

MDT101010	1280x720	LVDS Interface	TFT Module
Specification			
Version: 1		Date: 24/07/2020	
Revision			
1	22/07/2020	First issue	

Display Features			
Display Size	10.10"		
Resolution	1280x720		
Orientation	Landscape		
Appearance	RGB		
Logic Voltage	3.3V		
Interface	LVDS		
Brightness	2000 cd/m ²		
Touchscreen	---		
Module Size	238.60 x 148.00 x 6.50 mm		
Operating Temperature	-30°C ~ +85°C	Created By	Checked By
Pinout	40 way FFC	CL	TSB
Pitch	0.50 mm	Box Quantity	Weight / Display
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Display Accessories	
Part Number	Description
MBID-40FP	40 Way FFC to cable and wires. Driven by any driver board that can be wired to a 1mm pitch SHDR-40V-S-B receptacle.
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 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 Color Active Matrix Liquid Crystal Display composed of a TFT-LCD display a LED backlight system. The screen format is intended to support HD (1280(H) x 720(V)) screen and 16.7M colors.

2.2 Features

- High brightness display, 2000nits by LED backlight.
- Long operation lifetime BLU design
- RoHS Compliance

2.3 Application

Industrial applications.



2.4 Display specifications

Items	Unit	Specification
Screen Diagonal	mm	10.1
Active Area	mm	223.68 (H) X 125.82 (V)
Pixels H x V	pixels	1280 x3(RGB) x 720
Pixels Pitch	um	174.75 (per one triad) x 174.75
Pixel Arrangement		RGB Vertical stripe
Display mode		Normally Black
White luminance (center)	Cd/m ²	2000 (Typ)
Contrast ratio		1000:1 (Typ.)
Optical Response Time	msec	25 ms (Typ. On/off)
Normal Input Voltage VDD	Volt	3.3
Power Consumption (Vcc Line + LED backlight)	Watt	17.8 W (VDD line=1.6 W; LED lines= 16.2 W)
Weight	Grams	330
Physical size	mm	238.6 (W)×148.0 (H)×6.5 (D)
Electrical Interface		LVDS
Support colors		16.7M colors
Surface Treatment		Anti-glare and hard-coating 3H
Temperature range		
Operating	°C	-30 ~ 85 (TFT surface)
Storage	°C	-40 ~ 90
RoHS Compliance		RoHS Compliance

2.5 Optical characteristics

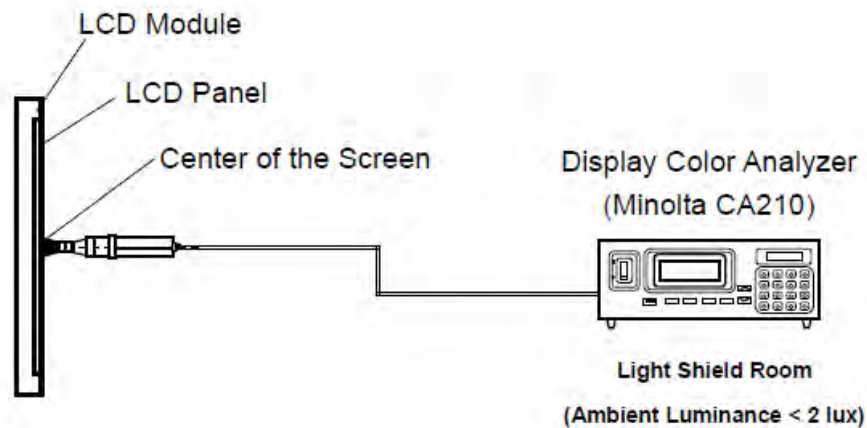
The following optical characteristics are measured under stable condition at 25 °C

Items	Unit	Conditions	Min.	Typ.	Max.	Note
Viewing angle	Deg.	Horizontal (Right)		85		2
		CR=10 (Left)		85		
		Vertical (Up)		85		
		CR=10 (Down)		85		
Contrast Ratio		Normal Direction	600	1000		3
Response Time	msec	Raising + Falling		25	35	4
Color coordinates (CIE) White		White x	-0.05	0.31	+0.05	
		White y		0.33		
Center Luminance	Cd/m ²		1600	2000		6
Luminance Uniformity	%		70	75		7
Crosstalk (in 60 Hz)	%				1.5	
Flicker	dB				-20	

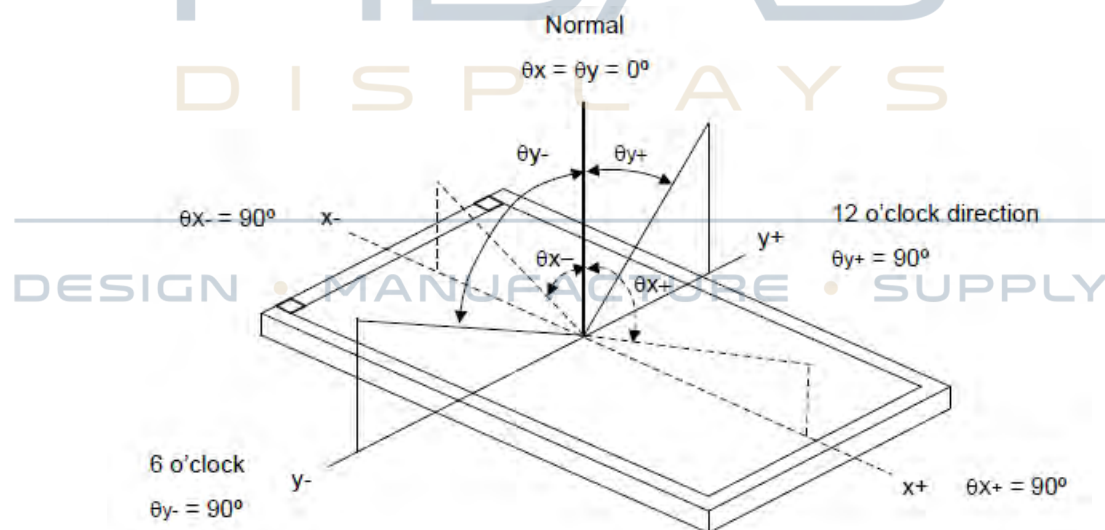


Note 1: Measurement method

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.



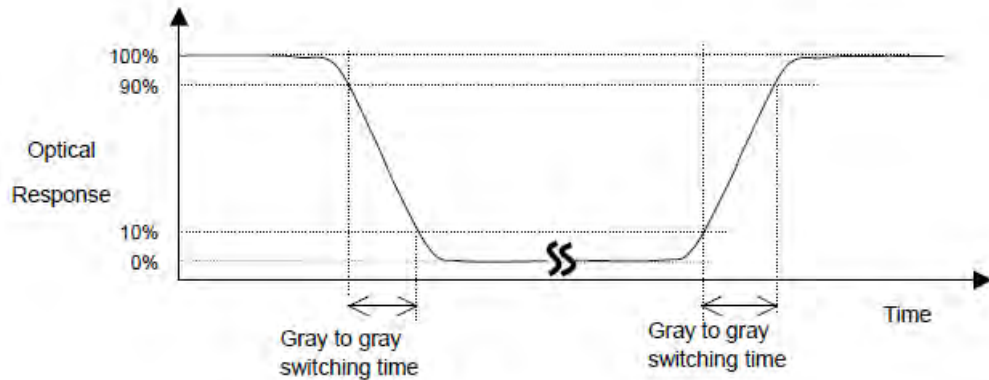
Note 2: Definition of viewing angle



Note 3: Contrast ratio is measured by Minolta CA210

Note 4: Definition of Response time

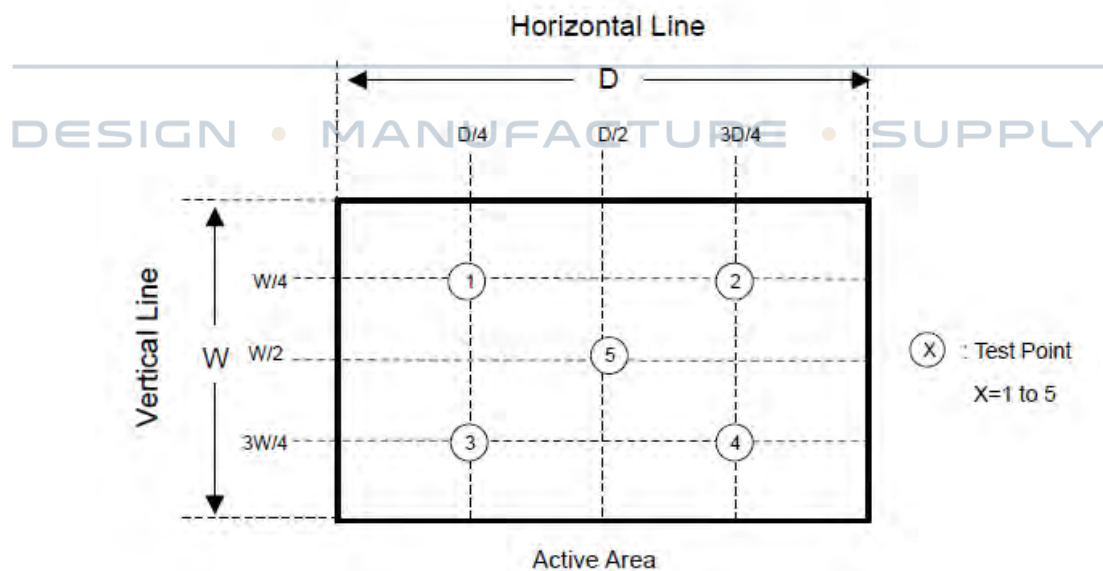
The output signals of photo detector are measured when the input signals are changed from “Full Black” to “Full White” (rising time), and from “Full White” to “Full Black” (falling time), respectively. The response time is interval between the 10% and 90% of amplitudes. Please refer to the figure as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



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



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	3.96	Volt	Note 1, 2

3.2 Backlight unit

Items	Symbol	Min	Max	Unit	Conditions
LED bar input current			480	mA	

3.3 Environment

Items	Symbol	Values			Unit	Conditions
		Min.	Typ.	Max.		
Operation temperature	T _{OS}	-30	-	85	°C	Note 3
Operation Humidity	H _{OP}	10		85	%	
Storage temperature	T _{ST}	-40		90	°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. Electrical characteristics

4.1 LCD electronics specification

(GND =0V)

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	V_{DD}	3.0	3.3	3.6	V	Note 1
Input logic high voltage	V_{IH}	$0.7 V_{DD}$	-	V_{DD}	V	Note 2
Input logic low voltage	V_{IL}	GND	-	$0.3 V_{DD}$	V	
Internal Pull low / high resistor	RI	200	350	850	k Ω	Note 2

Note 1: V_{DD} setting should match the signals output voltage of customer's system board .

Note 2: RESET, STBYB, SELB(DINT), L/R, U/D

4.2 Backlight unit

Parameter	Min	Typ	Max	Unit	Note
LED voltage (VL)		30		[V]	2
LED current (IL)		270		[mA]	2
LED power (PL)		16.2		[W]	
LED lite time (MTBF)		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 270 mA

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

4.3 Interface connector

4.3.1 TFT connector(CN1)

PCBa connector is used for the module electronics interface. The recommended model is 20647-040E-01 manufactured by I-PEX.

Pin No.	Symbol	I/O	Pulled Internally (Note3)	Function	Remark
1	NC	-		Keep floating	
2	VDD	Power		External main and I/O power supply ; Power3V3	Note 2
3	VDD	Power		External main and I/O power supply : Power3V3	Note 2
4	NC	-		Keep floating	
5	RESET	Input	H	Global reset pin	Note 2
6	STBYB	Input	H	Standby mode setting pin	Note 2
7	GND	Power		Ground	
8	RXIN0-	Input		LVDS data 0-	
9	RXIN0+	Input		LVDS data 0+	
10	GND	Power		Ground	
11	RXIN01-	Input		LVDS data 1-	
12	RXIN01+	Input		LVDS data 1+	
13	GND	Power		Ground	
14	RXCLKIN-	Input		LVDS clk -	
15	RXCLKIN+	Input		LVDS clk +	
16	GND	Power		Ground	
17	RXIN02-	Input		LVDS data 2-	
18	RXIN02+	Input		LVDS data 2+	
19	GND	Power		Ground	
20	RXIN03-	Input		LVDS data 3-	
21	RXIN03+	Input		LVDS data 3+	
22	GND	Power		Ground	
23	NC	-		Keep floating	
24	NC	-		Keep floating	

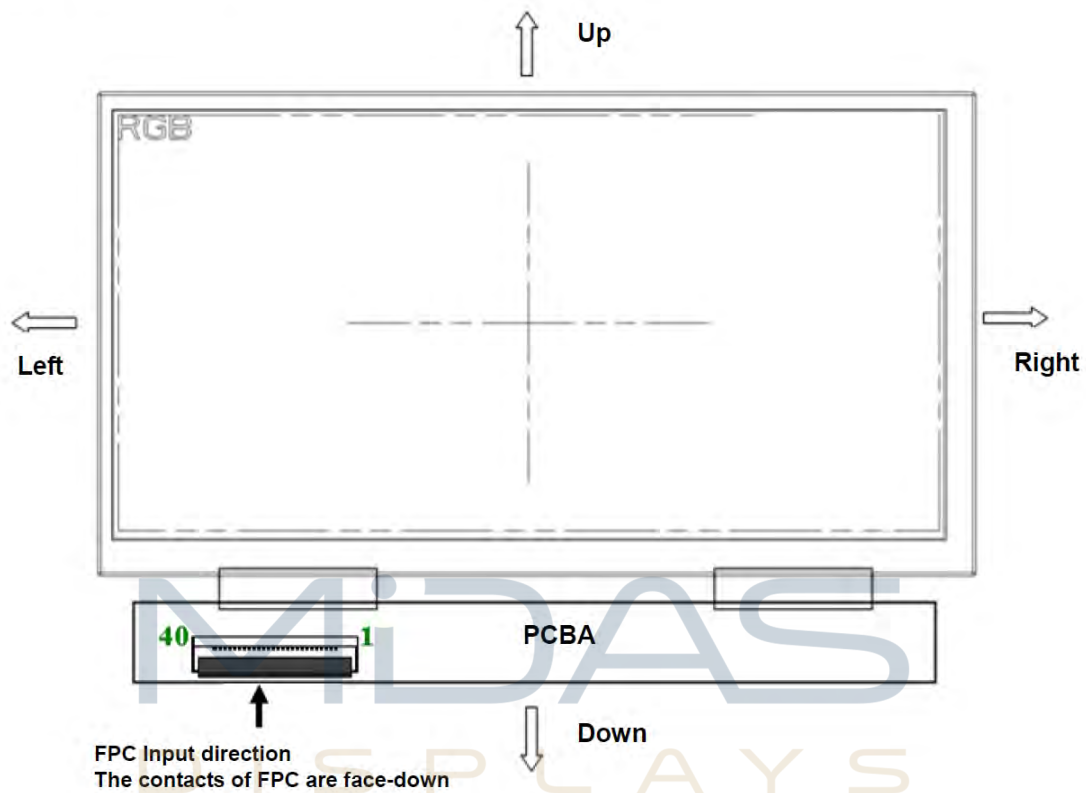
25	GND	Power		Ground	
26	NC	-		Keep floating	
27	NC	-		Keep floating	
28	SELB(DINT)	Input	H	Input Input data format selection DINT = 1 : 8-bit (Default) DINT = 0 : 6-bit	
29	NC	-		Keep floating	
30	GND	Power		Ground	
31	NC	-		Negative backlight voltage	
32	NC	-		Negative backlight voltage	
33	L/R	Input	H	Horizontal shift direction (source output) selection. RL = 1: Left -> Right (Default) RL = 0: Right -> Left	
34	U/D	Input	H	Vertical shift direction (gate output) selection. TB = 1: Top ->Bottom (Default) TB = 0: Bottom ->Top	
35	NC	-		Keep floating	
36	NC	-		Keep floating	
37	NC	-		Keep floating	
38	NC	-		Keep floating	
39	NC	-		Positive backlight voltage	
40	NC	-		Positive backlight voltage	

Note 2: Please follow "3.2 power sequence"

Note 3: Typical internal pull low / high resistor is 350 kΩ



Note 4: Definition of scanning direction.
Refer to the figure as below:



4.3.2 Backlight connector(CN2)

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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	



5. Signal characteristics

5.1 Timing characteristics

5.1.1 AC electrical characteristics

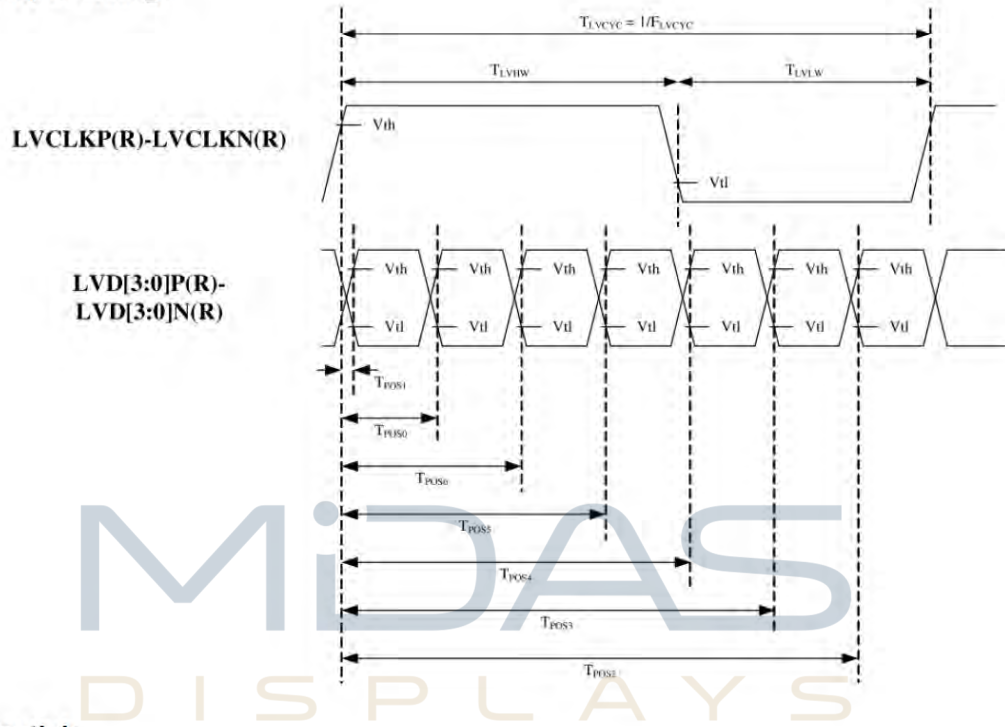
Parameter	Symbol	Spec.			Unit	Remark
		Min.	Typ.	Max.		
Clock frequency	FLVCYC	10	-	85	MHz	Frame rate=60Hz
Clock Period	TLVCYC	11.76	-	100	Nsec	Frame rate=60Hz
1 data bit time	UI	-	1/7	-	TLVCYC	
Position 1	TPOS1	-0.2	0	0.2	UI	Note 1
Position 0	TPOS0	0.8	1	1.2	UI	
Position 6	TPOS6	1.8	2	2.2	UI	
Position 5	TPOS5	2.8	3	3.2	UI	
Position 4	TPOS4	3.8	4	4.2	UI	
Position 3	TPOS3	4.8	5	5.2	UI	
Position 2	TPOS2	5.8	6	6.2	UI	
Input eye width	TEYEW	0.6	-	-	UI	
Input eye border	TEX	-	-	0.2	UI	
LVDS wake up time	TENLVDS	-	-	150	ns	

Note 1: Please refer to “3.3.2. Input Clock and Data Timing Diagram”

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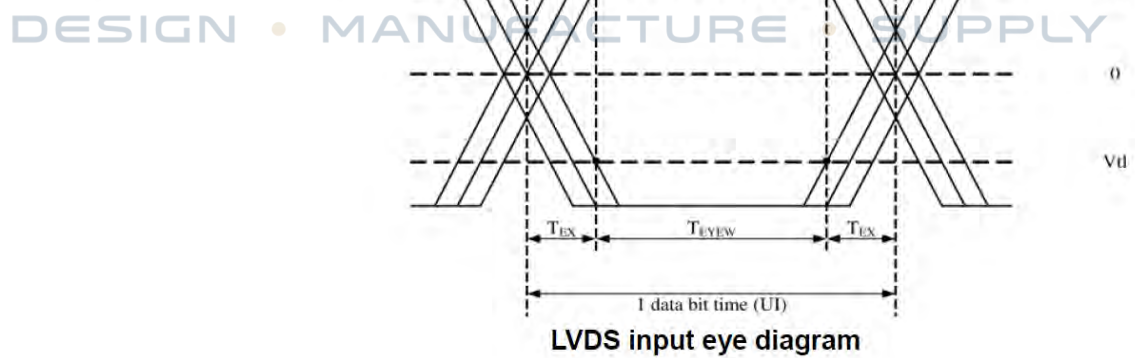
5.1.2 Input clock and data timing diagram

LVDS input timing:



Differential:

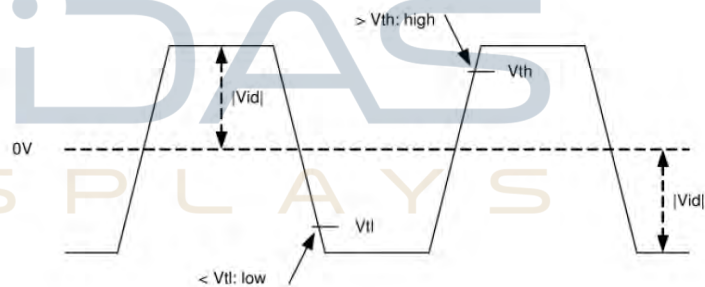
LVD[3:0]P-LVD[3:0]N



5.1.3 DE electrical characteristics

Parameter	Symbol	Spec.			Unit	Remark
		Min.	Typ.	Max.		
Differential input high Threshold voltage	Vth	-	-	+0.1	V	Vcm=1.2V
Differential input low Threshold voltage	Vtl	-0.1	-	-	V	
Differential input common Mode voltage	Vcm	1	1.2	1.8- V _{id} /2	V	-
LVDS input voltage	V _{INLV}	0.7		1.8	V	
Differential input voltage	V _{id}	0.2	-	0.6	V	-
Differential input leakage Current	Vleak	-10	-	+10	μA	-
Termination Resistor	Z _{id}	80	100	120	Ω	-

Differential:
LVCLKP(R)-LVCLKN(R),
LVD[3:0]P(R)-
LVD[3:0]N(R)



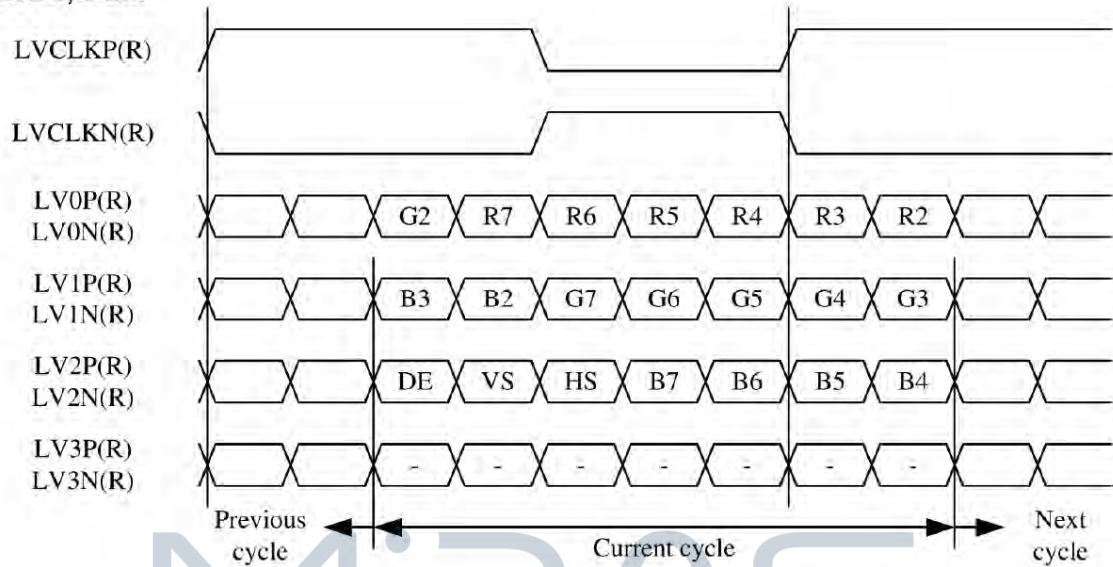
5.1.4 Timing

Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
DCLK Frequency	F DCLK	58.5	63.7	76.3	MHz	Frame rate=60Hz
Horizontal valid data	t _{hd}	1280			DCLK	
H-blanking	t _{hb}	56	60	192	DCLK	
1 Horizontal Line	t _h	1336	1340	1472	DCLK	
Vertical valid data	t _{vd}	720			H	
V-blanking	t _{vb}	10	72	144	H	
1 Vertical field	t _v	730	792	864	H	

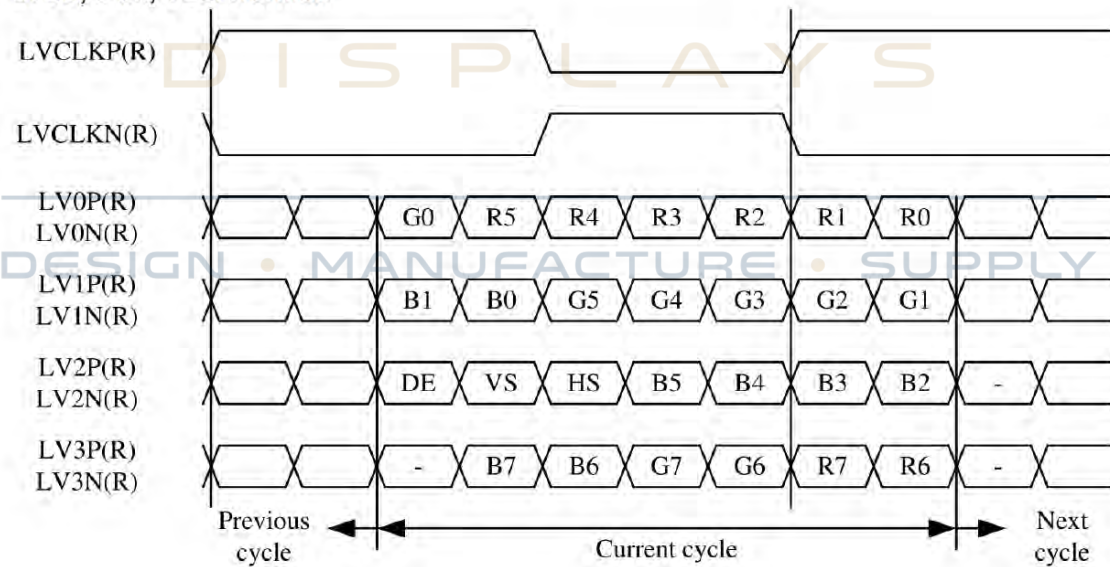
Note : DE mode only.

5.1.5 Data input format

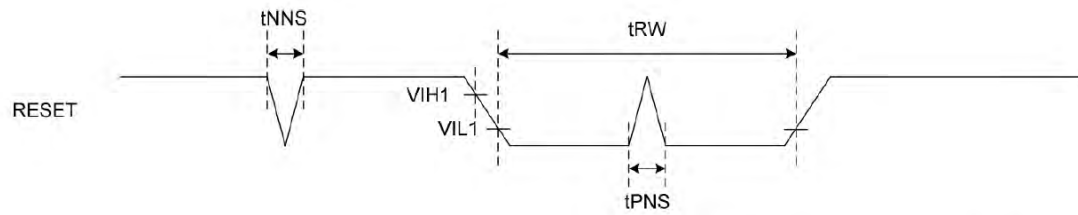
LVDS, 6-bit:



LVDS, 8-bit, VESA format:



5.1.6 Reset timing



(VDD=3.3V ~ 3.6V)

Signal	Parameter	Symbol	Spec.			Unit	Remark
			Min.	Typ.	Max.		
RESET	Reset pulse width	t_{RW}	10	-	-	μs	-
	Positive spike noise width	t_{PNS}	-	-	100	ns	-
	Negative spike noise width	t_{NNS}	-	-	100	ns	-

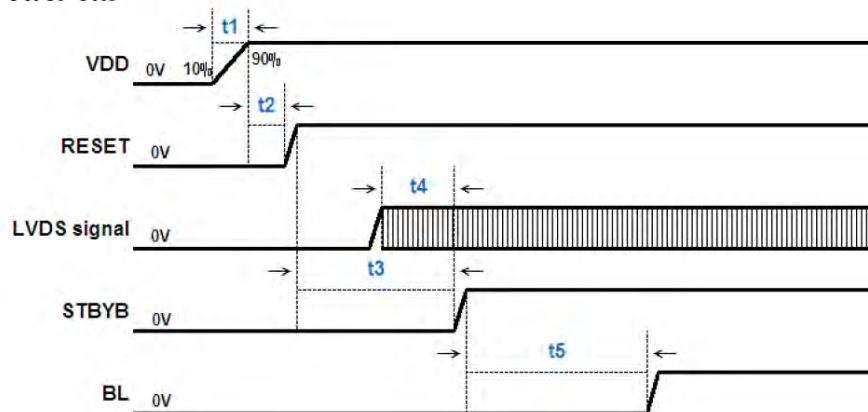
MIDAS
DISPLAYS

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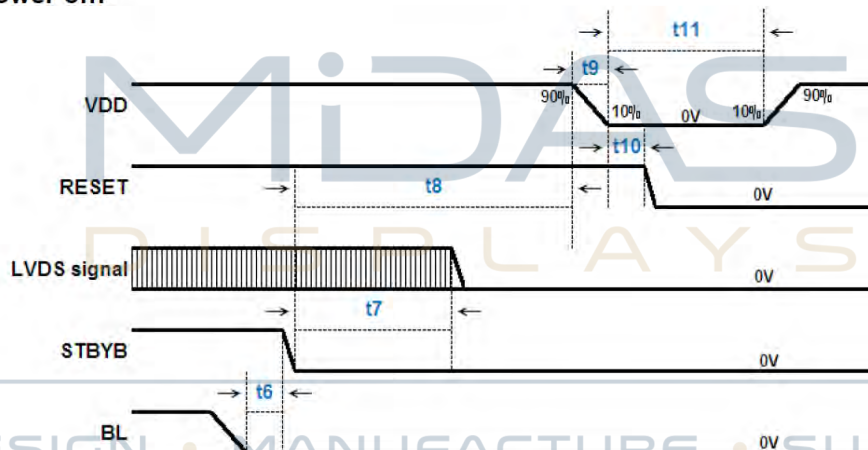
5.2 Power sequence

VDD = 3.0~3.6V

a. Power on:



b. Power off:



Symbol	SPEC.			Unit
	Min.	Typ.	Max.	
t1	0.5	---	10	ms
t2	20	---	---	us
t3	10	---	---	ms
t4	1	---	t3	ms
t5	30	---	---	ms
t6	0	---	---	ms
t7	20	---	t8	ms
t8	100	---	---	ms
t9	0.5	---	10	ms
t10	10	---	20	ms
t11	500	---	---	ms

6. Reliability Test

Environment test conditions are listed as following table.

Items	Required Condition	Note
Temperature Humidity Bias (THB)	Ta=40°C , 80%RH, 240hours	
High Temperature Operation (HTO)	Ts= 85°C , 240hours	3
Low Temperature Operation (LTO)	Ta= -30°C , 240hours	
High Temperature Storage (HTS)	Ta= 90°C , 240hours	
Low Temperature Storage (LTS)	Ta= -40°C , 240hours	
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: $\pm$ 8KV, 150pF(330 Ω) 1sec, 9 points, 25 times/ point.	
	Air Discharge: $\pm$ 15KV, 150pF(330 Ω) 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 -10°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.

Note 3: TFT surface.

8. Mechanical Characteristics

