

MDT101011	1024x600	LVDS Interface	TFT Module
Specification			
Version: 1		Date: 13/07/2019	
Revision			
1	11/07/2019	First issue	

Display Features			
Display Size	10.10"		
Resolution	1024x600		
Orientation	Landscape		
Appearance	RGB		
Logic Voltage	3.3V		
Interface	LVDS		
Brightness	1000 cd/m ²		
Touchscreen	---		
Module Size	244.00 x 143.00 x 12.40 mm		
Operating Temperature	-30°C ~ +85°C	Created By	Checked By
Pinout	20 way connector	CL	TSB
Pitch	1.25 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) In case if a Module has to be put back into the packing container slot after once it was taken out from the container, do not press the center of TFTLCD panel.
- 10) At the insertion or removal of the Signal Interface Connector, be sure not to rotate nor tilt the Interface Connector of the TFT Module.
- 11) 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

MDT101011 is a 10.1" TFT Liquid Crystal Display module with LED Backlight unit and LVDS interface. This module supports 1024 x 600 WSVGA mode

2.2 Features

- High brightness 1000 nits.
- LED backlight
- Wide operation temperature
- RoHS Compliance

2.3 Application

Industrial application.



2.4 Display Specifications

Items	Unit	Specification
Screen Diagonal	inch	10.1
Active Area	mm	222.72 (H) x 125.28 (V)
Pixels H x V	pixels	1024 x 3(RGB) x 600
Pixels Pitch	um	0.2175 (H) x 0.2088 (V)
Pixel Arrangement		RGB Vertical stripe
Display mode		TN mode, normally white
White luminance (center)	Cd/m ²	1000 (Typ.)
Contrast ratio		(500) (Typ.)
Optical Response Time	msec	16 ms (Typ. on/off)
Normal Input Voltage VDD	Volt	3.3
Power Consumption (VIN Line + LED BL Line)	Watt	7.11 (VIN line 0.63W, LED BL line 6.48(W))
Weight	Grams	440
Physical size	mm	244.0(H)x 143(V) x 12.4(D) (typ.)
Electrical Interface		LVDS
Support Colors		262k / 16.7 M
Surface Treatment		Anti-Glare
Temperature range		
Operating	°C	-30 ~ 85 (TFT surface)
Storage (Shipping)	°C	-30 ~ 85
RoHS Compliance		RoHS Compliance



2.5 Optical Characteristics

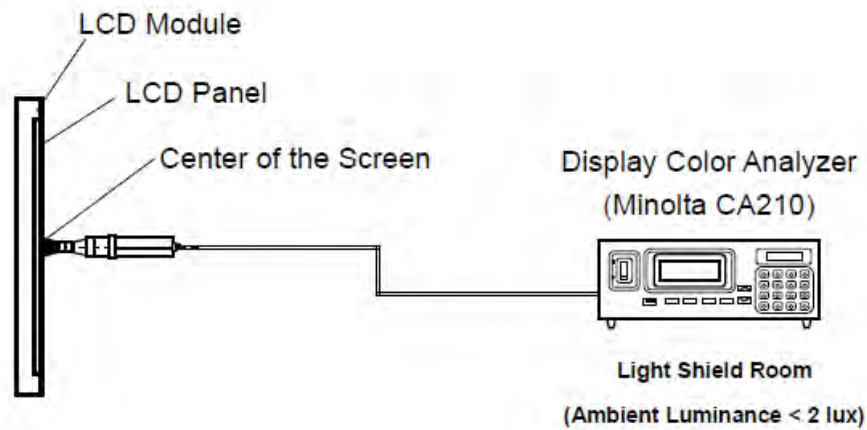
The following optical characteristics are measured under stable condition at 25 °C

Items	Unit	Conditions	Min.	Typ.	Max.	Note
Viewing angle	Deg.	Horizontal (Right) CR=10 (Left)	140	160		2
		Vertical (Up) CR=10 (Down)	140	160		
Contrast Ratio		Normal Direction		(500)		3
Response Time	msec	Raising time (T _{rR})		11		4
		Falling time (T _{rF})		5		
		Raising + Falling		16	50	
Color / Chromaticity Coordinates (CIE)		Red x	-0.04	0.58	+0.04	5
		Red y		0.34		
		Green x		0.33		
		Green y		0.59		
		Blue x		0.16		
		Blue y		0.13		
Color coordinates (CIE) White		White x		0.31		
		White y		0.33		
NTSC				45		%
Center Luminance	Cd/m ²		800	1000		6
Luminance Uniformity	%			70		7
Crosstalk (in 60 Hz)	%				1.2	
Flicker	dB				-20	

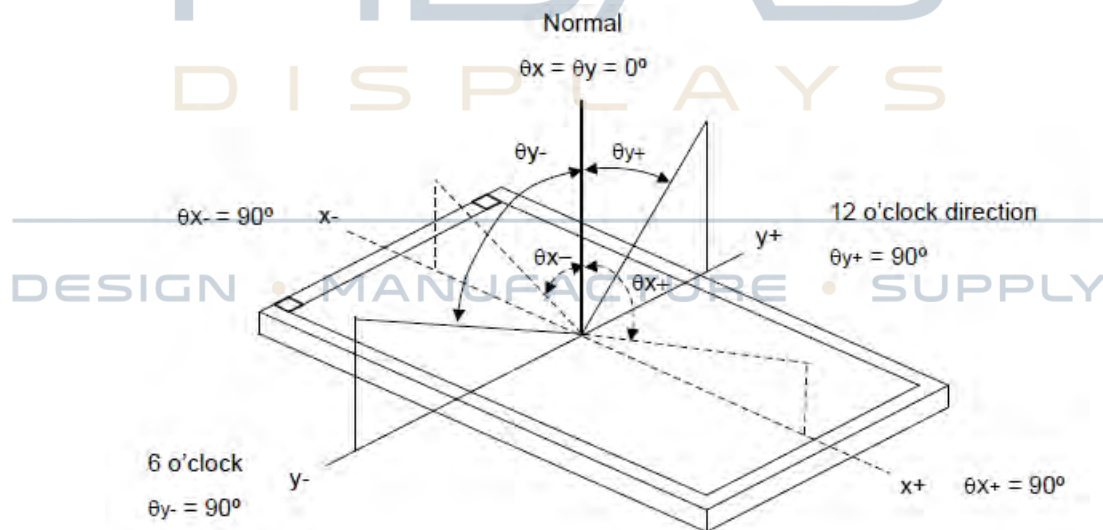


Note 1: Measurement method

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.



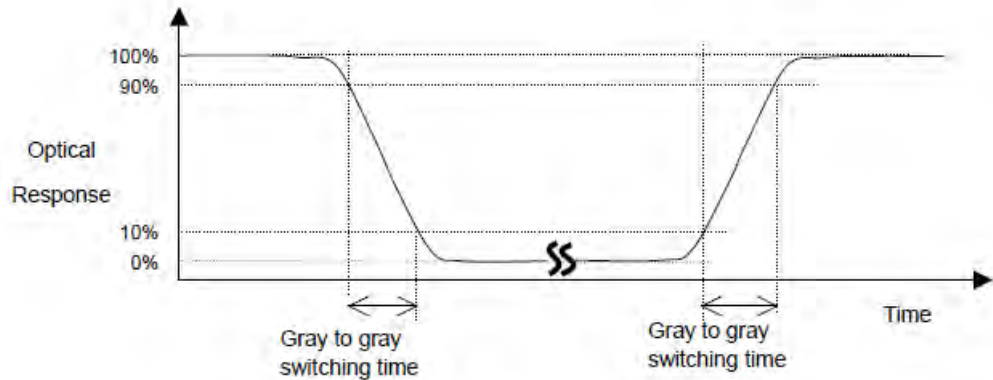
Note 2: Definition of viewing angle



Note 3: Contrast ratio is measured by Minolta CA210

Note 4: Definition of Response time

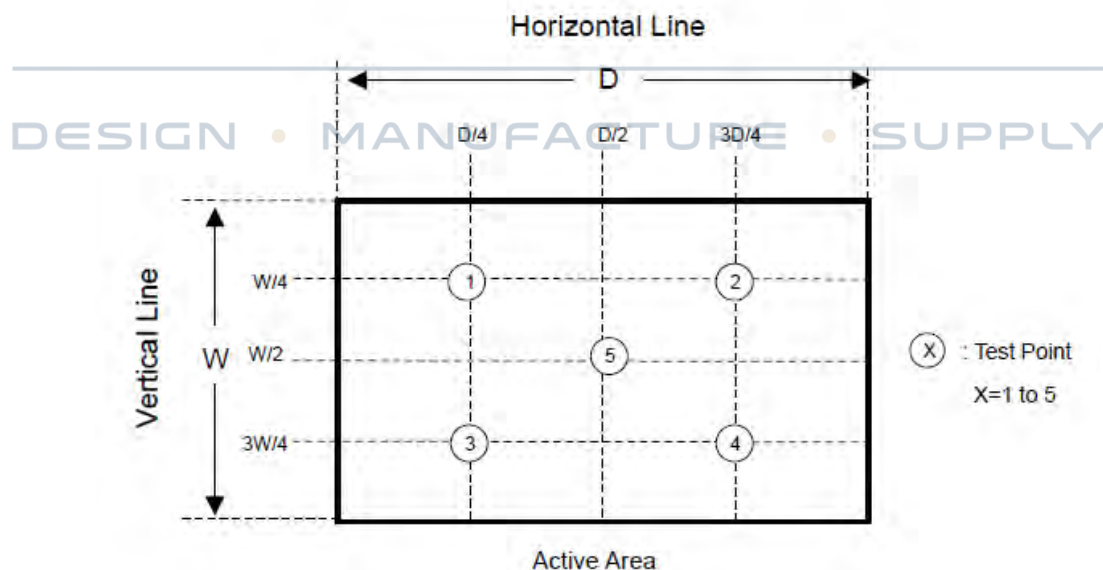
The output signals of photo detector are measured when the input signals are changed from “Full Black” to “Full White” (rising time), and from “Full White” to “Full Black” (falling time), respectively. The response time is interval between the 10% and 90% of amplitudes. Please refer to the figure as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

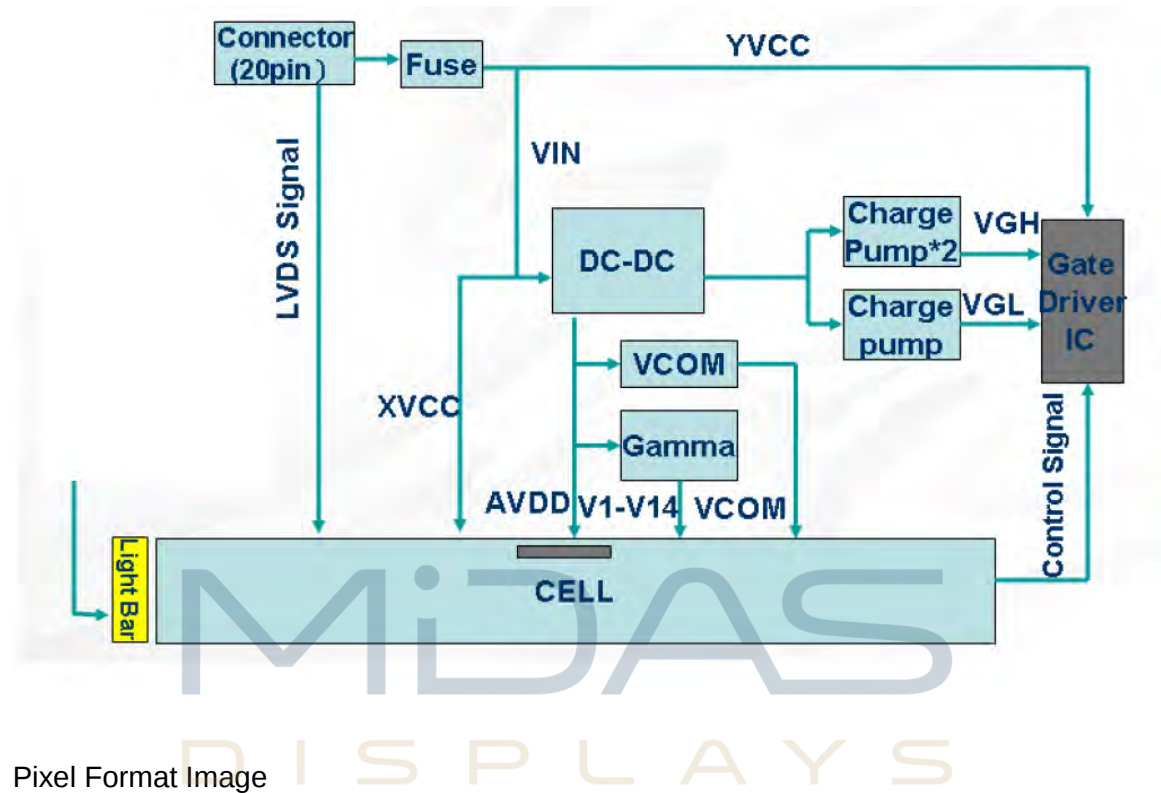


$$\text{Uniformity} = (\text{Min. Luminance of 5 points}) / (\text{Max. Luminance of 5 points})$$



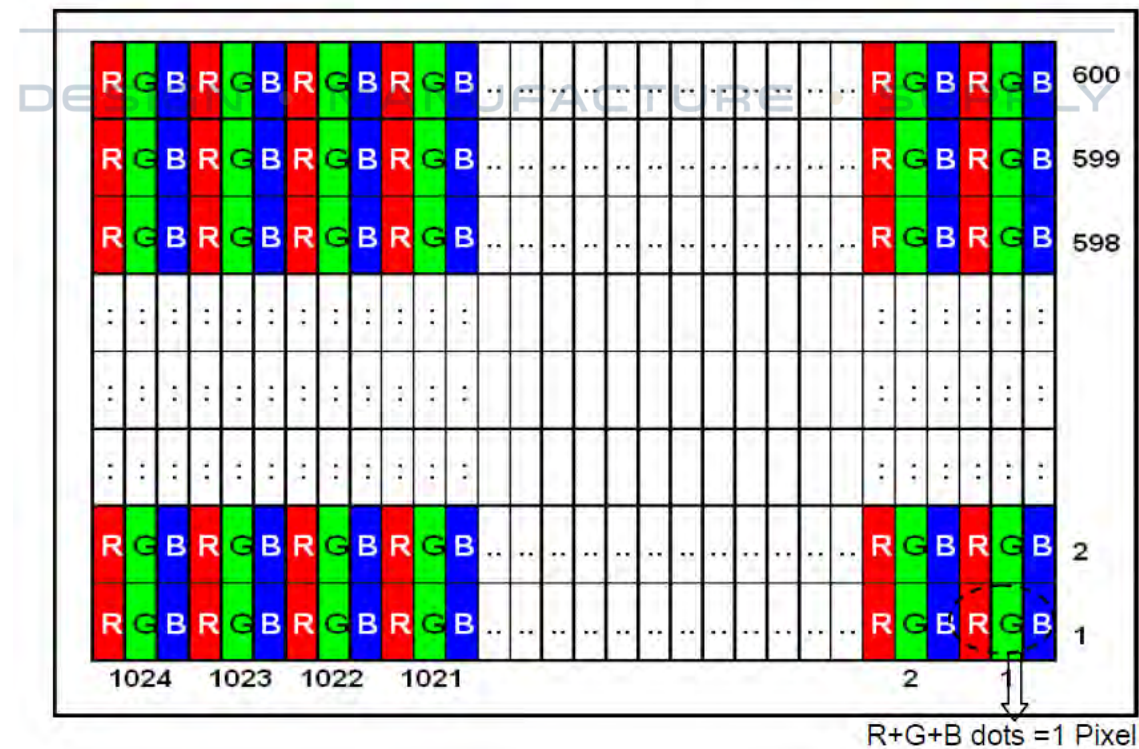
3. Functional Block Diagram

The following diagram shows the functional block of the 10.1 inches Color TFT-LCD Module:

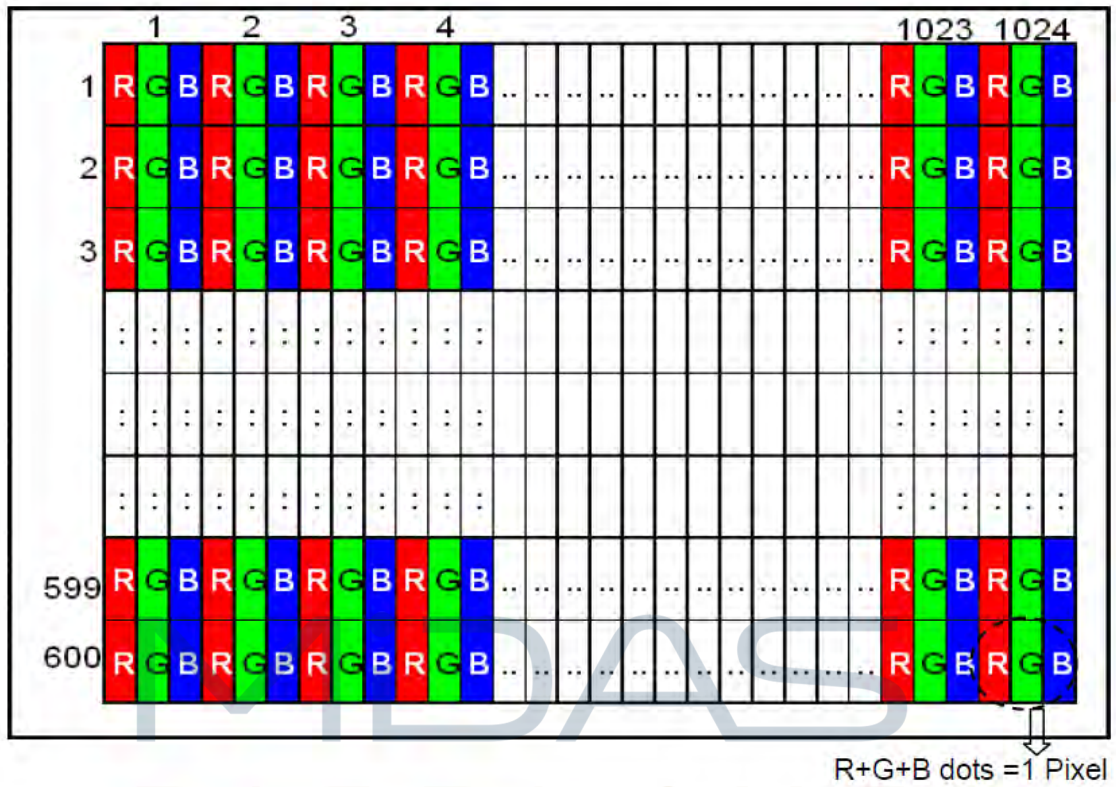


Pixel Format Image

REV=H



REV=L/NC



DISPLAYS

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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 supply voltage	V _{IN}	-0.3	3.6	Volt	Note 1, 2
Power Supply Fuse Current Setting	I _{FUSE}		1.5	A	
Logic input signal voltage	V _S		3.6	Volt	

4.2 Backlight unit

Items	Symbol	Min	Max	Unit	Conditions
Supply VLED Voltage	VLED	-0.3	22	V	
LED forward current			420	mA	

4.3 Absolute Ratings of Environment

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

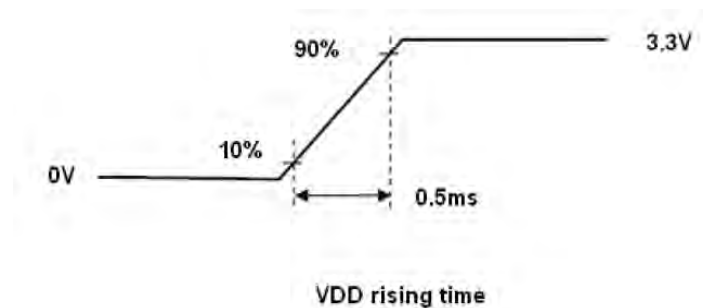
5. Electrical characteristics

5.1 TFT LCD Module

Input power specifications are as follows

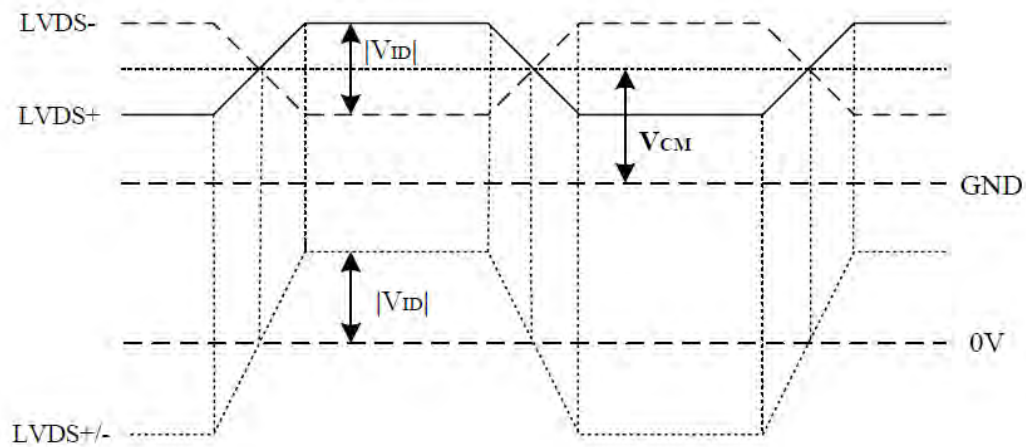
ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
System Power Supply						
Input Power Supply Voltage	V_{IN}	3.0	3.3	3.6	V	
Input Power Supply Current	I_{VIN}	-	-	191	mA	Black pattern 60Hz
Input Inrush Current	I_{RUSH}	-	-	1.5	A	0.5ms rise time (10%~90%)
Input Power Voltage Ripple	V_{RPL}	-	-	200	mV	Vp-p
REV	VH	2.0	3.3	5.0	V	
	VL	-	-	0.8	V	
LVDS Signals						
Differential Input High Threshold	V_{th}	-	-	+100	mV	$V_{cm}=+1.2V$
Differential Input Low Threshold	V_{tl}	-100	-	-	mV	$V_{cm}=+1.2V$
Magnitude Differential Input Voltage	$ V_{id} $	200	-	600	mV	
Common Mode Voltage	V_{cm}	1.0	1.2	1.4	V	$V_{th} - V_{tl} = 200mV$
Common Mode Voltage Offset	ΔV_{cm}	-50	-	+50	mV	$V_{th} - V_{tl} = 200mV$

Note (1) Measure Condition



Voltage Definitions

Note (2) LVDS waveform



5.2 Backlight Unit:

Parameter guideline is under stable conditions at 25°C (Room Temperature):

Parameter	Min	Typ	Max	Unit	Note
LED voltage (VL)		36		[V]	2
LED current (IL)		180		[mA]	2,
Power consumption (PL)		6.48		W	
LED Life Time(LTLED)		80,000		[Hour]	1

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

Note (1) LED current is measured by utilizing a high frequency current meter.

Note (2) $PL = IL \times VL$

Note (3) The lifetime of LED is defined as the time when it continues to operate under the conditions at $T_a = 25 \pm 2^\circ\text{C}$ until the brightness becomes $\leq 50\%$ of its original value.

5.3 Interface Connector:

Connector Name / Designation

Item	Description
Signal Connector	STM MSB240420HD
LED Connector	STM MSB24038P5A

Signal Pin Assignment

Pin #	Signal Name	Description	Remarks
1	VDD	Power Supply, 3.3V (typical)	
2	VDD	Power Supply, 3.3V (typical)	
3	VSS	Ground	
4	REV	Reverse Scan selection	
5	Rin1-	-LVDS differential data input	
6	Rin1+	+LVDS differential data input	
7	VSS	Ground	
8	Rin2-	-LVDS differential data input	
9	Rin2+	+LVDS differential data input	
10	VSS	Ground	
11	Rin3-	-LVDS differential data input	
12	Rin3+	+LVDS differential data input	
13	VSS	Ground	
14	CIKIN-	-LVDS differential clock input	
15	CIKIN+	+LVDS differential clock input	
16	GND		
17	Rin4-	-LVDS differential data input	
18	Rin4+	+VDS differential data input	
19	SEL68	6/8 bits LVDS data input selection(H:8bit ;L/Floating:6bit)	Table 7
20	NC	Not connection	High Active

SEL68 Power Voltage Specifications

Signal Name	SYMBOL	MIN.	TYP.	MAX.	UNIT
SEL68	VH	2.0	3.3	5.0	V
	VL	-	-	0.8	V

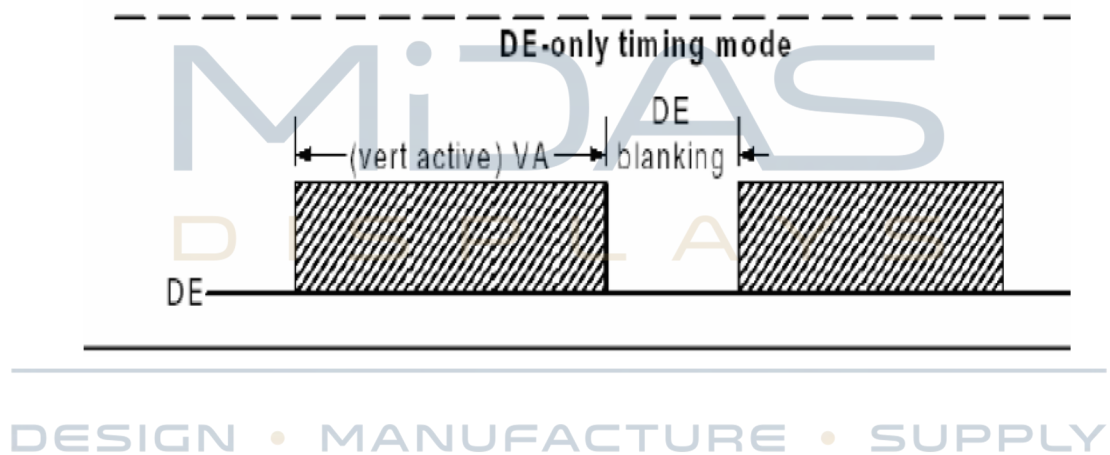
6.0 Interface Timing

6.1 Timing Characteristics

Synchronization Method: DE mode only

Parameter	Symbol	Unit	Min.	Typ.	Max.
LVDS Clock Frequency <single>	f_{dck}	MHz	45	51.2	57
H Total Time	T_{hp}	clocks	1,324	1,344	1,364
H Active Time	HA	clocks	1,024	1,024	1,024
H Blanking Time	TH_{BLANK}	clocks	300	320	340
V Total Time	T_{vp}	lines	625	635	645
V Active Time	VA	lines	600	600	600
V Blanking Time	TV_{BLANK}	lines	25	35	45
V Frequency	f_v	Hz	55	60	65

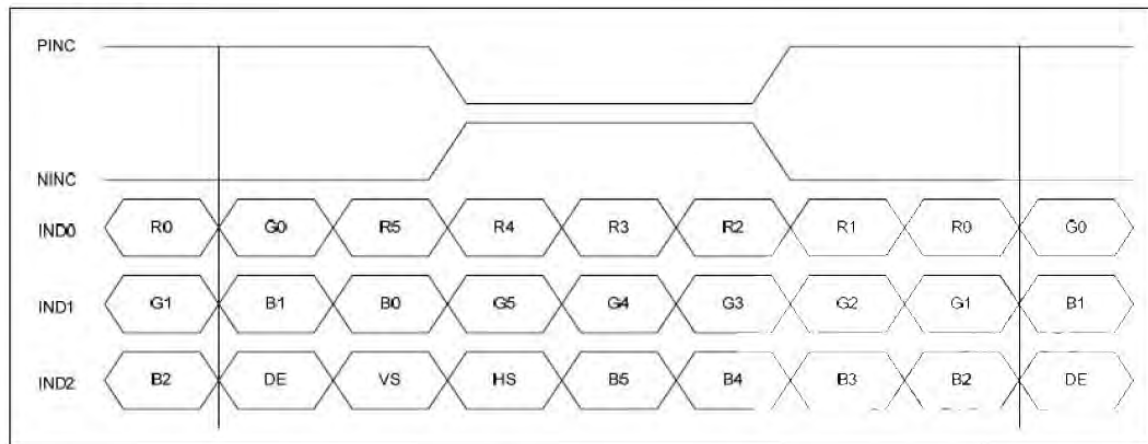
DE-only timing mode



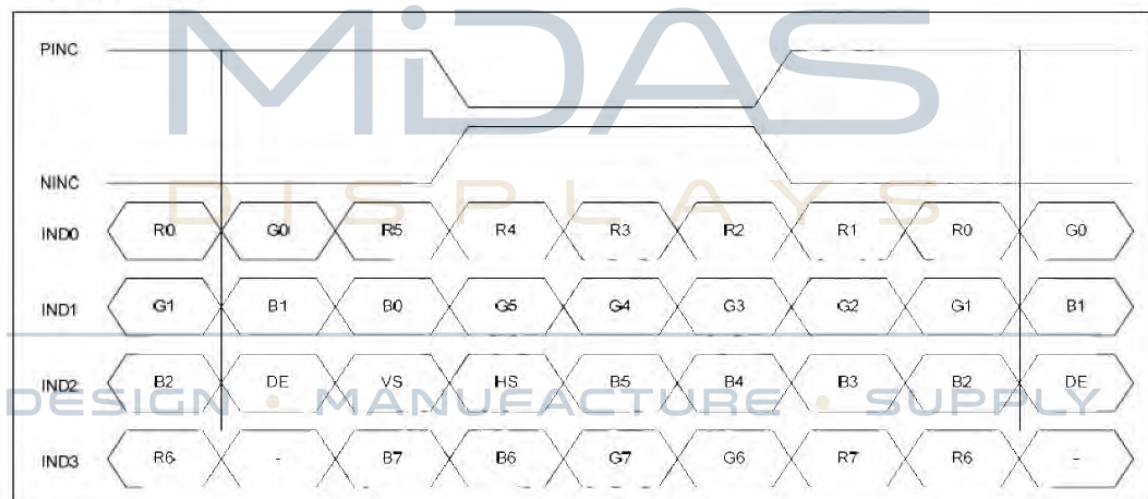
6.2 Timing Diagram of Interface Signal

LVDS Data Mapping

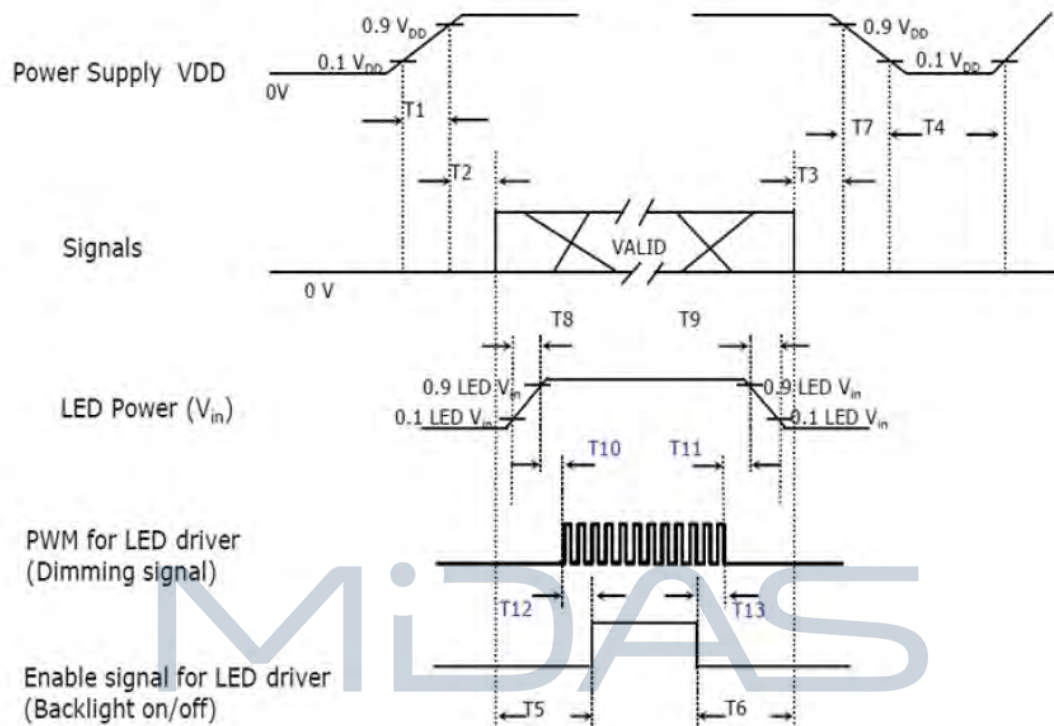
6 bit LVDS input



8 bit LVDS input



7. Power ON/OFF Sequence



Power Sequencing Requirements

Parameter	Symbol	Unit	min	typ	max
VDD rising Time from 10% to 90%	T1	ms	0.5	--	10
Delay from VDD to valid data at power ON	T2	ms	0	--	50
Delay from valid data OFF to VDD OFF at power OFF	T3	ms	0	--	50
VDD OFF time for Windows restart	T4	ms	500	--	--
Delay from valid data to B/L enable at power ON	T5	ms	200	--	--
Delay from valid data off to B/L disable at power OFF	T6	ms	200	--	--
VDD falling time from 90% to 10%	T7	ms	0	--	10
LED Vin rising time from 10% to 90%	T8	ms	0.5	--	10
LED Vin falling time from 90% to 10%	T9	ms	0.5	--	10
Delay from LED driver Vin rising time 90% to PWM ON	T10	ms	0	--	10
Delay from PWM Off to LED Driver Vin falling time 10%, Must Keep rule	T11	ms	0	--	--
Delay from PWM ON to B/L Enable ON, Must Keep rule	T12	ms	0	--	--
Delay from B/L Enable Off to PWM Off	T13	ms	0	--	--

8. Reliability Test

Environment test conditions are listed as following table.

Items	Required Condition	Note
Temperature Humidity Bias (THB)	Ta= 50°C , 80%RH, 300hours	
High Temperature Operation (HTO)	Ta= 85°C , 300hours	3
Low Temperature Operation (LTO)	Ta=-30°C , 300hours	
High Temperature Storage (HTS)	Ta= 85°C , 300hours	
Low Temperature Storage (LTS)	Ta= -30°C , 300hours	
Drop Test	Height: 60 cm, package test	
Thermal Shock Test (TST)	-20°C/30min, 60°C/30min, 100 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 -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.

10. Mechanical Characteristic

