**DATA IMAGE**

# DATA IMAGE    CORPORATION

## TFT Module Specification
### PRELIMINARY
### ITEM NO.:  FG1004C0DSSWBGT1

### Table of Contents

| Customer Companies | R&D Dept. | Q.C. Dept. | Eng. Dept. | Prod. Dept. |
|---|---|---|---|---|
|  | ALEX | JOE | GARY | KEN |
| Approved by | Version: | Issued Date: | Sheet Code: | Total Pages: |
|  | 2 | 23/MAY/13' |  | 18 |

## 2. RECORD OF REVISION

| Rev | Date | Item | Page | Comment |
|-----|------|------|------|---------|
| 1 | 19/OCT/12' | | | Initial PRELIMINARY |
| 2 | 23/MAY/13' | 10 14 | 12 17 | 1. Modify TOUCH PANEL CHARACTERISTICS. <br> 2. Modify OUTLINE DRAWING from Rev.1 to 2. |
| | | | | |

## 3. GENERAL SPECIFICATIONS

| Parameter | Specifications | Unit |
|---|---|---|
| Screen Size | 10.4 (diagonal) | inch |
| Display Format | 800(H) x (R,G,B) x 600(V) | dot |
| Active Area | 211.2(H) x 158.4 (V) | mm |
| Pixel Pitch | 0.264 (H) x 0.264 (V) | mm |
| Pixel Configuration | R.G.B. Vertical Stripe | |
| Outline Dimension | 236(W) x 176.9(H) x7.4(D) | mm |
| Surface treatment | Anti-Glare(3H) | |
| Back-light | LED | |
| Display mode | Normally white | |
| Interface | LVDS 6 bits | |
| Weight | TBD | g |
| Viewing direction | 6 o'clock (Gray scale inversion direction) | |
| Our components and processes are compliant to RoHS standard | | |

## 4. ABSOLUTE MAXIMUM RATINGS

GND= 0V

| Parameter | Symbol | MIN. | MAX. | Unit | Remark |
|---|---|---|---|---|---|
| Power supply voltage | $V_{DD}$ | -0.3 | +5.0 | V | |
| Logic input voltage | $V_{IN}$ | -0.3 | +5.0 | V | Note1 |
| Operating temperature | $T_{OPR}$ | -20 | 70 | °C | |
| Storage temperature | $T_{STG}$ | -30 | 80 | °C | |

Note1: $V_{IN}$ represent IN0±,IN1±,IN2±,CLK±

## 5. ELECTRICAL CHARACTERISTICS

### 5.1 Driving TFT LCD

GND=0V, Ta=25°C

| Parameter | Symbol | MIN. | Typ. | MAX. | Unit | Remark |
|---|---|---|---|---|---|---|
| LVDS Differential input high threshold | $V_{TH}$ | - | - | +100 | mV | $V_{CMLVDS}$=1.2V |
| LVDS Differential input low threshold | $V_{TL}$ | -100 | - | - | mV | $V_{CMLVDS}$=1.2V |
| Differential input voltage | $|V_{ID}|$ | 0.1 | - | 0.6 | V | |
| LVDS input common mode voltage | $V_{CMLVDS}$ | $|V_{ID}|/2$ | - | $1.4-(|V_{ID}|/2)$ | V | |
| Input current | $I_{IN}$ | -10 | - | 10 | µA | |
| Supply Voltage | VDD | 3.0 | 3.3 | 3.6 | V | |
| Common Electrode Driving Signal | VCOM | - | 4.36 | - | V | Note1 |
| Sync Frequency | FVD | - | 60 | 70 | Hz | |
| VDD Power Consumption | $I_{DD}$ | - | 260 | 380 | mA | Note2 |
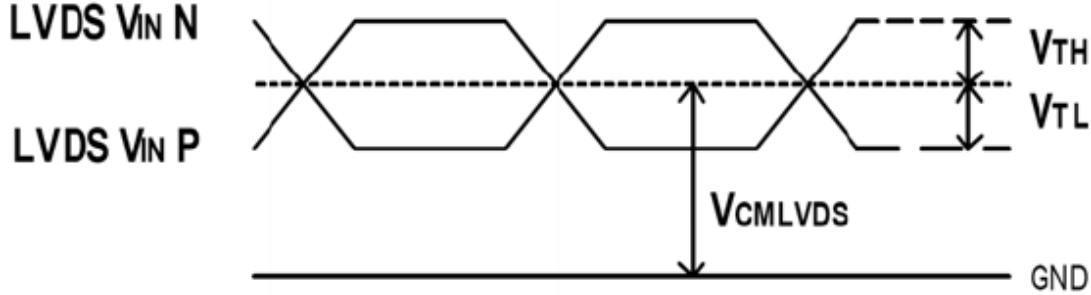
**Figure 5.1.1 LVDS DC timing diagram**

Note1: The value may be different for different LCM.

Note2: To test the current dissipation, using the "color bar" testing pattern shown as below:

1. White
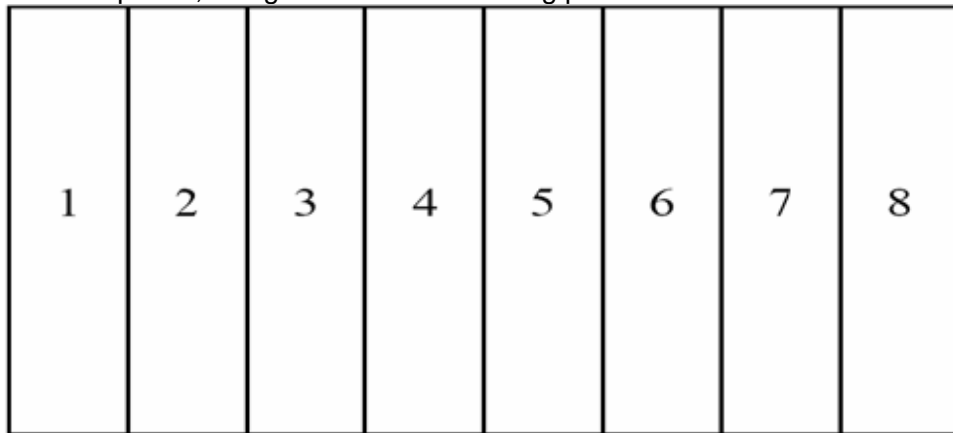2. Yellow
3. Cyan
4. Green
5. Magenta
6. Red
7. Blue
8. Black



**Figure 5.1.2 Current dissipation testing pattern**

### 5.2 Driving Backlight

Ta=25°C

| Parameter | Symbol | MIN. | Typ. | MAX. | Unit | Remark |
|---|---|---|---|---|---|---|
| Forward Current | $I_F$ | - | 120.0 | - | mA | |
| Forward Current Voltage | $V_F$ | - | 19.2 | - | V | Note 1 |
| Backlight Power Consumption | WBL | - | 2304 | | mW | |

Note 1: The figure below shows the connection of backlight LED.
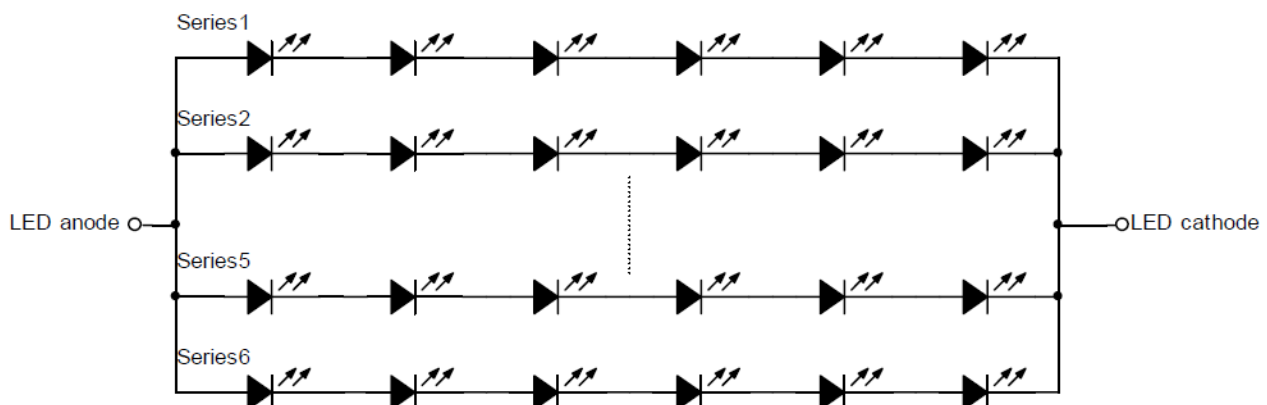


Note2:One LED: IF =120mA.

Note3:The Life of LED:20,000hrs.

# 6. INTERFACE SPECIFICATIONS

## 6.1 Timing Chart

| Item | Symbol | MIN. | TYP. | MAX. | Unit | Condition |
|------|--------|------|------|------|------|-----------|
| Clock period | tLVCP | 20 | 25 | 31.25 | ns | |
| Clock high time | tLVCH | - | 14.29 | - | ns | |
| Clock low time | tLVCL | - | 10.71 | - | ns | |
| PLL wake-up time | tLVPLL | - | - | 1 | ms | |
| Input skew marign | tLVSKM | 400 | - | - | ps | f=85MHz |

**Table 6.1 timing parameter**
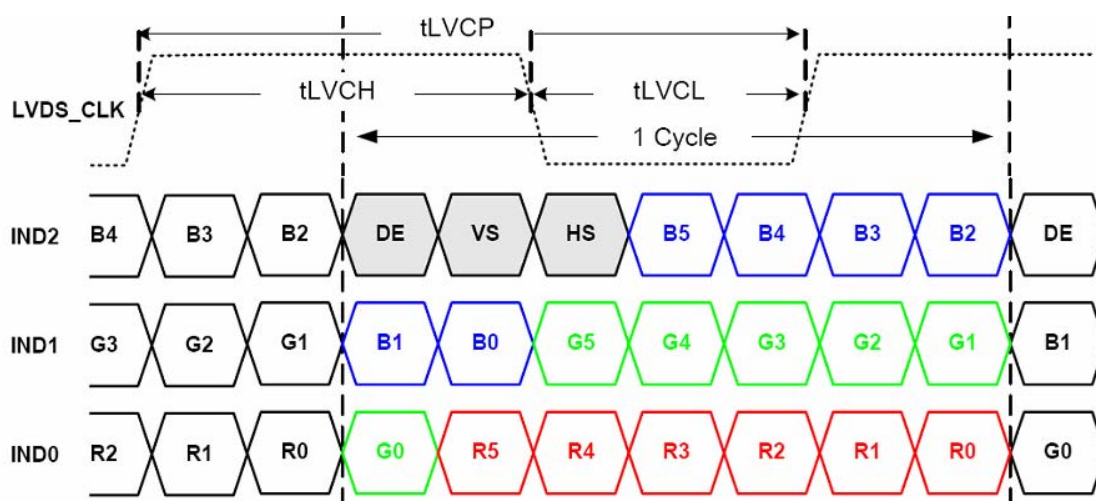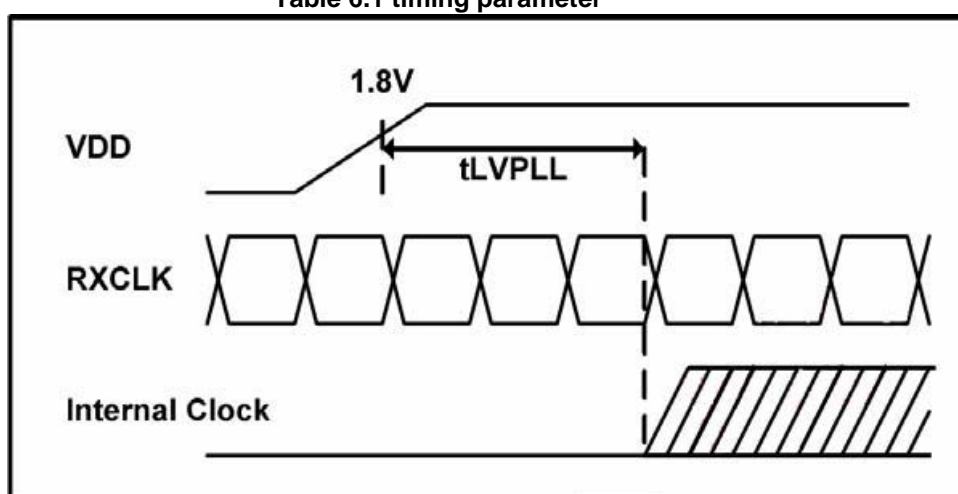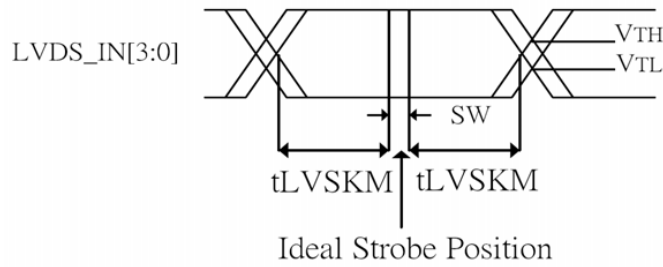
SW: Setup and Hold time
**Figure 6.1 Input signal data timing**

## 6.2 Power On/Off Sequence

| Item | Symbol | MIN. | TYP. | MAX. | Unit |
|---|---|---|---|---|---|
| VDD 3.0V to signal starting | Tp1 | 0 | - | 50 | ms |
| Signal starting to backlight on | Tp2 | 150 | - | - | ms |
| Signal off to VDD 3.0V | Tp3 | 0 | - | 50 | ms |
| Backlight off to signal off | Tp4 | 150 | - | - | ms |
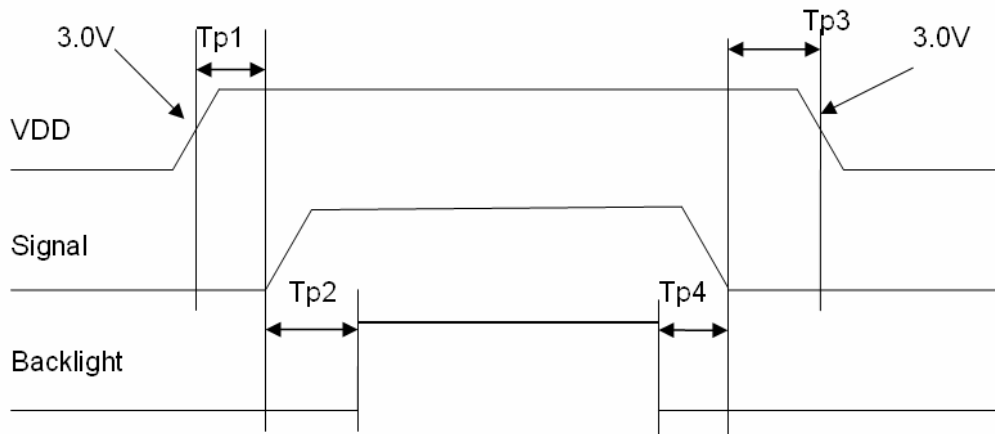


**Figure 6.2 Interface power on/off sequence**

# 7. OPTICAL CHARACTERISTIC

## 7.1. Specification:

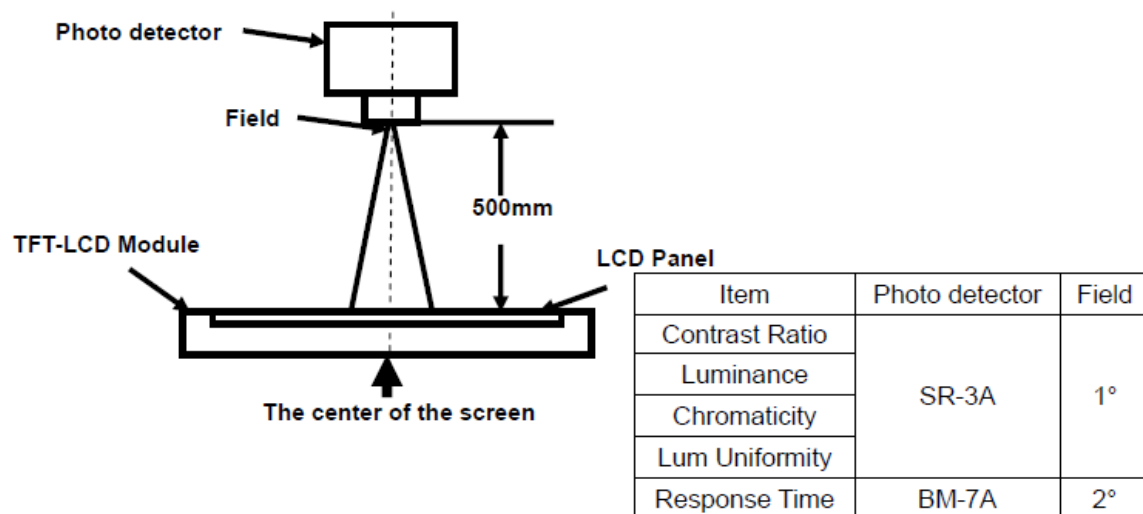| Parameter | | Symbol | Condition | MIN. | TYP. | MAX. | Unit | Remarks |
|---|---|---|---|---|---|---|---|---|
| Viewing Angle | Horizontal | $\theta T$ | Center CR≥10 | 35 | 45 | -- | deg | Note 2 |
| | | $\theta B$- | | 55 | 65 | -- | | |
| | Vertical | $\theta L$ | | 55 | 65 | -- | | |
| | | $\theta R$ | | 55 | 65 | -- | | |
| Contrast Ratio | | CR | Center | 300 | 400 | -- | | Note 1,3 |
| Response time | Rise | Ton | Center | - | 10 | 15 | ms | Note 1,4 |
| | Fall | Toff | $\theta x=\theta y =0°$ | - | 15 | 25 | ms | |
| Brightness Uniformity | | B-uni | $\theta x=\theta y =0°$ | 70 | 75 | -- | % | Note1,6 |
| Central Luminance | | L | | 250 | 320 | -- | cd/㎡ | Note 1,7 |
| Chromaticity | | $x_W$ | Center $\theta x=\theta y =0°$ | 0.259 | 0.309 | 0.309 | -- | Note 1,5 |
| | | $y_W$ | | 0.284 | 0.334 | 0.384 | | |
| | | $x_R$ | | 0.550 | 0.600 | 0.650 | | |
| | | $y_R$ | | 0.296 | 0.346 | 0.396 | | |
| | | $x_G$ | | 0.283 | 0.333 | 0.383 | | |
| | | $y_G$ | | 0.516 | 0.566 | 0.616 | | |
| | | $x_B$ | | 0.092 | 0.142 | 0.192 | | |
| | | $y_B$ | | 0.065 | 0.115 | 0.165 | | |

Test Conditions:

1. The ambient temperature is 25±2℃. Humidity is 65±7%

2. The test systems refer to Note 1 and Note 2.

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.



| Item | Photo detector | Field |
|---|---|---|
| Contrast Ratio | SR-3A | 1° |
| Luminance | | |
| Chromaticity | | |
| Lum Uniformity | | |
| Response Time | BM-7A | 2° |

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)。
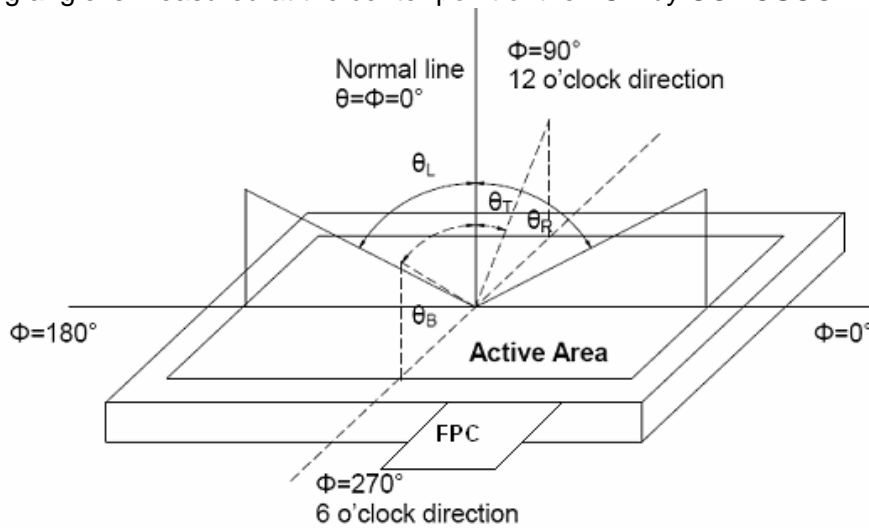
**Fig. 1 Definition of viewing angle**

Note 3: Definition of contrast ratio

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

"White state ":The state is that the LCD should driven by "white".
"Black state": The state is that the LCD should driven by "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%.
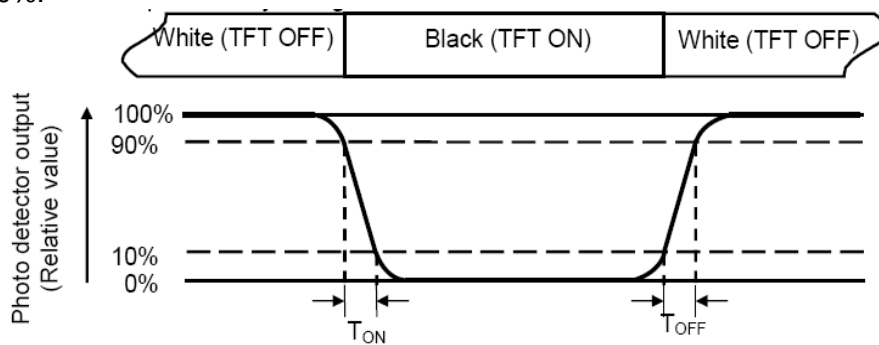
Note 5: Definition of color chromaticity (CIE1931)
Color coordinates measured at center point of LCD.

Note 6: Definition of Luminance Uniformity
Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.
Luminance Uniformity(U) = Lmin/ Lmax
L-------Active area length W----- Active area width
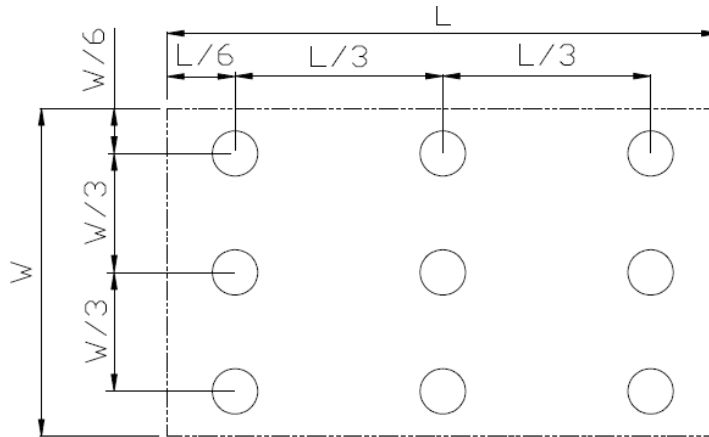


**Fig. 2 Definition of uniformity**

Lmax: The measured maximum luminance of all measurement position.
Lmin: The measured minimum luminance of all measurement position.

Note 7: Definition of Luminance :
Measure the luminance of white state at center point.

## 8. PIN CONNECTIONS

### 8.1 TFT LCD Panel Driving Section

| Pin | Name | I/O | Description | Remark |
|-----|------|-----|-------------|--------|
| 1 | VDD | P | Power Supply | |
| 2 | VDD | P | Power Supply | |
| 3 | GND | P | Ground | |
| 4 | GND | P | Ground | |
| 5 | IN0- | I | LVDS receiver negative signal channel 0 | |
| 6 | IN0+ | I | LVDS receiver negative signal channel 0 | |
| 7 | GND | P | Ground | |
| 8 | IN 1- | I | LVDS receiver negative signal channel 1 | |
| 9 | IN 1+ | I | LVDS receiver negative signal channel 1 | |
| 10 | GND | P | Ground | |
| 11 | IN 2- | I | LVDS receiver negative signal channel 2 | |
| 12 | IN 2+ | I | LVDS receiver negative signal channel 2 | |
| 13 | GND | P | Ground | |
| 14 | CLK- | I | LVDS receiver negative signal clock | |
| 15 | CLK + | I | LVDS receiver positive signal clock | |
| 16 | GND | P | Ground | |
| 17 | NC | - | No connection | |
| 18 | NC | - | No connection | |
| 19 | GND | P | Ground | |
| 20 | GND | P | Ground | |

Note: I/O definition:

I--Input   O--Output   P--Power/Ground

### 8.2 CN2(Backlight Connector)

| Pin | Symbol | I/O | Description | Wire Color |
|-----|--------|-----|-------------|------------|
| 1 | LEDA | P | LED driving anode (high voltage) | Red |
| 2 | LEDK | P | LED driving cathode (low voltage) | White |

## 9. BLOCK DIAGRAM
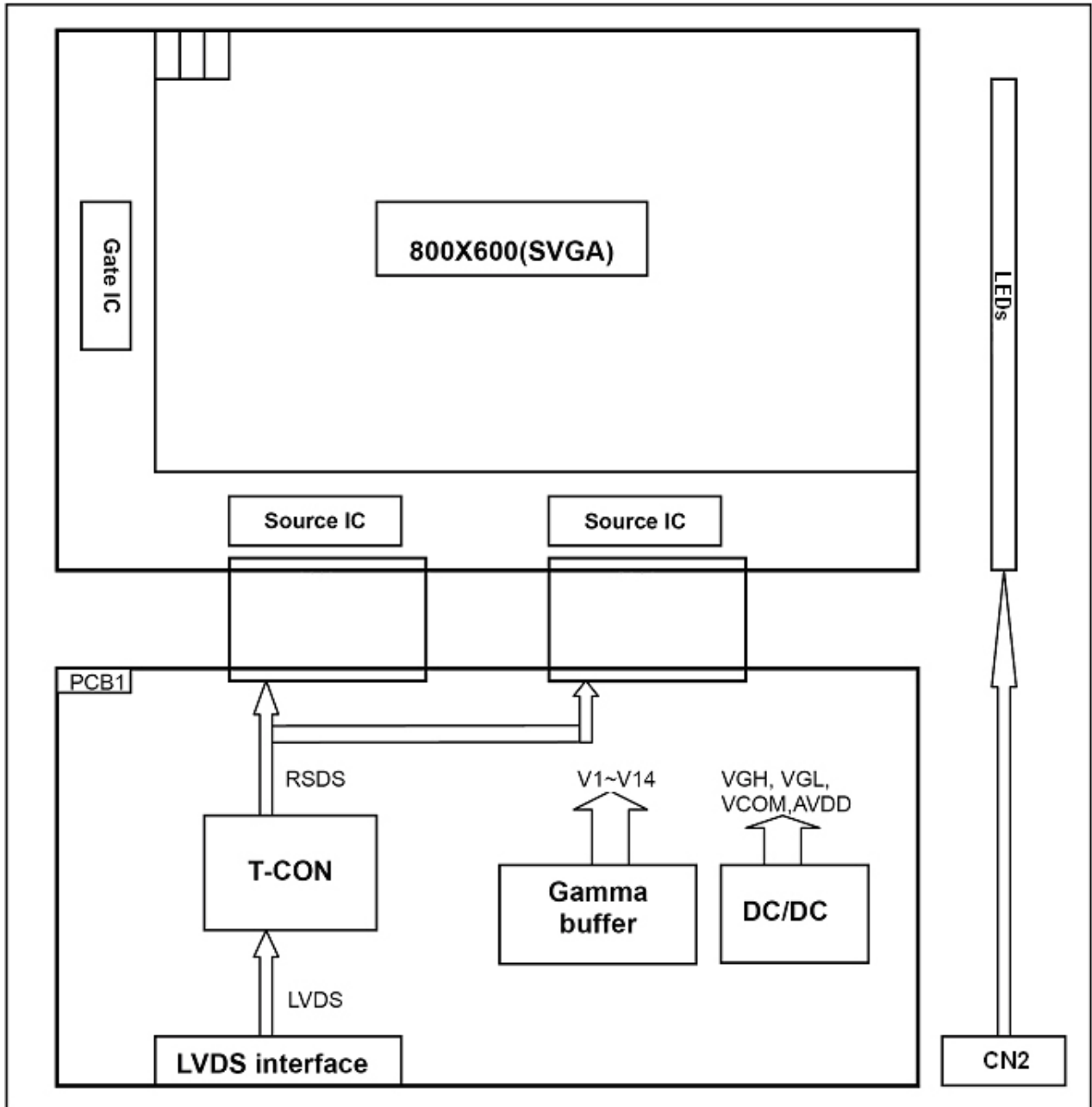
# 10. TOUCH PANEL CHARACTERISTICS

## 1. Input Method and Activation Force

| Input Method | Operation Force |
|---|---|
| 1.6mm dia. Delrin stylus | 45g~110g |
| 16mm dia Silicon "finger" | 45g~110g |

## 2. Typical Optical Characteristics

| ITEM | Parameter |
|---|---|
| Visible Light Transmission | 80% TYP. |
| Haze | 10±4% TYP. |

## 3. Electrical Specification

| ITEM | | Parameter |
|---|---|---|
| Operating Voltage | | DC 5V max. |
| Circuit close resistance | X | 200~900$\Omega$ |
| | Y | 200~900$\Omega$ |
| Circuit open resistance | | ≥20M$\Omega$ at 25V DC |
| Contact bounce | | ≤10ms |
| Linear Test | | ≤1.5% |

## 4. Linearity

| ITEM | | Parameter |
|---|---|---|
| Linear Test Specification Direction | X | ≤1.5% |
| | Y | ≤1.5% |

## 5. Specification

| ITEM | Parameter |
|---|---|
| Operating Temperature | -20°C~+70°C |
| Storage Temperature | -30°C~+80°C |

6. Durability test:

6.1 Touch panel is hit 1 millions times with a silicone rubber of R8 finger, hitting rate is by 1100g at 2 times per second. The measurement must satisfy the following:
- Circuit close resistance: x 200~900$\Omega$ ; y 200~900$\Omega$
- Circuit open resistance: ≥20M$\Omega$ at 25V DC
- Contact bounce: ≤10ms
- Linearity test: ≤1.5%
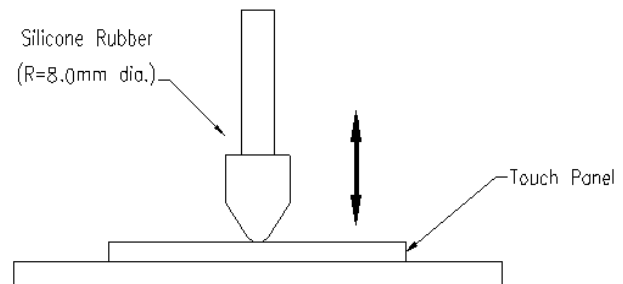
6.2 Stylus writing
Touch panel is drawn by R0.8 Darling stylus pen, at 110g forces, repeat one inch by 100k times. The measurement must satisfy the following:
- Circuit close resistance: x 200~900$\Omega$ ; y 200~900$\Omega$
- Circuit open resistance: ≥20M$\Omega$ at 25V DC
- Contact bounce: ≤10ms
- Linearity test: ≤1.5%
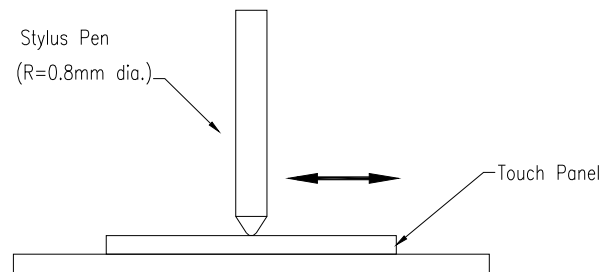
## 11. QUALITY ASSURANCE
### 11.1 Reliability Test

| Item | Test Conditions | Remark |
|---|---|---|
| High Temperature Operation | Ta = 70℃          240hrs | Note 1<br>IEC60068-2-2,GB2423.2—89 |
| Low Temperature Operation | Ta =-20℃          240hrs | IEC60068-2-1<br>GB2423.1—89 |
| High Temperature Storage (non-operation) | Ta = 80℃          240hrs | IEC60068-2-2,<br>GB2423.2—89 |
| Low Temperature Storage (non-operation) | Ta = -30℃          240hrs | IEC60068-2-1<br>GB2423.1—89 |
| High Temperature and High Humidity Operation | Ta = +80℃, 90% RH max, 240hours | Note2<br>IEC60068-2-3,<br>GB/T2423.3—2006 |
| Thermal Shock (non-operation) | -40℃ 30 min~+80℃ 30 min, Change time:60min, 10 Cycles | Start with cold temperature, end with high temperature<br>IEC60068-2-14,GB2423.22—87 |
| Electro Static Discharge (operation) | C=150pF,R=330Ω, Air:±15Kv, Contact:±8Kv, 10times/terminal | IEC61000-4-2<br>GB/T17626.2—1998 |
| Vibration (non-operation) | Frequency range:10~55Hz, Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2hours for each direction of X.Y.Z (6 hours for total) | IEC60068-2-6<br>GB/T2423.10—1995 |
| Shock (non-operation) | 80G 6ms, ±X,±Y,±Z 3 times for each direction | IEC60068-2-27<br>GB/T2423.5—1995 |
| Package Drop Test | Height:80 cm,1 corner, 3 edges, 6 surfaces | IEC60068-2-32<br>GB/2423.8—1995 |
| Package Vibration Test | Random Vibration: 0.015GxG/Hz for 5-200Hz, -6dB/Octave from 200-500Hz 2 hours for each direction of X,Y,Z (6 hours for total) | IEC60068-2-34 |

Note1: Ts is the temperature of panel's surface.
Note2: Ta is the ambient temperature of sample.

**12. LCM Product Label Define**

**Product Label style:**

35mm

Bar Code ←

A A 6 0 0 1 4 2 1 0 2 6 - 0 0 1 3

10mm

Product Name ←

F G 1 0 0 4 C 0 D S S W B G T 1
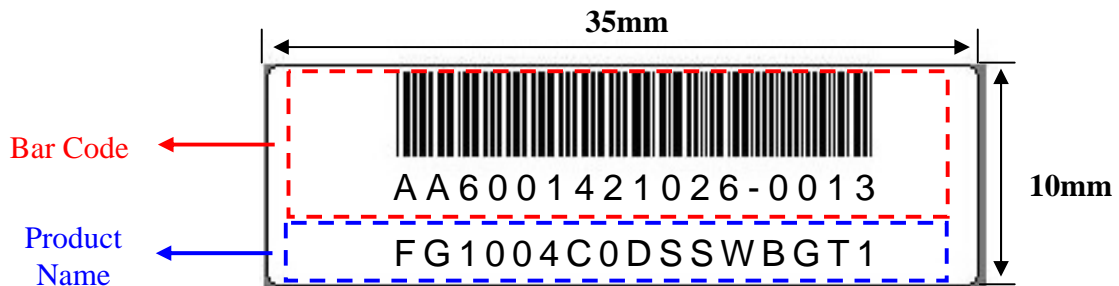
**BarCode Define:**

# A A 6 0014 2 10 26-0013

Serial number of the products
Serial number starts from 0000
Every work order is 10K at most

→ Week of production

→ Year of production

→ Storage area

→ Serial number of work order
Serial number starts from 0000 each month

→ Month of work order

→ Year of work order

→ The first 3 numbers of work order

**Product Name Define:**

FG　1004C0　D　S　S　W　B　G　T1

- **VERSION : T1**
- RoHS
- **View direction & Temp. Range**
  - A – Bottom view 6H & Normal temp.
  - **B – Bottom view 6H & Wide temp.**
  - C – Top View & Normal temp
  - D – Top View & Wide temp.
- **Backlight Color**
  - **W –White**　Y – Yellow Green
  - G - green
- **Backlight**
  - C – CCFL B/L
  - S – LED B/L
- **LCD Polarize type**
  - N – Negative　**S – Super wide view**
  - M – transmissive　F – transflective
- **LCD type**
  - A – TFT analog
  - **D – TFT digital**
- **Series code**
  - 1004C0–, 10.4 inch
- **Model type**
  - **FG – Standard TFT Module**
  - FX – Custom TFT Module

## 13. PRECAUTIONS IN USE LCM

1. ASSEMBLY PRECAUTIONS
   (1) You must mount a module using holes arranged in four corners or four sides.
   (2) You should consider the mounting structure so that uneven force (ex. Twisted stress) is not applied to the module. And the case on which a module is mounted should have sufficient strength so that external force is not transmitted directly to the module.
   (3) Do not touch, push or rub the exposed polarizers with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment.
   (4) Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading.
   (5) Do not open the case because inside circuits do not have sufficient strength.
   (6) Please do not take a LCD module to pieces and reconstruct it. Resolving and reconstructing modules may cause them not to work well.
   (7) Please do not touch metal frames with bare hands and soiled gloves. A color change of the metal frames can happen during a long preservation of soiled LCD modules.
   (8) Please pay attention to handling lead wire of backlight so that it is not tugged in connecting with inverter.

2. OPERATING PRECAUTIONS
   (1) Please be sure to turn off the power supply before connecting and disconnecting signal input cable.
   (2) Please do not change variable resistance settings in LCD module. They are adjusted to the most suitable value. If they are changed, it might happen LCD does not satisfy the characteristics specification
   (3) Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.
   (4) When fixed patterns are displayed for a long time, remnant image is likely to occur.
   (5) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimize the interference.
   (6) Please consider that LCD backlight takes longer time to become stable of radiation characteristics in low temperature than in room temperature.

3. ELECTROSTATIC DISCHARGE CONTROL
   (1) The operator should be grounded whenever he/she comes into contact with the module. Never touch any of the conductive parts such the copper leads on the PCB and the interface terminals with any

parts of the human body.
   (2) The modules should be kept in antistatic bags or other containers resistant to static for storage.
   (3) Only properly grounded soldering irons should be used.
   (4) If an electric screwdriver is used, it should be well grounded and shielded from commutator sparks.
   (5) The normal static prevention measures should be observed for work clothes and working benches; for the latter conductive (rubber) mat is recommended
   (6) Since dry air is inductive to statics, a relative humidity of 50-60% is recommended.

4. STORAGE PRECAUTIONS
   (1) When you store LCDs for a long time, it is recommended to keep the temperature between 0°C-40°C without the exposure of sunlight and to keep the humidity less than 90%RH.
   (2) Please do not leave the LCDs in the environment of high humidity and high temperature such as 60°C 90%RH
   (3) Please do not leave the LCDs in the environment of low temperature; below -20°C.

5. OTHERS
   (1) A strong incident light into LCD panel might cause display characteristics' changing inferior because of polarizer film, color filter, and other materials becoming inferior. Please do not expose LCD module direct sunlight Land strong UV rays
   (2) Please pay attention to a panel side of LCD module not to contact with other materials in preserving it alone.
   (3) For the packaging box, please pay attention to the followings:
   a. Please do not pile them up more than 5 boxes. (They are not designed so.) And please do not turn over.
   b. Please handle packaging box with care not to give them sudden shock and vibrations. And also please do not throw them up.
   c. Packing box and inner case for LCDs are made of cardboard. So please pay attention not to get them wet. (Such like keeping them in high humidity or wet place can occur getting them wet.)

6. LIMITED WARRANTY
   Unless otherwise agreed between DATA IMAGE and customer, DATA IMAGE will replace or repair any of its LCD and LCM which is found to be defective electrically and visually when inspected in accordance with DATA IMAGE acceptance standards, for a period on one year from date of shipment. Confirmation of such date shall be based on freight documents. The warranty liability of DATA IMAGE is limited to repair and/or replacement on the terms set forth above. DATA IMAGE will not responsible for any subsequent or consequential events.

# 14. OUTLINE DRAWING



**T/P PIN FUNCTION**

| PIN # | Description |
|---|---|
| # 1 | Right |
| # 2 | Top |
| # 3 | Left |
| # 4 | Bottom |

Detail "A"
Scale 2:1

**CN2 (Backlight) PIN FUNCTION**
1. LEDA
2. LEDK

**CN1 PIN FUNCTION**

| | |
|---|---|
| 1. VDD | 11. IN2- |
| 2. VDD | 12. IN2+ |
| 3. GND | 13. GND |
| 4. GND | 14. CLK- |
| 5. IN0- | 15. CLK+ |
| 6. IN0+ | 16. GND |
| 7. GND | 17. NC |
| 8. IN1- | 18. NC |
| 9. IN1+ | 19. GND |
| 10. GND | 20. GND |

Note:
1. For RoHS.
2. Tolerance: ±0.5 mm.
3. CN1 LVDS connector: Hirose DF19K-20P-1H or compatible.
4. CN2 (backlight) connector : JST BHSR-02VS-1.
   Matching connector : JST SM02B-BHSS-1-TB.
5. Center brightness : 250 cd/m$^2$ (Min).
   320 cd/m$^2$ (Typ).
6. Touch Panel matching connector: MOLEX 0522710479 or equivalent
7. Touch-panel front surface is antiglare 3H
8. Touch Panel flex tail do not bend to less than 3.175mm radius.
9. * is important dimension.

CN1 HIROSE
DF19K-20P-1H

10.4" RESOLUTION:800xRGBx600

| | | DATE: | 05/07/13' | TITLE: | |
|---|---|---|---|---|---|
| | | DRAWN: | | LCM OUTLINE DIMENSION | |
| ⚠ | Change drawing Rev. 1 to REV. 2 <ESR 0204022> | DWG. NO. | | FG1004C0SGT1 | |
| AUTH | DESCRIPTION / DATE / APPROVED | CHECK: | | | |
| | | UNITS M M | | REV. 2 | DATA IMAGE |
| | REVISIONS | SCALE 1 / 1 | | SHEET 1 OF 1 | |

## 15. PACKAGE INFORMATION
### TDB