



Specification for TFT

AFY800480A0-5.0INTH

Revision C



| | |
|--------|---|
| A | Orient Display |
| FY | TFT Type |
| 800480 | Resolution 800 x 480 |
| A0 | Serial A0 |
| 5.0 | 5.0", Module Dimension 120.7 x 75.8 x 2.8 mm |
| I | IPS Display |
| N | Top: -20~+70°C; Tstr: -30~+80°C |
| T | Transmissive |
| H | High Brightness, 1000 cd/m ² |
| / | No Touch Panel |
| / | Controller ST7262 Or Compatible |
| / | RGB Interface |



REVISION RECORD

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1. GENERAL INFORMATION

| No. | Item | Contents | Unit |
|-----|--------------------------------|---------------------------------|------|
| 1 | LCD size | 5.0 inch (Diagonal) | / |
| 2 | LCD type | IPS/Normally black/Transmissive | / |
| 3 | Viewing direction(eye) | Free | / |
| 4 | Gray scale inversion direction | - | / |
| 5 | Resolution(H*V) | 800 *480 Pixels | / |
| 6 | Module size (L*W*H) | 120.7×75.8×2.8 | mm |
| 7 | Active area (L*W) | 108.0*64.8 | mm |
| 8 | Pixel pitch (L*W) | 0.135(W)×0.135(H) | mm |
| 9 | Interface type | RGB interface | / |
| 10 | Module power consumption | TBD | W |
| 11 | Back light type | LED | / |
| 12 | Driver IC | ST7262-G4-1-E OR COMPATIBLE | / |
| 13 | Weight | TBD | g |

2. ABSOLUTE MAXIMUM RATINGS

| Item | Symbol | Min. | Max. | Unit |
|--|--------|------|---------------|------|
| Power supply input voltage(TFT Module) | VDD | -0.3 | 3.6 | V |
| Backlight current (normal temp.) | ILED | - | 100 | mA |
| Operation temperature | Top | -20 | 70 | °C |
| Storage temperature | Tst | -30 | 80 | °C |
| Humidity | RH | - | 90%(Max60 °C) | RH |

3. ELECTRICAL CHARACTERISTICS

DC CHARACTERISTICS(at Ta=25°C)

| Item | Symbol | Min. | Typ. | Max. | Unit | Note |
|--|--------|--------|------|--------|------|------|
| Power supply input voltage(TFT Module) | VDD | 3.0 | 3.3 | 3.6 | V | |
| I/O logic voltage | VDDIO | - | - | - | V | |
| Input voltage 'H' level | VIH | 0.7VDD | - | VDD | V | |
| Input voltage 'L' level | VIL | VSS | - | 0.3VDD | V | |
| Power supply current | IVDD | - | TBD | - | mA | |
| TFT gate on voltage | VGH | - | - | - | V | |
| TFT gate off voltage | VGL | - | - | - | V | |
| Analog power supply voltage | AVDD | - | - | - | V | |
| Differential input common mode voltage | Vcom | -2 | 0 | 0 | V | |

4. BACKLIGHT CHARACTERISTICS

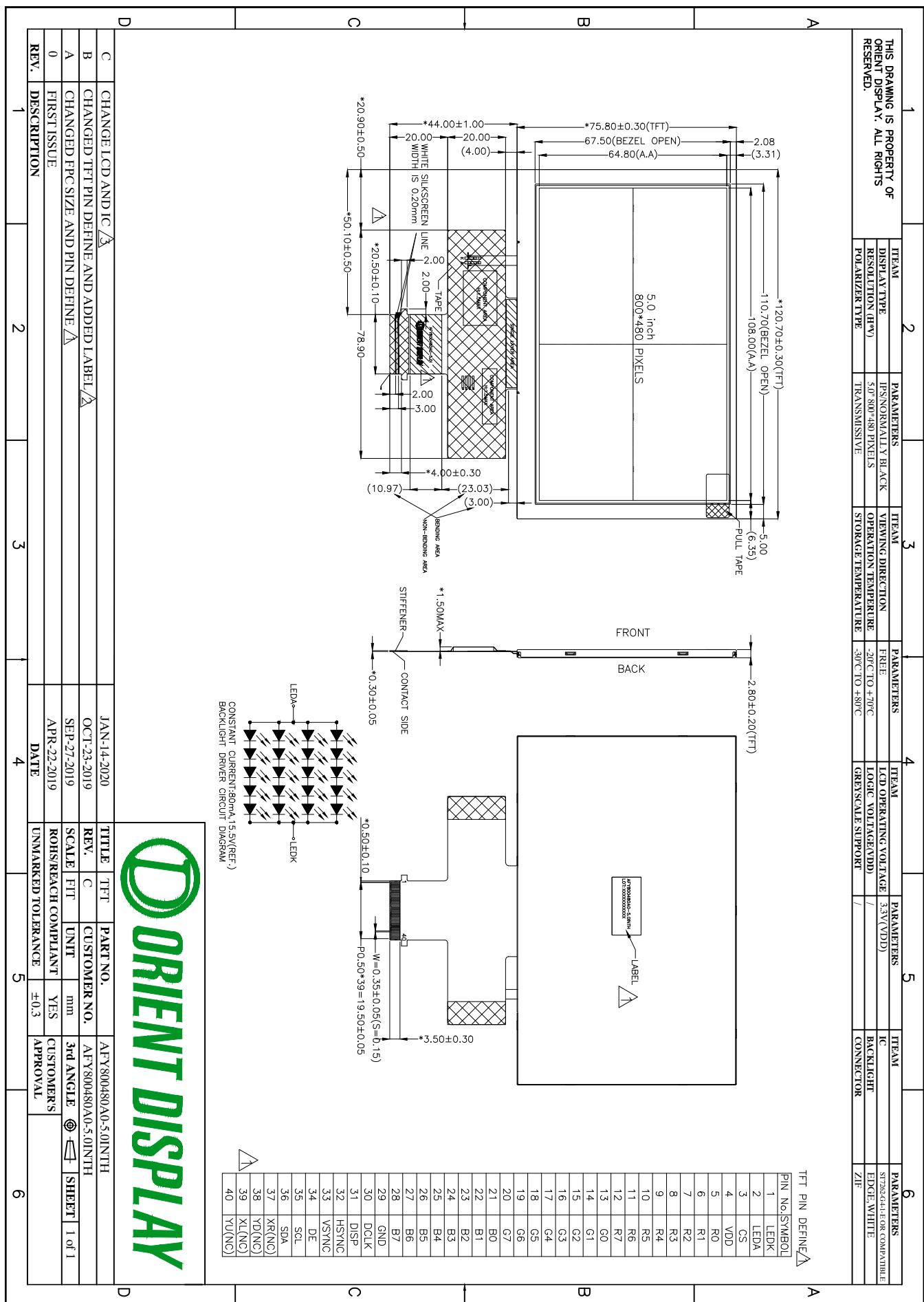
(at Ta=25°C,RH=60%)

| Item | Symbol | Min. | Typ. | Max. | Unit | Note |
|-----------------------|--------|-------------|---------------|------|------|-----------|
| LED forward voltage | VF | 14.5 | 15.5 | - | V | IF=20*8mA |
| LED forward current | IF | - | 80 | - | mA | |
| LED power consumption | PLED | - | 1.24 | - | W | Note1 |
| Number of LED | - | | 20 | | PCS | |
| Connection mode | - | 5 in series | 4 in parallel | / | | |
| LED life-time | - | 20000 | - | - | Hrs | Note2 |

Note1 : Calculator value for reference : IF*VF = PLED

Note2 : The LED life-time define as the estimated time to 50% degradation of initial brightness at Ta=25°C and IF =80mA. The LED lifetime could be decreased if operating IF is larger than 80mA.

5. ETERNAL DIMENSIONS



6. ELECTRO-OPTICAL CHARACTERISTICS

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit | Remark | Note |
|------------------------|----------|--|--------------|------|--------------|-------------------|------------------|--------|
| Response time | Tr+ Tf | - | - | 25 | 50 | ms | FIG.1 | Note 4 |
| Contrast ratio | Cr | | 400 | 500 | - | - | FIG.2 | Note 1 |
| Surface luminance | Lv | $\theta=0^\circ$ | 800 | 1000 | - | cd/m ² | FIG.2 | Note 2 |
| Luminance uniformity | Yu | $\theta=0^\circ$ | 75 | 85 | - | % | FIG.2 | Note 3 |
| NTSC | - | $\theta=0^\circ$ | 60 | 70 | - | % | FIG.2 | Note 5 |
| Viewing angle | θ | $\emptyset=90^\circ$ | 70 | 80 | - | deg | FIG.3 | Note 6 |
| | | $\emptyset=270^\circ$ | 70 | 80 | - | deg | FIG.3 | |
| | | $\emptyset=0^\circ$ | 70 | 80 | - | deg | FIG.3 | |
| | | $\emptyset=180^\circ$ | 70 | 80 | - | deg | FIG.3 | |
| CIE (x,y) chromaticity | Red x | $\theta=0^\circ$ $\emptyset=0^\circ$ $Ta=25^\circ C$ | Typ -0.04 | TBD | Typ +0.04 | - | FIG.2 CIE1931 | Note 5 |
| | Red y | | | TBD | | - | | |
| | Green x | | | TBD | | - | | |
| | Green y | | | TBD | | - | | |
| | Blue x | | | TBD | | - | | |
| | Blue y | | | TBD | | - | | |
| | White x | | | TBD | | - | | |
| | White y | | | TBD | | - | | |

Note1. Definition of contrast ratio

Contrast ratio(Cr) is defined mathematically by the following formula.

For more information see FIG.2.

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

Measured at the center area of the LCD

Note2. Definition of surface luminance

Surface luminance is the luminance with all pixels displaying white.

For more information see FIG.2.

Lv = Average Surface Luminance with all white pixels(P1,P2,P3,,Pn)

Note3. 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.2.

Yu = $\frac{\text{Minimum surface luminance with all white pixels (P1,P2,P3,.....,Pn)}}{\text{Maximum surface luminance with all white pixels (P1,P2,P3,.....,Pn)}}$

Note4. 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_{ON}) is the time between photo detector output intensity changed from 90% to 10%.

And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.

For additional information see FIG1.

Note5. Definition of color chromaticity (CIE1931)

CIE (x,y) chromaticity, The x,y value is determined by screen active area center position P5. For more information see FIG.2.

Note6. Definition of viewing angle

Viewing angle is the angle at which the contrast ratio is greater than 10. angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface.

For more information see FIG.3.

For viewing angle and response time testing, the testing data is base on Autronic-Melchers's ConoScope or DMS series Instruments or compatible. For contrast ratio, Surface Luminance, Luminance uniformity and CIE, the testing data is base on TOPCON's BM-5or BM-7 photo detector or compatible.

Note: For TFT module, Gray scale reverse occurs in the direction of panel viewing angle.

FIG.1. The definition of response Time

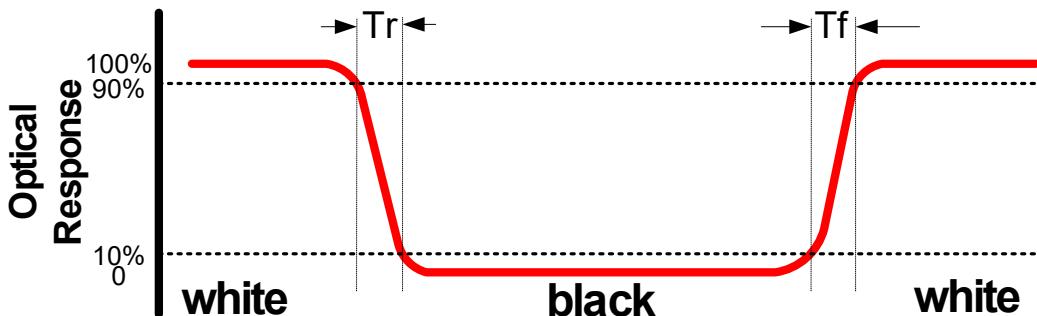


FIG.2. Measuring method for contrast ratio, surface luminance, luminance uniformity, CIE (x,y) chromaticity

Size : $S \leq 5"$ (see Figure a)

A : 5 mm B : 5 mm

H,V : Active area

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 a.

measurement instrument : TOPCON's luminance meter BM-5 or BM-7 or compatible (see Figure c).

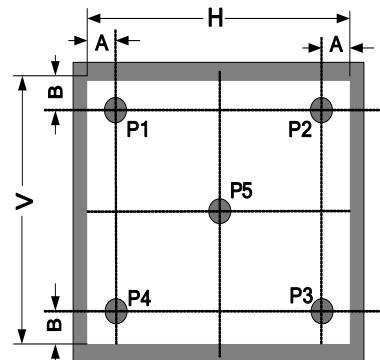


Figure a

Size : $5" < S \leq 12.3"$ (see Figure b)

H,V : Active area

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 BM-5 or BM-7 or compatible (see Figure c).

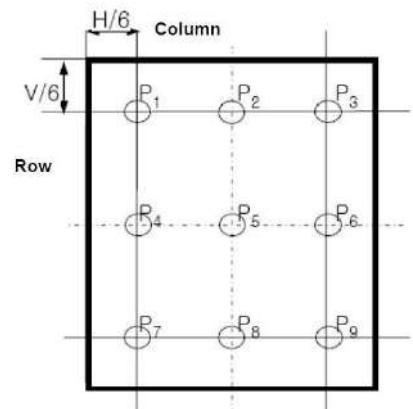


Figure b

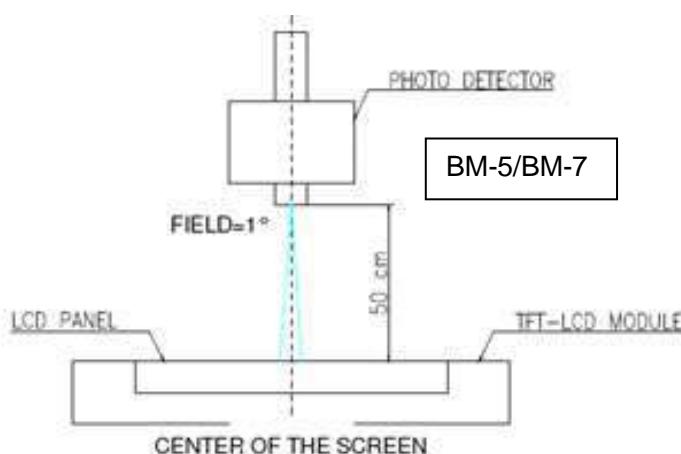
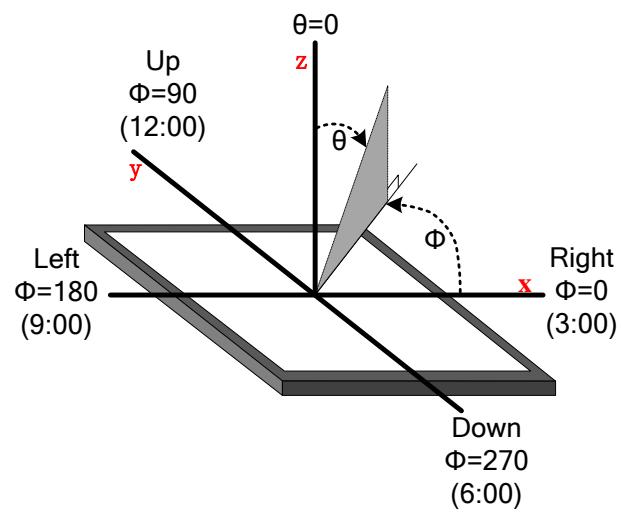


Figure c

FIG.3. The definition of viewing angle



7. INTERFACE DESCRIPTION

TFT Module Interface description

| | | | |
|-------|--------|-----|---|
| 1 | LEDK | P | Power for LED backlight(Cathode) |
| 2 | LEDA | P | Power for LED backlight(Anode) |
| 3 | CS | I | Chip Selected signal When CS=0,the chip is enable. |
| 4 | VDD | P | Power for LCD |
| 5-12 | R0-R7 | I | Red data Bus |
| 13-20 | G0-G7 | I | Green data Bus |
| 21-28 | B0-B7 | I | Blue data Bus |
| 29 | GND | P | Ground |
| 30 | DCLK | I | Dot clock |
| 31 | DISP | I | Set display mode. DISP=0:Standby mode. DISP=1:Normal display mode. |
| 32 | H SYNC | I | Horizontal sync input. |
| 33 | V SYNC | I | Vertical sync input |
| 34 | DE | I | Data enable |
| 35 | SCL | I | Serial Clock input Signal |
| 36 | SDA | I/O | Serial Data input Signal |
| 37 | XR/NC | / | No connected |
| 38 | YD/NC | / | No connected |
| 39 | XL/NC | / | No connected |
| 40 | YU/NC | / | No connected |

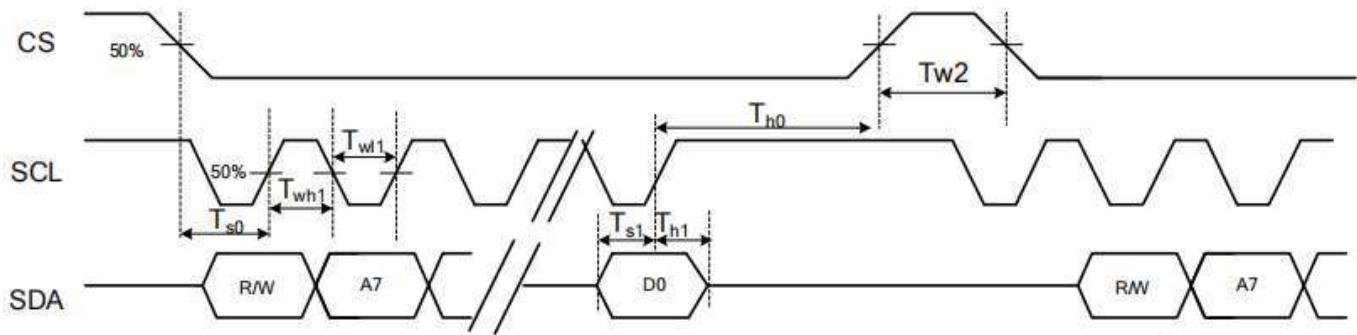
8. AC CHARACTERISTICS

AC Electrical Characteristics (PVDD=PVDD1=VDD=VDDI= 3.3V, AGND= 0V, TA=25 °C, Bare Chip)

8.1 System Operation AC Characteristics

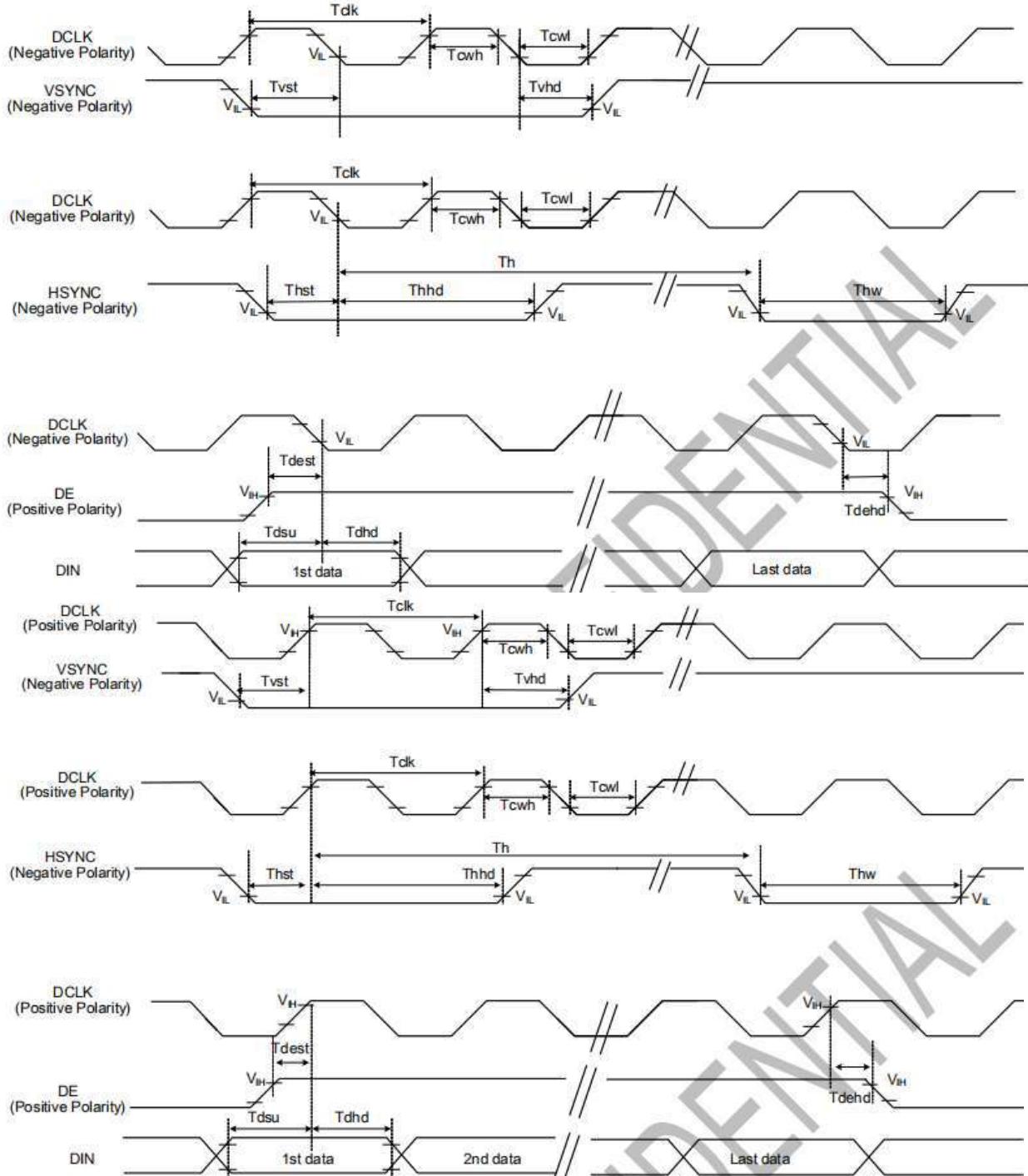
| Item | Symbol | Min | Typ. | Max. | Unit | Conditions |
|------------------------------|--------|-----|------|------|------|--|
| VDD Power Source Slew Time | TPOR | - | - | 20 | μs | From 0V to 99% VDD |
| GRB Pulse Width | tRSTW | 10 | 50 | - | μs | R=10Kohm, C=1uF |
| SD Output Stable Time | Tst | - | - | TBD | μs | Output settled within +20mV Loading = 6.8k+28.2pF. |
| GD Output Rise and Fall Time | Tgst | - | - | TBD | μs | Output settled (5%~95%), Loading = 4.7k+29.8pF |

8.2 System Bus Timing for 3-Wire SPI Interface



| Item | Symbol | Min | Typ | Max | Unit | Conditions |
|------------------------------|--------|-----|-----|-----|------|------------|
| CS Input Setup Time | Ts0 | 50 | - | - | ns | |
| Serial Data Input Setup Time | Ts1 | 50 | - | - | ns | |
| CS Input Hold Time | Th0 | 50 | - | - | ns | |
| Serial Data Input Hold Time | Th1 | 50 | - | - | ns | |
| SCL Write Pulse High Width | Twh1 | 50 | - | - | ns | |
| SCL Write Pulse Low Width | Twl1 | 50 | - | - | ns | |
| SCL Read Pulse High Width | Trh1 | 300 | | | ns | |
| SCL Read Pulse Low Width | Trl1 | 400 | | | ns | |
| CS Pulse High Width | Tpor | 400 | - | - | ns | |

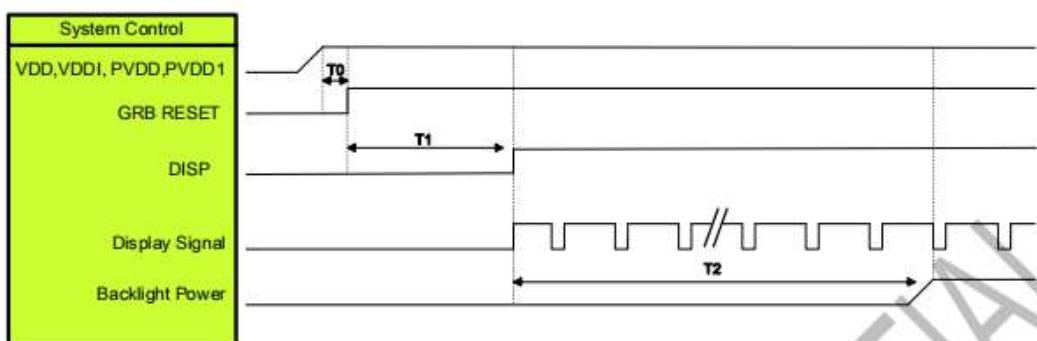
8.3 System Bus Timing for RGB Interface



| Item | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|-------------------|--------|------|------|------|------|------------|
| CLK Pulse Duty | Tcw | 40 | 50 | 60 | % | |
| H SYNC Width | Thw | 2 | - | - | DCLK | |
| H SYNC Period | Th | 55 | 60 | 65 | us | |
| V SYNC Setup Time | Tvst | 12 | - | - | ns | |
| V SYNC Hold Time | Tvhd | 12 | - | - | ns | |
| H SYNC Setup Time | Thst | 12 | - | - | ns | |
| H SYNC Hold Time | Thhd | 12 | - | - | ns | |
| Data Setup Time | Tdsu | 12 | - | - | ns | |
| Data Hold Time | Tdhd | 12 | - | - | ns | |
| DE Setup Time | Tdest | 12 | - | - | ns | |
| DE Hold Time | Tdehd | 12 | - | - | ns | |

9. POWER ON/OFF SEQUENCE

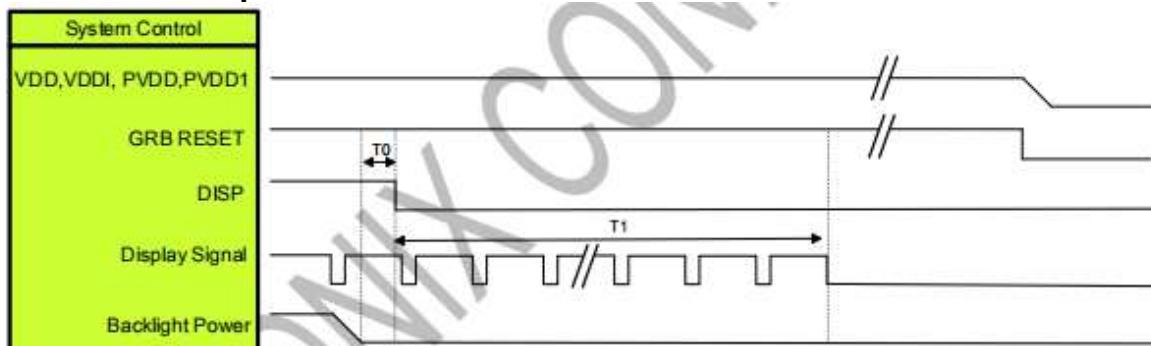
9.1 Power On Sequence



| 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: RGB Interface Display signal: DCLK; VSYNC; HSYNC; DE; DR[7:0]; DG[7:0]; DB[7:0]

9.2 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: RGB Interface Display signal: DCLK; VSYNC; HSYNC; DE; DR[7:0]; DG[7:0]; DB[7:0]

10. RELIABILITY TEST CONDITIONS

| No. | Test item | Test condition | Inspection after test |
|---|----------------------------|--|--|
| 10.1 | High temperature storage | 80±2°C/240 hours | Inspection after 2~4hours storage at room temperature, the sample shall be free from defects : 1. Current changing value before test and after test is 50% larger; 2. Function defect : Non-display, abnormal display, missing lines, Short lines, ITO corrosion; 3. Visual defect : Air bubble in the LCD, Seal leak, Glass crack. |
| 10.2 | Low temperature storage | -30±2°C/240 hours | |
| 10.3 | High temperature operating | 70±2°C/120 hours | |
| 10.4 | Low temperature operating | -20±2°C/120 hours | |
| 10.5 | Temperature cycle | -20±2°C~25°C~70±2°C*10cycles (30min.) (5min.) (30min.) | |
| 10.6 | Damp proof test | 50°C*90% RH/120 hours | |
| 10.7 | Vibration test | Frequency : 10Hz~55Hz~10Hz Amplitude : 1.5mm , X , Y , Z direction for total 3hours (Packing condition) | |
| 10.8 | Dropping test | Drop to the ground from 1m height, one time, every side of carton. (Packing condition) | |
| 10.9 | ESD test | Voltage : ±8KV R : 330Ω C : 150pF Air discharge, 10time | |
| <p>Remark :</p> <ol style="list-style-type: none"> 1.The test samples should be applied to only one test item. 2.Sample size for each test item is 3~5pcs. 3.For damp proof test, Pure water(Resistance>10MΩ) should be used. 4.In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judged as a good part. 5.EL evaluation should be excepted from reliability test with humidity and temperature: Some defects such as black spot/blemish can happen by natural chemical reaction with humidity and Fluorescence EL has. 6.Failure judgment criterion: Basic specification, Electrical characteristic, Mechanical characteristic, Optical characteristic. | | | |

11.INSPECTION CRITERION

Refer to 《Inspection Criterion for TFT Products-To customer》 V2.3

12. HANDLING PRECAUTIONS

12.1 Mounting method

The LCD module consists of two thin glass plates with polarizers which easily be damaged. And since the module is so constructed as to be fixed by utilizing fitting holes in the printed circuit board. Extreme care should be needed when handling the LCD modules.

12.2 Caution of LCD handling and cleaning

When cleaning the display surface, Use soft cloth with solvent [recommended below] and wipe lightly :

- Isopropyl alcohol
- Ethyl alcohol

Do not wipe the display surface with dry or hard materials that will damage the polarizer surface.

Do not use the following solvent :

- Water
- Aromatics

Do not wipe ITO pad area with the dry or hard materials that will damage the ITO patterns

Do not use the following solvent on the pad or prevent it from being contaminated :

- Soldering flux
- Chlorine (Cl), Sulfur (S)

If goods were sent without being silicon coated on the pad, ITO patterns could be damaged due to the corrosion as time goes on.

If ITO corrosion happen by miss-handling or using some materials such as Chlorine (Cl), Sulfur (S) from customer, Responsibility is on customer.

12.3 Caution against static charge

The LCD module use C-MOS LSI drivers, so we recommended that you :

Connect any unused input terminal to Vdd or Vss, do not input any signals before power is turned on, and ground your body, work/assembly areas, assembly equipment to protect against static electricity.

12.4 Packing

Module employ LCD elements and must be treated as such.

- Avoid intense shock and falls from a height.
- To prevent modules from degradation, do not operate or store them exposed direct to sunshine or high temperature/humidity.

12.5 Caution for operation

- It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage then the limit cause the shorter LCD life.
- An electrochemical reaction due to direct current causes LCD's undesirable deterioration, so that the use of direct current drive should be avoided.
- Response time will be extremely delayed at lower temperature then the operating temperature range and on the other hand at higher temperature LCD's have dark color in them. However those phenomena do not mean malfunction or out of order with LCD's, which will come back in the specified operation temperature.
- If the display area is pushed hard during operation, some font will be abnormally displayed but it resumes normal condition after turning off once.
- A slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit.
- Usage under the maximum operating temperature, 50%Rh or less is required.
- When fixed patterns are displayed for a long time, remnant image is likely to occur.

12.6 Storage

In the case of storing for a long period of time for instance, for years for the purpose or replacement use, the following ways are recommended.

- Storing in an ambient temperature 10°C to 30°C, and in a relative humidity of 45% to 75%. Don't expose to sunlight or fluorescent light.
- Storing in a polyethylene bag with the opening sealed so as not to enter fresh air outside in it. And with no desiccant.
- Placing in a dark place where neither exposure to direct sunlight nor light's keeping the storage temperature range.
- Storing with no touch on polarizer surface by the anything else.

It is recommended to store them as they have been contained in the inner container at the time of delivery from us.

12.7 Safety

- It is recommendable to crash damaged or unnecessary LCD's into pieces and wash off liquid crystal by either of solvents such as acetone and ethanol, which should be burned up later.
- When any liquid leaked out of a damaged glass cell comes in contact with your hands, please wash it off well with soap and water.

13. PRECAUTION FOR USE

13.1 A limit sample should be provided by the both parties on an occasion when the both parties agreed its necessity. Judgment by a limit sample shall take effect after the limit sample has been established and confirmed by the both parties.

13.2 On the following occasions, the handing of problem should be decided through discussion and agreement between responsible of the both parties.

- When a question is arisen in this specification.
- When a new problem is arisen which is not specified in this specifications.
- When an inspection specifications change or operating condition change in customer is reported to ODNA, and some problem is arisen in this specification due to the change.
- When a new problem is arisen at the customer's operating set for sample evaluation in the customer site.

14. PACKING SPECIFICATION

Please consult our technical department for detail information.