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MDT0500D6IH-LVDS	800 x 480	LVDS Interface	TFT Module

Specification

Version: 1	Date: 24/06/2020

Revision

1	22/06/2020	First issue

Display Features	
Display Size	5.0”
Resolution	800 x 480
Orientation	Landscape
Appearance	RGB
Logic Voltage	3.3V
Interface	LVDS
Brightness	500 cd/m^2
Touchscreen	---
Module Size	120.70 x 75.80 x 2.80mm
Operating Temperature	-30°C ~ +80°C
Pinout	40 way FFC
Pitch	0.5mm

RoHS compliant

Box Quantity	Weight / Display
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* - For full design functionality, please use this specification in conjunction with the ST7262 specification.(Provided Separately)

Display Accessories

Part Number	Description
MPBV6	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.

Optional Variants

Appearances	Voltage

Summary

TFT 5.0” is a is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This TFT LCD has a 5.0 inch diagonally measured active display area with 800 x 480 (800 horizontal by 480 vertical pixel) resolution.

General Specifications

- Size: 5.0 inch
- Dot Matrix: 800 × 3(RGB) × 480 dots
- Module dimension: 120.7(W) × 75.8(H) × 2.8mm
- Active area: 108(W) × 64.8 (H) mm
- Dot pitch: 0.135(W) × 0.135(H) mm
- LCD type: TFT, Normally Black, Transmissive
- View Direction: 80/80/80/80
- Aspect Ratio: 16:9
- Driver IC: ST7262 or equivalent
- Interface: LVDS
- Backlight Type: LED ,Normally White
- With /Without TP: Without TP
- Surface: Anti-Glare

*Color tone slight changed by temperature and driving voltage.

Interface

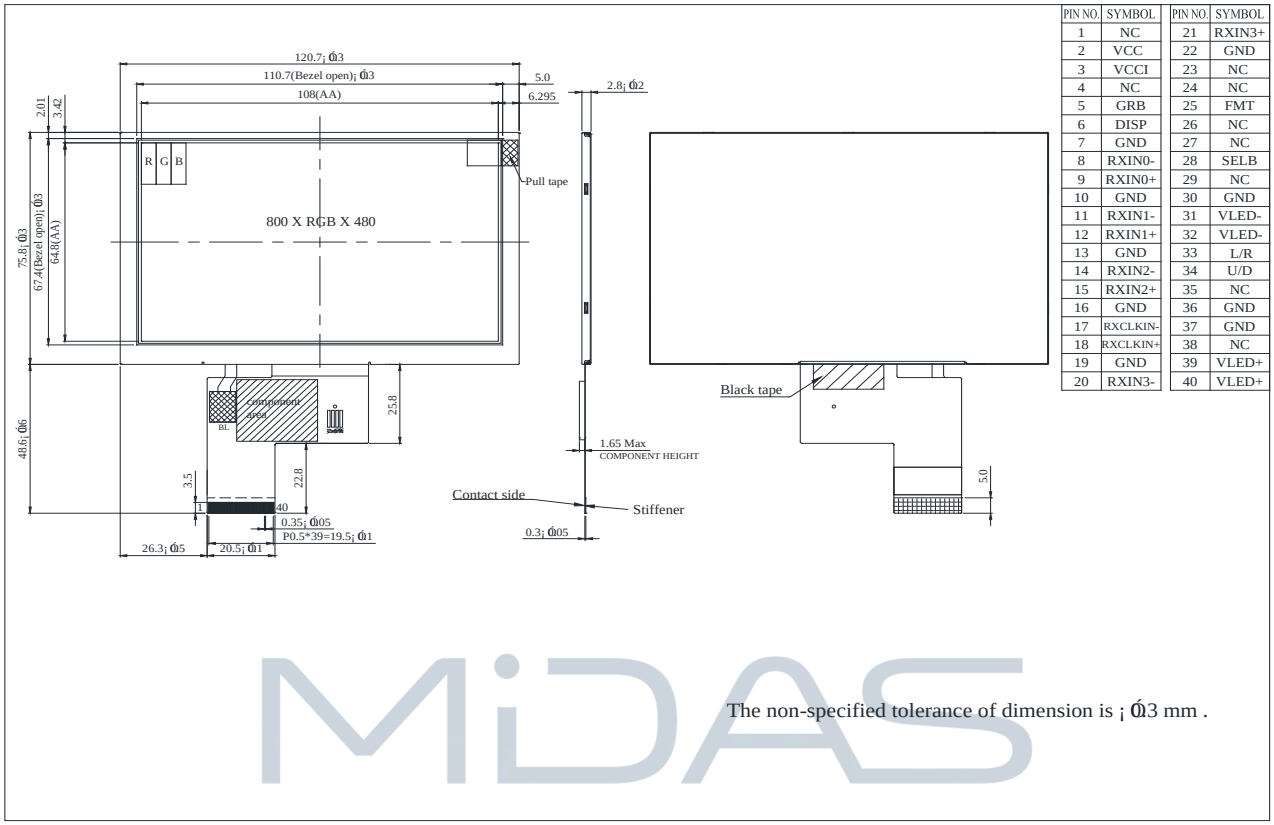
1. LCM PIN Definition

FPC Connector is used for the module electronics interface.

<table>
<tr><th>Pin</th><th>Symbol</th><th>Function</th><th>Remark</th></tr>
<tr><td>1</td><td>NC</td><td>No connection</td><td></td></tr>
<tr><td>2</td><td>VCC</td><td>Power voltage</td><td></td></tr>
<tr><td>3</td><td>VCCI</td><td>Power supply for digital I/O pins.</td><td></td></tr>
<tr><td>4</td><td>NC</td><td>No connection</td><td></td></tr>
<tr><td>5</td><td>GRB</td><td>Global reset pin. When GRB is “L”, internal initialization procedure is executed</td><td></td></tr>
<tr><td>6</td><td>DISP</td><td>Display on/off</td><td></td></tr>
<tr><td>7</td><td>GND</td><td>Power Ground</td><td></td></tr>
<tr><td>8</td><td>RXIN0-</td><td rowspan="2">LVDS input lane: RX0-/ RX0+</td><td></td></tr>
<tr><td>9</td><td>RXIN0+</td><td></td></tr>
<tr><td>10</td><td>GND</td><td>Power Ground</td><td></td></tr>
<tr><td>11</td><td>RXIN1-</td><td rowspan="2">LVDS input lane: RX1-/ RX1+</td><td></td></tr>
<tr><td>12</td><td>RXIN1+</td><td></td></tr>
<tr><td>13</td><td>GND</td><td>Power Ground</td><td></td></tr>
<tr><td>14</td><td>RXIN2-</td><td rowspan="2">LVDS input lane: RX2-/ RX2+</td><td></td></tr>
<tr><td>15</td><td>RXIN2+</td><td></td></tr>
<tr><td>16</td><td>GND</td><td>Power Ground</td><td></td></tr>
<tr><td>17</td><td>RXCLKIN-</td><td rowspan="2">LVDS input lane, detail pin define please refer to LVDS Input Pin Mapping Table.</td><td></td></tr>
<tr><td>18</td><td>RXCLKIN+</td><td></td></tr>
<tr><td>19</td><td>GND</td><td>Power Ground</td><td></td></tr>
<tr><td>20</td><td>RXIN3-</td><td rowspan="2">LVDS input lane: RX3-/ RX3+</td><td></td></tr>
<tr><td>21</td><td>RXIN3+</td><td></td></tr>
<tr><td>22</td><td>GND</td><td>Power Ground</td><td></td></tr>
<tr><td>23-24</td><td>NC</td><td>No connection</td><td></td></tr>
<tr><td>25</td><td>FMT</td><td>LVDS_FMT sets LVDS data format.<table><tr><th>LVDS_FMT</th><th>Function Description</th></tr><tr><td>L</td><td>VESA Mode(Default)</td></tr><tr><td>H</td><td>JEIDA Mode</td></tr></table>LVDS_FMT is not used in RGB interface and should be connected to “L”.</td><td></td></tr>
<tr><td>26-27</td><td>NC</td><td>No connection</td><td></td></tr>
<tr><td>28</td><td>SELB</td><td>SELB sets VSYNC polarity in RGB interface and sets LVDS</td><td></td></tr>
</table>

<table>
<tr><td></td><td></td><td>3- / 4- lane in LVDS interface.<table><tr><th>MCU Type</th><th>VDPOL</th><th>Function Description</th></tr><tr><td rowspan="2">RGB interface</td><td>L</td><td>VSYNC polarity: positive</td></tr><tr><td>H</td><td>VSYNC polarity: negative(Default)</td></tr><tr><td rowspan="2">LVDS interface</td><td>L</td><td>LVDS 3 lane</td></tr><tr><td>H</td><td>LVDS 4 lane(Default)</td></tr></table></td><td></td></tr>
<tr><td>29</td><td>NC</td><td>No connection</td><td></td></tr>
<tr><td>30</td><td>GND</td><td>Power Ground</td><td></td></tr>
<tr><td>31-32</td><td>VLED-</td><td>Power for LED backlight (Cathode)</td><td></td></tr>
<tr><td>33</td><td>L/R</td><td>Horizontal scan direction control pin. This pin must be connected to “H” or “L” according to system application<table><tr><th>HDIR</th><th>Function Description</th></tr><tr><td>L</td><td>From right to left</td></tr><tr><td>H</td><td>From left to right(Default)</td></tr></table></td><td></td></tr>
<tr><td>34</td><td>U/D</td><td>Vertical scan direction control pin. This pin must be connected to “H” or “L” according to system application.<table><tr><th>VDIR</th><th>Function Description</th></tr><tr><td>L</td><td>From down to up.</td></tr><tr><td>H</td><td>From up to down. (Default)</td></tr></table></td><td></td></tr>
<tr><td>35</td><td>NC</td><td>No connection</td><td></td></tr>
<tr><td>36-37</td><td>GND</td><td>Power Ground</td><td></td></tr>
<tr><td>38</td><td>NC</td><td>No connection</td><td></td></tr>
<tr><td>39-40</td><td>VLED+</td><td>Power for LED backlight (Anode)</td><td></td></tr>
</table>

Contour Drawing



PIN NO.	SYMBOL	PIN NO.	SYMBOL
1	NC	21	RXIN3+
2	VCC	22	GND
3	VCCI	23	NC
4	NC	24	NC
5	GRB	25	FMT
6	DISP	26	NC
7	GND	27	NC
8	RXIN0-	28	SELB
9	RXIN0+	29	NC
10	GND	30	GND
11	RXIN1-	31	VLED-
12	RXIN1+	32	VLED-
13	GND	33	L/R
14	RXIN2-	34	U/D
15	RXIN2+	35	NC
16	GND	36	GND
17	RXCLKIN-	37	GND
18	RXCLKIN+	38	NC
19	GND	39	VLED+
20	RXIN3-	40	VLED+

The non-specified tolerance of dimension is ¡ 0.3 mm .

Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	TOP	-30	—	+80	℃
Storage Temperature	TST	-30	—	+80	℃

Note: Device is subject to be damaged permanently if stresses beyond those absolute maximum ratings listed above

1. Temp. ≦60℃, 90% RH MAX. Temp. ＞60℃, Absolute humidity shall be less than 90% RH at 60℃

Electrical Characteristics

7.1. Typical Operation Conditions

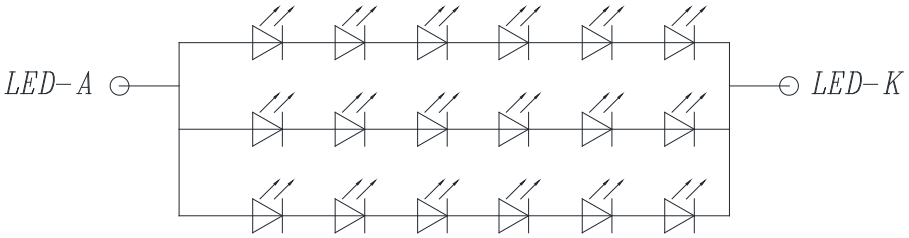
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	VCC	3.1	3.3	3.6	V	
Power voltage	VCCI	3.1	3.3	3.6	V	
Current for Driver(Black)	ICC	-	67.6	102	mA	Vcc=3.3V

7.2. Backlight Driving Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED backlight	VL	16.8	19.2	20.4	V	Note 1
Current for LED backlight	IL	--	60	--	mA	
LED life time	-	--	50,000	-	Hr	Note 2

Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25℃ and I_L =20ma/pcs.

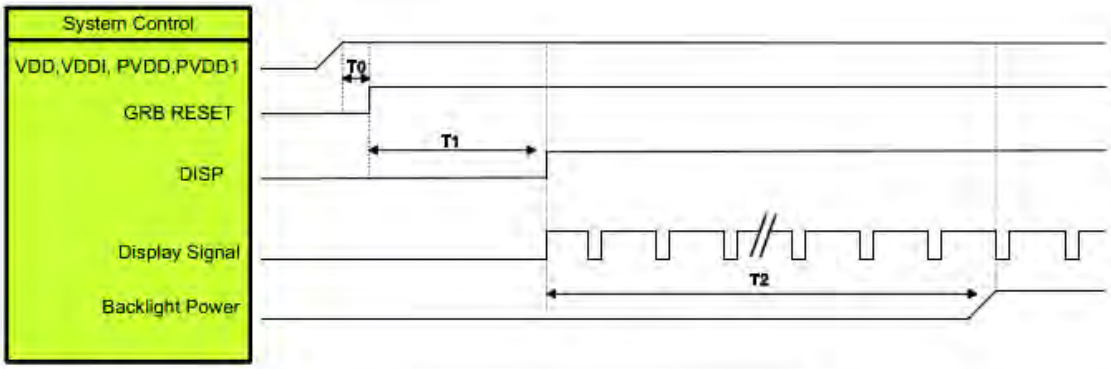
Note 2: The “LED life time” is defined as the module brightness decrease to 50% Original brightness at Ta=25℃ and I_L =20mA/pcs. The LED lifetime could be decreased if operating I_L is lager than 25mA/pcs.



CIRCUIT DIAGRAM(LED 3*6=18 DIES)

Power ON/OFF Sequence

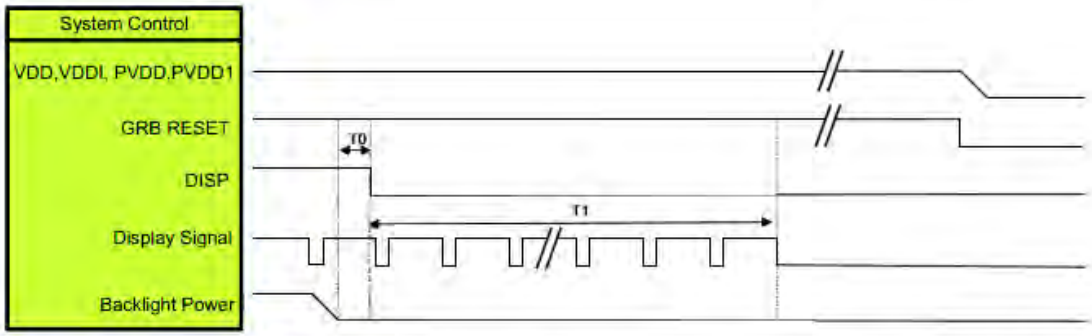
1. Power On Sequence



Symbol	Description	Min. Time	Unit
T0	System power stability to GRB RESET signal	0	ms
T1	GRB RESET= "High" to DISP="High"	10	ms
T2	Display Signal output to Backlight Power on	250	ms

Note: LVDS interface Display signal: DCLK P/N; RX[3:0]P/N

2. Power Off Sequence



Symbol	Description	Min. Time	Unit
T0	Backlight Power off to DISP="Low"	5	ms
T1	DISP="Low" to IC internal voltage discharge complete	100	ms

Note: LVDS interface Display signal: DCLK P/N; RX[3:0]P/N

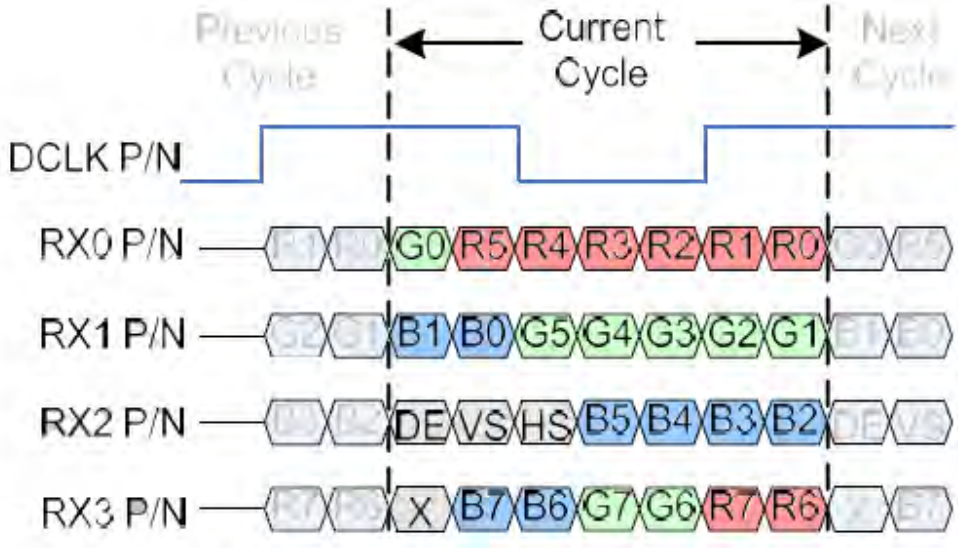
LVDS Interface

1. LVDS Input Pin Mapping Table

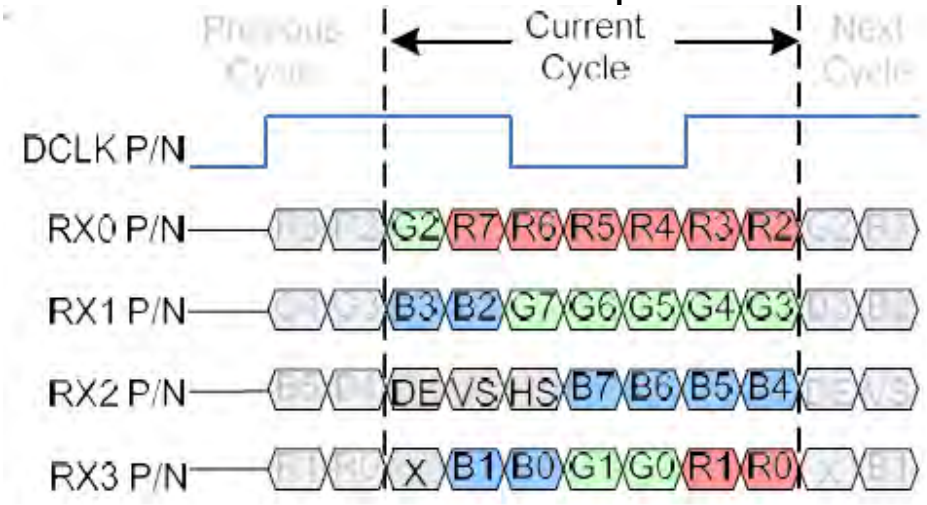
Pin Name RGB (LVDS)	LVDS 3 lane	LVDS 4 Lane
DCLKN	DCLKN	DCLKN
DCLKP	DCLKP	DCLKP
DB0	RX0P	RX0P
DB1	RX0N	RX0N
DB2	RX1P	RX1P
DB3	RX1N	RX1N
DB4	RX2P	RX2P
DB5	RX2N	RX2N
DB6	-	RX3P
DB7	-	RX3N

Note: Symbol "-" means reserve pin and should fix to "L" by DGND.

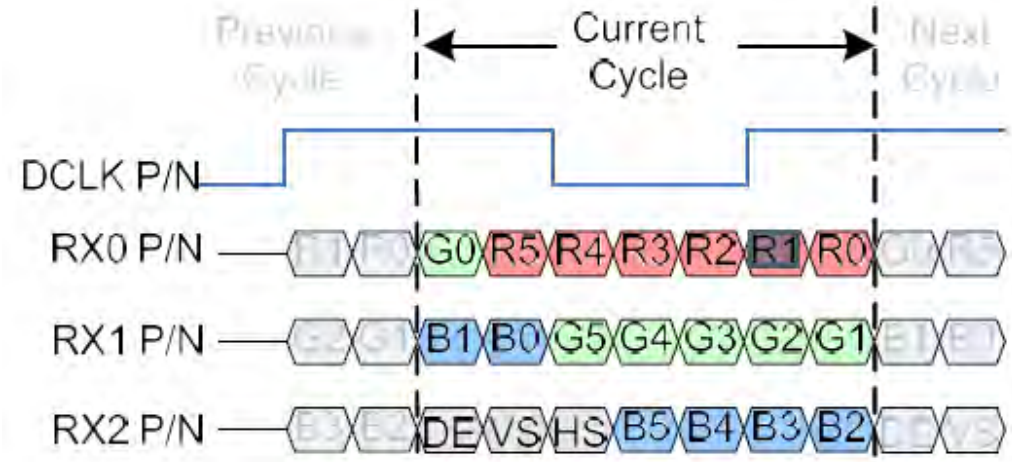
2. 4 Lane VESA Data Format Color Bit Map



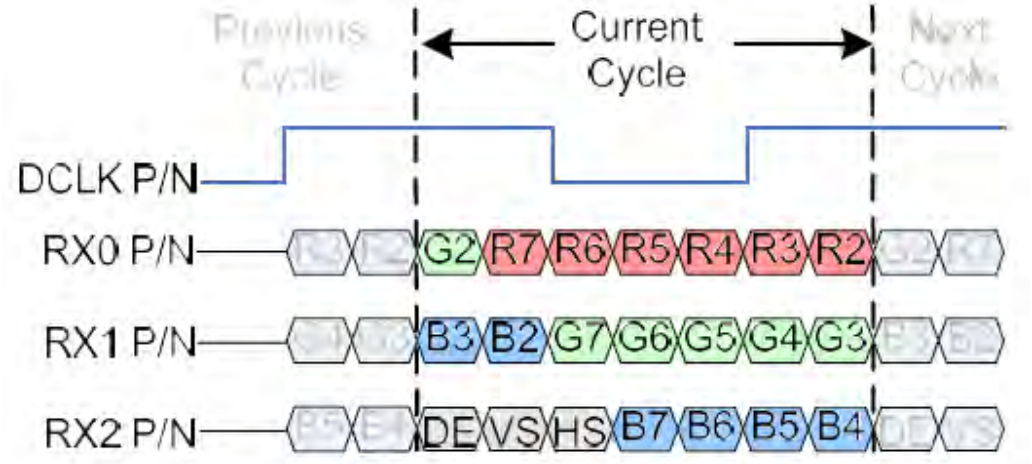
3. 4 Lane JEIDA Data Format Color Bit Map



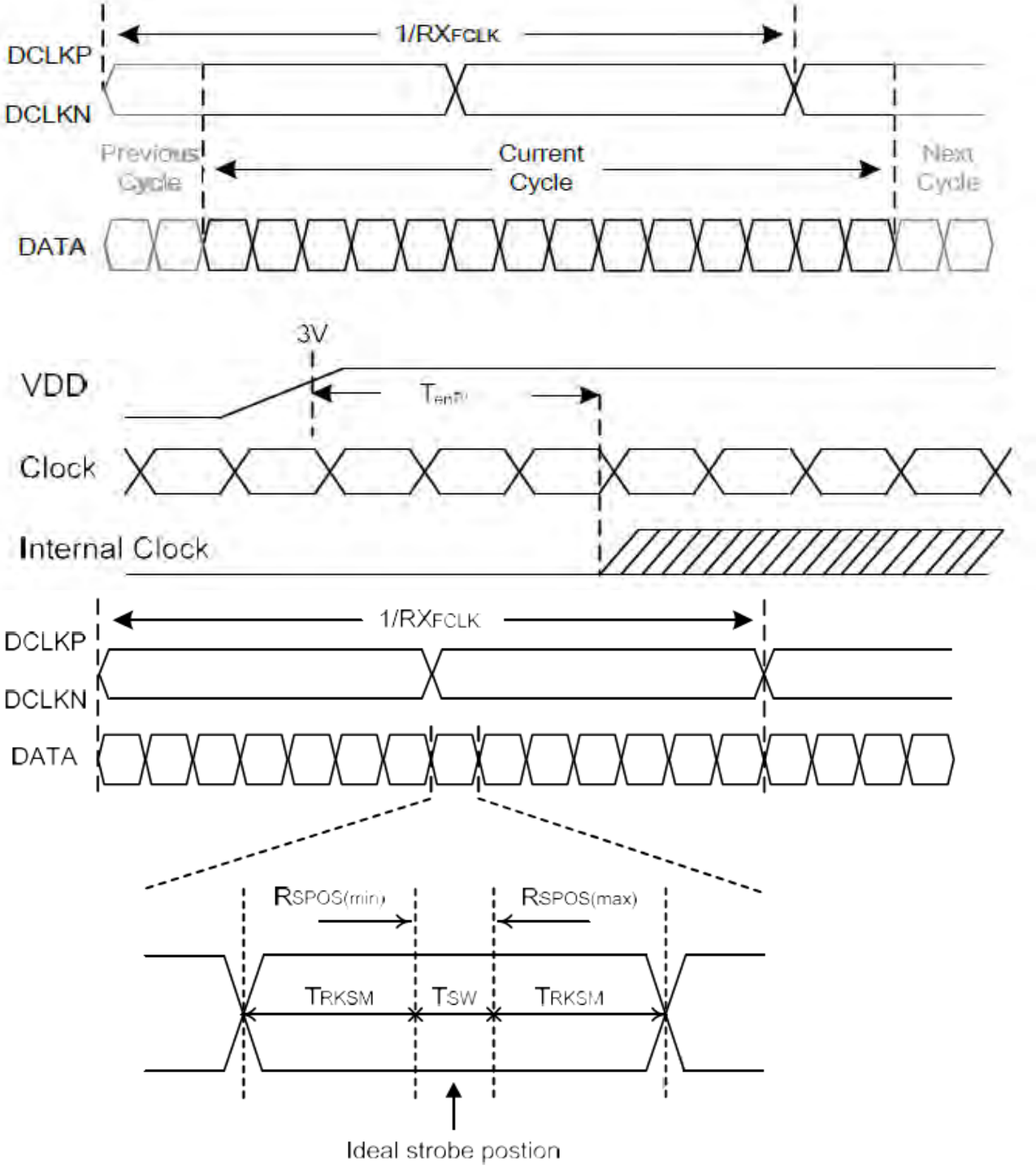
4. 3 Lane VESA Mode Color Bit Map



5. 3 Lane JEIDA Mode Color Bit Map



6. LVDS Input Timing Table



RRKSM : Receiver strobe margin
RSPOS : Receiver strobe position
TSW : Strobe width (internal DATA sampling window)

LVDS Input Timing (PVDD=PVDD1=VDD=VDDI= 3.3V, AGND= 0V, TA=25□C)

Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
Clock Frequency	RX_{FCLK}	23	25	27	MHz	
Input Data Skew Margin	T_{RSKM}	400			ps	
Clock High Time	T_{LVCH}	4/(7 x RX_{FCLK})			ns	
Clock Low Time	T_{LVCL}	3/(7 x RX_{FCLK})			ns	
PLL Wake-up Time	T_{enPLL}			150	us	
LVDS Spread Spectrum Clocking (SSC) Tolerance of LVDS Receiver						
Modulation Frequency	SSC_{MF}			100	KHz	
Modulation Rate	SSC_{MR}			+/-3	%	

Optical Characteristics

Item		Symbol	Condition.	Min	Typ.	Max.	Unit	Remark
Response time		Tr+Tf	θ=0°、Φ=0°	-	30	40	.ms	Note 3
Contrast ratio		CR	At optimized viewing angle	800	1000	-	-	Note 4
Color Chromaticity	White	Wx	θ=0°、Φ=0	0.27	0.32	0.37		Note 2,6,7
		Wy		0.295	0.345	0.395		
Viewing angle	Hor.	ΘR	CR≧10	70	80	-	Deg.	Note 1
		ΘL		70	80	-		
	Ver.	ΦT		70	80	-		
		ΦB		70	80	-		
Brightness		-	-	400	500	-	cd/m^2	Center of display
Uniformity		(U)	-	75	-	-	%	Note5

Ta=25±2℃

Note 1: Definition of viewing angle range

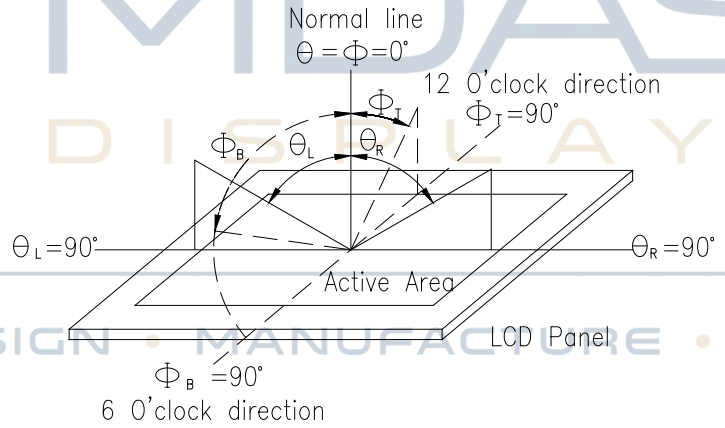


Fig. 10.1. Definition of viewing angle

Note 2: Test equipment setup:

After stabilizing and leaving the panel alone at a driven temperature for 10 minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7or BM-5 luminance meter 1.0° field of view at a distance of 50cm and normal direction.

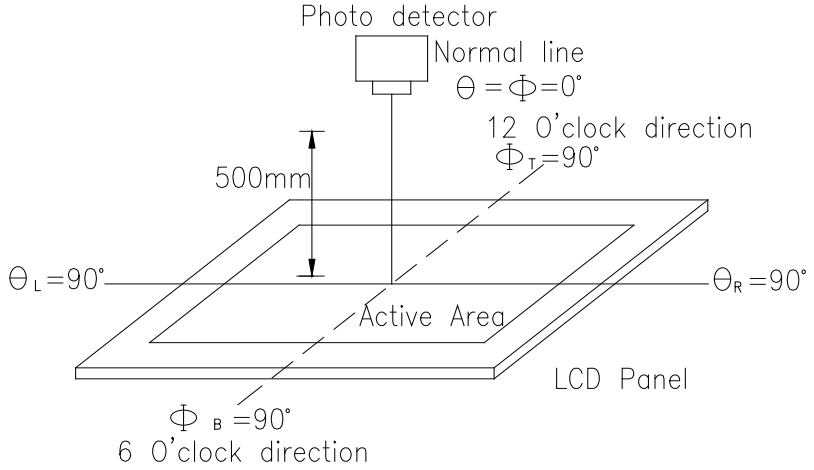
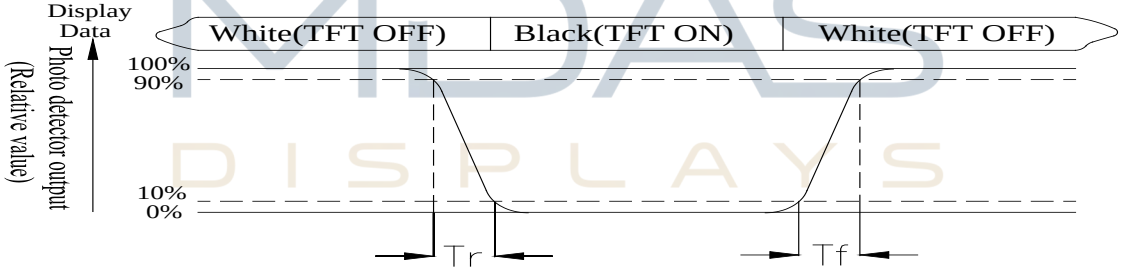


Fig. 10.2. Optical measurement system setup

Note 3: Definition of Response time:
The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time, Tr, is the time between photo detector output intensity changed from 90%to 10%. And fall time, Tf, is the time between photo detector output intensity changed from 10%to 90%



Note 4: Definition of contrast ratio:
The contrast ratio is defined as the following expression.

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note 5: Definition of Luminance Uniformity
Active area is divided into 9 measuring areas (reference the picture in below). Every measuring point is placed at the center of each measuring area.
Luminance Uniformity (U) = Lmin/Lmax x100%
L = Active area length
W = Active area width

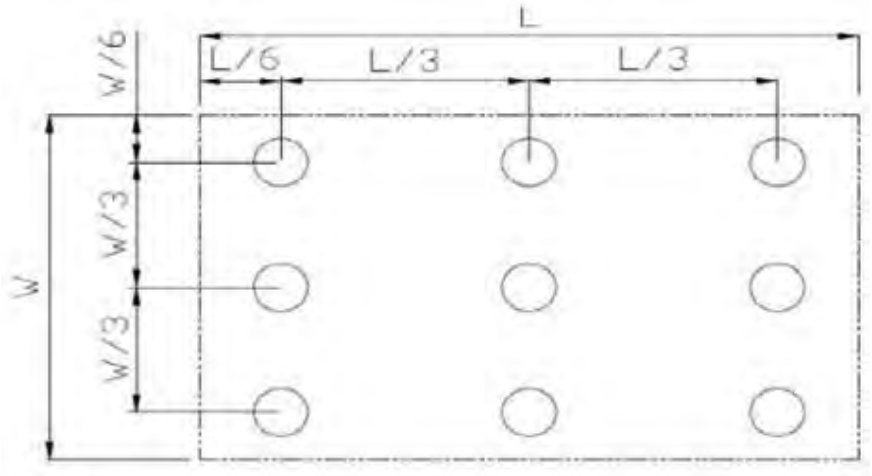


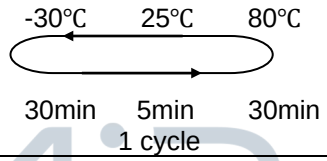
Fig10.3. . Definition of uniformity

Note 6: Definition of color chromaticity (CIE 1931)
Color coordinates measured at the center point of LCD

Note 7: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

Reliability

Content of Reliability Test (Super Wide temperature, -30℃~80℃)

Environmental Test			
Test Item	**Content of Test**	**Test Condition**	**Note**
High Temperature storage	Endurance test applying the high storage temperature for a long time.	80℃ 200hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30℃ 200hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	80℃ 200hrs	——
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-30℃ 200hrs	1
High Temperature/ Humidity storage	The module should be allowed to stand at 60℃,90%RH max	60℃,90%RH 96hrs	1,2
Thermal shock resistance	The sample should be allowed stand the following 10 cycles of operation  1 cycle	-30℃/80℃ 10 cycles	——
Vibration test	Endurance test applying the vibration during transportation and using.	Total fixed amplitude : 1.5mm Vibration Frequency : 10~55Hz One cycle 60 seconds to 3 directions of X,Y,Z for Each 15 minutes	**3**
Static electricity test	Endurance test applying the electric stress to the terminal.	VS=±600V(contact) ,±800v(air), RS=330Ω CS=150pF 10 times	——

Note1: No dew condensation to be observed.

Note2: The function test shall be conducted after 4 hours storage at the normal Temperature and humidity after remove from the test chamber.

Note3: The packing have to including into the vibration testing.