

DISPLAY Elektronik GmbH

DATA SHEET

LCD MODULE

DEM 1024600P3 VMH-PW-N

Product Specification

Version:1

19.10.2023

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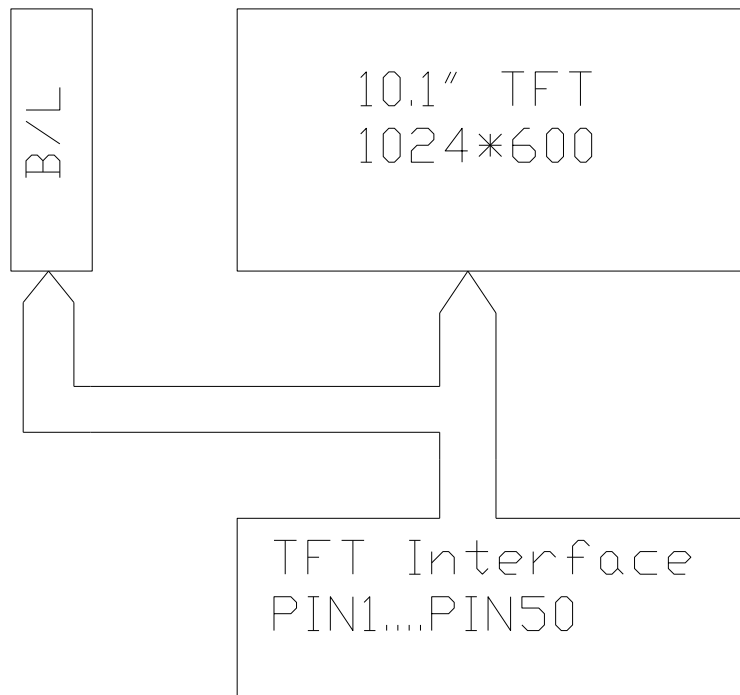
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1. GENERAL SPECIFICATIONS

| ITEM | STANDARD VALUE | UNIT |
|--------------------------------|--------------------------------------|-------------|
| LCD SIZE | 10.1 TFT | inch |
| LCD TYPE | TFT/IPS/ NORMALLY BLACK/TRANSMISSIVE | |
| MODULE SIZE | 235.00 x 143.00 x 5.05 | mm |
| ACTIVE AREA | 222.72 x 125.28 | mm |
| PIXEL PITCH (W*H) | 0.2175 x 0.2088 | |
| NUMBER OF PIXELS | 1024 x 600 | |
| DRIVER IC | EK73215 + EK79001H | |
| INTERFACE TYPE | LVDS | |
| RECOMMEND VIEWING DIRECTION | ALL | O'clock |
| GRAY SCALE INVERSION DIRECTION | - | O'clock |
| COLORS | 16.7 M | |
| BACKLIGHT TYPE | 36-DIES WHITE LED | |
| TOUCH PANEL TYPE | WITHOUT | |

3. BLOCK DIAGRAM



4. PIN ASSIGNMENT

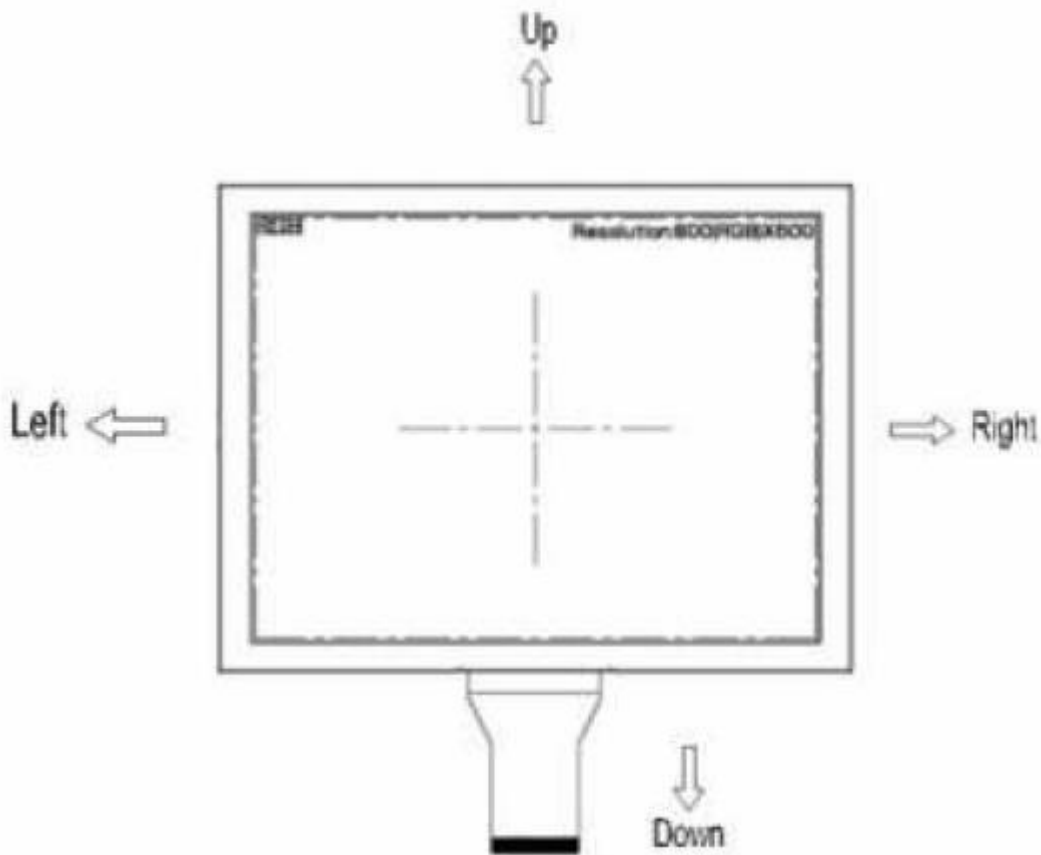
| PIN NO. | SYMBOL | DESCRIPTION |
|---------|----------|--|
| 1 | NC | Not connection |
| 2 | NC | Not connection |
| 3 | NC | Not connection |
| 4 | NC | Not connection |
| 5 | NC | Not connection |
| 6 | VCOM | Common Voltage |
| 7 | VDD | Power supply |
| 8 | VDD | Power supply |
| 9 | NC | Not connection |
| 10 | RESET | Reset pin |
| 11 | STBYB | Standby mode, normally pulled high. STBYB = "1", normal operation STBYB = "0", timing controller, source driver will turn off, all output are High-Z |
| 12 | GND | Power ground |
| 13 | RXIN0- | Data lane0 input |
| 14 | RXIN0+ | Data lane0 input |
| 15 | GND | Power ground |
| 16 | RXIN1- | Data lane1 input |
| 17 | RXIN1+ | Data lane1 input |
| 18 | GND | Power ground |
| 19 | RXIN2- | Data lane2 input |
| 20 | RXIN2+ | Data lane2 input |
| 21 | GND | Power ground |
| 22 | RXCLKIN- | CLK input |
| 23 | RXCLKIN+ | CLK input |
| 24 | GND | Power ground |
| 25 | RXIN3- | Data lane3 input |
| 26 | RXIN3+ | Data lane3 input |
| 27 | GND | Power ground |
| 28 | NC | Not connection |
| 29 | NC | Not connection |
| 30 | GND | Power ground |
| 31 | NC | Not connection |
| 32 | NC | Not connection |

| | | |
|----|------|---|
| 33 | SELB | In LVDS interface connected HSD to FPC for Pin Setting SELB="L":8 bit SELB="H":6 bit |
| 34 | AVDD | Power for Analog Circuit |
| 35 | GND | Power ground |
| 36 | NC | Not connection |
| 37 | NC | Not connection |
| 38 | L/R | Source Right or Left sequence control. Normally pull high. L/R = "L", shift left: last data = S1←S2←S3.....←S1200 = first data. L/R = "H", shift right: first data = S1→S2→S3.....→S1200 = last data |
| 39 | U/D | Gate Up or Down scan control. Normally pull low. UPDN = "L", STV2 output vertical start pulse and UD pin output logical "0" to Gate driver.(Default) UPDN = "H", STV1 output vertical start pulse and UD pin output logical "1" to Gate driver. |
| 40 | VGL | Gate OFF Voltage |
| 41 | NC | Not connection |
| 42 | NC | Not connection |
| 43 | VGH | Gate ON Voltage |
| 44 | NC | Not connection |
| 45 | NC | Not connection |
| 46 | NC | Not connection |
| 47 | NC | Not connection |
| 48 | NC | Not connection |
| 49 | NC | Not connection |
| 50 | NC | Not connection |

SELECTION OF SCANNING MODE

| SETTING OF SCAN CONTROL INPUT | | SCANNING DIRECTION |
|-------------------------------|------|---------------------------|
| U/D | L/R | |
| GND | DVDD | UP TO DOWN, RIGHT TO LEFT |
| DVDD | GND | DOWN TO UP, LEFT TO RIGHT |
| GND | GND | UP TO DOWN, LEFT TO RIGHT |
| DVDD | DVDD | DOWN TO UP, RIGHT TO LEFT |

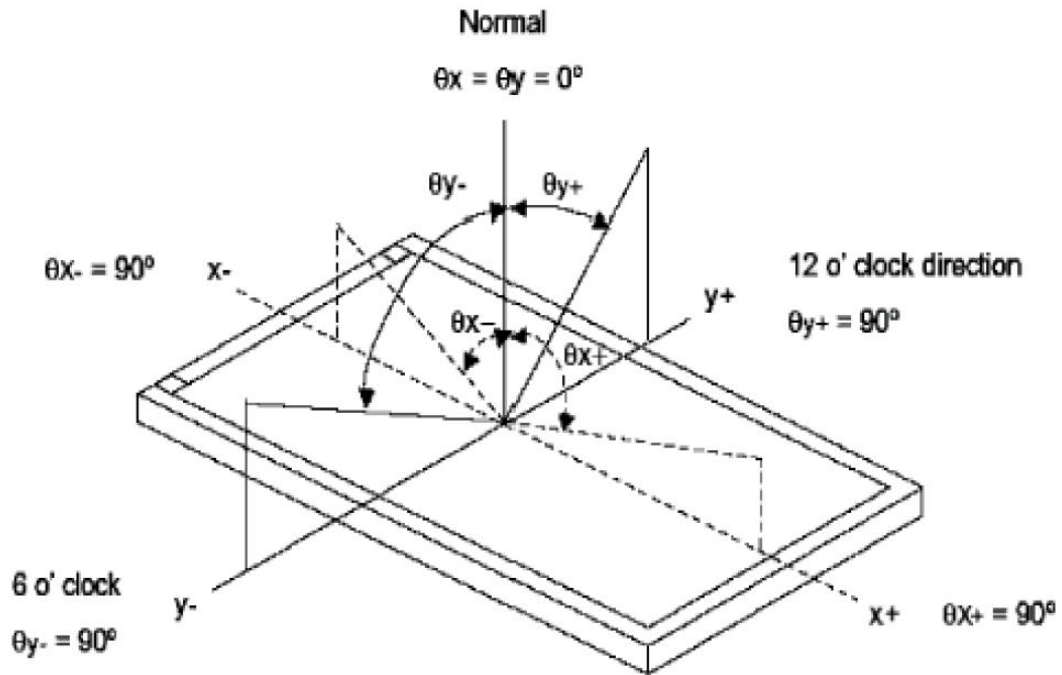
DEFINITION OF SCANNING DIRECTION REFER TO THE FIGURE AS BELOW:



5. OPTICAL CHARACTERISTICS

| ITEM | SYMBOL | CONDITIONS | SPECIFICATIONS | | | UNIT | NOTE |
|-----------------------------|------------------|--------------------|-------------------------|----------------|-------|-------------------|------|
| | | | MIN | TYP. | MAX | | |
| Luminance | L | $I_L=540\text{mA}$ | | 1000 | | Cd/m ² | |
| Contrast ratio | CR | $\theta =0^\circ$ | | 800 | | | |
| Response time | T _{ON} | 25°C | | 30 | 40 | ms | |
| | T _{OFF} | | | | | | |
| CIE COLOUR COORDINATE | RED | RX | VIEWING NORMAL ANGLE | TYP. - 0.03 | 0.605 | TYP. + 0.03 | |
| | | RY | | | 0.336 | | |
| | GREEN | GX | | | 0.297 | | |
| | | GY | | | 0.552 | | |
| | BLUE | BX | | | 0.139 | | |
| | | BY | | | 0.132 | | |
| | WHITE | WX | | | 0.307 | | |
| | | WY | | | 0.338 | | |
| VIEWING ANGLE | Hor. | θ_{x+} | CR \geq 10 | | 85 | Degree | |
| | | θ_{x-} | | | 85 | | |
| | Ver. | θ_{y+} | | | 85 | | |
| | | θ_{y-} | | | 85 | | |

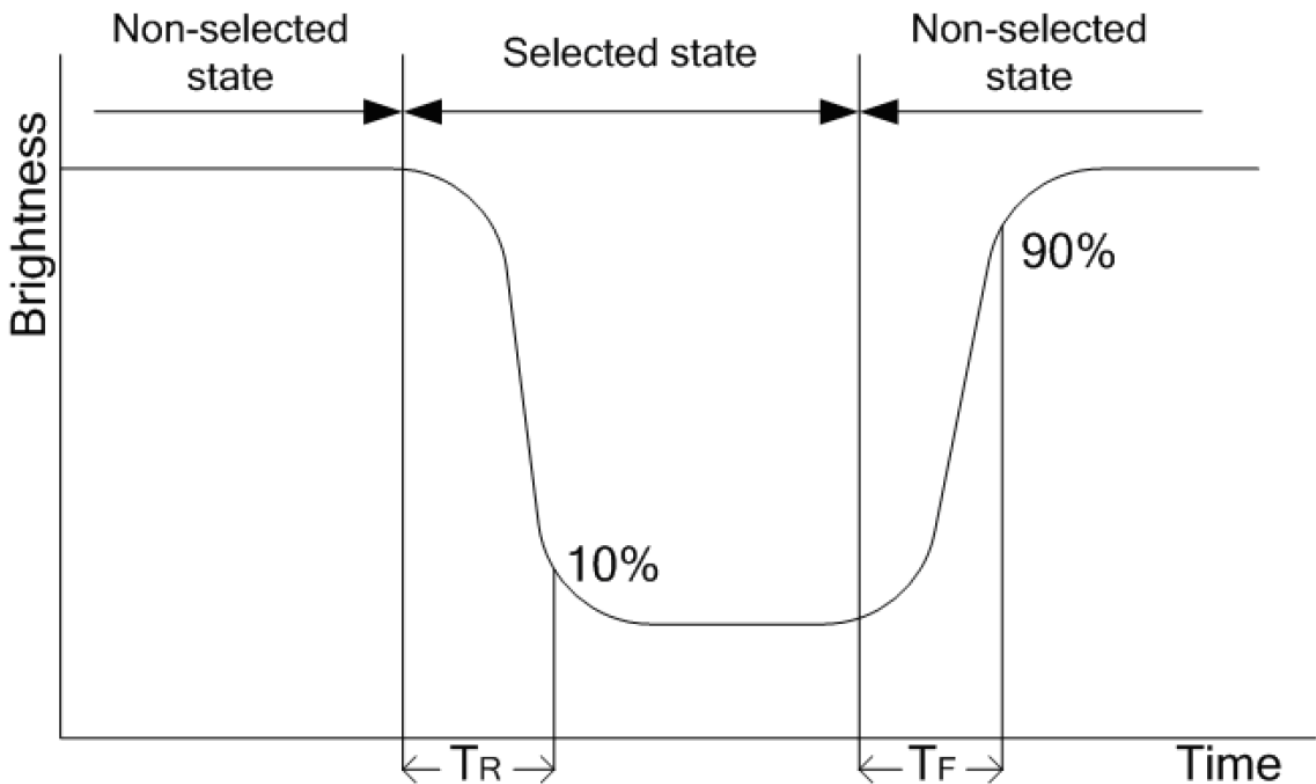
Note 1 : Definition of Viewing Angle θ_x and θ_y :



Note 2: Definition of contrast ratio CR:

$$CR = \frac{\text{Brightness of non-selected dots (white)}}{\text{Brightness of selected dots (black)}}$$

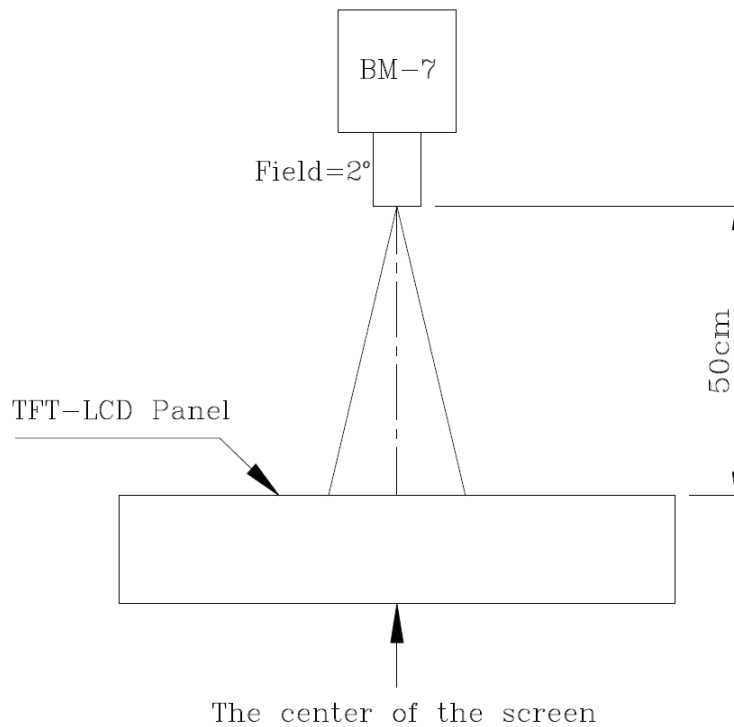
Note 3: Definition of response time (T_R , T_F)



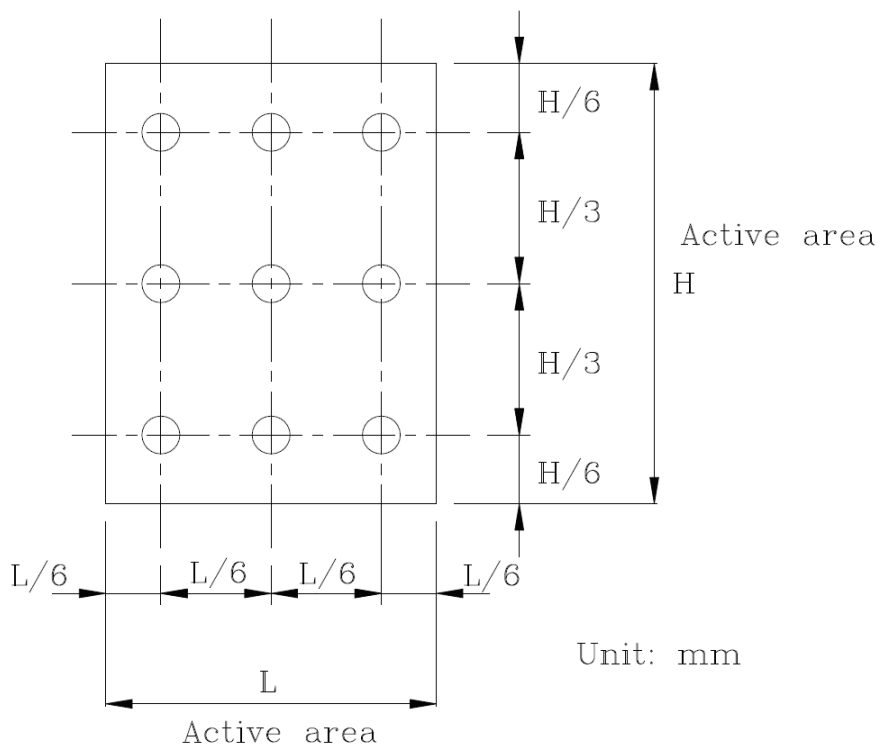
Note 4: Definition of Luminance

① The Brightness Test Equipment Setup

Field=2° (As measuring “black” image, field=2° is the best testing condition)



② The Brightness Test Point Setup



6. ABSOLUTE MAXIMUM RATINGS

| PARAMETER | SYMBOL | MIN | MAX | UNIT |
|-----------------------|--------|------|-----|------|
| Power Supply Voltage | VDD | -0.5 | 5.0 | V |
| Operating Temperature | Top | -20 | +70 | °C |
| Storage Temperature | Tst | -30 | +80 | °C |

7. ELECTRICAL CHARACTERISTICS

7.1 BLACKLIGHT DRIVING CONDITIONS

| ITEM | SYMBOL | SPECIFICATIONS | | | UNIT | REMARK |
|-------------------|--------|----------------|------|------|----------------|--------|
| | | MIN | TYP. | MAX | | |
| Supply Voltage | Vf | 10.8 | 12.2 | 13.6 | V | |
| Supply Current | IL | | 540 | | mA | |
| Power Consumption | P | | 6.58 | | W | |
| LED Lifetime | | 30,000 | | | H _r | |

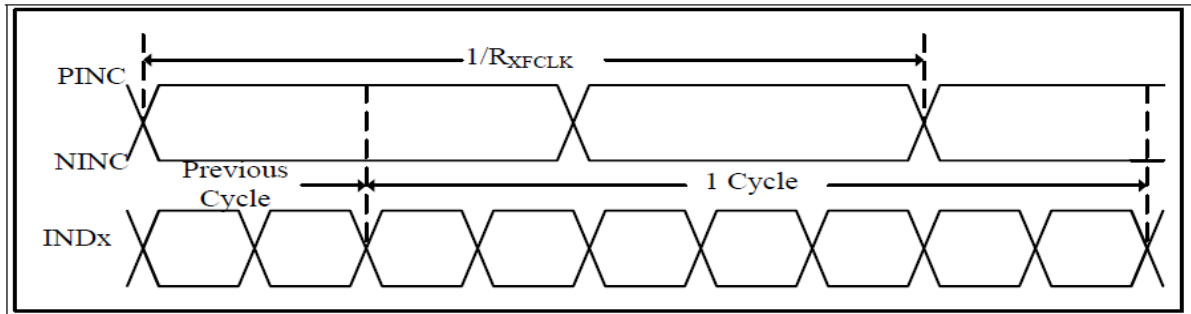
7.2 ELECTRICAL CHARACTERISTICS

| ITEM | SYMBOL | MIN | TYP. | MAX | UNIT |
|---------------|--------|--------|------|--------|------|
| Power Supply | VDD | 3.0 | 3.3 | 3.6 | V |
| | AVDD | | 9.6 | | V |
| | VGH | | 18 | | V |
| | VGL | | -6 | | V |
| | VCOM | 4.0 | | 4.4 | V |
| Input voltage | Vil | GND | - | 0.3VDD | V |
| | Vih | 0.7VDD | - | VDD | V |

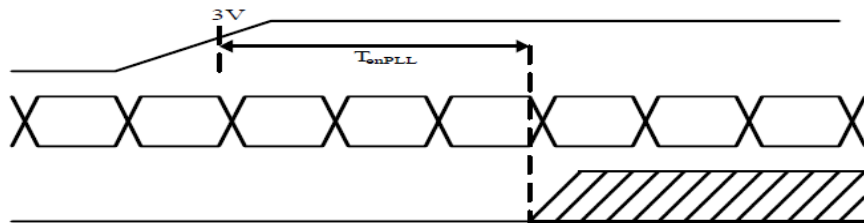
8.TIMING CHARACTERISTICS

8.1 LVDS mode

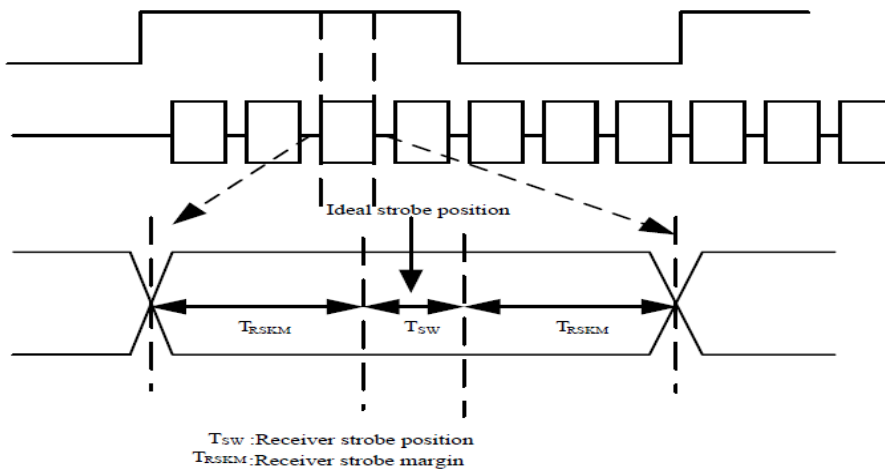
| Parameter | Symbol | Condition | Min. | Typ. | Max. | Unit |
|------------------------|--------|--|------|---------------|------|------|
| Clock Frequency | RxFCLK | | 20 | - | 71 | MHz |
| Input data skew margin | TRSKM | VID =400mV RxVCM=1.2V RxFCLK=71MHz | 500 | | | ps |
| Clock High Time | TLVCH | | | 4/(7* RxFCLK) | | ns |
| | | | | | | ns |
| Clock Low Time | TLVCL | | | 3/(7* RxFCLK) | | ns |
| PLL wake-up-time | TenPLL | | | | 150 | us |



LVDS timing(1)

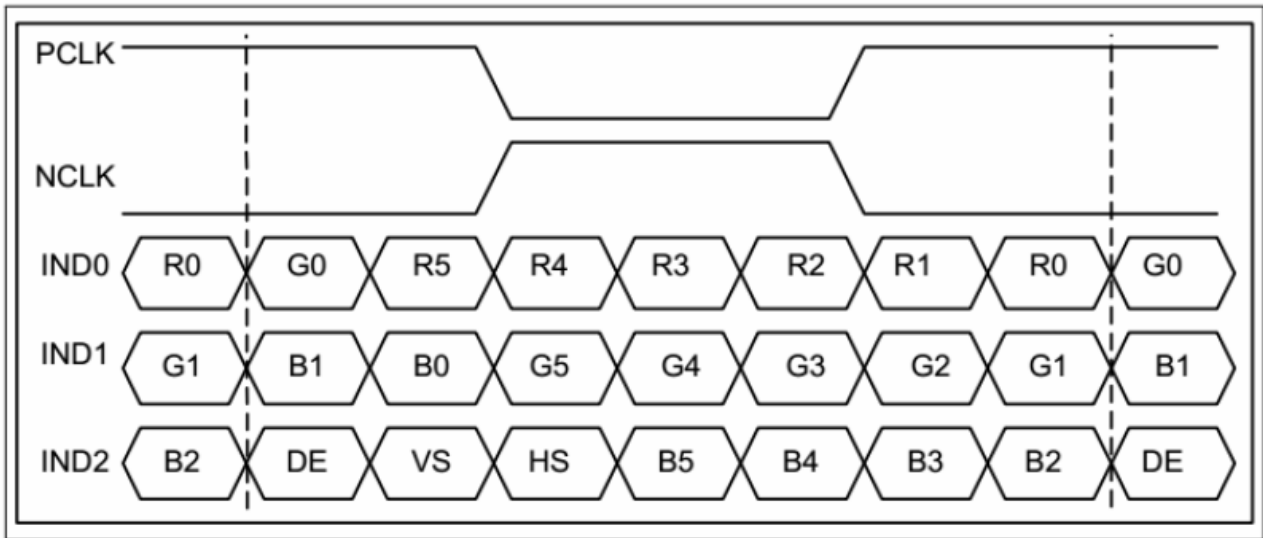


LVDS timing(2)

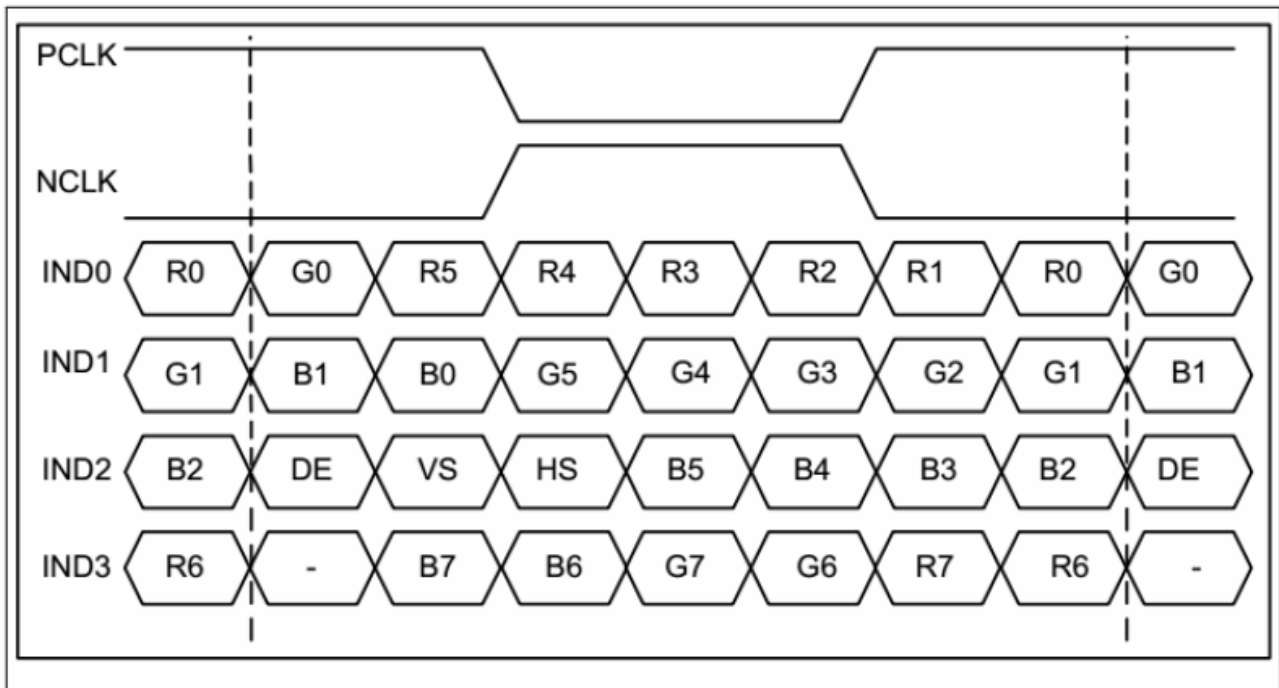


LVDS timing(3)

8.2 Date input format



6-bit LVDS Input Timing chart



8-bit LVDS Input Timing chart

9. RELIABILITY TEST

| NO. | TEST ITEM | CONDITIONS | |
|------------|--|-------------------|--------------|
| 1 | HIGH TEMPERATURE STORAGE | TA=80°C | 96H |
| 2 | LOW TEMPERATURE STORAGE | TA=-30°C | 96H |
| 3 | HIGH TEMPERATURE OPERATION | TA=70°C | 96H |
| 4 | LOW TEMPERATURE OPERATION | TA=-20°C | 96H |
| 5 | HIGH TEMPERATURE AND HIGH HUMIDITY OPERATION | +60°C, 90%RH | 96H |
| 6 | THERMAL SHOCK | -30°C → +80°C, | 0.5H:5CYCLES |

10. LCD MODULES HANDLING PRECAUTIONS

- The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.
- If the display panel is damaged and the liquid crystal substance inside it leaks out, do not get any in your mouth. If the substance come into contact with your skin or clothes promptly wash it off using soap and water.
- Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.
- The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarize carefully.
- To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
 - Be sure to ground the body when handling the LCD module.
 - Tools required for assembly, such as soldering irons, must be properly grounded.
 - To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.
 - The LCD module is coated with a film to protect the display surface. Exercise care when peeling off this protective film since static electricity may be generated.
- Storage precautions
When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps. Keep the modules in bags designed to prevent static electricity charging under low temperature / normal humidity conditions (avoid high temperature / high humidity and low temperatures below 0°C).Whenever possible, the LCD modules should be stored in the same conditions in which they were shipped from our company.

11. OTHERS

- Liquid crystals solidify at low temperature (below the storage temperature range) leading to defective orientation of liquid crystal or the generation of air bubbles (black or white). Air bubbles may also be generated if the module is subjected to a strong shock at a low temperature.
- If the LCD modules have been operating for a long time showing the same display patterns may remain on the screen as ghost images and a slight contrast irregularity may also appear. Abnormal operating status can be resumed to be normal condition by suspending use for some time. It should be noted that this phenomena does not adversely affect performance reliability.
- To minimize the performance degradation of the LCD modules resulting from caused by static electricity, etc. exercise care to avoid holding the following sections when handling the modules:
 - Exposed area of the printed circuit board
 - Terminal electrode sections.