

MDT185000	1366 x 768	LVDS Interface	TFT Module
Specification			
Version: 1		Date: 24/03/2024	
Revision			
1	22/03/2024	First issue	

Display Features			
Display Size	18.5"		
Resolution	1366 x 768		
Orientation	Landscape		
Appearance	RGB		
Logic Voltage	5V		
Interface	LVDS		
Brightness	1500 cd/m ²		
Touchscreen	---		
Module Size	430.4 x 254.6 x 12.0 mm		
Operating Temperature	-30°C ~ +80°C	Created By	Checked By
Pinout	30 way FFC	RV	WE
Pitch	1 mm	Box Quantity	Weight / Display
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Display Accessories	
Part Number	Description
MDIB-CC1	Interconnect board for standard pitch pinouts to fine pitch wires. Providing pinouts for 2.54 pinout. 1.27, 1, 0.845, 0.8, 0.7, 0.65, 0.62, 0.6, 0.5 & 0.3 pads.

Optional Variants	
Appearances	Voltage



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

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This specification applies to the Color Active Matrix Liquid Crystal Display composed of a TFT-LCD display a LED backlight system. The screen format is intended to support FHD (1920(H) x 1080(V)) screen and 16.7M (8 bits) color support.

2.2 Features

- High brightness display, 1500nits by LED backlight.
- Long operation lifetime BLU design
- Wide view angle
- Wide operation temperature
- RoHS Compliance



2.4 Display specifications

Items	Unit	Specification
Screen Diagonal	inch	18.5"
Active Area	mm	408.96 (H) X 230.04 (V)
Pixels H x V	pixels	1920 x3(RGB) x 1080
Pixels Pitch	um	213 (per one triad) x 213
Pixel Arrangement		RGB Vertical stripe
Display mode		Normally black, AHVA mode
White luminance (center)	Cd/m ²	1500 (Typ)
Contrast ratio		1000:1 (Typ.)
Optical Response Time	msec	20 ms (Typ. On/off)
Normal Input Voltage	Volt	5V
Power Consumption (Vcc Line + LED backlight)	Watt	43.45 W (VDD line=4.45 W; LED lines= 39 W)
Weight	Grams	1750
Physical size	mm	430.4 (W)× 254.6 (H)× 12.0 (D, typ)
Electrical Interface		LVDS
Support colors		16.7M colors (8 bits)
Surface Treatment		AG type, 3H hard coating
Temperature range		
Operating	°C	-30 ~ 80 (TFT surface)
Storage	°C	-30 ~ 80
RoHS Compliance		RoHS Compliance



2.5 Optical characteristics

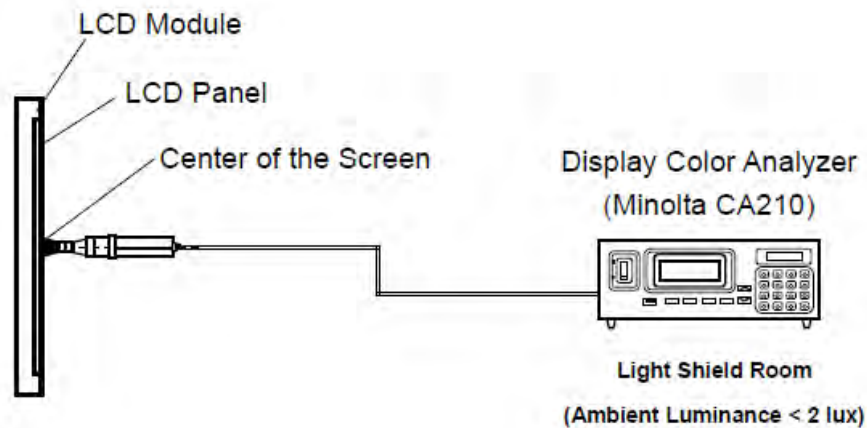
The following optical characteristics are measured under stable condition at 25 °C

Items	Unit	Conditions	Min.	Typ.	Max.	Note
Viewing angle	Deg.	Horizontal (Right)		89		2
		CR=10 (Left)		89		
		Vertical (Up)		89		
		CR=10 (Down)		89		
Contrast Ratio		Normal Direction	800	1000		3
Response Time	msec	Raising + Falling		20	40	4
Color coordinates (CIE) White		Red x	-0.05	0.646	+0.05	
		Red y		0.333		
		Green x		0.305		
		Green y		0.615		
		Blue x		0.155		
		Blue y		0.060		
		White x		0.299		5
		White y		0.315		
Center Luminance	Cd/m ²		1200	1500		6
Luminance Uniformity	%		70	75		7
Crosstalk (in 60 Hz)	%				1.5	
Flicker	dB				-20	

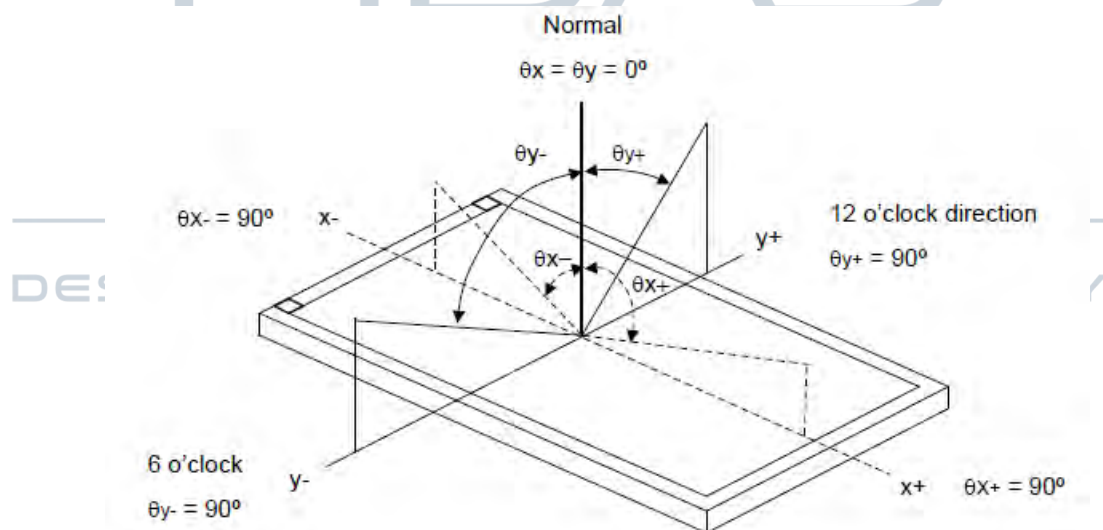


Note 1: Measurement method

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.



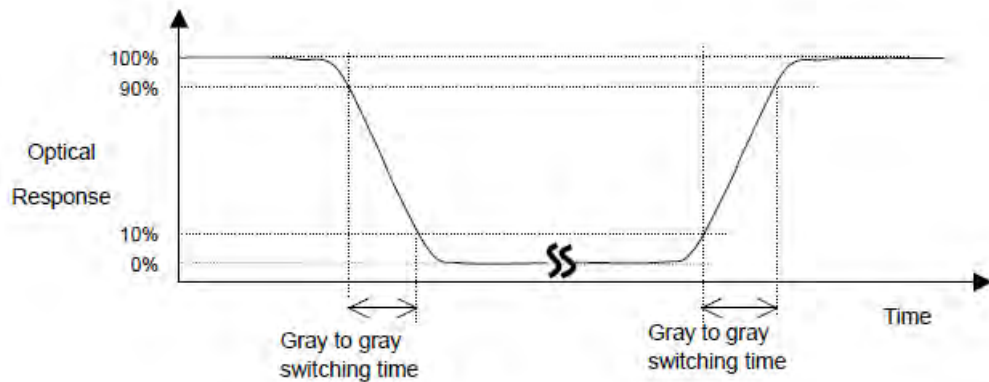
Note 2: Definition of viewing angle



Note 3: Contrast ratio is measured by Minolta CA310

Note 4: Definition of Response time

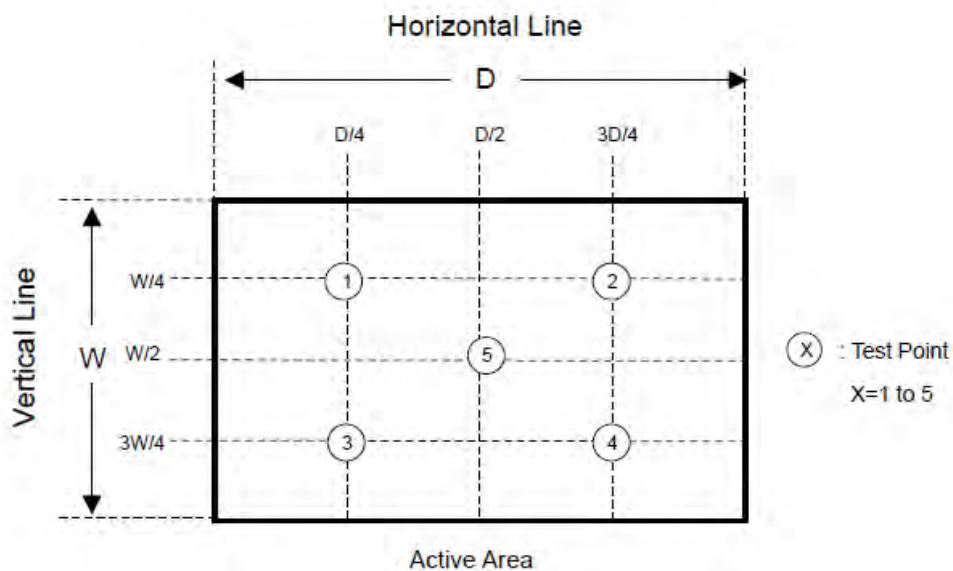
The output signals of photo detector are measured when the input signals are changed from “Full Black” to “Full White” (rising time), and from “Full White” to “Full Black” (falling time), respectively. The response time is interval between the 10% and 90% of amplitudes. Please refer to the figure as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



Note 5: Color chromaticity and coordinates (CIE) is measured by Minolta CA310

Note 6: Center luminance is measured by Minolta CA310

Note 7: Luminance uniformity of these 5 points is defined as below and measured by Minolta CA310



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

3. Absolute Maximum Ratings

Absolute maximum ratings of the module are as following:

3.1 TFT LCD module

Items	Symbol	Min	Max	Unit	Conditions
Power supply voltage	V _{DD}	-0.3	5.5	Volt	Note 1, 2

3.2 Backlight unit

Items	Symbol	Min	Max	Unit	Conditions
LED bar input current			720	mA	

3.3 Environment

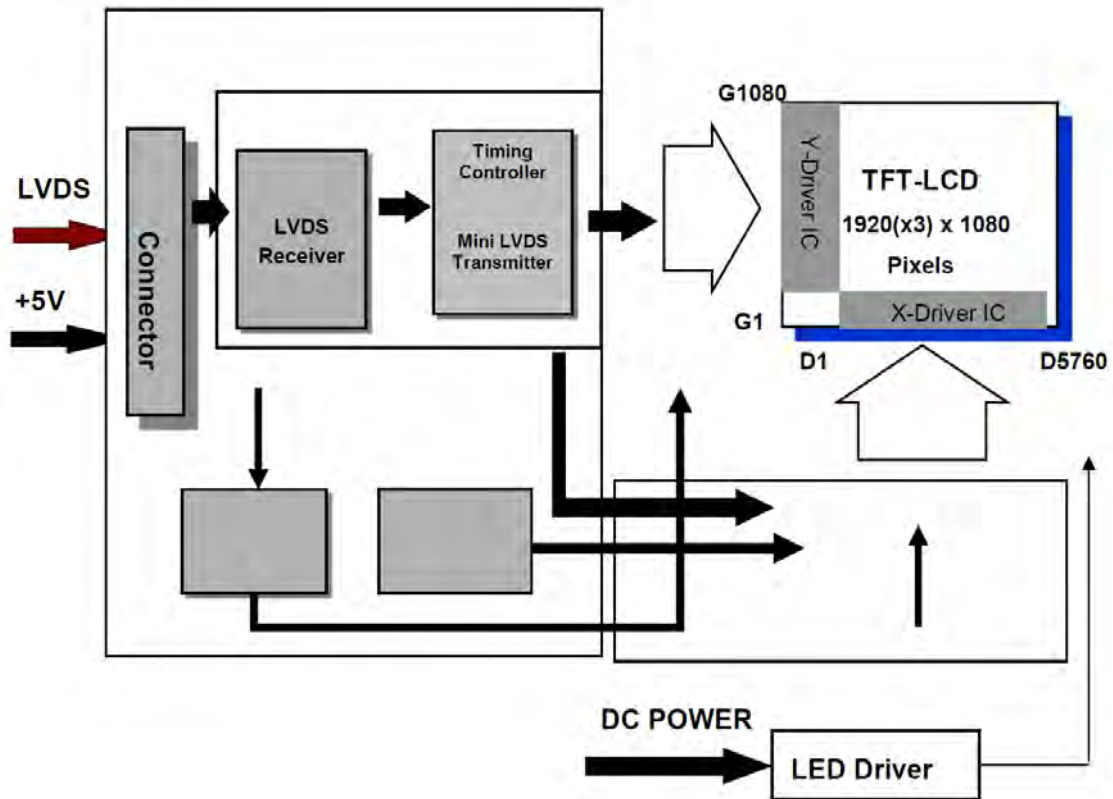
Items	Symbol	Values			Unit	Conditions
		Min.	Typ.	Max.		
Operation temperature	T _{OS}	-30	-	80	°C	Note 3
Operation Humidity	H _{OP}	10		85	%	
Storage temperature	T _{ST}	-30		80	°C	
Storage Humidity	H _{ST}	5		90	%	

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. Functional block diagram



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5. Electrical characteristics

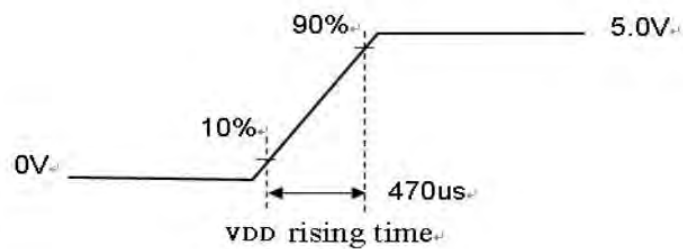
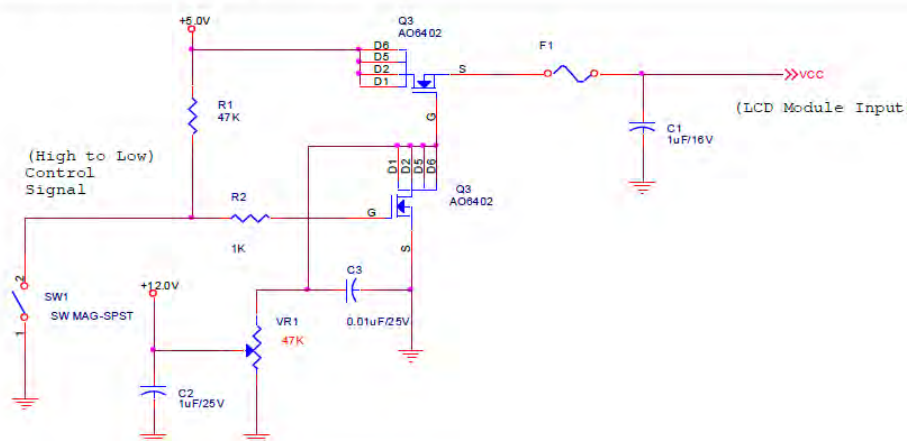
5.1 LCD electronics specification

5.1.1 Power specification

Symbol	Parameter	Min	Typ	Max	Unit	Conditions
VDD	Logic/LCD Drive Voltage	4.5	5.0	5.5	[Volt]	+/-10%
IDD	Input Current	-	0.89	1.07	[A]	VDD= 5.0V, All White Pattern At 60Hz,
PDD	VDD Power	-	4.45	5.35	[Watt]	VDD= 5.0V, All White Pattern At 60Hz
IRush	Inrush Current	-	2.7	3.4	[A]	Note 1
VDDrp	Allowable Logic/LCD Drive Ripple Voltage	-	-	300	[mV] p-p	VDD= 5.0V, All White Pattern At 60Hz

Note 1: Measurement conditions:

The duration of rising time of power input is 470us.



5.2 Backlight unit

Parameter	Min	Typ	Max	Unit	Note
LED voltage (VL)	31.2	39	41.6	[V]	2
LED current (IL)		500		[mA]	2
LED power (PL)		39		[W]	
LED life time (MTBF)		70,000		[Hour]	1

Note 1: The “LED lift time” is defined as the module brightness decrease to 50% original brightness that the ambient temperature is 25°C and typical LED Current at 500 mA

Note 2: The variance of LED Light Bar power consumption is ±10%. Calculator value for reference ($IL \times VL \times 2 = PLED$)

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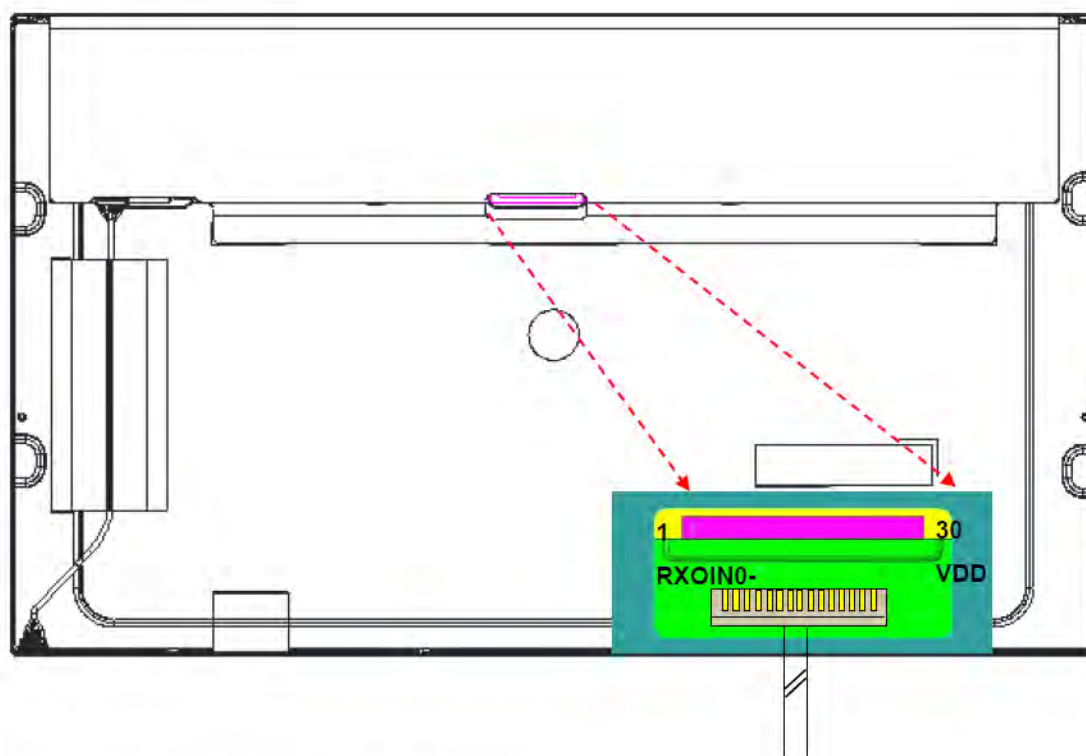
5.3 Interface connector

5.3.1 TFT connector(CN1)

PIN #	SIGNAL NAME	DESCRIPTION
1	RXOIN0-	Negative LVDS differential data input (Odd data)
2	RXOIN0+	Positive LVDS differential data input (Odd data)
3	RXOIN1-	Negative LVDS differential data input (Odd data)
4	RXOIN1+	Positive LVDS differential data input (Odd data)
5	RXOIN2-	Negative LVDS differential data input (Odd data, H-Sync,V-Sync,DSPTMG)
6	RXOIN2+	Positive LVDS differential data input (Odd data, H-Sync,V-Sync,DSPTMG)
7	GND	Power Ground
8	RXOCLKIN-	Negative LVDS differential clock input (Odd clock)
9	RXOCLKIN+	Positive LVDS differential clock input (Odd clock)
10	RXOIN3-	Negative LVDS differential data input (Odd data)
11	RXOIN3+	Positive LVDS differential data input (Odd data)
12	RXEIN0-	Negative LVDS differential data input (Even data)
13	RXEIN0+	Positive LVDS differential data input (Even data)
14	GND	Power Ground
15	RXEIN1-	Negative LVDS differential data input (Even data)
16	RXEIN1+	Positive LVDS differential data input (Even data)
17	GND	Power Ground
18	RXEIN2-	Negative LVDS differential data input (Even data)
19	RXEIN2+	Positive LVDS differential data input (Even data)
20	RXECLKIN-	Negative LVDS differential clock input (Even clock)
21	RXECLKIN+	Positive LVDS differential clock input (Even clock)
22	RXEIN3-	Negative LVDS differential data input (Even data)
23	RXEIN3+	Positive LVDS differential data input (Even data)
24	GND	Power GND
25	NC	NC
26	NC	NC
27	NC	NC
28	VDD	+5.0V Power Supply
29	VDD	+5.0V Power Supply
30	VDD	+5.0V Power Supply

Connector Name / Designation	Interface Connector / Interface card
Manufacturer	JAE
Type Part Number	FI-XB30SSRLA-HF-I6-R3500 (JAE)
Mating Housing Part Number	FI-X30HL or FI-X30C2L-NPB

Note 1: Start from left side



Note2: Input signals of clock shall be the same timing.

Note3: Please follow TV VESA Pin Assignment.

	1			2									1919			1920		
1st Line	R	G	B	R	G	B	· · · · ·						R	G	B	R	G	B
	·			·			·						·			·		
	·			·			·						·			·		
	·			·			·						·			·		
	·			·			·						·			·		
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1080 Line	R	G	B	R	G	B	· · · · ·						R	G	B	R	G	B



5.3.2 Backlight connector(CN2、CN3)

Recommended connector : BHSR-02VS-1 manufactured by JST

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

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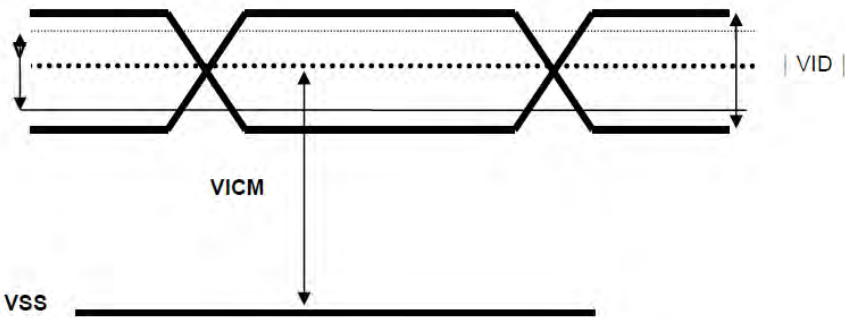


6. Signal characteristics

6.1 Signal electrical characteristics

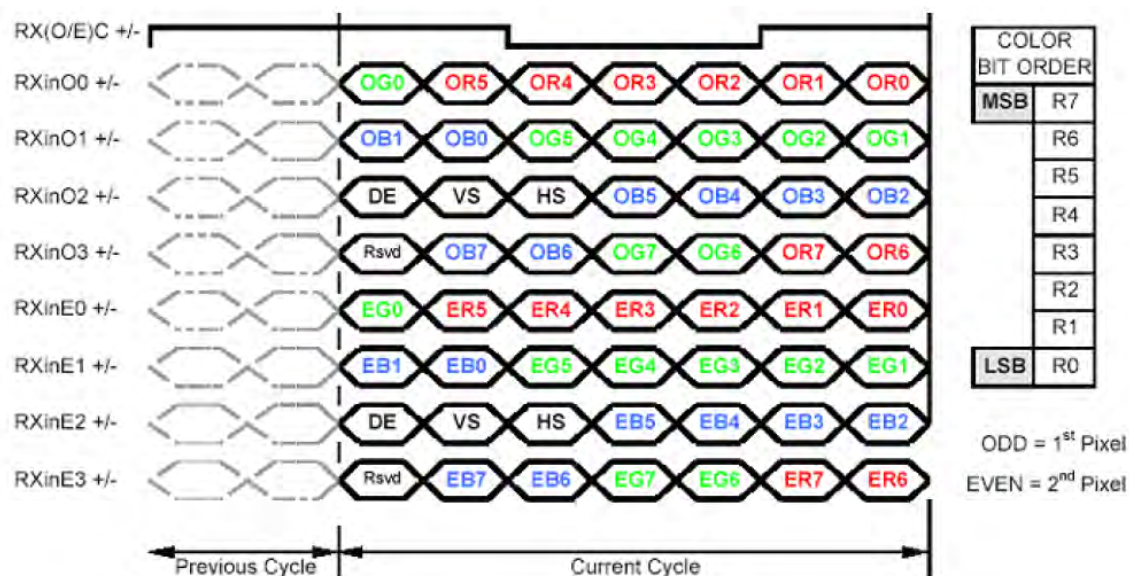
Symbol	Parameter	Min	Typ	Max	Units	Condition
VTH	Differential Input High Threshold	-		100	[mV]	VICM = 1.2V <i>Note 1</i>
VTL	Differential Input Low Threshold	-100		-	[mV]	VICM = 1.2V <i>Note 1</i>
VID	Input Differential Voltage	100	400	600	[mV]	<i>Note 1</i>
VICM	Differential Input Common Mode Voltage	1.125	-	1.375	[V]	VTH-VTL = 200mV (max) <i>Note 1</i>

Note 1: LVDS Signal Waveform



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6.2 The input data format



Note1: Normally DE mode only. VS and HS on EVEN channel are not used.

Note2: Please follow VESA.

Note3: 8-bits signal input.

6.3 Timing characteristics

Signal	Item	Symbol	Min	Typ	Max	Unit
V-section	Period	T _v	1090	1100	1160	Th
	Active	T _{disp(v)}	1080	1080	1080	Th
	Blanking	T _{bp(v)} +T _{fp(v)} +PW _{vs}	10	20	80	Th
H-section	Period	T _h	1000	1088	1120	Tclk
	Active	T _{disp(h)}	960	960	960	Tclk
	Blanking	T _{bp(h)} +T _{fp(h)} +PW _{hs}	40	128	160	Tclk
Clock	Period	T _{clk}	11.76	13.89	15.38	ns
	Frequency	F _{req.}	60	72	87.5	MHz
Frame Rate	Frame Rate	1/T _v	50	60	75	Hz

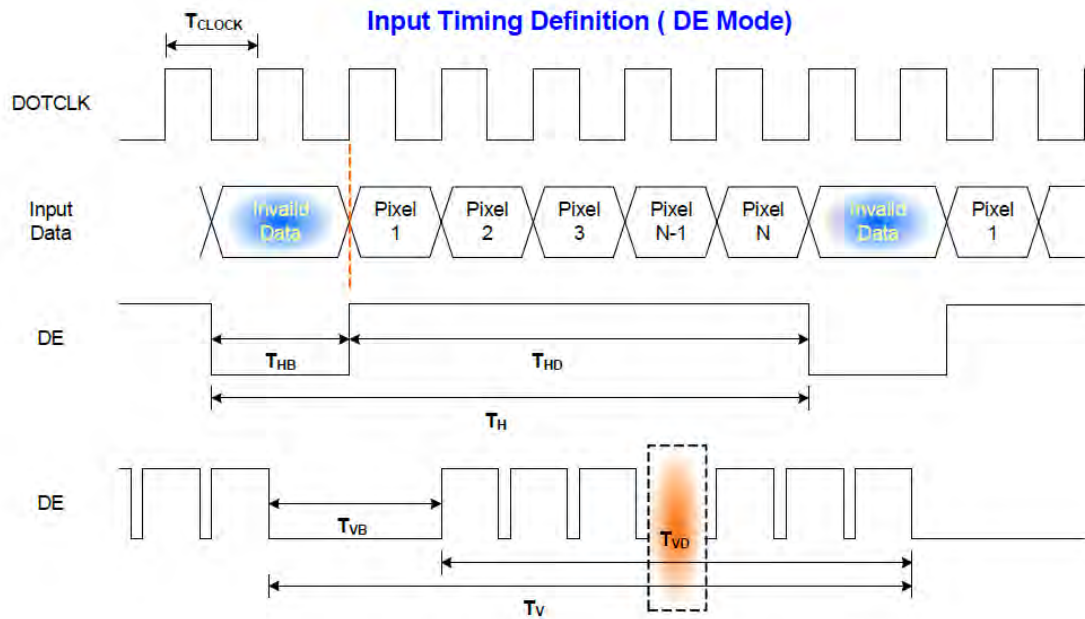
Note 1: Only DE mode operation.

The input of Hsync & Vsync signal does not have an effect upon the LCD normal operation.

Note 2: The performance of the electro-optical characteristics may be influenced by variance of the vertical refresh rates.

Note 3: Horizontal period should be even.

6.4 Timing diagram

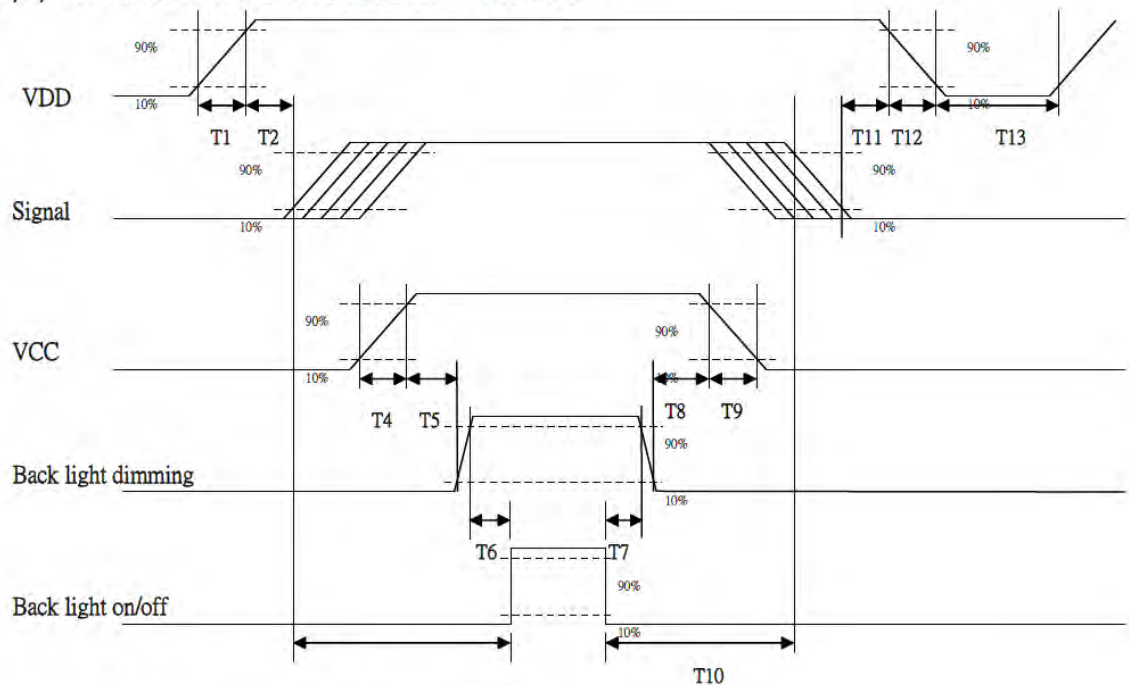


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6.5 Power ON / OFF sequence

VDD power and LED on/off sequence are as follows. Interface signals are also shown in the chart. Signals from any system shall be Hi-Z state or low level when VDD is off.



Power ON/OFF sequence timing

Parameter	Value			Units
	Min.	Typ.	Max.	
T1	0.5	-	10	[ms]
T2	0	40	50	[ms]
T3	200	-	-	[ms]
T4	0.5	-	10	[ms]
T5	10	-	-	[ms]
T6	10	-	-	[ms]
T7	0	-	-	[ms]
T8	10	-	-	[ms]
T9	-	-	10	[ms]
T10	110	-	-	[ms]
T11	0.5	16	50	[ms]
T12	-	-	100	[ms]
T13	1000	-	-	[ms]

7. Reliability Test

Environment test conditions are listed as following table.

Items	Required Condition	Note
Temperature Humidity Bias (THB)	Ta=40℃, 80%RH, 120hours	
High Temperature Operation (HTO)	Ts= 80℃, 120hours	3
Low Temperature Operation (LTO)	Ta= -30℃, 120hours	
High Temperature Storage (HTS)	Ta= 80℃, 120hours	
Low Temperature Storage (LTS)	Ta= -30℃, 120hours	
Thermal Shock Test (TST)	-20℃/30min, 60℃/30min, 100 cycles	
On/Off Test	On/10sec, Off/10sec, 30,000 cycles	
ESD (ElectroStatic Discharge)	Contact Discharge: ± 8KV, 150pF(330Ω) 1sec/cycle	
	Air Discharge: ± 15KV, 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 -10℃ to 50℃, 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.

9. Mechanical Characteristics

