geq 10 (Left)	55	65		
		Vertical (Up)	35	45		
		CR \geq 10 (Down)	55	65		
Contrast Ratio		Normal Direction		400		3
Response Time	msec	Raising time (T_{rR})		10	15	4
		Falling time (T_{rF})		15	25	
		Raising + Falling		25	40	
Color / Chromaticity Coordinates (CIE)		Red x	-0.03	-	+0.03	5
		Red y		-		
		Green x		-		
		Green y		-		
		Blue x		-		
		Blue y		-		
Color coordinates (CIE) White		White x		0.311		
		White y		0.330		
Center Luminance	Cd/m ²		800	1000		6
Luminance Uniformity	%		70	75		7
Crosstalk (in 60 Hz)	%				1.5	
Flicker	dB				-20	

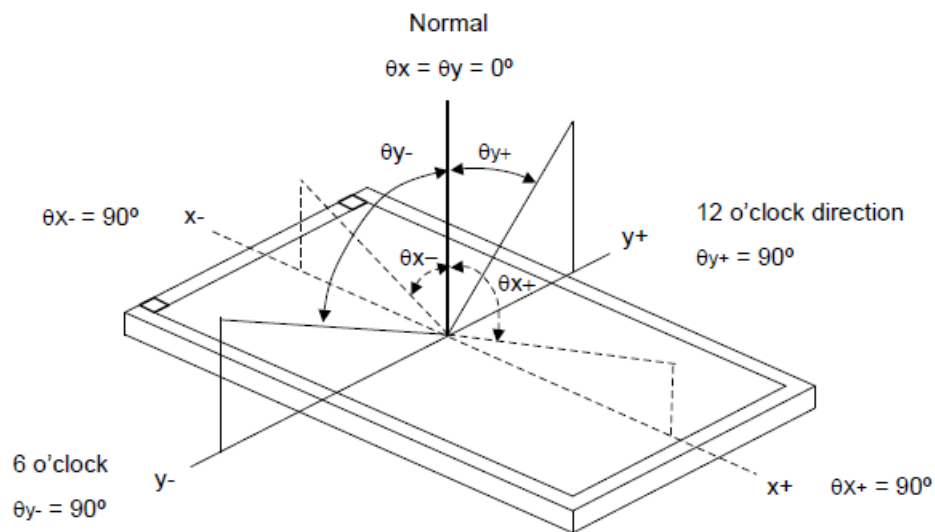
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Note 1: Measurement method

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



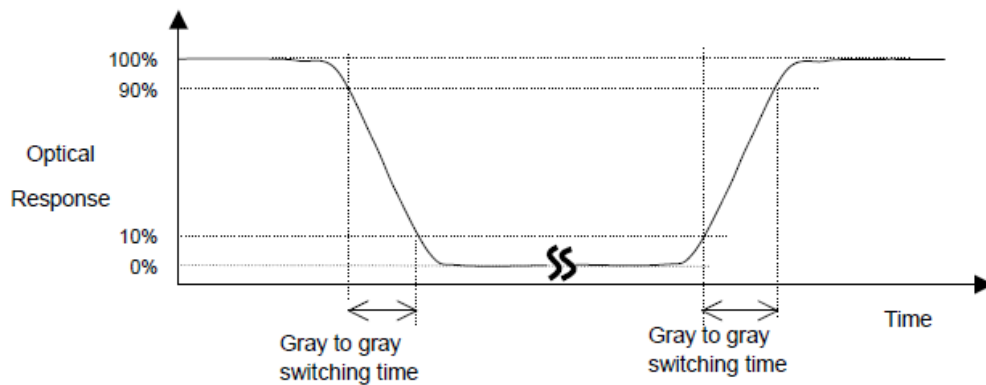
Note 3: Contrast ratio is measured by Minta BM-7

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Note 4: Definition of Response time

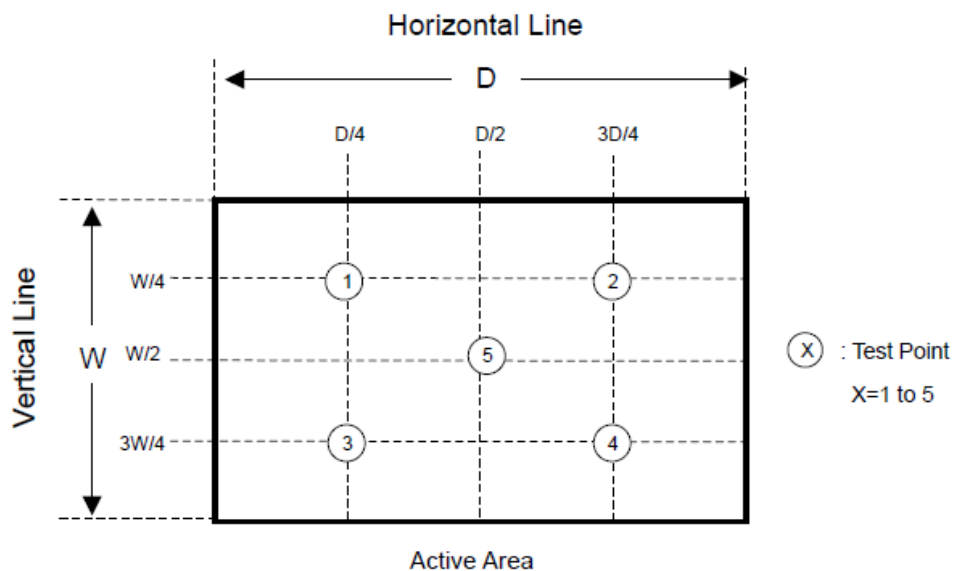
The output signals of photo detector are measured when the input signals are changed from "Full Black" to "Full White" (rising time), and from "Full White" to "Full Black" (falling time), respectively. The response time is interval between the 10% and 90% of amplitudes. Please refer to the figure as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



Note 5: Color chromaticity and coordinates (CIE) is measured by Minta BM-7

Note 6: Center luminance is measured by Minta BM-7

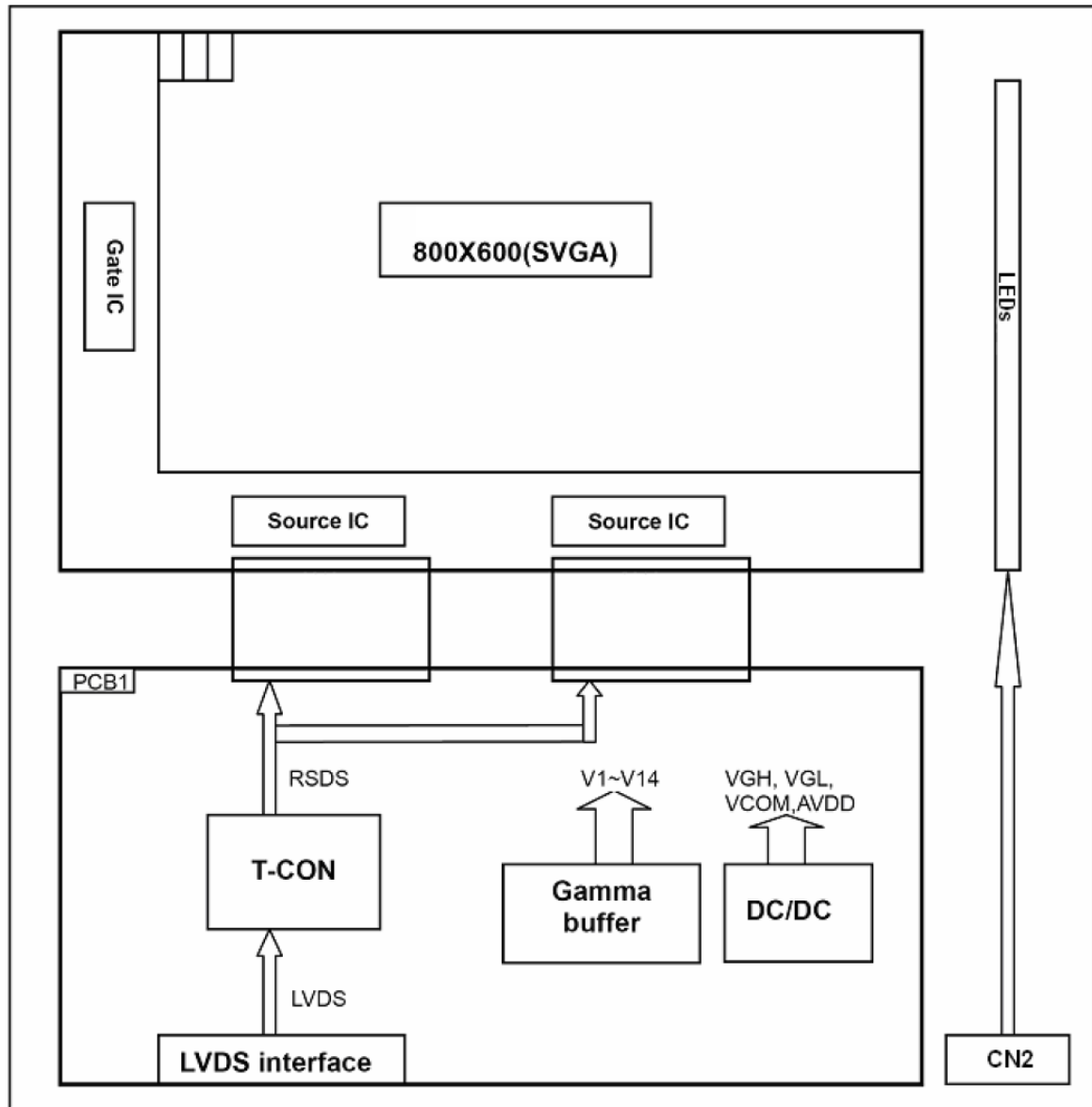
Note 7: Luminance uniformity of these 5 points is defined as below and measured by Minta BM-7



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

3. Functional Block Diagram

The following diagram shows the functional block of the 10.4 inches Color TFT-LCD Module:



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4. Absolute Maximum Ratings

Absolute maximum ratings of the module are as following:

4.1 TFT LCD Module

Items	Symbol	Min	Max	Unit	Conditions
Logic/ LCD drive voltage	V _{in}	-0.3	3.6	Volt	Note 1, 2

4.2 Backlight unit

Items	Symbol	Min	Max	Unit	Conditions
LED Current	I _{LED}	--	360	mA	Note 1, 2

4.3 Absolute Ratings of Environment

Items	Symbol	Values			Unit	Conditions
		Min.	Typ.	Max.		
Operation temperature	T _{OP}	-20	-	70	°C	Note 3
Operation Humidity	H _{OP}	5		90	%	
Storage temperature	T _{ST}	-30		80	°C	
Storage Humidity	H _{ST}	5		90	%	

Note 1: With in T_a= 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).

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5. Electrical characteristics

5.1 TFT LCD Module

GND=0V, Ta=25°C

Item	Symbol	Min	Typ	Max	Unit	Remark
LVDS Differential input high threshold	V_{TH}	-	-	+100	mV	$V_{CMLVDS}=1.2V$
LVDS Differential input low threshold	V_{TL}	-100	-	-	mV	$V_{CMLVDS}=1.2V$
Differential input voltage	$ V_{ID} $	0.1	-	0.6	V	
LVDS input common mode voltage	V_{CMLVDS}	$ V_{ID} /2$	-	$1.4-(V_{ID} /2)$	V	
Input current	I_{IN}	-10	-	10	μA	
Supply Voltage	VDD	3.0	3.3	3.6	V	
Common Electrode Driving Signal	VCOM	-	4.36	-	V	Note1
Sync Frequency	FVD	-	60	70	Hz	
VDD Power Consumption	I_{DD}	-	260	380	mA	Note2

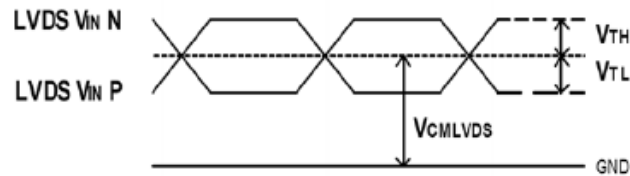


Figure LVDS DC timing diagram

Note1: The value may be different for different LCM.

Note2: To test the current dissipation, using the "color bar" testing pattern shown as below:

1. White
2. Yellow
3. Cyan
4. Green
5. Magenta
6. Red
7. Blue
8. Black

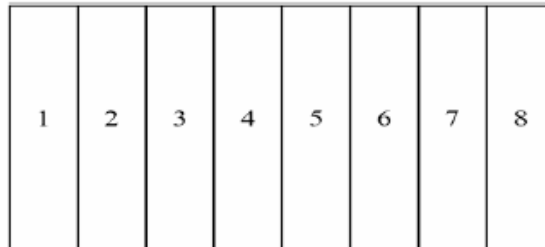


Figure Current dissipation testing pattern

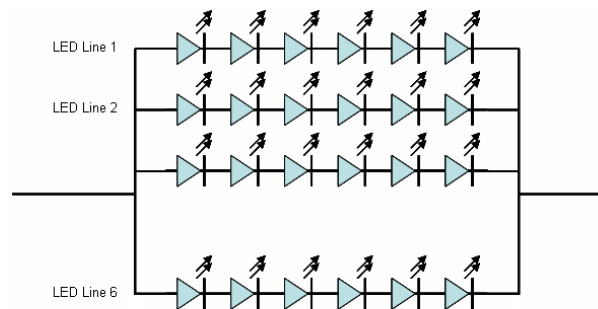
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5.2 Backlight Unit

The backlight (LED module, Note 1) is suggested to drive by constant current with typical value.

Parameter	Symbol	Min	Typ.	Max.	Uni	Remark
LED light bar Current	I	-	270	360	mA	
LED light bar voltage	V		19.8		V	
Power Consumption	P	-	5.346		W	Note 1
LED Life Time	L		30,000	-	Hr	Note 2, 3

Note 1: The LED driving condition is defined for LED module (36 LED). The Voltage range will be 18.5V to 19.9V based on suggested driving current set as 270mA.



Note 2: Define “LED Lifetime”: brightness is decreased to 50% of the initial value. LED Lifetime is restricted under normal condition, ambient temperature = 25°C and LED light bar current = 270mA.

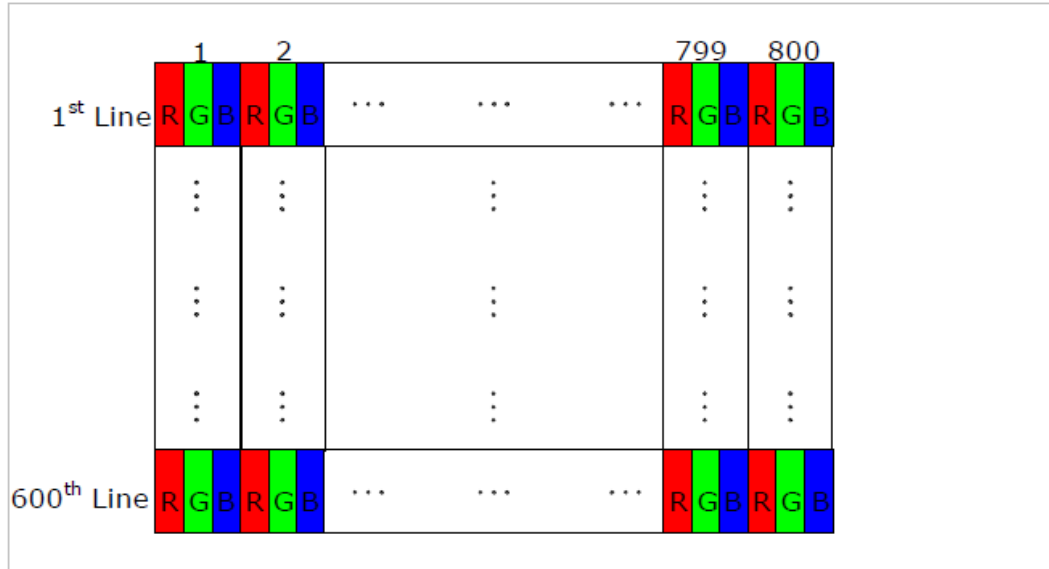
Note 3: If it uses larger LED light bar current more than 270mA, it maybe decreases the LED lifetime.

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6. Signal Characteristic

6.1 Pixel Format Image

Following figure shows the relationship of the input signals and LCD pixel format.



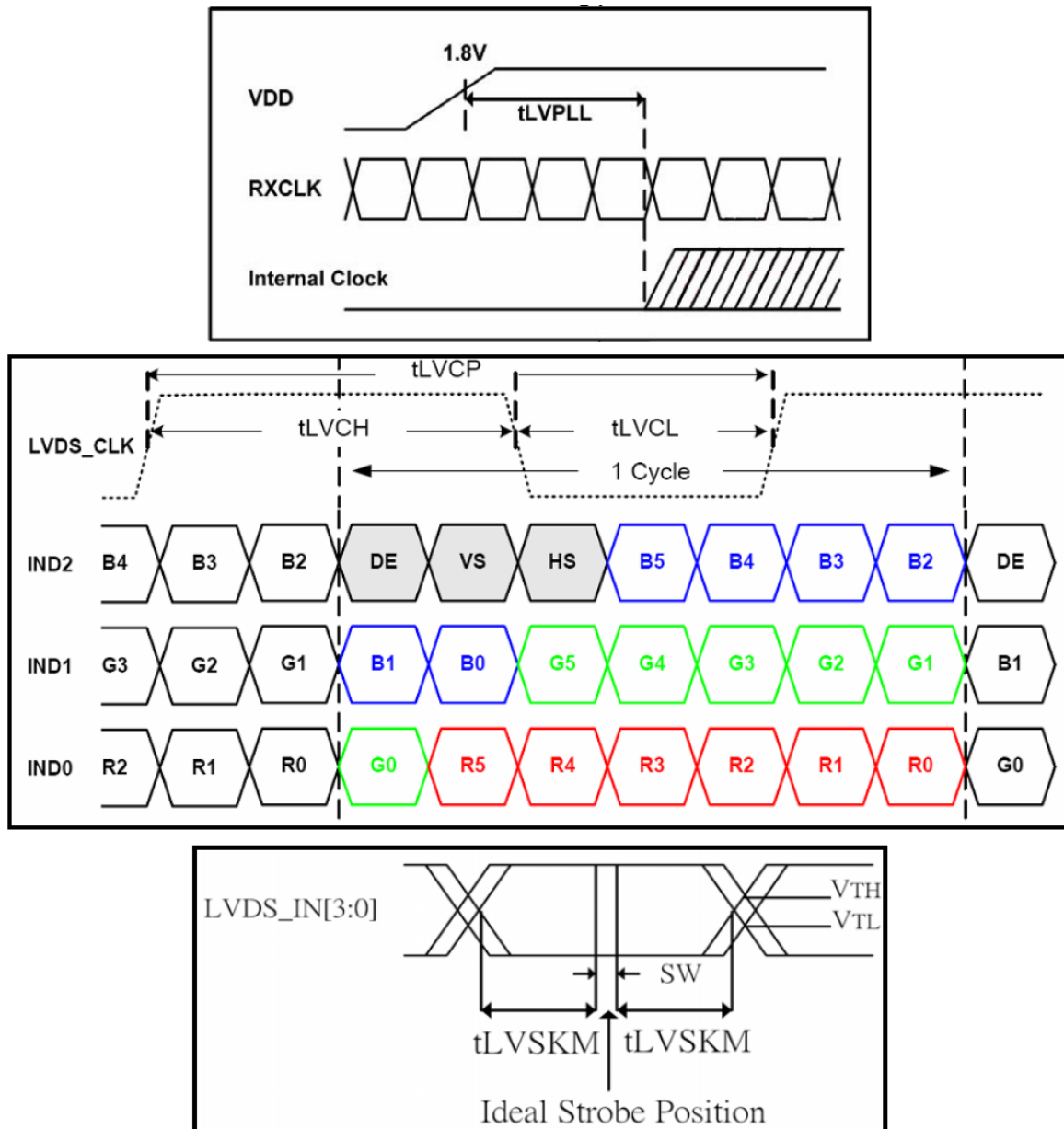
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6.2 LVDS Signal Format:

6.1 Timing Parameter

Item	Symbol	Min	Typ	Max	Unit	Condition
Clock period	tLVCP	20.0	25	31.25	ns	
Clock high time	tLVCH	-	14.29	-	ns	
Clock low time	tLVCL	-	10.71	-	ns	
PLL wake-up time	tLVPLL	-	-	1	ms	
Input skew margin	tLVSKM	400	-	-	ps	f=85MHz

Table 5.1 timing parameter



SW: Setup and Hold time

Figure 5.1 Input signal data timing

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6.4 Signal Description

Matching connector of Hirose DF19K-20P-1H (56)

No	Symbol	I/O	Description	Comment
1	VDD	P	Power Supply	
2	VDD	P	Power Supply	
3	GND	P	Ground	
4	GND	P	Ground	
5	IN0-	I	LVDS receiver negative signal channel 0	
6	IN0+	I	LVDS receiver positive signal channel 0	
7	GND	P	Ground	
8	IN1-	I	LVDS receiver negative signal channel 1	
9	IN1+	I	LVDS receiver positive signal channel 1	
10	GND	P	Ground	
11	IN2-	I	LVDS receiver negative signal channel 2	
12	IN2+	I	LVDS receiver positive signal channel 2	
13	GND	P	Ground	
14	CLK-	I	LVDS receiver negative signal clock	
15	CLK+	I	LVDS receiver positive signal clock	
16	GND	P	Ground	
17	NC	-	No connection	
18	NC	-	No connection	
19	GND	P	Ground	
20	GND	P	Ground	

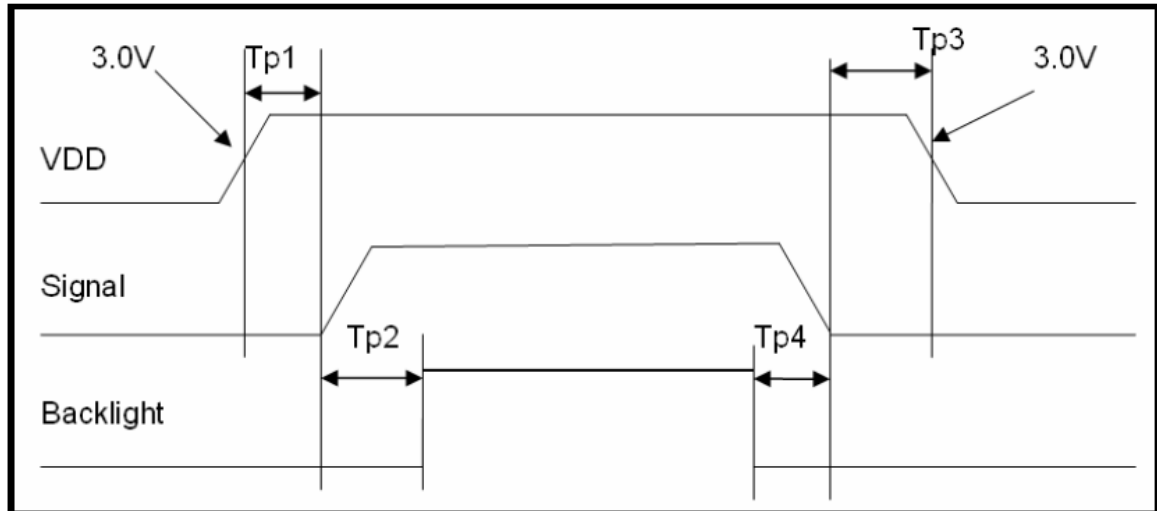
Note: I/O definition:

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

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6.6 Power ON/OFF Sequence

Item	Symbol	Min	Typ	Max	Unit	Remark
VDD 3.0V to signal starting	Tp1	0	-	50	ms	
Signal starting to backlight on	Tp2	150	-	-	ms	
Signal off to VDD 3.0V	Tp3	0	-	50	ms	
Backlight off to signal off	Tp4	150	-	-	ms	



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7.0 Connector & Pin Assignment

Physical interface is described as for the connector on module. These connectors are capable of accommodating the following signals and will be following components.

7.1 TFT LCD Module

Connector Name / Designation	Interface Connector / Interface card
Manufacturer	Hirose
Mating Housing Part Number	DF19K-20P-1H (56)

7.2 Backlight Unit

Recommended connector : JST BHSR-02VS-1

Pin no	Symbol	I/O	Description	Remark
1	VLED+	P	Backlight LED anode	White
2	VLED-	P	Backlight LED cathode	Black

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8. Reliability Test

Environment test conditions are listed as following table.

Items	Required Condition	Note
Temperature Humidity Bias (THB)	Ta= 50°C , 90%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	
Drop Test	Height: 60 cm, package test	
Thermal Shock Test (TST)	-20°C/30min, 60°C/30min, 100 cycles	
On/Off Test	On/10sec, Off/10sec, 30,000 cycles	
ESD (ElectroStatic Discharge)	Contact Discharge: ± 8KV, 150pF(330Ω) 1sec, 9 points, 25 times/ point.	
	Air Discharge: ± 15KV, 150pF(330Ω) 1sec 9 points, 25 times/ point.	

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: The test items are tested by open frame type chassis.

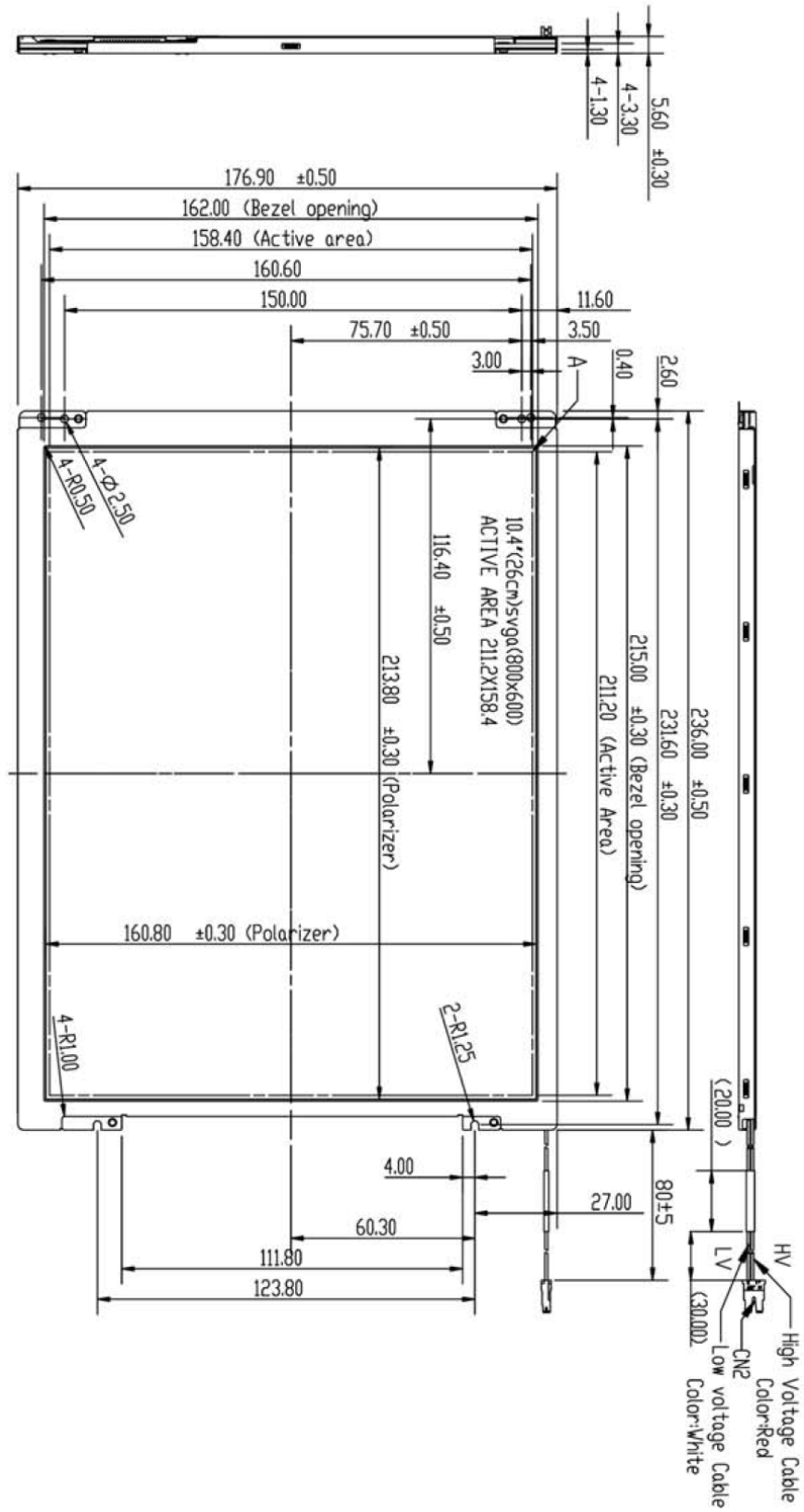
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9. Shipping Label & Package
(TBD)

(Original panel package)

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10. Mechanic Characteristic



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