

PRODUCT SPECIFICATION

PART NUMBER: QP-070WSVGAMLLC02#00
DESCRIPTION: TFT 7"wide 1024*600 IPS LVDS 400CD
With Pcap USB - I2C Black 1.1mm Cover Glass Ext DSA

- () Preliminary Specification
- (V) Approved Specification

| | |
|-----------------------|--------------|
| Customer Name: | |
| Signature: | Date: |
| | |

| | |
|---|--------------------|
| QiteX Futurelabs Advanced Display Product Line | |
| PREPARED BY | REVIEWED BY |
| <i>Renee Huang</i> | <i>David</i> |

CONTENTS

Table of Content

| | |
|---|----|
| 1 Precautions and Warranty | 4 |
| 1.1 Precaution | 4 |
| 1.2 Warranty | 4 |
| 2 GENERAL DESCRIPTION..... | 5 |
| 2.1 General Specifications..... | 5 |
| 3 Absolute Maximum Ratings..... | 6 |
| 3.1 Absolute Ratings of Environment | 6 |
| 3.2 Electrical Absolute Ratings | 6 |
| 3.2.1 DC Characteristics | 6 |
| 3.2.2 BLU DC Characteristic..... | 6 |
| 4 BLOCK DIAGRAM | 7 |
| 5 PIN CONNECTIONS..... | 8 |
| 5.1 Pin Definition Connector: 093G30-00001A-M4..... | 8 |
| 6 AC characteristics..... | 10 |
| 6.1 Timing Table | 12 |
| 7. Power On/Off Sequence | 13 |
| 8. OPTICAL CHARACTERISTIC..... | 14 |
| 8.1 Optical Characteristics | 14 |
| B. Touch Screen specificatio..... | 17 |
| B-1. Environmental Specification | 17 |
| B-2. Mechanical Specification | 17 |
| B-3. USB-I2C Combo Type Controller..... | 17 |
| 9. OUTLINE DRAWING..... | 18 |

RECORD OF REVISIONS

| Revision | Date | Description | Page |
|----------|------------|--|--------|
| Rev 1.0 | 2022/02/20 | 1st Release | |
| Rev 1.1 | 2022/11/08 | Update Electrical Characteristics & ME drawing | P6/P18 |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

FutureLabs Confidential

1 Precautions and Warranty

1.1 Precaution

- 1.1.1 Do not apply rough force such as bending or twisting to the module during assembly.
- 1.1.2 To assemble or install module into user's system can be only in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.
- 1.1.3 Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.
- 1.1.4 It's not permitted to have pressure or impulse on the module because the LCD panel and Backlight will be damaged.
- 1.1.5 Always follow the correct power sequence when LCD module is connecting and operating. This can prevent damage to the CMOS LSI chips during latch-up.
- 1.1.6 Do not pull the I/F connector in or out while the module is operating.
- 1.1.7 Do not disassemble the module, or insert anything into the Backlight unit
- 1.1.8 It is dangerous that moisture come into or contacted the LCD module, because moisture may damage LCD module when it is operating.
- 1.1.9 High temperature or humidity may reduce the performance of module. Please store LCD module
- 1.1.10 within the specified storage conditions.
- 1.1.11 The response time will become slowly below lower temperature.
- 1.1.12 Do not keep same pattern in a long period of time. It may cause image sticking on LCD.
- 1.1.13 Display may change color with different temperature.
- 1.1.14 The Module should be kept into anti-static bag or other containers resistant to static for storage.
- 1.1.15 If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.
- 1.1.16 After the module's end of life, it is not harmful in case of normal operation and storage.

1.2 Warranty

- 1.2.1 Our warranty liability is limited to repair and/or replacement. We will not be responsible for any consequential loss.
- 1.2.2 If possible, we suggest customer to use up all modules in six months. If the module storage time over twelve months, we suggest that recheck it before the module be used.

2 GENERAL DESCRIPTION

The specification is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This product is composed of a TFT-LCD panel, driver ICs and a backlight unit.

2.1 General Specifications

| Features | Details | Unit |
|-----------------------------|---|------------|
| Display Size(Diagonal) | 7.0" | |
| LCD type | IPS | |
| Display Mode | Transmissive / Normally Black | |
| Resolution | 1024 RGB x 600 | Pixels |
| View Direction | FULL VIEW | Best Image |
| Module Outline | 175.89(H) x 112.96(V) x 5,65 (T) 175.89(H) x 112.96(V) x 9.9 max.(T) (Note1) | mm |
| Active Area | 154.21(H) x 85.92(V) | mm |
| Pixel Size | 0.1506 (H) x 0.1432 (V) | mm |
| Pixel Arrangement | RGB Vertical stripe | |
| Interface | LVDS 6/8 bit | |
| Display Colors | 262K /16.7M | |
| With or Without Touch Panel | With | - |

Note1: Exclusive posts, FFC/FPC tail etc.

3 Absolute Maximum Ratings

3.1 Absolute Ratings of Environment

$V_{SS}=0V, T_a=25^{\circ}C$

| Item | Symbol | Min. | Max. | Unit |
|-----------------------|------------------|------|------|------|
| Supply Voltage | VCC LCD | -0.5 | 5.0 | V |
| Storage temperature | T _{STG} | -30 | +80 | °C |
| Operating temperature | T _{OP} | -20 | +70 | °C |

Note 1: If T_a below $50^{\circ}C$, the maximal humidity is 90%RH, if T_a over $50^{\circ}C$, absolute humidity should be less than 60%RH.

Note 2: The response time will be extremely slow when the operating temperature is around $-10^{\circ}C$, and the back ground will become darker at high temperature operating.

3.2 Electrical Absolute Ratings

3.2.1 DC Characteristics

| Item | Symbol | Min. | Typ. | Max. | Unit |
|---|---------|-----------|------|-----------------|------|
| Digital Supply Voltage | VCC LCD | 2.3 | 3.3 | 3.6 | V |
| Differential input high threshold voltage | RxVTH | - | - | 0.1 | V |
| Differential input low threshold voltage | RxVTL | -0.1 | - | - | V |
| Input voltage range (singled-end) | RxVIN | 0 | - | 2.4 | V |
| Differential input common mode voltage | RxVCM | $ VID /2$ | - | $2.4 - VID /2$ | V |
| Differential input voltage | $ VID $ | 0.2 | - | 0.6 | V |
| Current Consumption All white | ICC | - | 105 | - | mA |

3.2.2 BLU DC Characteristic

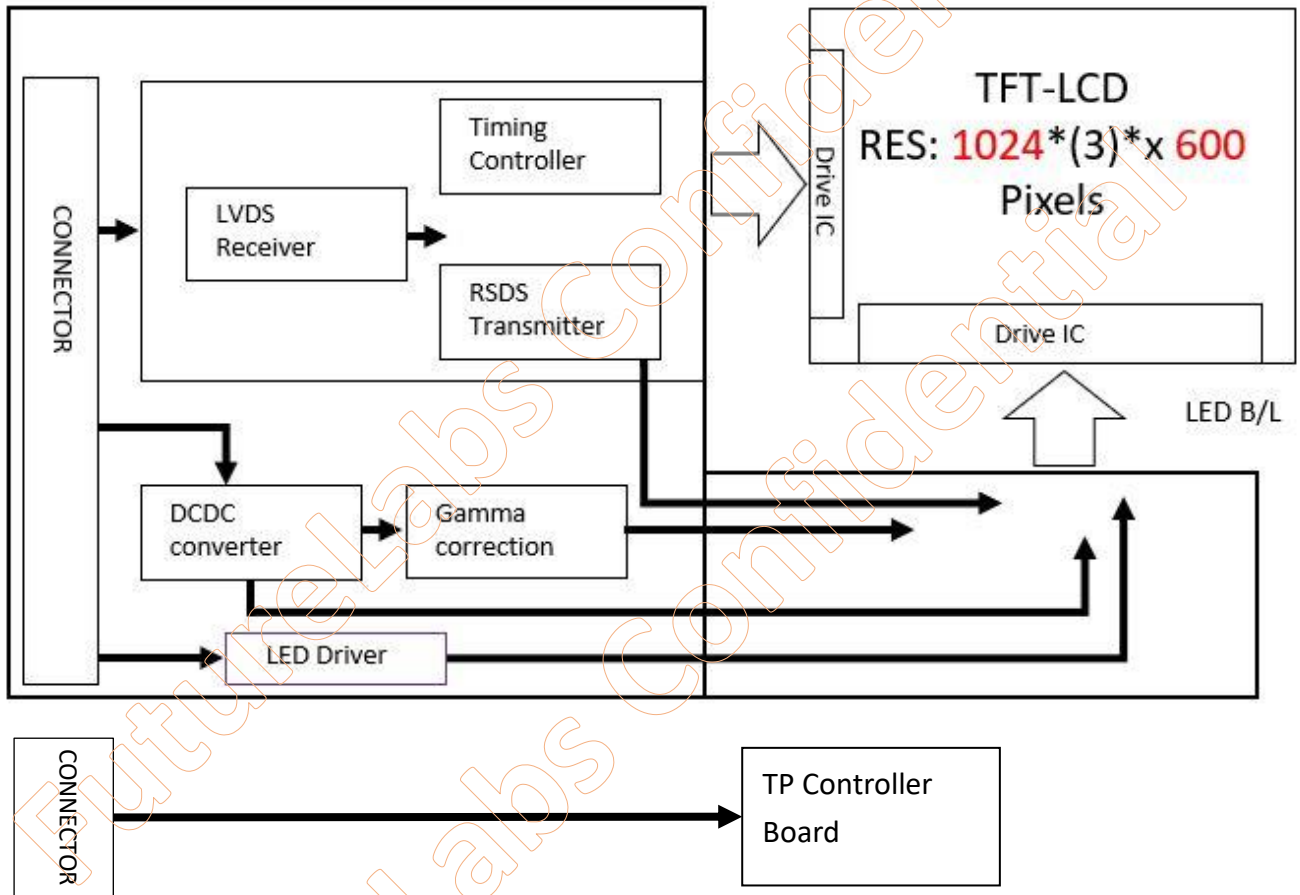
| Item | Symbol | Min. | Typ. | Max. | Unit |
|--|------------------|------|--------|------|------|
| BLU Supply Voltage | BLK VCC | - | 5 | 7.5 | V |
| Backlight Current | BLK ICC | - | 160 | - | mA |
| Logic Low Threshold (EN,PWM) | V _{IL} | - | - | 0.8 | V |
| Logic High Threshold (EN,PWM) | V _{IH} | 1.9 | - | 24.0 | V |
| PWM Duty Cycle | - | 0.1 | - | 100 | % |
| PWM Dimming Frequency | f _{DIM} | 100 | - | 30K | Hz |
| Pull Down Resistor (Both EN and PWM pins) | R _{PD} | - | 800 | - | kΩ |
| LED working life($25^{\circ}C$) | | | 40,000 | | Hrs |

* Note1 : Led life time defined as follows: The final brightness is at 50% of original brightness.

The environmental conducted under ambient air flow, at $T_a=25\pm 2^{\circ}C, 60\%RH\pm 5\%$.

Typical operating life time is estimated data, led power dissipation is evaluated by led supplier

4 BLOCK DIAGRAM



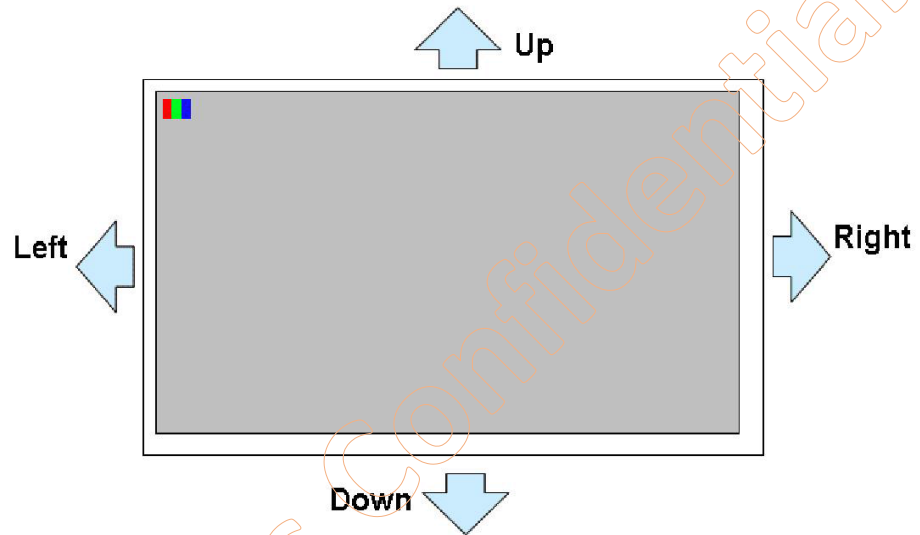
5 PIN CONNECTIONS

5.1 Pin Definition Connector: 093G30-00001A-M4

| No. | Symbol | Function |
|-----|---------------|--|
| 1 | VCC LCD(3.3V) | Power Supply |
| 2 | VCC LCD(3.3V) | Power Supply |
| 3 | SEL 6/8 | “L”: 8bit LVDS interface “H”:6bit LVDS interface |
| 4 | RX0- | -LVDS differential data input |
| 5 | RX0+ | +LVDS differential data input |
| 6 | RX1- | -LVDS differential data input |
| 7 | RX1+ | +LVDS differential data input |
| 8 | RX2- | -LVDS differential data input |
| 9 | RX2+ | +LVDS differential data input |
| 10 | GND | Ground |
| 11 | RXCLK- | -LVDS differential clock input |
| 12 | RXCLK+ | +LVDS differential clock input |
| 13 | RX3- | -LVDS differential data input |
| 14 | RX3+ | +LVDS differential data input |
| 15 | GND | Ground |
| 16 | U/D | Horizontal inversion (Note1) |
| 17 | L/R | Vertical inversion (Note1) |
| 18 | NC | No connection |
| 19 | NC | No connection |
| 20 | NC | No connection |
| 21 | NC | No connection |
| 22 | GND | Ground |
| 23 | NC | No connection |
| 24 | NC | No connection |
| 25 | NC | No connection |
| 26 | NC | No connection |
| 27 | BLK VCC(5V) | Power for LED backlight |
| 28 | BLK VCC(5V) | Power for LED backlight |
| 29 | ENABLE | Chip Enable (Active High) for Boost Converter |
| 30 | PWM | Dimming Control Input |

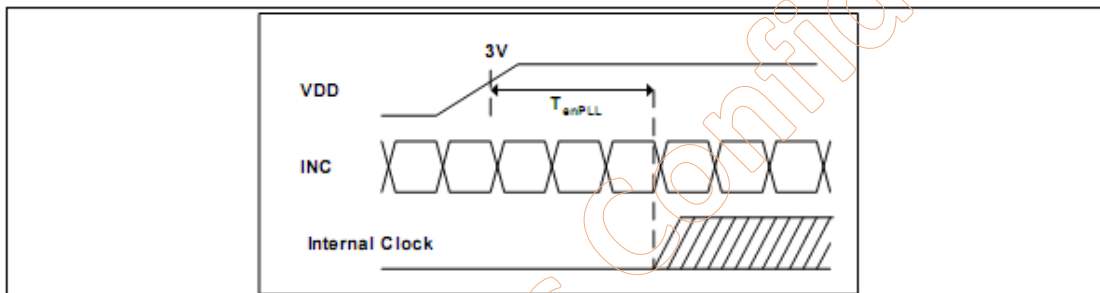
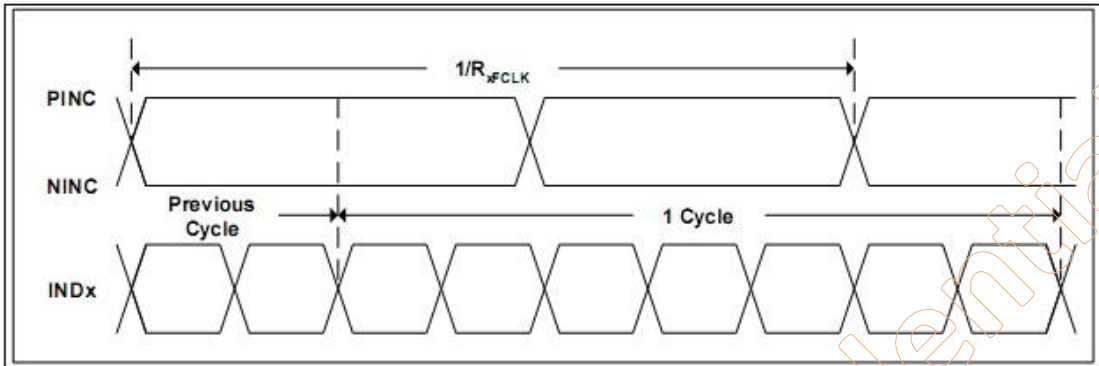
*Note1: U/D R/L Function Description

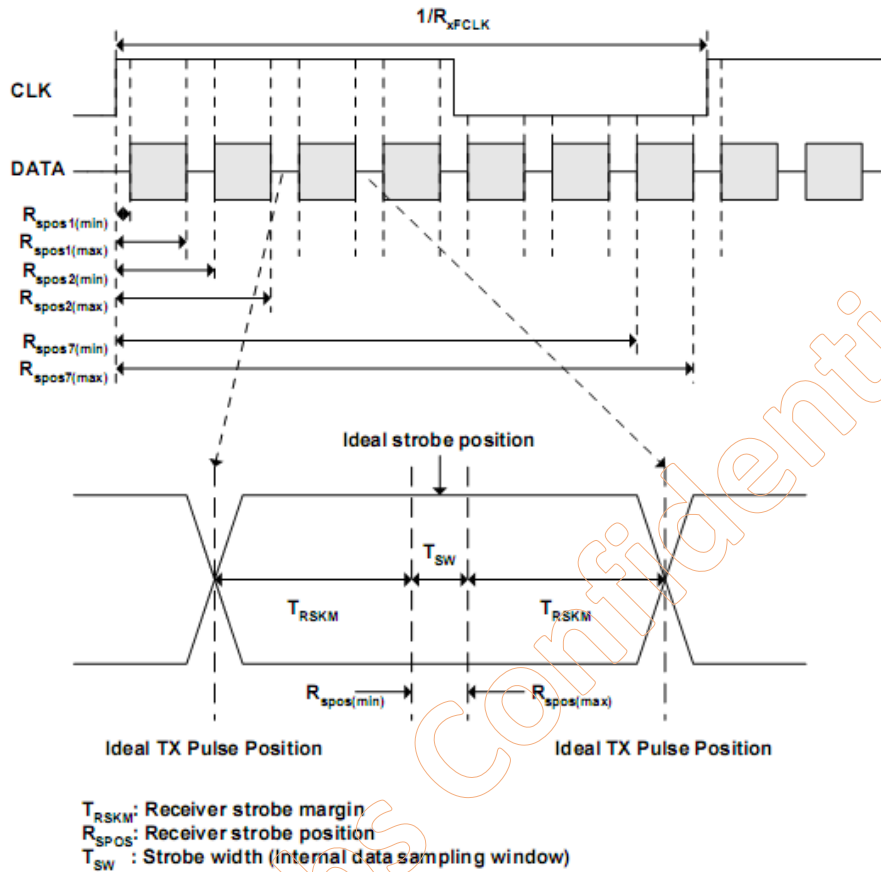
| Scan Control Input | | Scanning Direction |
|--------------------|------|------------------------------|
| UPDN | SHLR | |
| GND | VCC | Left→Right, Up→Down(default) |
| GND | GND | Right→Left, Up→Down |
| VCC | VCC | Left→Right, Down→Up |
| VCC | GND | Right→Left,, Down→Up |



6 AC characteristics

1) Timing





2) LVDS mode

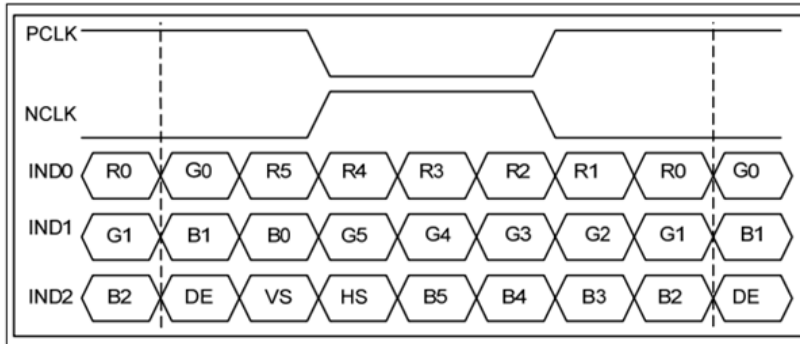
| Parameter | Symbol | Min | Typ | Max | Unit | Condition |
|------------------------|--------|------|----------------------|-----|------|---|
| Clock frequency | RxFCLK | 26.2 | 45 | 71 | MHz | |
| Input data skew margin | TRSKM | 500 | | | pS | IVIDI = 400Mv RxVCM = 1.2V RxFCLK = 71MHz |
| Clock high time | TLVCH | | $4/(7 \cdot RxFCLK)$ | | ns | |
| Clock low time | TLVCL | | $3/(7 \cdot RxFCLK)$ | | ns | |
| PLL wake-up time | TenPLL | | | 150 | uS | |

SSC tolerance of LVDS receiver

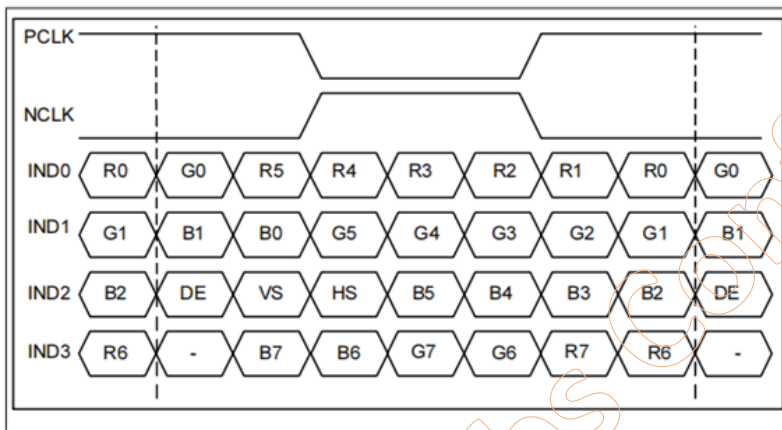
| Parameter | Symbol | Min | Typ | Max | Unit | Condition |
|----------------------|--------|-----|-----|-------|------|-------------------------------------|
| Modulation Frequency | SSCMF | 23 | - | 93 | KHz | |
| Modulation Rate | SSCMR | | | +/- 3 | % | LVDS clock = 71MHz Center spread |

3) Data Input Format for LVDS

6-bit LVDS input



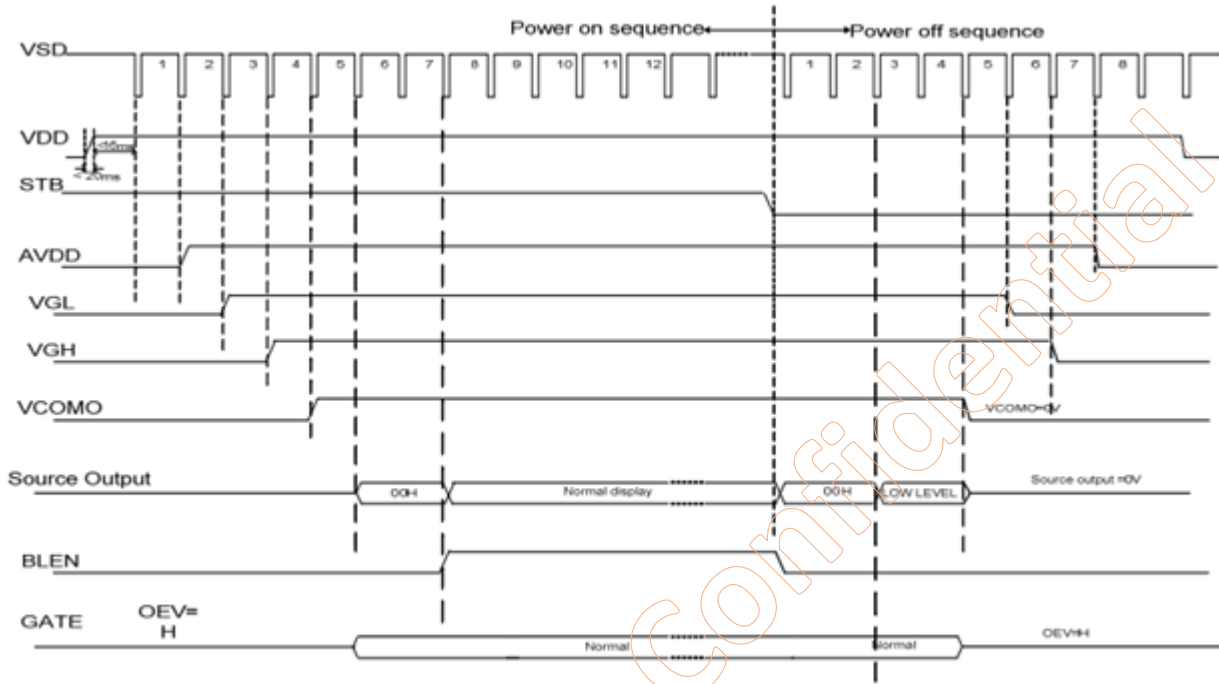
8-bit LVDS input



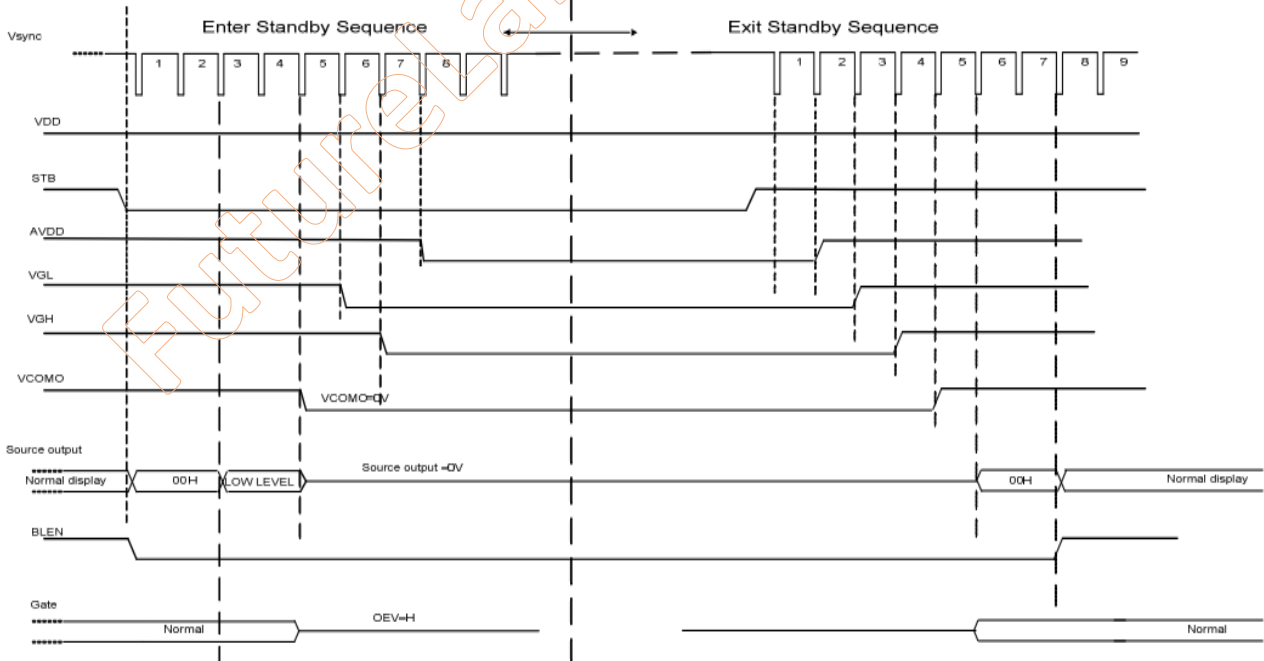
6.1 Timing Table

| Parameter | Symbol | Value |
|------------------------|---------|-------|
| Horizontal Pulse Width | HPW | 4 |
| Horizontal Back Porch | HBP | 156 |
| Horizontal Front Porch | HFP | 160 |
| Horizontal Active | HActive | 1024 |
| Vertical Pulse Width | VPW | 1 |
| Vertical Back Porch | VBP | 22 |
| Vertical Front Porch | VFP | 12 |
| Vertical Active | VActive | 600 |

7. Power On/Off Sequence



Power On/Off timing chart



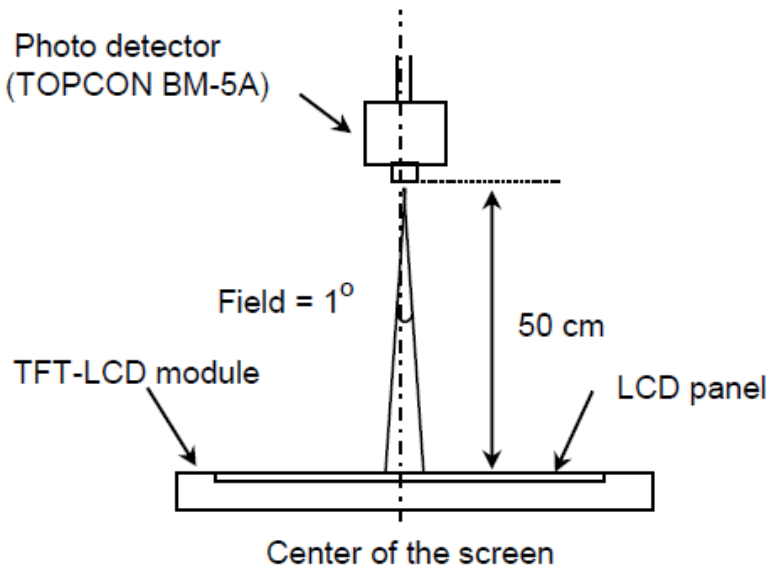
Enter and Exit Standby Mode timing chart

8. OPTICAL CHARACTERISTIC

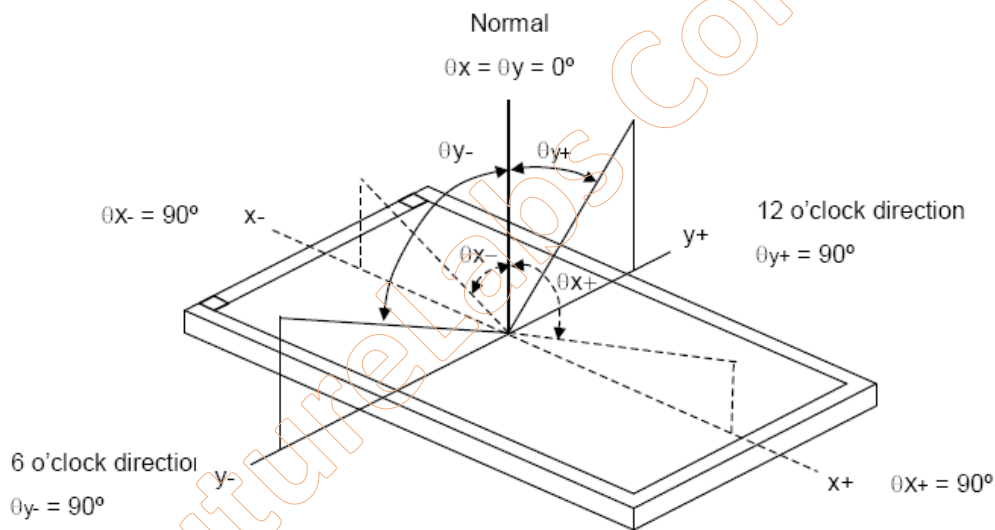
8.1 Optical Characteristics

| Item | | Symbol | Condition | Specification | | | Unit | Note |
|--|------------|-------------|---|---------------|------|----------|-------------------|--------|
| | | | | Min. | Typ. | Max. | | |
| Viewing Angle | Horizontal | $\theta X+$ | Center CR \geq 10 | - | 85 | - | Deg. | Note 2 |
| | | $\theta X-$ | | - | 85 | - | | |
| | Vertical | $\phi Y+$ | | - | 85 | - | | |
| | | $\phi Y-$ | | - | 85 | - | | |
| NTSC Ratio(Gamut) | | | | - | 50 | - | % | |
| Contrast ratio | | CR | Normally viewing angle $\theta X = \phi Y = 0^\circ$ | | 800 | - | | Note 3 |
| Luminance on TFT ($I_f=20mA/LED$) | | Lv | | - | 400 | - | cd/m ² | |
| Response time | | TR+TF | | - | 30 | 40 | ms | Note 4 |
| Color Chromaticity | Red | XR | +/-0.05% | +/-0.05% | TBD | +/-0.05% | - | |
| | | YR | | | TBD | | | |
| | Green | XG | | | TBD | | | |
| | | YG | | | TBD | | | |
| | Blue | XB | | | TBD | | | |
| | | YB | | | TBD | | | |
| | White | XW | | | TBD | | | |
| | | YW | | | TBD | | | |

Note 1: The method of optical measurement:



Note 2: Definition of Viewing Angles:



Note 3: Definition of Contrast ratio

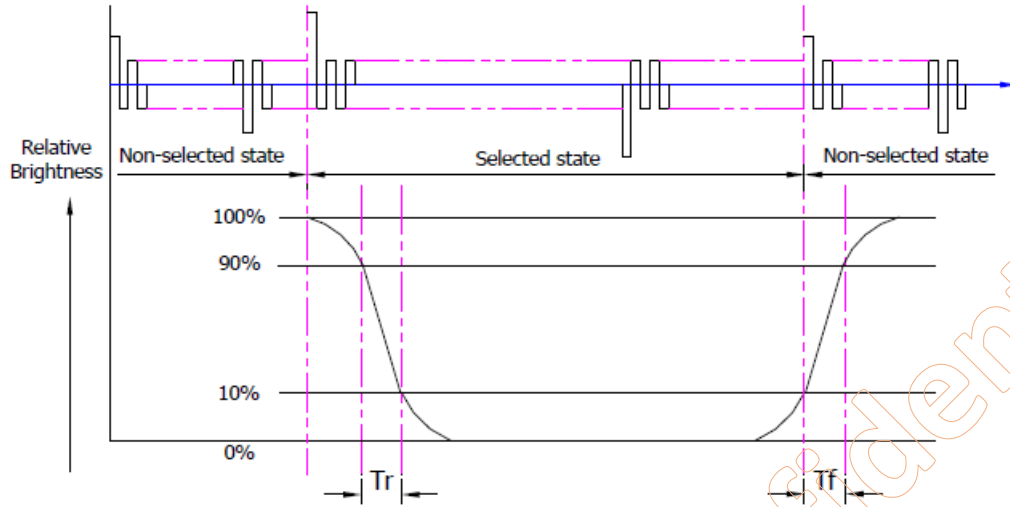
Contrast is measured perpendicular to display surface in reflective and transmissive mode.

The measurement condition is:

| | |
|--------------------------|--------------------------|
| Measuring Equipment | Eldim or Equivalent |
| Measuring Point Diameter | 3mm//1mm |
| Measuring Point Location | Active Area centre point |
| Test pattern | A: All Pixels white |
| | B: All Pixel black |
| Contrast setting | Maximum |

Definitions: CR (Contrast) = Luminance of White Pixel / Luminance of Black Pixel

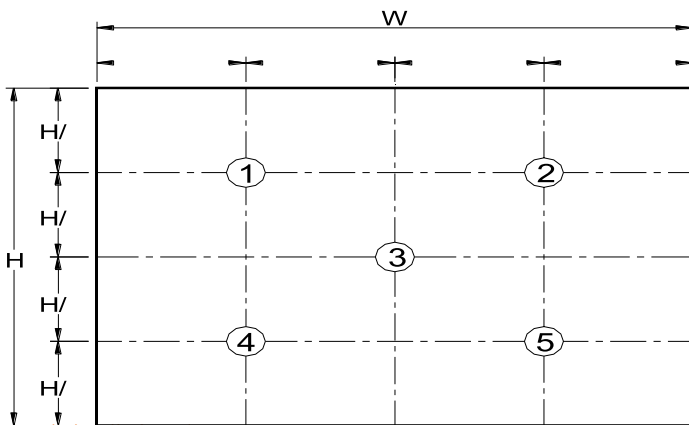
Note 4: Definition of Response Time:



Note 5: Definition of White Variation (δW):

Measure the luminance of gray level 255 at 5 points

$$\delta W = \frac{\text{Minimum} [L(1), L(2), L(3), L(4), L(5)]}{\text{Maximum} [L(1), L(2), L(3), L(4), L(5)]} * 100\%$$



B. Touch Screen specificatio

B-1. Environmental Specification

| Specification | Value |
|-----------------------|--------------|
| Operating Temperature | -20°C ~ 70°C |
| Storage Temperature | -30°C ~ 80°C |
| Operating Humidity | 20% ~ 90%RH |
| Storage Humidity | 10% ~ 90%RH |

B-2. Mechanical Specification

| Specification | Value |
|-------------------------------|-----------------------------------|
| Operating Life (Finger input) | 10 ⁷ times |
| Light Transmittance | >85% Min. (JIS K-7105) with glass |
| Surface hardness | 6H |
| FPC Peeling Force | 5N Max |

B-3. USB-I2C Combo Type Controller

| Parameters | Features |
|---------------------------------|---|
| Circuit Board Dimension | Refer to drawings |
| Channels of Panel | Based on Sensor Design |
| Input Voltage | 5V for USB- 5V/3.3V (Min 3,2V) for I2C |
| Linearity(Note 1) | Single Line drawing accuracy : Up to 1pt +/- 1mm offset /10mm |
| | Single Touch (point) accuracy : Up to 1pt +/- 1mm |
| Interface | USB: 2.0(Below) Full Speed |
| | I2C: 100K/400K Hz |
| Resolution | 16384×16384 resolution |
| | Active Mode: <50mA |
| | Idle Mode : <45mA |
| | Sleep Mode :<15mA |
| | (Operation Mode :Active Mode only) |
| Report rate(points/sec) Note(2) | > 100 Hz |
| Response time | Average < 25 ms |

Note (1): Depending by Sensor design and other parameters, Refer to Windows 8 Logo regulation if need to follow min spec

Note (2): Report rate will vary by channel number, cover thickness, number of fingers and other parameter

9. OUTLINE DRAWING

