

|                  |            |                  |            |
|------------------|------------|------------------|------------|
| 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 <sup>2</sup>   |                                                                                     |                  |
| Touchscreen           | ---                     |                                                                                     |                  |
| Module Size           | 120.70 x 75.80 x 2.80mm |                                                                                     |                  |
| Operating Temperature | -30°C ~ +80°C           |                                                                                     |                  |
| Pinout                | 40 way FFC              |                                                                                     |                  |
| Pitch                 | 0.5mm                   | Box Quantity                                                                        | Weight / Display |
|                       |                         | ---                                                                                 | ---              |

\* - 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.<br>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 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.

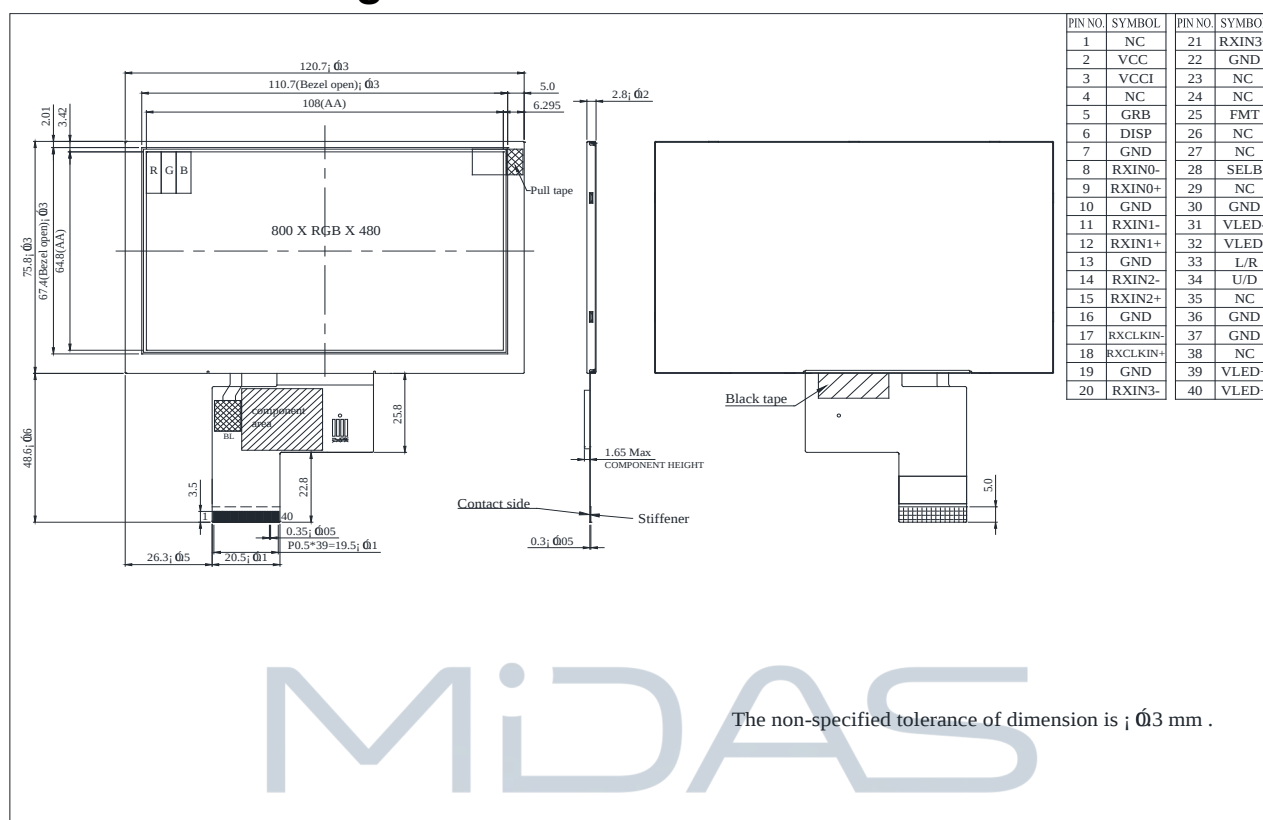
| Pin      | Symbol               | Function                                                                                                                                                                                                                                                                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



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



## Contour Drawing



## Absolute Maximum Ratings

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

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

- Temp.  $\leq 60^{\circ}\text{C}$ , 90% RH MAX. Temp.  $> 60^{\circ}\text{C}$ , Absolute humidity shall be less than 90% RH at  $60^{\circ}\text{C}$

## Electrical Characteristics

### 7.1. Typical Operation Conditions

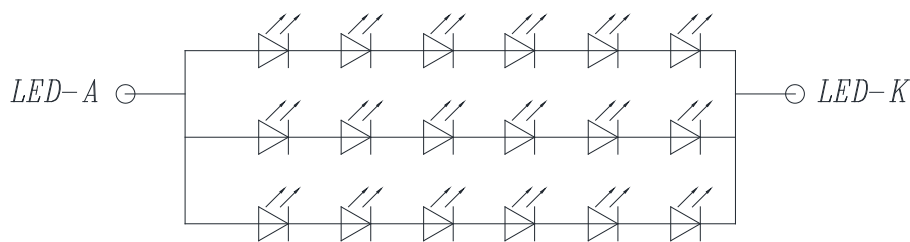
| Item                      | Symbol | Values |      |      | Unit | Remark   |
|---------------------------|--------|--------|------|------|------|----------|
|                           |        | Min.   | Typ. | Max. |      |          |
| Power voltage             | VCC    | 3.1    | 3.3  | 3.6  | 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°C and IL=20mA/pcs.

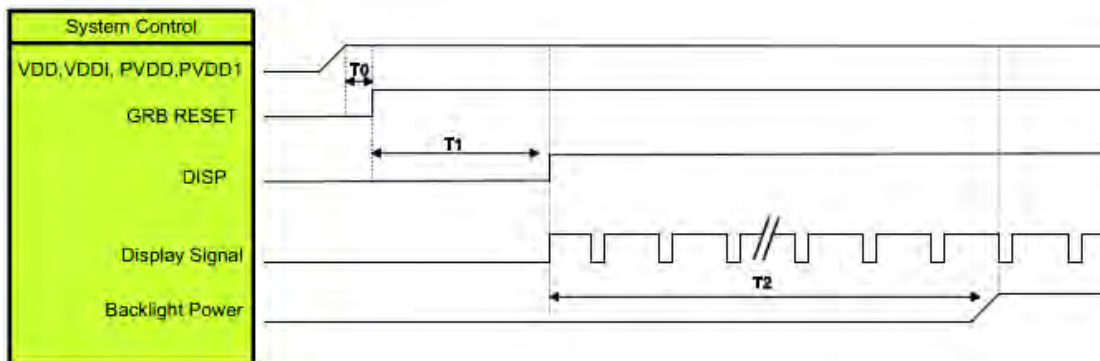
Note 2: The "LED life time" is defined as the module brightness decrease to 50% Original brightness at Ta=25°C and IL=20mA/pcs. The LED lifetime could be decreased if operating IL is larger than 25mA/pcs.



CIRCUIT DIAGRAM(LED 3\*6=18 DIES)

# Power ON/OFF Sequence

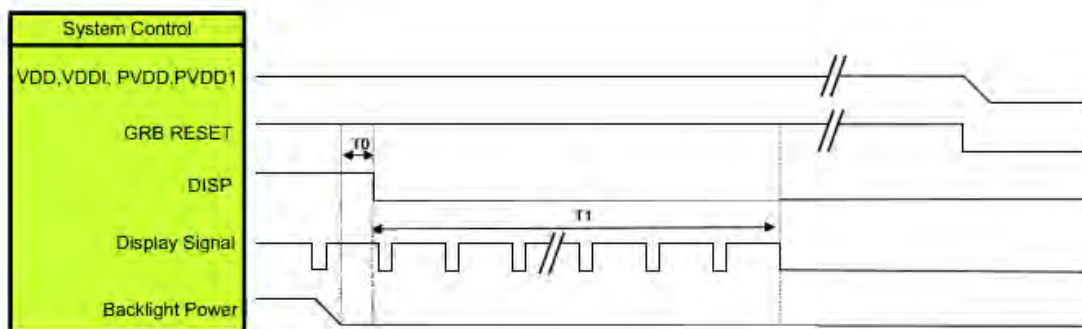
## 1. Power On Sequence



| 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

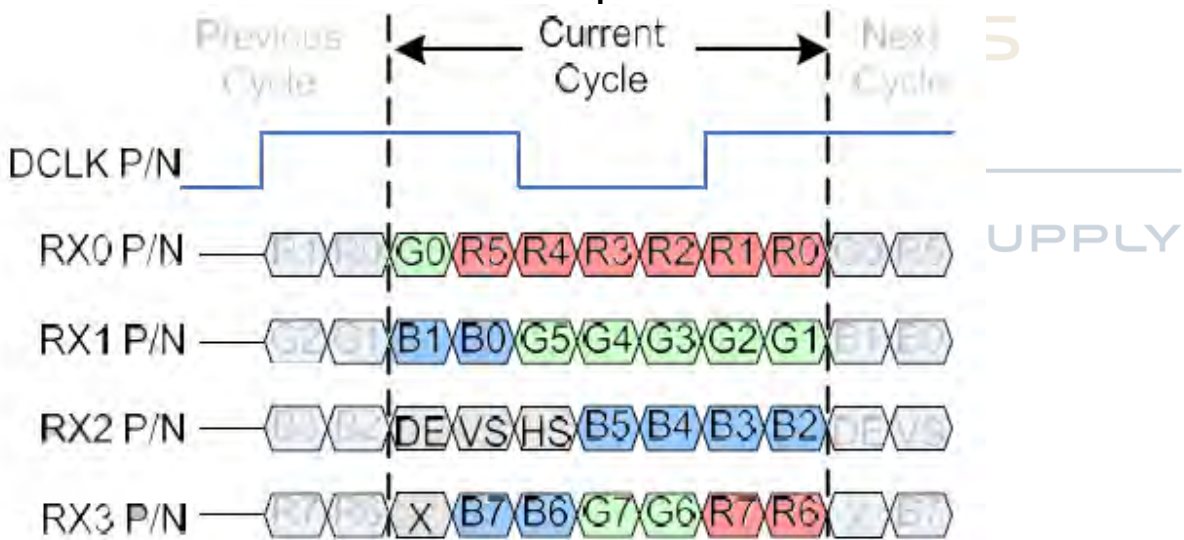
# LVDS Interface

## 1. LVDS Input Pin Mapping Table

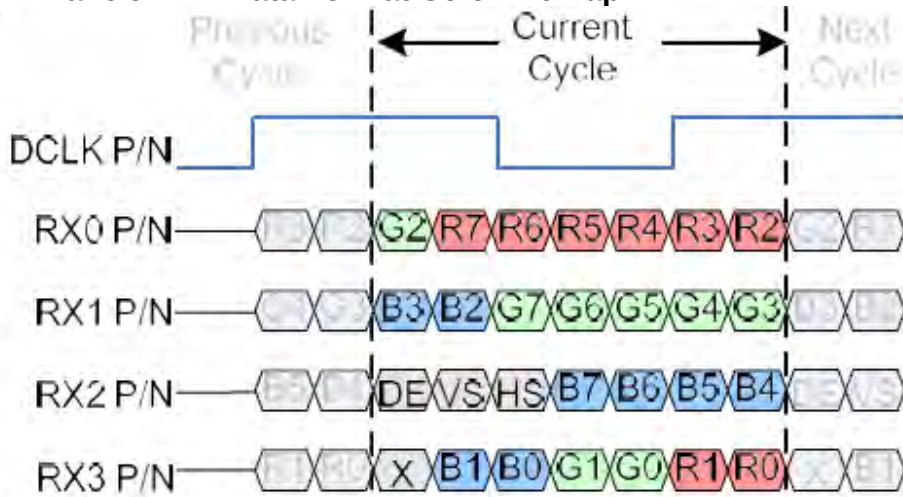
| Pin Name<br>RGB (LVDS) | LVDS 3 lane | LVDS 4 Lane |
|------------------------|-------------|-------------|
| DCLKN                  | DCLKN       | DCLKN       |
| DCLKP                  | DCLKP       | DCLKP       |
| DB0                    | RX0P        | RX0P        |
| DB1                    | 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.

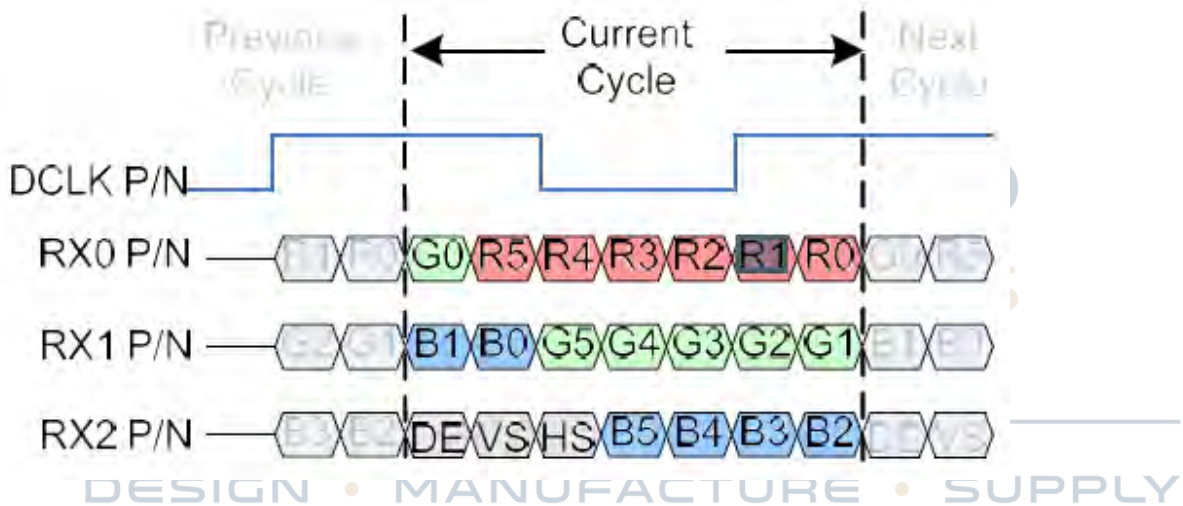
## 2. 4 Lane VESA Data Format Color Bit Map



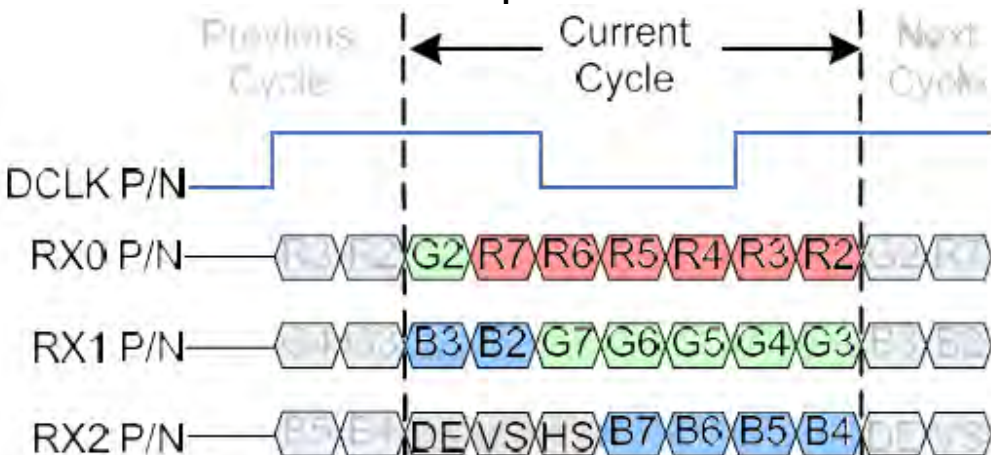
### 3. 4 Lane JEIDA Data Format Color Bit Map



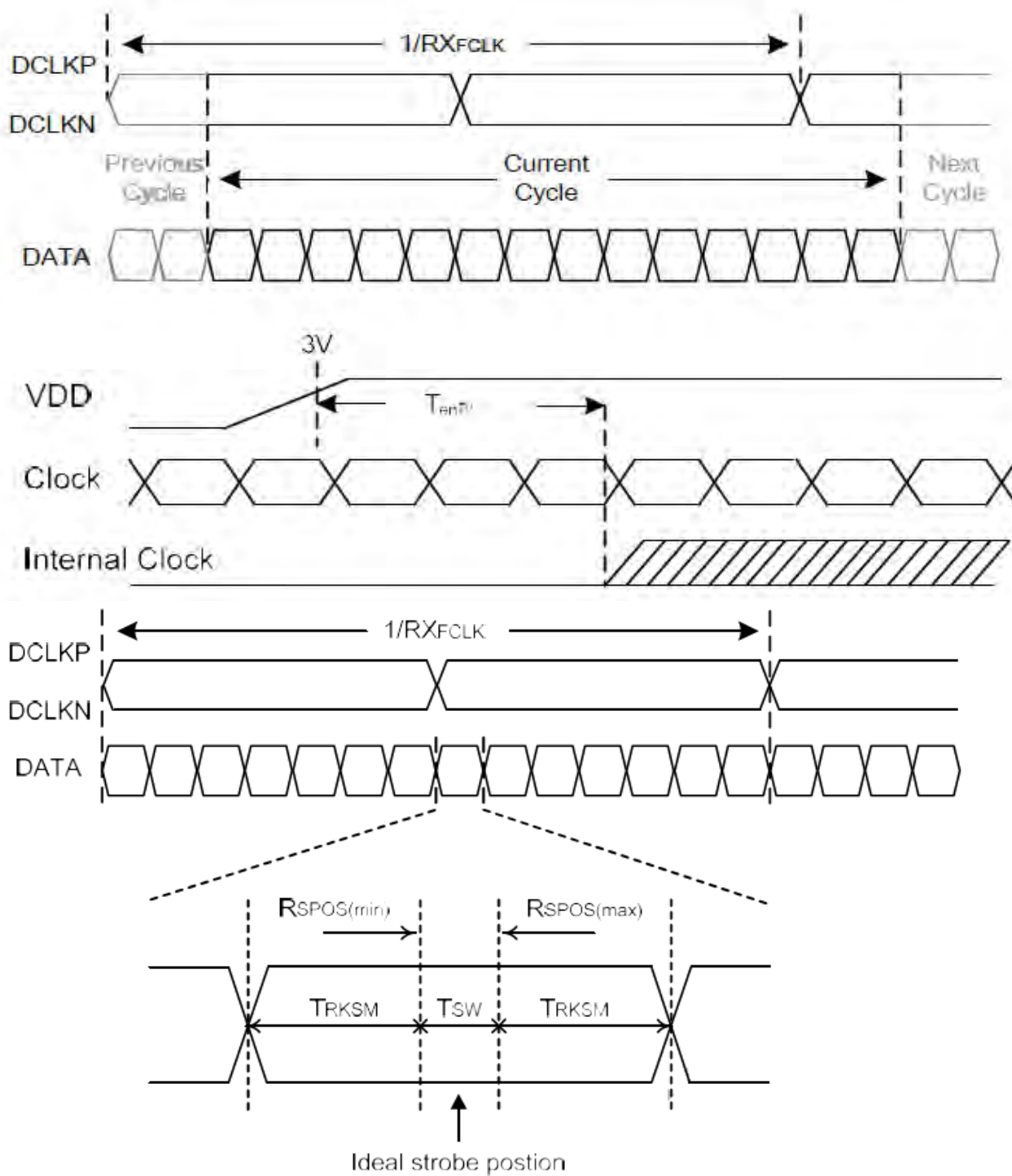
### 4. 3 Lane VESA Mode Color Bit Map



### 5. 3 Lane JEIDA Mode Color Bit Map



## 6. LVDS Input Timing Table



$TRKSM$ : Receiver strobe margin

$RSPOS$ : Receiver strobe position

$T_{SW}$ : 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 <sub>FCLK</sub> | 23                          | 25   | 27   | MHz  |            |
| Input Data Skew Margin                                         | T <sub>RSKM</sub>  | 400                         |      |      | ps   |            |
| Clock High Time                                                | T <sub>LVCH</sub>  | 4/(7 x RX <sub>FCLK</sub> ) |      |      | ns   |            |
| Clock Low Time                                                 | T <sub>LVCL</sub>  | 3/(7 x RX <sub>FCLK</sub> ) |      |      | ns   |            |
| PLL Wake-up Time                                               | T <sub>enPLL</sub> |                             |      | 150  | us   |            |
| LVDS Spread Spectrum Clocking (SSC) Tolerance of LVDS Receiver |                    |                             |      |      |      |            |
| Modulation Frequency                                           | SSC <sub>MF</sub>  |                             |      | 100  | KHz  |            |
| Modulation Rate                                                | SSC <sub>MR</sub>  |                             |      | +/-3 | %    |            |

MIDAS  
DISPLAYS

DESIGN • MANUFACTURE • SUPPLY



## Optical Characteristics

| Item               |       | Symbol     | Condition.                            | Min   | Typ.  | Max.  | Unit              | Remark            |
|--------------------|-------|------------|---------------------------------------|-------|-------|-------|-------------------|-------------------|
| Response time      |       | Tr+Tf      | $\theta=0^{\circ}$ 、 $\Phi=0^{\circ}$ | -     | 30    | 40    | .ms               | Note 3            |
| Contrast ratio     |       | CR         | At optimized viewing angle            | 800   | 1000  | -     | -                 | Note 4            |
| Color Chromaticity | White | Wx         | $\theta=0^{\circ}$ 、 $\Phi=0$         | 0.27  | 0.32  | 0.37  |                   | Note 2,6,7        |
|                    |       | Wy         |                                       | 0.295 | 0.345 | 0.395 |                   |                   |
| Viewing angle      | Hor.  | $\Theta R$ | $CR \geq 10$                          | 70    | 80    | -     | Deg.              | Note 1            |
|                    |       | $\Theta L$ |                                       | 70    | 80    | -     |                   |                   |
|                    | Ver.  | $\Phi T$   |                                       | 70    | 80    | -     |                   |                   |
|                    |       | $\Phi B$   |                                       | 70    | 80    | -     |                   |                   |
| Brightness         |       | -          | -                                     | 400   | 500   | -     | cd/m <sup>2</sup> | Center of display |
| Uniformity         |       | (U)        | -                                     | 75    | -     | -     | %                 | Note5             |

Ta=25±2℃

Note 1: Definition of viewing angle range

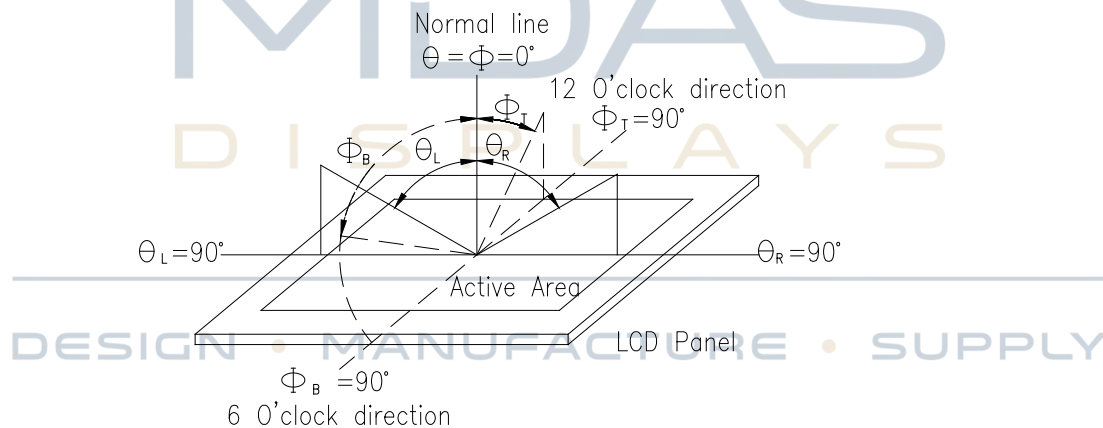


Fig. 10.1. Definition of viewing angle

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-7 or BM-5 luminance meter 1.0° field of view at a distance of 50cm and normal direction.



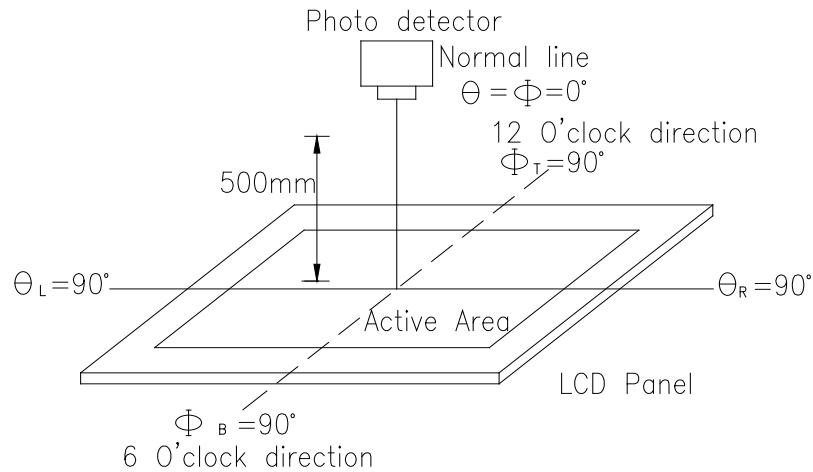
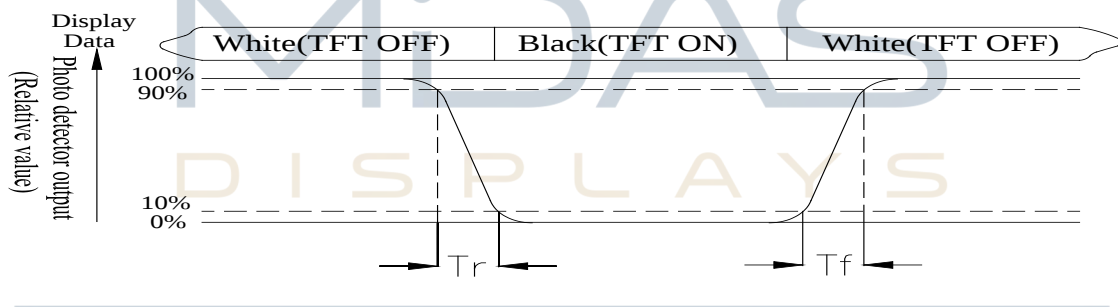


Fig. 10.2. Optical measurement system setup

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,  $T_r$ , is the time between photo detector output intensity changed from 90% to 10%. And fall time,  $T_f$ , 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) =  $L_{min}/L_{max} \times 100\%$

L = Active area length

W = Active area width

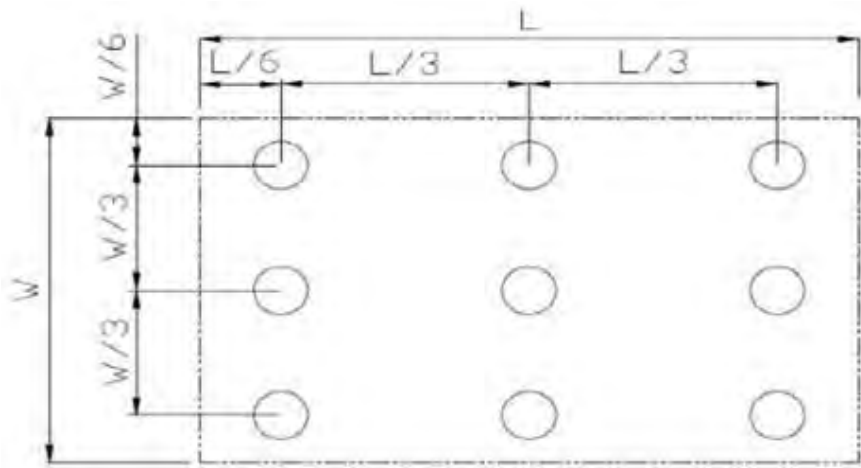


Fig10.3. . Definition of uniformity

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.

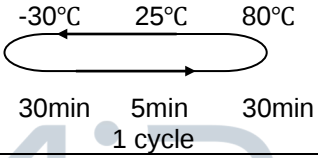
---

DESIGN • MANUFACTURE • SUPPLY



# Reliability

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

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

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.