

MDT185002	1366 x 768	LVDS Interface	TFT Module
Specification			
Version: 1		Date: 01/05/2021	
Revision			
1	29/04/2021	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	430.40 x 254.60 x 10.90 mm		
Operating Temperature	-10°C ~ +50°C	Created By	Checked By
Pinout	30 way connector	CL	WE
Pitch	1.00 mm	Box Quantity	Weight / Display
		---	---

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Display Accessories	
Part Number	Description
MBID-30FP	30 way FFC/FPC 0.5mm to 30 way JST 1mm crimp header
MCIB14/16	HDMI-to-LVDS interface board, with voltage generation.
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 momentarily. 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

MDT185002 is a 18.5" TFT Liquid Crystal Display module with LED Backlight unit and 30 pins LVDS interface. This module supports 1366 x 768, WXGA mode and can display 16.7M colors (RGB 8 data). All input signals are LVDS interface compatible. The LED driver is not included

2.2 Features

- TFT surface with 1500 nits high brightness design
- Wide view angle
- RoHS Compliance

2.3 Application

Industrial applications



2.4 Display specifications

Items	Unit	Specification
Screen Diagonal	inch	18.5
Active Area	mm	409.8 (W) × 230.4 (H) mm
Pixels H x V	pixels	1366 × 3(RGB) × 768
Pixels Pitch	mm	0.1 × 0.3
Pixel Arrangement		RGB Vertical stripe
Display mode		Normally Black
White luminance (center)	Cd/m ²	1500 (typ)
Contrast ratio		1000:1 (Typ.)
Optical Response Time	msec	14 ms (Typ. on/off)
Normal Input Voltage VDD	Volt	3.3
Power Consumption (Vcc Line + LED L Lines)	Watt	30.22W (VDD line=2.5W; LED line=27.72W)
Weight	Grams	1300 typ.
Physical size	mm	430.4 (H) x 254.6 (V) x 10.9 (D) (Typ)
Electrical Interface		1 Channel LVDS
Support Colors		16.7M colors (RGB 8 bit data)
Surface Treatment		Anti-Glare, 3H
Temperature range		
Operating	°C	-10 ~ 50
Storage (Shipping)	°C	-20 ~ 60
RoHS Compliance		RoHS Compliance



2.5 Optical characteristics

The following optical characteristics are measured on TFT surface and under stable condition at 25 °C

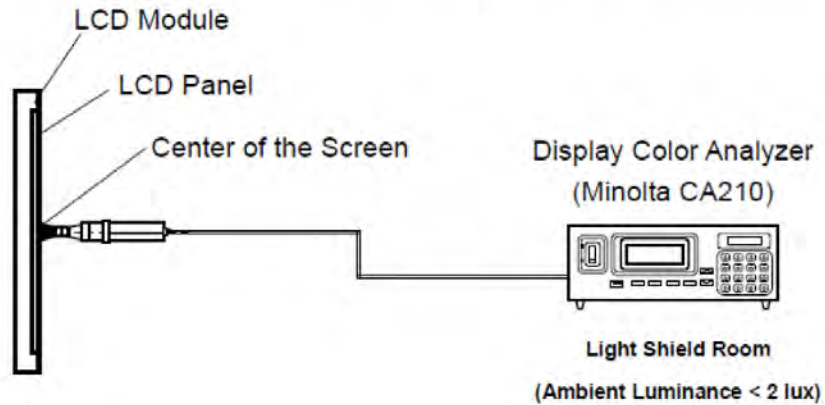
Items	Unit	Conditions	Min.	Typ.	Max.	Note
Viewing angle	Deg.	Horizontal (Right)	85	89		2
		CR=10 (Left)	85	89		
		Vertical (Up)	85	89		
		CR=10 (Down)	85	89		
Contrast Ratio		Normal Direction	700	1000		3
Response Time	msec	Raising + Falling		14	25	4
Color / Chromaticity Coordinates (CIE)		Red x	-0.05	0.658	+0.05	5
		Red y		0.338		
		Green x		0.297		
		Green y		0.657		
		Blue x		0.152		
		Blue y		0.070		
Color coordinates (CIE) White		White x		0.313		
		White y		0.329		
Center Luminance	Cd/m ²		1200	1500		6
Luminance Uniformity	%		70			7

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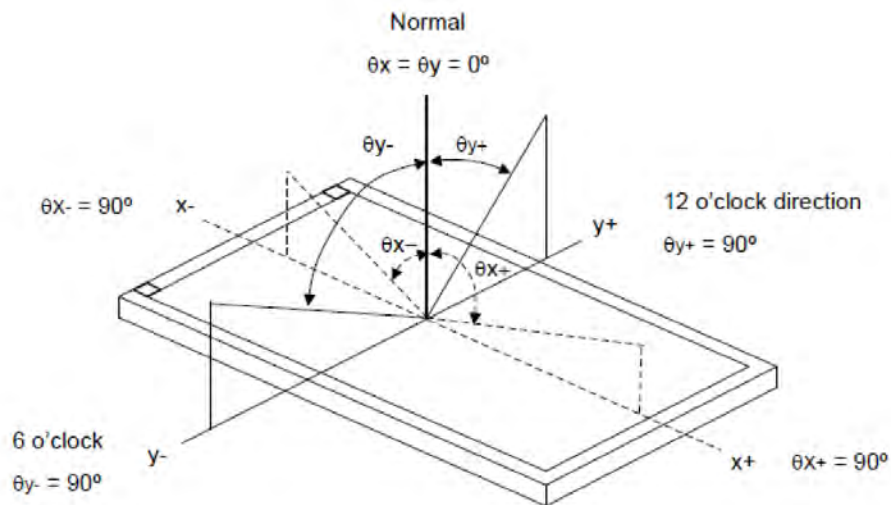


Note 1: Measurement method

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.



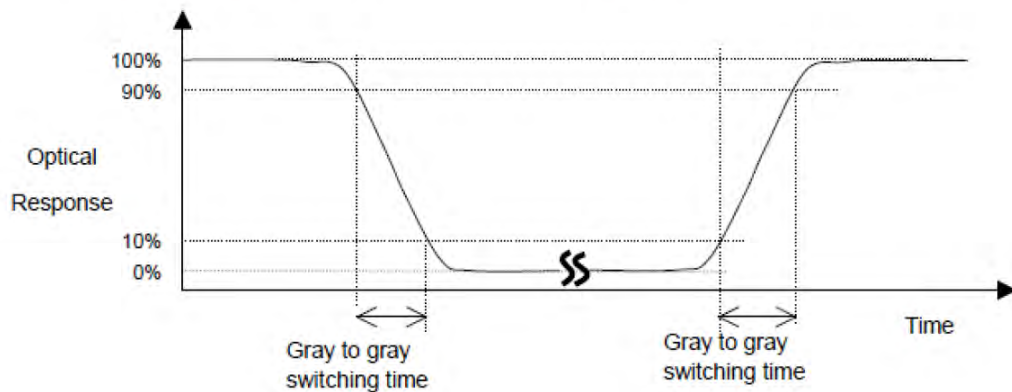
Note 2: Definition of viewing angle



Note 3: Contrast ratio is measured by Minolta CA210

Note 4: Definition of Response time

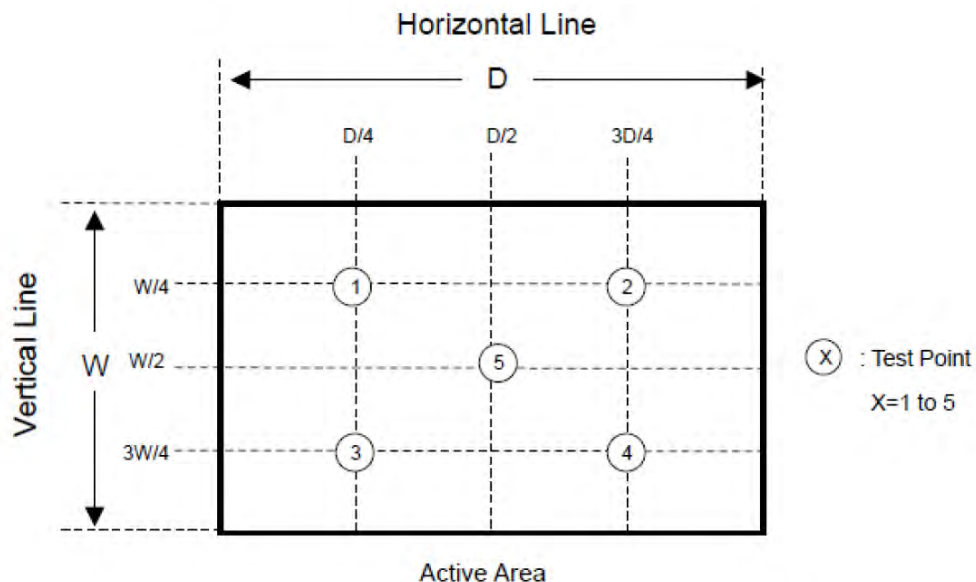
The output signals of photo detector are measured when the input signals are changed from “Full Black” to “Full White” (rising time), and from “Full White” to “Full Black” (falling time), respectively. The response time is interval between the 10% and 90% of amplitudes. Please refer to the figure as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



Note 5: Color chromaticity and coordinates (CIE) is measured by Minolta CA210

Note 6: Center luminance is measured by Minolta CA210

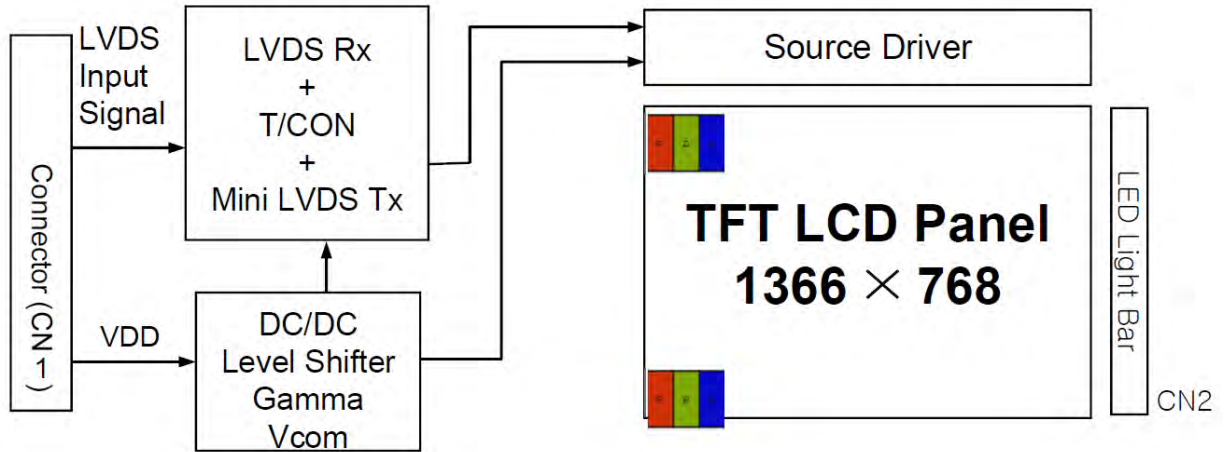
Note 7: Luminance uniformity of these 5 points is defined as below and measured by Minolta CA210



Uniformity = (Min. Luminance of 5 points) / (Max. Luminance of 5 points)

3. Functional block diagram

The follow diagram shows the functional block of the 18.5 inches color TFT/LCD module.



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4. Absolute maximum ratings

4.1 TFT LCD module

Item	Symbol	Value		Unit	Note
		Min.	Max		
Power supply voltage	V_{DD}	-0.3	5.5	V	$T_a = 25^{\circ}\text{C}$
Logic supply voltage	V_{IN}	$V_{SS}-0.3$	$V_{DD}+0.3$	V	

4.2 Backlight module

Item	Symbol	Value		Unit	Note
		Min.	Max		
Input current	I_{LED}		480	mA	

4.3 Environment

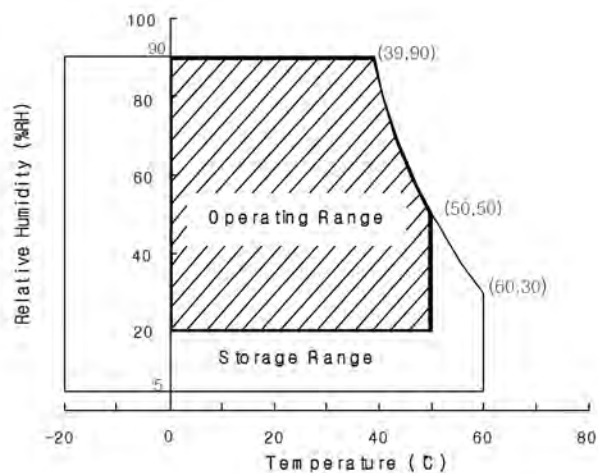
Item	Symbol	Value		Unit	Note
		Min.	Max		
Operating ambient temperature	T_{OP}	-10	50	$^{\circ}\text{C}$	1, 2, 3, 4
Storage temperature	T_{ST}	-20	60	$^{\circ}\text{C}$	1, 2, 3, 4

Note 1: Temperature and relative humidity range is shown in the figure below.

Note 2: 90%RH max. ($T_a \leq 39^{\circ}\text{C}$).

Note 3: Wet-Bulb temperature should be 39°C Max ($T_a > 39^{\circ}\text{C}$)

Note 4: No condensation.



5. Electrical characteristics

5.1 TFT LCD module

Item	Symbol	Value			Unit	Note
		Min.	Typ	Max		
Power supply voltage	V_{DD}	4.5	5.0	5.5	V	1
Power supply current	I_{DD}		500	720	mA	1
Rush current	I_{RUSH}		2	3	A	2
Permissible input ripple voltage	V_{RF}			300	mV	1,3
High level differential input threshold voltage	V_{IH}			+100	mV	
Low level differential input threshold voltage	V_{IL}	-100			mV	
Different input voltage	V_{ID}	200		600	mV	
Differential input common mode voltage	$ V_{cm} $	1.0	1.2	1.5		
Power consumption	P_D		2.5	3.6	W	

Note 1: The supply voltage is measured and specified at the interface connector of LCM. The current draw and power consumption specified is for $V_{DD} = 5.0V$, Frame rate = 60Hz and clock frequency = 75.4MHz. Test pattern of power supply current

a) Typ : Color bar pattern

b) Max : Gray : level 255.

Note 2: Duration of rush current is about 2mS and rising time of V_{DD} is 520uS $\pm$ 20%

Note 3: Ripple voltage should be covered by input voltage spec.



5.2 Backlight unit

Parameter	Min	Typ	Max	Unit	Note
LED voltage (VL)		42		[V]	2
LED current (IL)		330		[mA]	2,
LED Power (PL)		27.72		[W]	
LED Life Time(LTLED)		50,000		[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 330 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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6. Input terminal pin assignment

6.1 TFT LCD module

- CN1 Module Side Connector : UJU IS100-30O-C23 or Equivalent
User Side Connector : JAE FI-X30H or Equivalent

Pin No	Symbol	Function	Remark
1	NC	No connection	
2	NC	No connection	
3	NC	No connection	
4	GND	GND Ground	
5	RX0-	Negative LVDS differential data input. Channel 0	
6	RX0+	Positive LVDS differential data input. Channel 0	
7	GND	Ground	Optical: Bist function
8	RX1-	Negative LVDS differential data input. Channel 1	
9	RX1+	Positive LVDS differential data input. Channel 1	
10	GND	Ground	
11	RX2-	Negative LVDS differential data input. Channel 2	
12	RX2+	Positive LVDS differential data input. Channel 2	
13	GND	Ground	
14	RXCLK-	Negative LVDS differential clock input.	
15	RXCLK+	Positive LVDS differential clock input.	
16	GND	Ground	
17	RX3-	Negative LVDS differential data input. Channel 3	
18	RX3+	Positive LVDS differential data input. Channel 3	
19	GND	Ground	
20	NC	Not connection, this pin should be open.	
21	NC	Not connection, this pin should be open.	
22	NC	Not connection, this pin should be open.	
23	GND	Ground	
24	GND	Ground	
25	GND	Ground	
26	VCC	5V Power supply	
27	VCC		
28	VCC		
29	VCC		
30	VCC		

6.2 Backlight unit

LED Light bar connector (CN2)

Recommended connector : JOIN TEK JT1025-1021 (BHSR-02VS-1 manufactured by JST)

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

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6.3 LVDS interface (TX; THC63LVDF83A or Equivalent)

6.3.1 LVDS interface

	Input Signal	Transmitter		Interface		MT185WHM-N20 (CN11)	Remark
		Pin No.	Pin No.	System (Tx)	TFT-LCD (Rx)	Pin No.	
L V D S	OR0	51	48 47	OUT0- OUT0+	RXO0- RXO0+	5 6	
	OR1	52					
	OR2	54					
	OR3	55					
	OR4	56					
	OR5	3					
	OG0	4	46 45	OUT1- OUT1+	RXO1- RXO1+	8 9	
	OG1	6					
	OG2	7					
	OG3	11					
	OG4	12					
	OG5	14					
	OB0	15	42 41	OUT2- OUT2+	RXO2- RXO2+	11 12	
	OB1	19					
	OB2	20					
	OB3	22					
	OB4	23					
	OB5	24					
	Hsync	27	40 39	CLK OUT- CLK OUT+	RXO CLK- RXO CLK+	14 15	
	Vsync	28					
	DE	30					
	MCLK	31					
	OR6	50	38 37	OUT3- OUT3+	RXO3- RXO3+	17 18	
	OR7	2					
	OG6	8					
	OG7	10					
	OB6	16					
	OB7	18					
	RSVD	25					



7. Signal timing specification

7.1 Operated by DE only.

Item	Symbols		Min	Typ	Max	Unit
DCLK	Period	tCLK	10.6	13.26	15.91	ns
	Frequency	-	62.9	75.4	94.3	MHz
Horizontal Display Term	Period	tHP	1446	1560	1936	tCLK
	Horizontal Valid	tHV	1366	1366	1366	tCLK
	Horizontal Blank	tHB	80	194	570	tCLK
	Frequency	fH	40.3	48.36	60.45	KHz
Vertical Display Term	Period	tVP	778	806	888	tHP
	Vertical Valid	tVV	768	768	768	tHP
	Vertical Blank	tVB	10	38	120	tHP
	Frequency	fV	50	60	75	Hz
LVDS Receiver clock	Input spread spectrum ratio	SSr	-3	-	+3	%

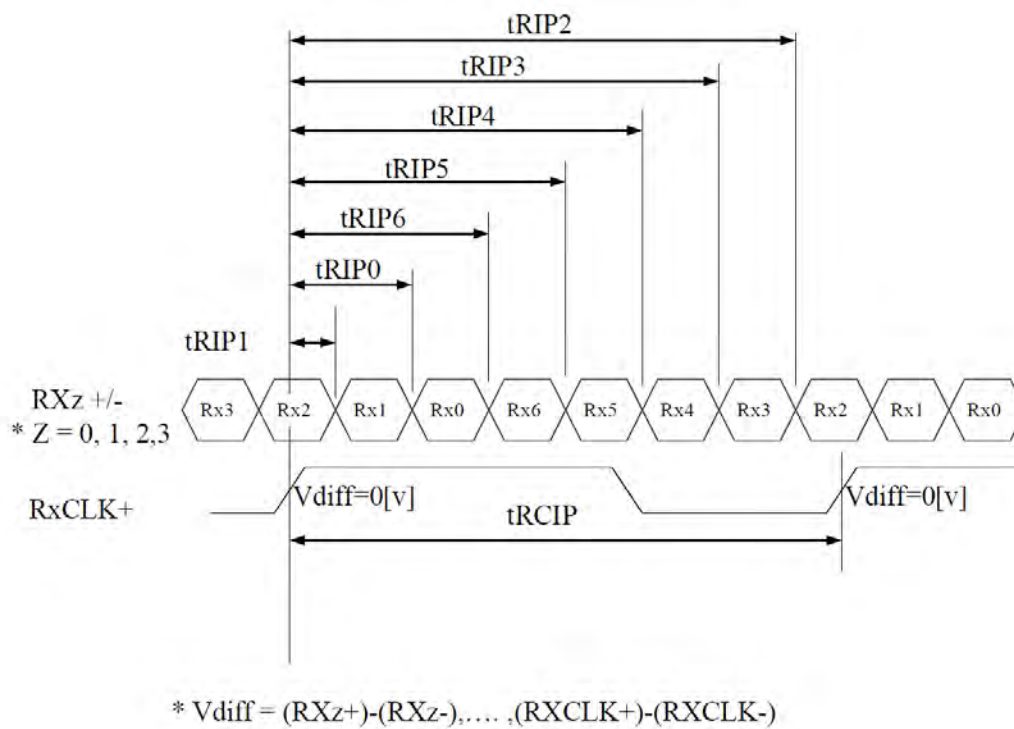
Note: The DCLK range at last line of V-blanking should be set in 0~987

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7.2 LVDS Rx interface timing parameter

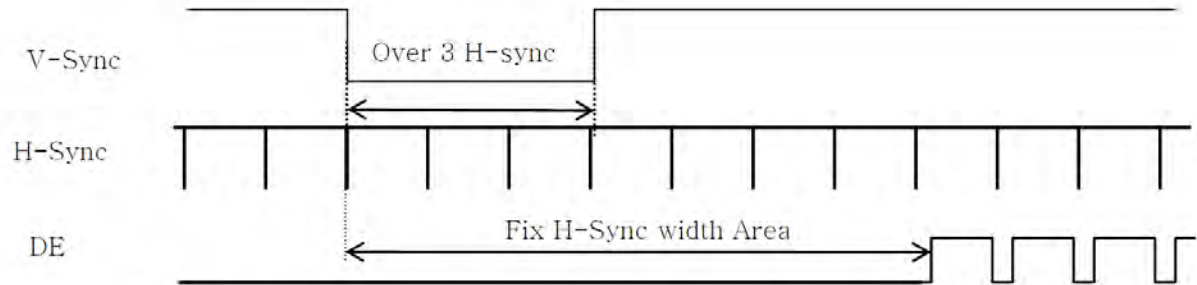
The specification of the LVDS Rx interface timing parameter is show as below.

Item	Symbol	Min	Typ	Max	Unit	Remark
CLKIN Period	tRCIP	10.60	13.26	15.91	nsec	
Input Data 0	tRIP1	-0.4	0.0	+0.4	nsec	
Input Data 1	tRIP0	tRCIP/7-0.4	tRCIP/7	tRCIP/7+0.4	nsec	
Input Data 2	tRIP6	$2 \times \text{tRCIP}/7-0.4$	$2 \times \text{tRCIP}/7$	$2 \times \text{tRCIP}/7+0.4$	nsec	
Input Data 3	tRIP5	$3 \times \text{tRCIP}/7-0.4$	$3 \times \text{tRCIP}/7$	$3 \times \text{tRCIP}/7+0.4$	nsec	
Input Data 4	tRIP4	$4 \times \text{tRCIP}/7-0.4$	$4 \times \text{tRCIP}/7$	$4 \times \text{tRCIP}/7+0.4$	nsec	
Input Data 5	tRIP3	$5 \times \text{tRCIP}/7-0.4$	$5 \times \text{tRCIP}/7$	$5 \times \text{tRCIP}/7+0.4$	nsec	
Input Data 6	tRIP2	$6 \times \text{tRCIP}/7-0.4$	$6 \times \text{tRCIP}/7$	$6 \times \text{tRCIP}/7+0.4$	nsec	



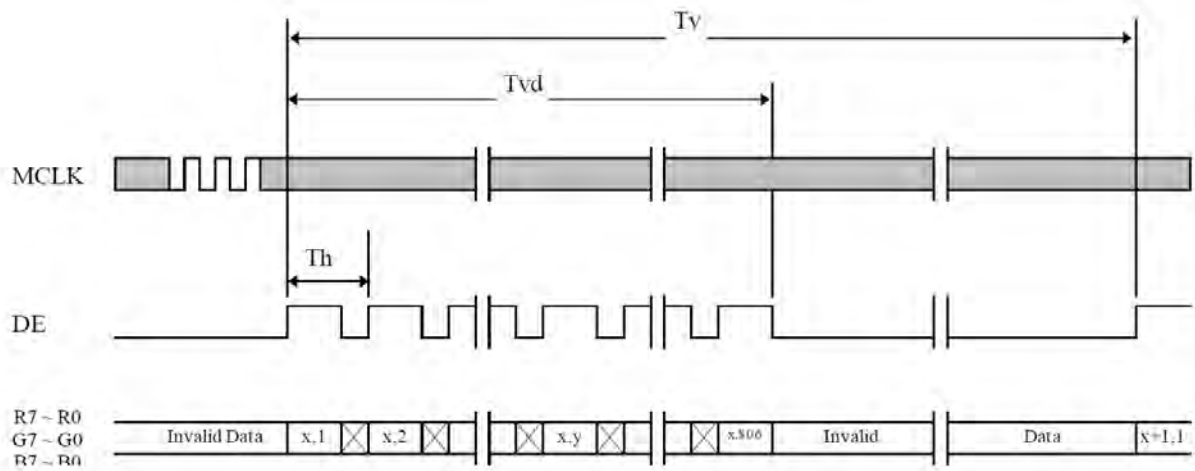
8. Signal timing waveforms of interface signal

8.1 Sync timing waveforms



- 1) Need over 3 H-sync during V-Sync Low
- 2) Fix H-Sync width from V-Sync falling edge to first rising edge

8.2 Vertical timing waveforms



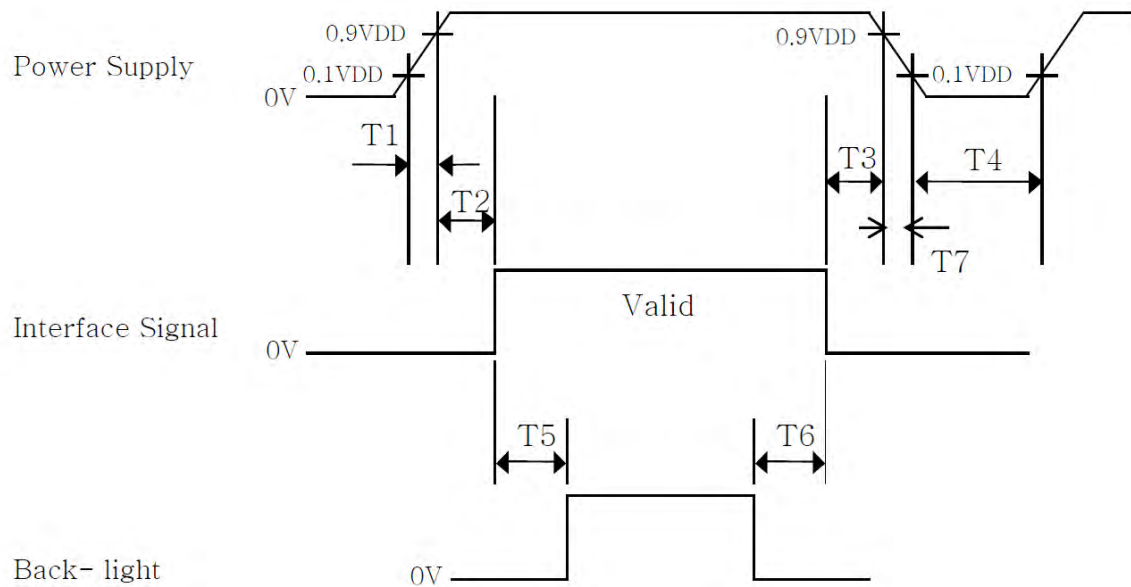
9. Input signals, basic display colors & gray scale of colors

Color & Gray Scale		RED DATA								GREEN DATA								BLUE DATA							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	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	1	1	1	1	1	1
Gray Scale of RED	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△																								
	▽																								
	Brighter	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	▽	1	1	1	1	1	1	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	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale of GREEN	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	△																								
	▽																								
	Brighter	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	▽	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Gray Scale of BLUE	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	△																								
	▽																								
	Brighter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	1
	▽	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	1
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
Gray Scale of WHITE	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
	Darker	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0
	△																								
	▽																								
	Brighter	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1
	▽	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1



10. Power sequence

To prevent a latch-up or DC operation of the LCD module, the power on/off sequence shall be as shown in below



- $0.5 \text{ ms} \leq T1 \leq 10 \text{ ms}$
- $0 \leq T2 \leq 50 \text{ ms}$
- $0 \leq T3 \leq 50 \text{ ms}$
- $1 \text{ sec} \leq T4$
- $200 \text{ ms} \leq T5$
- $200 \text{ ms} \leq T6$

Notes:

1. When the power supply VDD is 0V, keep the level of input signals on the low or keep high impedance.
2. Do not keep the interface signal high impedance when power is on.
3. Back Light must be turn on after power for logic and interface signal are valid.
4. T7 decreases smoothly, there is none re-bouncing voltage.

11. Reliability Test

Environment test conditions are listed as following table.

Items	Required Condition	Note
Temperature Humidity Bias (THB)	Ta= 39°C, 90%RH, 240 hours	
High Temperature Operation (HTO)	Ta= 50°C, 50%RH, 240 hours	3
Low Temperature Operation (LTO)	Ta= -10°C, 240 hours	
High Temperature Storage (HTS)	Ta= 60°C, 240 hours	
Low Temperature Storage (LTS)	Ta= -20°C, 240 hours	
Thermal Shock Test (TST)	-20°C/30min, 60°C/30min, 50 cycles	1
On/Off Test	On/10sec, Off/10sec, 30,000 cycles	
ESD (ElectroStatic Discharge)	Contact Discharge: $\pm 8KV$, 150pF(330 Ω) 1sec, 9 points, 25 times/ point.	2
	Air Discharge: $\pm 15KV$, 150pF(330 Ω) 1sec 9 points, 25 times/ point.	2

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 0°C to 50°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.



MDT185002

