



PRODUCT SPECIFICATION

KADI Model: KD121HWX13ED

CUSTOMER Model: -

Description: 12.1 ” TFT-LCD Module

Version: 1.0

| | | | |
|------------------|--------------------|-------------------|--------------------|
| KADI | PREPARED BY | CHECKED BY | APPROVED BY |
| SIGNATURE | | | |
| DATE | 2026.1.16 | 2026.1.16 | 2026.1.16 |

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|--------------------------|------------------|-------------|
| CUSTOMER APPROVAL | SIGNATURE | DATE |
| | | |



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1. General Specifications

1.1 LCM General Information

| Item | Specification | Unit |
|-----------------------|---------------------------------|--------|
| LCD Size | 12.1 | inch |
| Number of Pixels | 1280 (H) RGB x 800 (V) | pixels |
| Display Mode | Normally Black | - |
| Viewing Direction | Free | - |
| Interface | LVDS | - |
| Display Colors | 16.7M | colors |
| Outline Dimension | 277.7 (H) x 180.6 (V) x 6.2 (D) | mm |
| Active Area | 260.35 (H) x 162.72 (V) | mm |
| Pixel Pitch | 0.2034 (H) x 0.2034 (V) | mm |
| Driver IC | EK79202B1 | - |
| Operation Temperature | -20~70 | °C |
| Storage Temperature | -30~80 | °C |

Note1:Requirements on environmental protection RoHS compliant.

2. Absolute Maximum Ratings

| Item | Symbol | MIN. | MAX. | Unit | Note |
|-----------------------|--------|------|------|------|--------|
| Analog Supply voltage | VDD | -0.5 | 4.0 | V | Note 1 |

Note 1:Permanent damage may occur to the LCD module if beyond this specification.

Functional operation should be restricted to the conditions described under normal operating conditions.



3. Electrical Characteristics

3.1 Recommended Operating Condition for TFT LCD

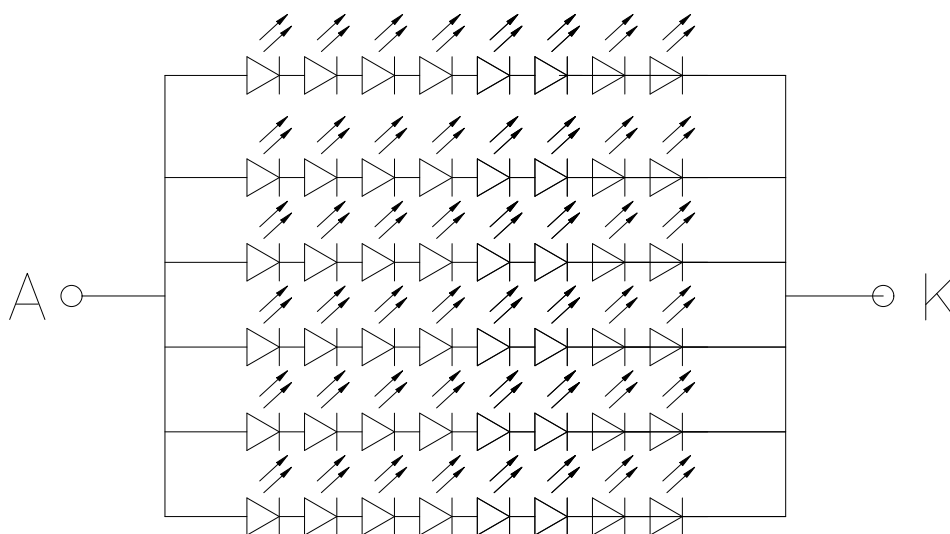
| Item | Symbol | Min. | Typ. | Max. | Unit | Note |
|-----------------------|------------------|---------|------|---------|------|----------|
| Analog Supply voltage | VDD | 3.0 | 3.3 | 3.6 | V | |
| Analog supply current | I _{VDD} | - | TBD | - | mA | VDD=3.3V |
| Logic input voltage | V _{IH} | 0.7*VDD | - | VDD | V | |
| | V _{IL} | GND | - | 0.3*VDD | V | |

3.2 Recommended Driving Condition for Backlight

| Item | Symbol | Min. | Typ. | Max. | Unit | Note |
|-------------------|-----------------|------|--------|------|-------|-------------------|
| Driving Current | I _F | - | 360 | - | mA | |
| Driving Voltage | V _F | 23 | - | 26.5 | V | |
| Power consumption | W _{BL} | 8.28 | - | 9.54 | W | |
| LED Life-Time | N/A | - | 50,000 | - | Hours | Ta=25°C Note 1 |

Note 1: LED lifetime is defined as the module brightness decay 50% of original brightness at Ta=25 degree, typical current.

Note 2: LED circuit :





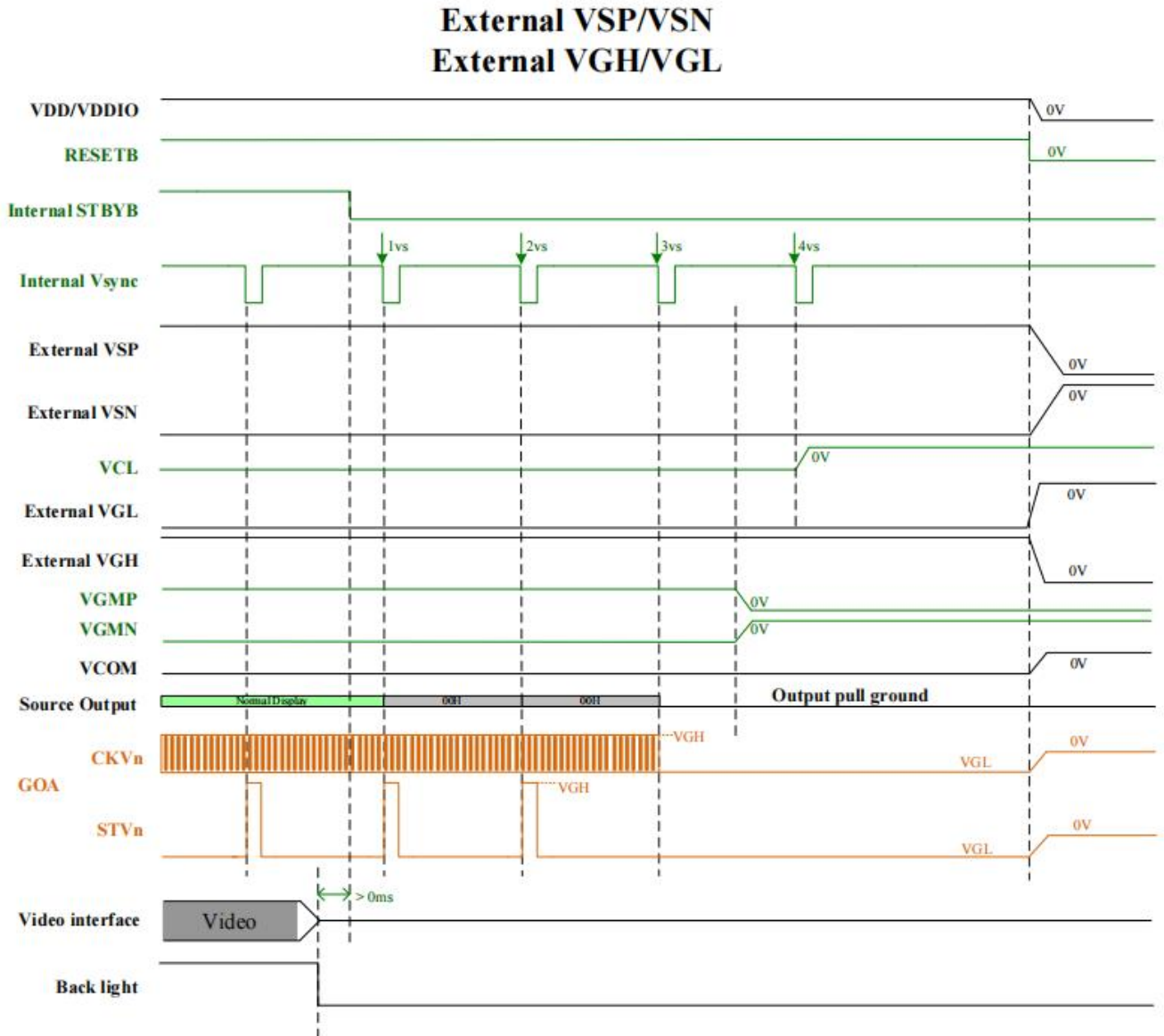
4. Interface Pin Assignment

4.1 LCM Pin Assignment

| No. | Symbol | Description |
|-------|-----------|--------------------------------|
| 1 | NC | No connection |
| 2-4 | VDD | Power supply |
| 5 | NC | No connection |
| 6 | GND | Ground |
| 7 | GND | Ground |
| 8 | Rin0- | - LVDS differential data input |
| 9 | Rin0+ | + LVDS differential data input |
| 10 | GND | Ground |
| 11 | Rin1- | - LVDS differential data input |
| 12 | Rin1+ | + LVDS differential data input |
| 13 | GND | Ground |
| 14 | Rin2- | - LVDS differential data input |
| 15 | Rin2+ | + LVDS differential data input |
| 16 | GND | Ground |
| 17 | LVDS_CLK- | -LVDS differential clock input |
| 18 | LVDS_CLK+ | +LVDS differential clock input |
| 19 | GND | Ground |
| 20 | Rin3- | - LVDS differential data input |
| 21 | Rin3+ | + LVDS differential data input |
| 22 | GND | Ground |
| 23 | SWDIO(NC) | No connection |
| 24 | SWCLK(NC) | No connection |
| 25 | GND | Ground |
| 26 | NC | No connection |
| 27 | NC | No connection |
| 28 | GND | Ground |
| 29-30 | NC | No connection |
| 31-33 | GND | Ground |
| 34 | NC | No connection |
| 35 | NC | No connection |
| 36 | NC | No connection |
| 37 | NC | No connection |
| 38-40 | NC | No connection |



Power off sequence





5.2 DC Characteristics

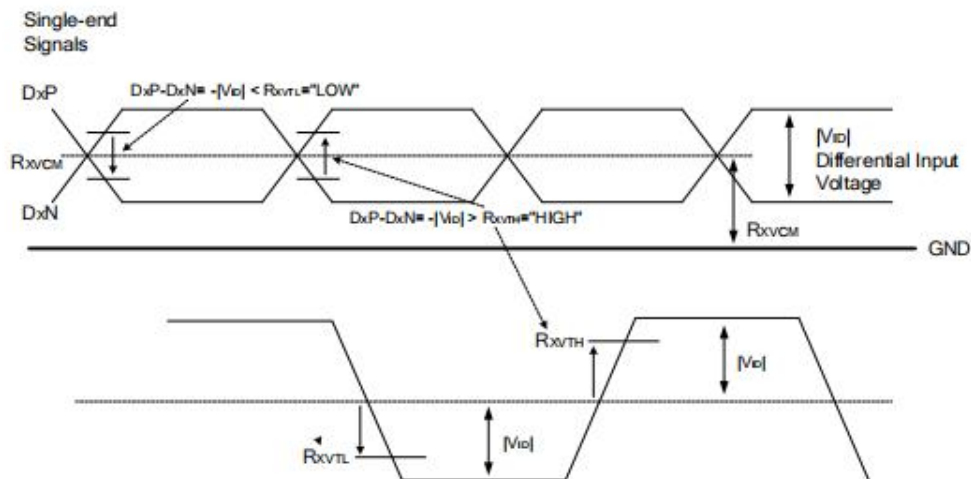
DC electrical characteristics

| Parameter | Symbol | Spec. | | | Unit | Note |
|--------------------------------|--|-------------|-------|-------------|------|------|
| | | Min. | Typ. | Max. | | |
| Input high level voltage | VIH | 0.8 x VDDIO | | VDDIO | V | |
| Input low level voltage | VIL | VSS | | 0.2 x VDDIO | V | |
| Input Leakage Current | Ileak | (-1) | | (+1) | μA | |
| Output high level voltage | VOH | 0.8 x VDDIO | | VDDIO | V | |
| Output low level voltage | VOL | VSS | | 0.2 x VDDIO | V | |
| VGH_REG output voltage | VGH_REG | 9 | 16 | 22 | V | |
| VGL_REG output voltage | VGL_REG | -15 | -10 | -4.5 | | |
| VGMP output voltage | VGMP | 3.5 | 4.24 | 5.8 | V | |
| VGMN output voltage | VGMN | -5.8 | -4.64 | -3.5 | V | |
| VGL output voltage | VGL | -17 | -12 | -6 | V | |
| VGH output voltage | VGH | 11 | 18 | 24 | V | |
| VCL output voltage | VCL | -3 | -2.8 | -2.1 | V | |
| VCOM output voltage | VCOM | -2.405 | -1.5 | -0.5 | V | |
| Input terminal resistance | ZID | | 100 | | ohm | |
| Source output level deviation | Graycode = 0 ~ 14 Graycode = 241 ~ 255 | | TBD | | mV | |
| | Graycode = 15 ~ 31 Graycode = 208 ~ 240 | | TBD | | mV | |
| | Graycode = 32 ~ 207 | | TBD | | mV | |
| Source output offset deviation | Graycode = 0 ~ 14 Graycode = 241 ~ 255 | - | TBD | | mV | |
| | Graycode = 15 ~ 31 Graycode = 208 ~ 240 | - | TBD | | mV | |
| | Graycode = 32 ~ 207 | - | TBD | | mV | |
| Current consumption | Analog Operating | IAOP | | TBD | mA | |
| | Analog Stand-by | IAST | | TBD | mA | |
| Rush current | | Ivddpeak | | TBD | mA | |



LVDS DC electrical characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Condition |
|---|----------------|------|------|------|---------|---|
| Differential input high threshold voltage | R_{XVTH} | - | - | +0.1 | V | $R_{XVCM}=1.2V$ |
| Differential input low threshold voltage | R_{XVTL} | -0.1 | - | - | V | |
| Input voltage range (singled-end) | R_{XVIN} | 0.7 | - | 1.7 | V | |
| Differential input common mode voltage | R_{XVCM} | 1 | 1.2 | 1.4 | V | $ V_{ID} =0.2$ |
| Differential input impedance | Z_{ID} | 80 | 100 | 125 | ohm | |
| Differential input voltage | $ V_{ID} $ | 0.2 | - | 0.6 | V | |
| Differential input leakage current | $I_{LQ, LVDS}$ | -10 | - | +10 | μA | |
| LVDS Digital Operating Current | I_{VDD} | - | 15 | 20 | mA | $F_{CLK}=80MHz, VDD=3.3V$, Input pattern: 55h->Aah->55h->Aah |
| LVDS Digital Stand-by Current | I_{ST} | - | - | 250 | μA | Clock & all Functions are stopped |





5.3 AC Characteristics

LVDS mode AC electrical characteristics

| Parameter | Symbol | Spec. | | | Unit | Condition |
|------------------------|-------------|-------|---------------------|------|------|---|
| | | Min. | Typ. | Max. | | |
| Clock frequency | R_{xFCLK} | 30 | - | TBD | MHz | Refer to input timing table for each display resolution |
| Input data skew margin | T_{RSKM} | - | - | 0.2 | UI | |
| Clock high time | T_{LVCH} | - | $4/(7 * R_{xFCLK})$ | - | ns | |
| Clock low time | T_{LVCL} | - | $3/(7 * R_{xFCLK})$ | - | ns | |
| PLL wake-up time | T_{enPLL} | - | - | 150 | us | |

Table 13.1: LVDS mode AC electrical characteristics

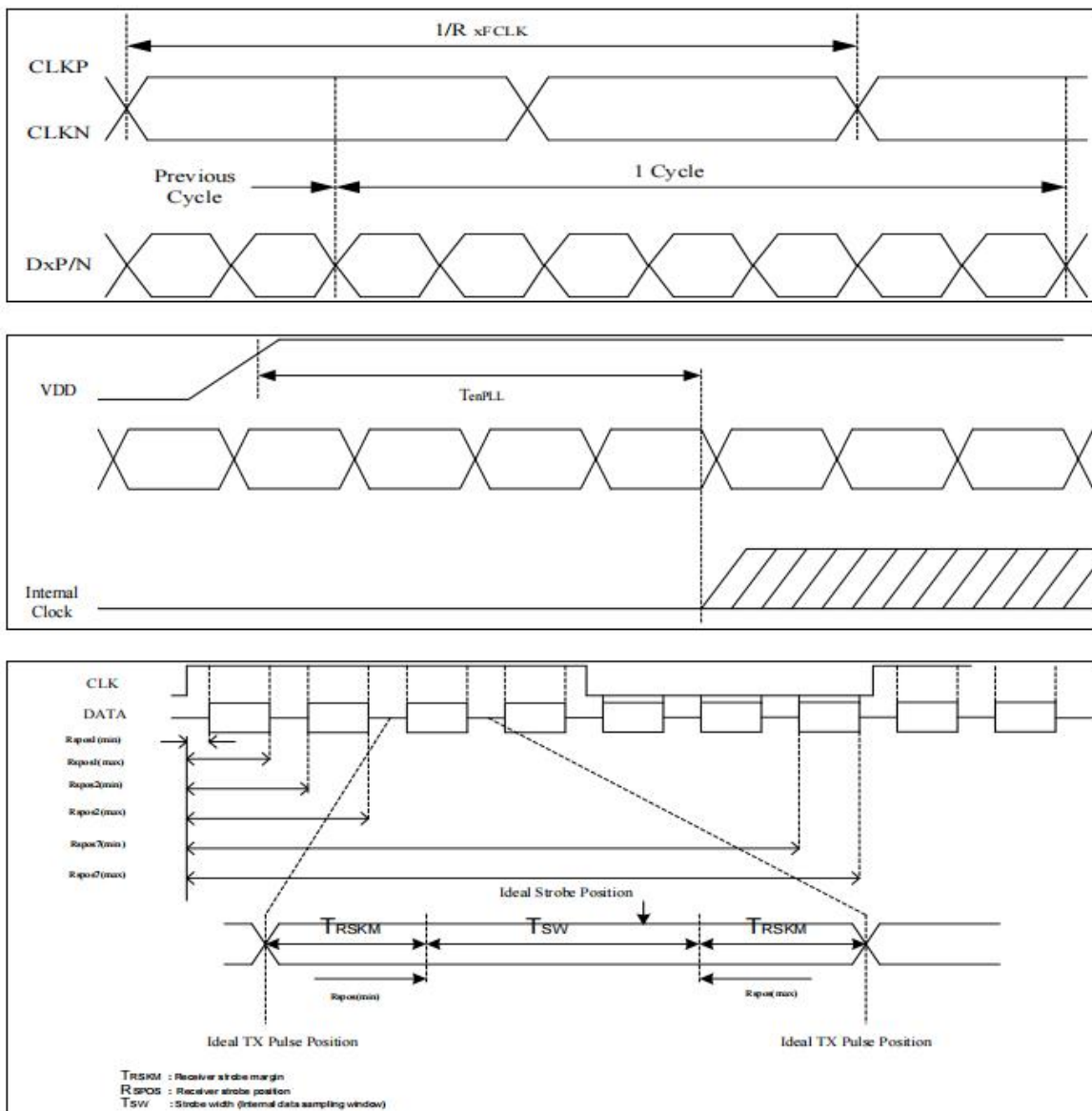


Figure 13.3: LVDS figure



5.4 Reset Timing

Timing requirements for RESETB

When RESETB of the reset pin equals to Low, it will be in the condition of reset. When it is in the condition of reset, it will make the device recover the initial set.

However, in order to avoid the reset noise cause reset, there is a mechanism to judge about whether the reset is needed or not.

The closed interval of Low can be shown as the following.

| Parameter | Symbol | Conditions | Spec. | | | Unit |
|-----------------------|--------|------------|-------|------|-----|---------------|
| | | | Min. | Typ. | Max | |
| Reset low pulse width | Trst | | 20 | - | - | μs |

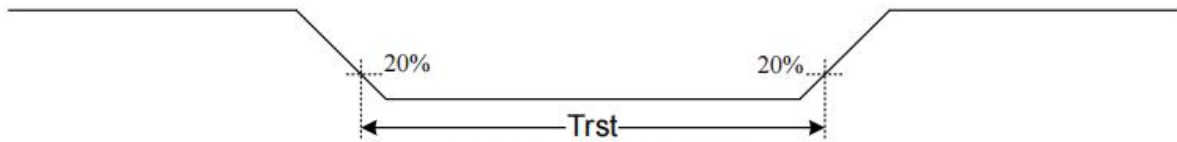
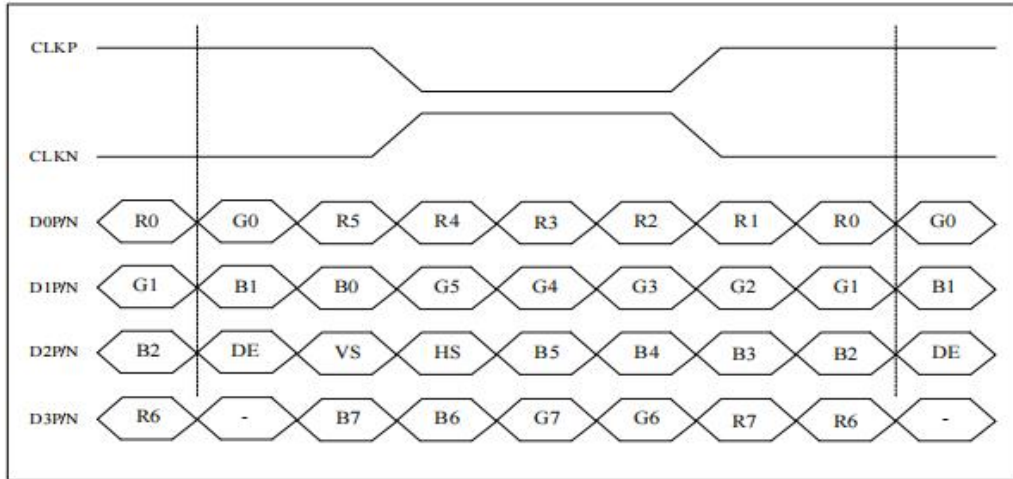


Figure 13.5: Reset timing



5.5 LVDS interface

Data input format for LVDS



8-bit LVDS input(LVBIT=H, LVFMT=H)



For 1280RGBx800

| Parameter | Symbol | Value | | | Unit |
|--|-------------------|-------|------|------|------|
| | | Min. | Typ. | Max. | |
| DCLK frequency @Frame rate=60Hz (LVDS) | F _{DCLK} | 68.2 | 72.4 | 78.4 | MHz |
| HSYNC period time | T _H | 1380 | 1440 | 1500 | DCLK |
| Horizontal display area | T _{HD} | 1280 | | | DCLK |
| HSYNC pulse width | T _{HPW} | Min. | 2 | | |
| | | Typ. | - | | |
| | | Max. | 40 | | |
| HSYNC back porch(with pulse width) | T _{HBP} | 88 | 88 | 88 | DCLK |
| HSYNC front porch | T _{HFP} | 12 | 72 | 132 | DCLK |
| VSYNC period time | T _V | 824 | 838 | 872 | H |
| Vertical display area | T _{VD} | 800 | | | H |
| VSYNC pulse width | T _{VPW} | Min. | 2 | | H |
| | | Typ. | - | | |
| | | Max. | 20 | | |
| VSYNC back porch(with pulse width) | T _{VBP} | 23 | 23 | 23 | H |
| VSYNC front porch | T _{VFP} | 1 | 15 | 49 | H |

For 1280RGBx800 DE mode

| Parameter | Symbol | Value | | | Unit |
|--|------------------------------------|-------|------|------|------|
| | | Min. | Typ. | Max. | |
| DCLK frequency @Frame rate=60Hz (LVDS) | F _{DCLK} | 68.2 | 72.4 | 78.4 | MHz |
| Horizontal display area | T _{HD} | 1280 | | | DCLK |
| HSYNC period time | T _H | 1380 | 1440 | 1500 | DCLK |
| HSYNC blanking | T _{HBP} +T _{HFP} | 100 | 160 | 220 | DCLK |
| Vertical display area | T _{VD} | 800 | | | H |
| VSYNC period time | T _V | 824 | 838 | 872 | H |
| VSYNC blanking | T _{VBP} +T _{VFP} | 24 | 38 | 72 | H |



6. Optical Specifications

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit | Note |
|------------------------------------|------------|------------------------------|------|------|------|-------------------|----------------|
| Viewing Angle (CR≥10) B/L ON | θ_T | $\Phi=90^\circ$ (12 o'clock) | 80 | 85 | - | deg | Note2 |
| | θ_B | $\Phi=270^\circ$ (6 o'clock) | 80 | 85 | - | deg | Note2 |
| | θ_L | $\Phi=180^\circ$ (9 o'clock) | 80 | 85 | - | deg | Note2 |
| | θ_R | $\Phi=0^\circ$ (3 o'clock) | 80 | 85 | - | deg | Note2 |
| Response Time | T_{ON} | Normal $\theta=\Phi=0^\circ$ | - | - | 15 | msec | Note4 |
| | T_{OFF} | | - | - | 15 | msec | Note4 |
| Contrast Ratio | CR | | - | 1200 | - | - | Note1 Note3 |
| Color Chromaticity | W_X | | TBD | TBD | TBD | - | Note1 Note5 |
| | W_Y | | TBD | TBD | TBD | - | Note1 Note5 |
| Luminance | L | | 800 | 1000 | - | cd/m ² | Note1 Note7 |
| Luminance Uniformity | Y_U | | 70 | 80 | - | % | Note1 Note6 |
| NTSC | - | | - | 70 | - | % | - |

Note 1: Definition of optical measurement system

The optical characteristics should be measured in dark room. After 5 minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.

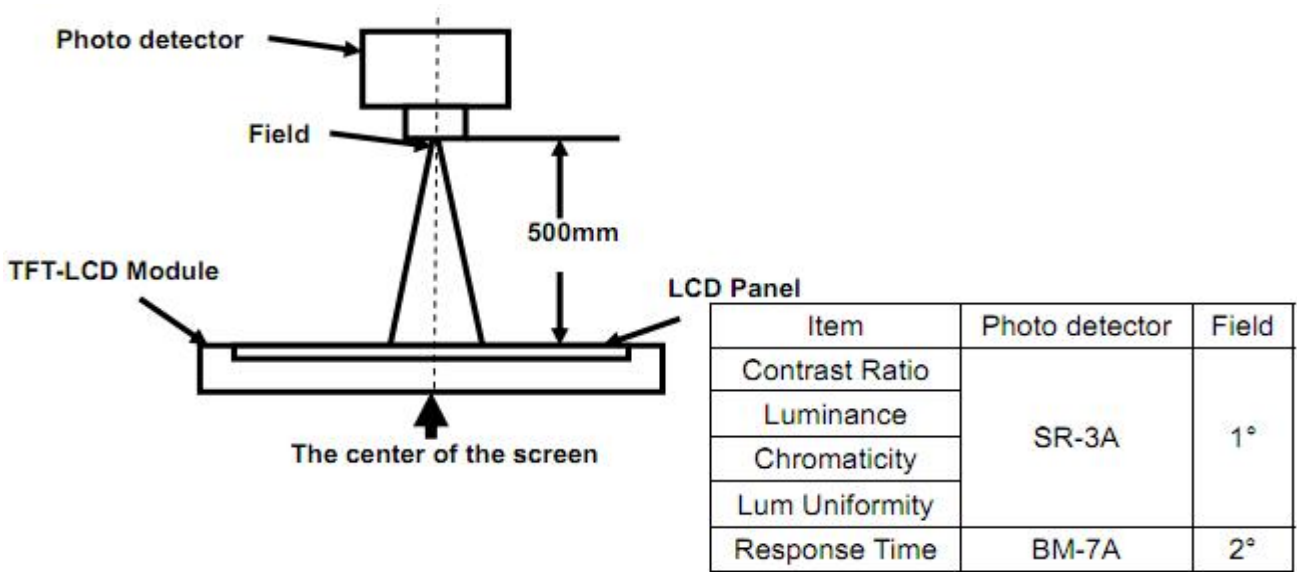


Fig 1

Note 2: Definition of viewing angle range and measurement system.
viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80).

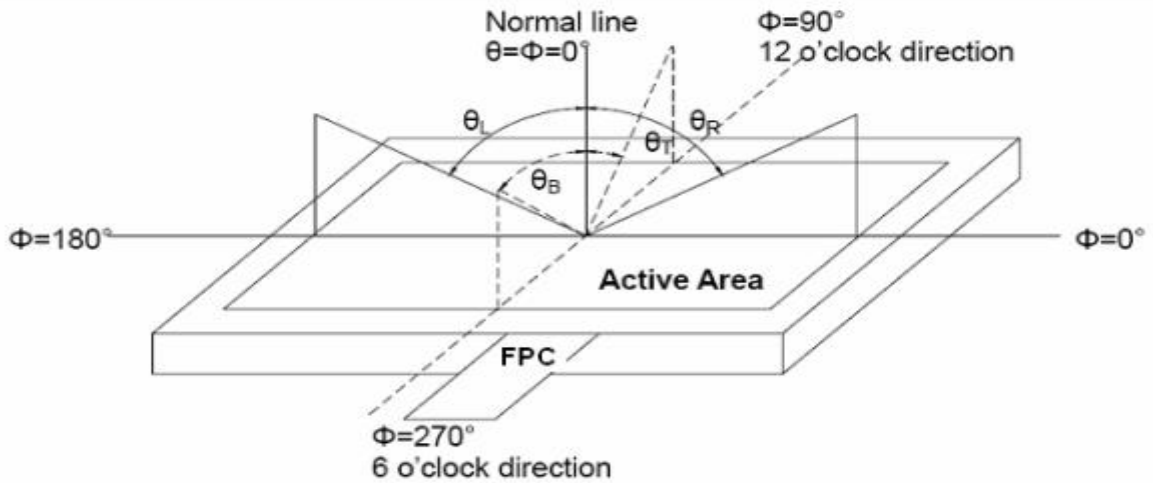


Fig 2 Definition of viewing angle

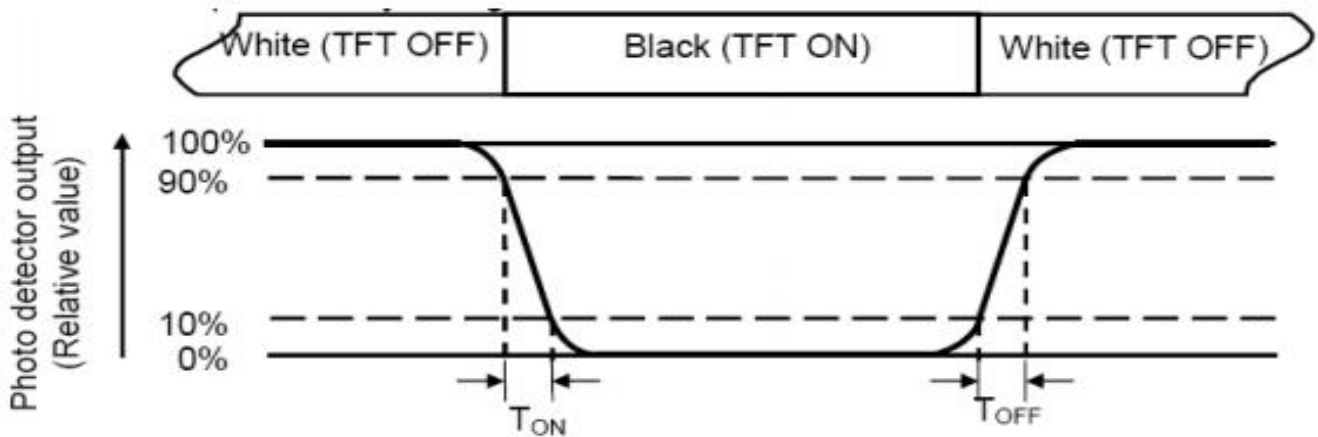


Note 3: Definition of contrast ratio

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

Note 4: Definition of Response time

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) is the time between photo detector output intensity changed from 10% to 90%.



Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note 6: Definition of Luminance Uniformity

The luminance uniformity in surface luminance is determined by measuring luminance at each test position 1 through n, and then dividing the maximum luminance of n points luminance by minimum luminance of n points luminance. For more information see FIG.3-a/b

Note 7: Surface luminance is the luminance with all pixels displaying white.

$L_v = \text{Average Surface Luminance with all white pixels}(P_1, P_2, P_3, \dots, P_n)$

For more information see FIG.3-a/b



Note 8:

H,V : Active area(see Figure b)

Light spot size $\varnothing = 5\text{mm}$ (BM-5) or $\varnothing = 7.7\text{mm}$ (BM-7)50cm distance or compatible distance from the LCD surface to detector lens. test spot position : see Figure b.

measurement instrument : TOPCON's luminance meter SR-3A or BM-7 or compatible (see Figure 1).

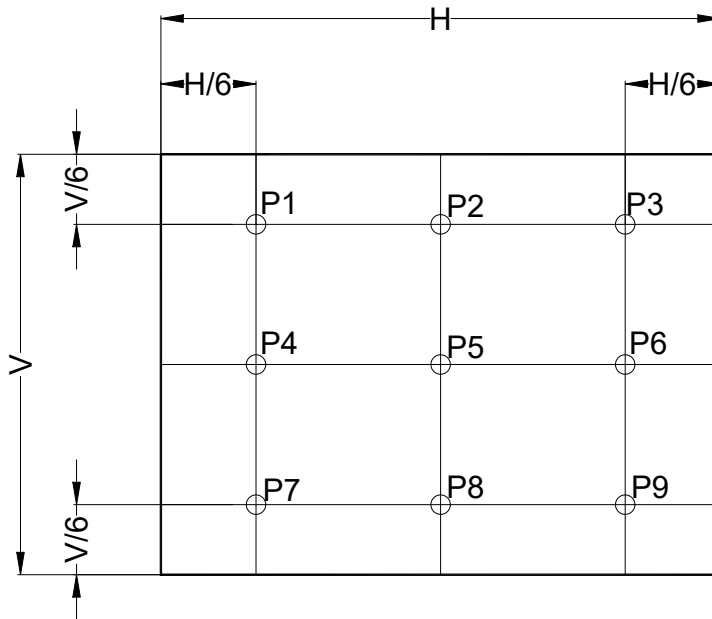


Fig. 3-b Definition of points



7. Reliability Test Items

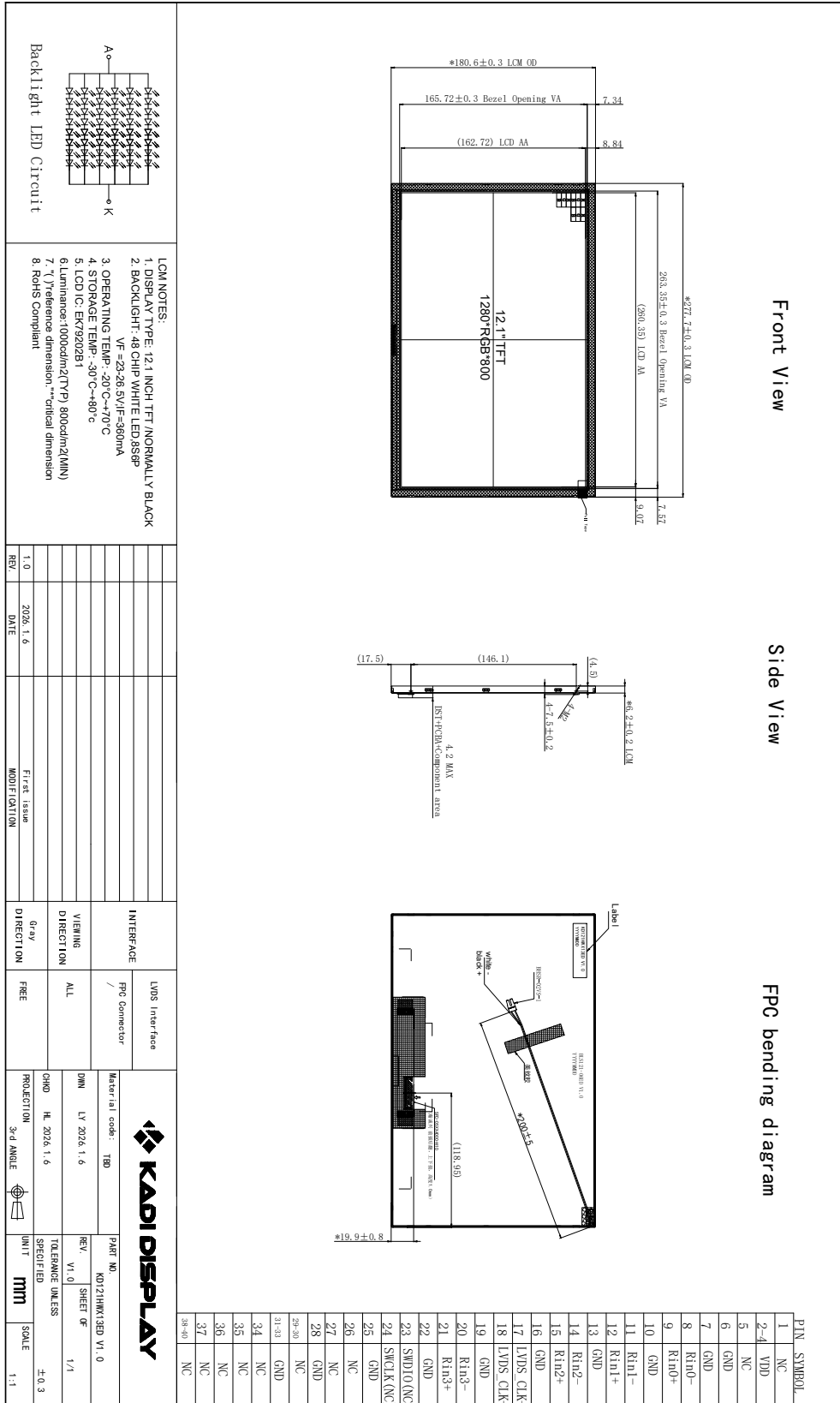
| Test Item | Test Conditions |
|---------------------------------------|---|
| High Temperature Storage | Ta= +80°C 96hrs |
| Low Temperature Storage | Ta= -30°C 96hrs |
| High Temperature Operation | Ta= +70°C 96hrs |
| Low Temperature Operation | Ta= -20°C 96hrs |
| High Temperature and Humidity Storage | Ta= +60°C, 90% RH 96hrs |
| Thermal Shock (Non-operation) | -30°C/30 min ~ +80°C/30 min for 20 cycles Start with cold temperature end with high temperature |
| Electro Static Discharge | Contact = ± 4 kV, class B Air = ± 8 kV, class B R=330Ω,C=150pF |
| Vibration | Sweep: 10Hz~55Hz~10Hz Stroke: 1.5mm 2 hrs for each direction of X .Y. Z. |
| Mechanical Shock | 60G 6ms,±X,±Y,±Z 3 times for each direction |
| Package Drop Test | Height: 60 cm 1 corner, 3 edges, 6 surfaces |

Notes: The test result shall be evaluated after the sample has been left at room temperature and humidity for 2 hours without load. No condensation shall be accepted. The sample will not be accepted if appear these defects:

- 1). Air bubble in the LCD
- 2). Seal leak or Glass crack
- 3). Non display or abnormal display
- 4). Brightness reduction >50%



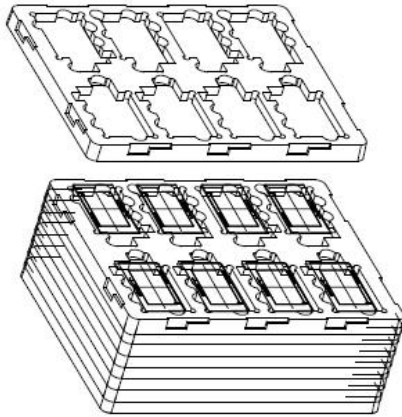
8. Mechanical Drawing



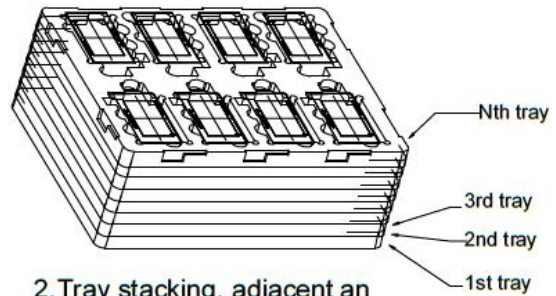


9. Packing

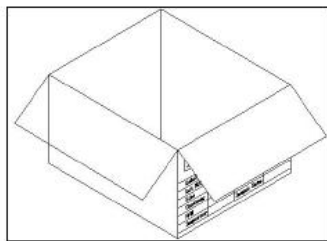
Packing Method



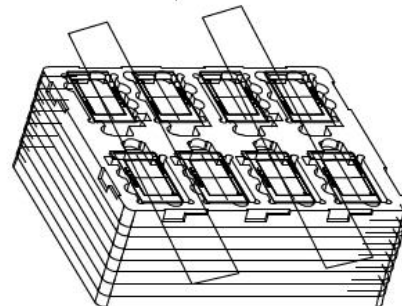
1. Put LCD module into tray cavity



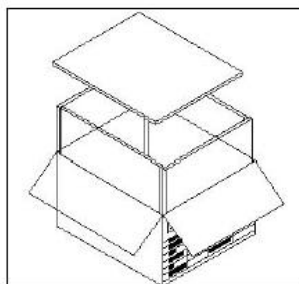
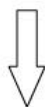
2. Tray stacking, adjacent an upper lower layer with a 180-degree rotation



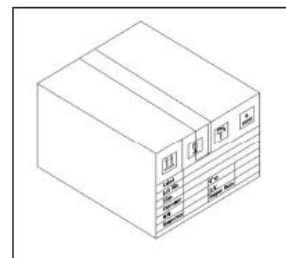
4. put the tray stack into carton



3. Medium Carton: Fix the tray stack with stretch film
Large Carton: Fix the tray stack with stretch film, then place it into a transparent PE antistatic bag



5. 6 sides of white foams inside the box



6. Carton sealing with adhesive tape



10. Precautions for Use of LCD modules

10.1 Handling Precautions

10.1.1. The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

10.1.2. If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.

10.1.3. Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

10.1.4. The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

10.1.5. If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

- Isopropyl alcohol
- Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

- Water
- Ketene
- Aromatic solvents

10.1.6. Do not attempt to disassemble the LCD Module.

10.1.7. If the logic circuit power is off, do not apply the input signals.

10.1.8. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

10.1.8.1. Be sure to ground the body when handling the LCD Modules.

10.1.8.2. Tools required for assembly, such as soldering irons, must be properly ground.

10.1.8.3. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

10.1.8.4. The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

10.2 Storage Precautions

10.2.1. When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

10.2.2. The LCD modules should be stored under the storage temperature range if the LCD modules will be stored for a long time, the recommend condition is :

Temperature : 0°C ~40°C Relatively humidity: ≤80%

10.2.3. The LCD modules should be stored in the room without acid, alkali and harmful gas.

10.3 Transportation Precautions

The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.

10.4 Packaging instructions

When the customers using trays, they have to stack the adjacent trays in a 180° staggered to prevent pressure that could cause product damage.