

# ***TFT-Display Datenblatt***

Modell FG0700K4DSSWBGT1

## **Kurzdaten**

|             |                           |
|-------------|---------------------------|
| Hersteller  | Data Image                |
| Diagonale   | 7" / 17,8cm               |
| Format      | 15:9                      |
| Auflösung   | 800x480                   |
| Backlight   | LED/ 280cd/m <sup>2</sup> |
| Interface   | RGB                       |
| Touchscreen | ja                        |
| Temperatur  | -20...+70°C (Betrieb)     |



# DATA IMAGE CORPORATION

## TFT Module Specification

ITEM NO.: FG0700K4DSSWBGT1

### Table of Contents

|                                      |    |
|--------------------------------------|----|
| 1. COVER & CONTENTS .....            | 1  |
| 2. RECORD OF REVISION .....          | 2  |
| 3. APPLICATION.....                  | 3  |
| 4. GENERAL SPECIFICATIONS .....      | 3  |
| 5. ABSOLUTE MAXIMUM RATINGS .....    | 3  |
| 6. ELECTRICAL CHARACTERISTICS .....  | 4  |
| 7. INTERFACE SPECIFICATIONS .....    | 5  |
| 8. OPTICAL CHARACTERISTIC .....      | 7  |
| 9. PIN CONNECTIONS .....             | 10 |
| 10. BLOCK DIAGRAM .....              | 12 |
| 11. APPLICATION CIRCUIT.....         | 13 |
| 12 TOUCH PANEL CHARACTERISTICS ..... | 15 |
| 13 QUALITY ASSURANCE .....           | 16 |
| 14 LCM PRODUCT LABEL DEFINE .....    | 17 |
| 15 PRECAUTIONS IN USE LCM .....      | 19 |
| 16 OUTLINE DRAWING .....             | 20 |
| 17 PACKAGE INFORMATION.....          | 21 |

|                    |             |              |             |              |
|--------------------|-------------|--------------|-------------|--------------|
| Customer Companies | R&D Dept.   | Q.C. Dept.   | Eng. Dept.  | Prod. Dept.  |
|                    | <i>Jack</i> | <i>Eric</i>  | <i>Paul</i> | <i>Heien</i> |
| Approved by        | Version:    | Issued Date: | Sheet Code: | Total Pages: |
|                    | A           | 22/NOV/10'   |             | 21           |

**2. RECORD OF REVISION**

| Rev | Date       | Item               | Page                | Comment   |
|-----|------------|--------------------|---------------------|---|
| 1   | 4/Feb/10'  |                    |                     | Initial Preliminary   |
| 2   | 1/JUN/10'  | 6<br>9<br>11<br>14 | 4<br>11<br>14<br>17 | Modify: LED dice life time data<br>Add: power ON/OFF sequence<br>Add: DC-DC circuit<br>Modify: LCM PRODUCT LABEL DEFINE |
| A   | 22/NOV/10' | 16                 | 20                  | 1.Revise OUTLINE DRAWING from Rev.1 to A<br>Release Rev.A for production  |
|     |            |                    |                     |   |

### 3. APPLICATION

DVD player, Car TV, UMPC, POS

### 4. GENERAL SPECIFICATIONS

| Parameter            | Specifications                   | Unit |
|----------------------|----------------------------------|------|
| Screen Size          | 7 (diagonal)                     | inch |
| Display Format       | 800(H) x (R,G,B) x 480(V)        | dot  |
| Active Area          | 152.4(H) x 91.44(V)              | mm   |
| Dot Pitch            | 0.0635 (H) x 0.1905 (V)          | mm   |
| Pixel Configuration  | Stripe                           |      |
| Outline Dimension    | 165(W) x 106.4(H) x 4.96 (D)     | mm   |
| Surface treatment    | Anti-glare and hard coating (3H) |      |
| Back-light           | LED                              |      |
| Display mode         | Normally white                   |      |
| Weight               | 180                              | g    |
| View Angle direction | 6 o'clock                        |      |

### 5. ABSOLUTE MAXIMUM RATINGS

GND=0V

| Parameter             | Symbol        | MIN.                      | MAX.                 | Unit | Remark          |
|-----------------------|---------------|---------------------------|----------------------|------|-----------------|
| Power supply voltage  | VCC           | -0.3                      | 6                    | V    | Ta=25°C         |
|                       | AVDD          | 6.5                       | 13.5                 | V    |                 |
|                       | VGH           | 7                         | VGL+40               | V    |                 |
|                       | VGL           | -20                       | 5                    | V    |                 |
|                       | VGH-VGL       | 12                        | 40                   | V    |                 |
| Input Signal voltage  | VI            | -0.3                      | V <sub>CC</sub> +0.3 | V    | Note 1          |
|                       | V1-V5         | 0.4AVDD                   | AVDD-0.1             | V    |                 |
|                       | V6-V10        | 0.1                       | 0.6AVDD              | V    |                 |
|                       | VCOM          | --                        | --                   | V    |                 |
| Operating temperature | Top           | -20                       | 70                   | °C   | Module surface* |
| Storage temperature   | Tst           | -30                       | 80                   | °C   | -               |
| Humidity              | Operation     | 20%~90% relative humidity |                      |      | Ta<=38°C        |
|                       | Non Operation | 5%~90% relative humidity  |                      |      | Ta<=38°C        |

Note 1: DCLK, DE, R0~ R5, G0~ G5, B0~ B5.

## 6. ELECTRICAL CHARACTERISTICS

### 6.1 Operating Conditions

GND=0V, fH=31.49KHz, fV=60Hz, fCLK=33.26MHz, Ta=25°C

| Parameter                       | Symbol          | MIN.               | Typ. | MAX.               | Unit | Remark                |
|---------------------------------|-----------------|--------------------|------|--------------------|------|-----------------------|
| Power Supply voltage            | V <sub>CC</sub> | 3.0                | 3.3  | 3.6                | V    |                       |
|                                 | AVDD            | 11.5               | 12   | 12.5               | V    |                       |
|                                 | VGH             | 17                 | 18   | 19                 | V    |                       |
|                                 | VGL             | -8                 | -7   | -6                 | V    |                       |
| Input Signal voltage            | V1-V5           | 0.4AVDD            | --   | AVDD-0.1           | V    |                       |
|                                 | V6-V10          | 0.1                | --   | 0.6AVDD            | V    |                       |
|                                 | VCOM            | --                 | 4.3  | --                 | V    |                       |
| Power Supply Current            | I <sub>CC</sub> | --                 | 150  | 200                | mA   | V <sub>CC</sub> =3.3V |
| "H" level logical input voltage | V <sub>IH</sub> | 0.7V <sub>CC</sub> | --   | V <sub>CC</sub>    | V    |                       |
| "L" level logical input voltage | V <sub>IL</sub> | 0                  | --   | 0.3V <sub>CC</sub> | V    |                       |

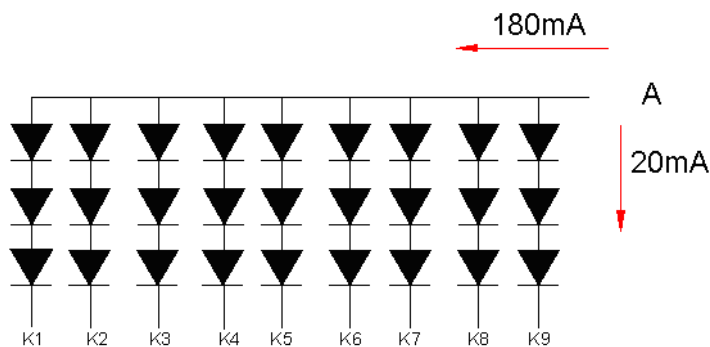
### 6.2 Gamma Voltage

| Parameter | Value | Unit | Parameter | Value | Unit |
|-----------|-------|------|-----------|-------|------|
| V1        | 11.07 | V    | V6        | 4.943 | V    |
| V2        | 8.71  | V    | V7        | 3.677 | V    |
| V3        | 8.292 | V    | V8        | 3.174 | V    |
| V4        | 7.945 | V    | V9        | 2.508 | V    |
| V5        | 6.873 | V    | V10       | 0.5   | V    |

### 6.3 Backlight Driving Consumption

Ta= 25 °C

| Parameter          | Symbol         | Min.  | Typ. | Max. | Unit | Remark  |
|--------------------|----------------|-------|------|------|------|---------|
| LED voltage        | V <sub>L</sub> | 8.4   | 9.9  | 10.8 | V    | Note1   |
| LED current        | I <sub>L</sub> | -     | 180  | -    | mA   |         |
| LED dice life time |                | 25000 | --   | --   | hr   | Note2,3 |

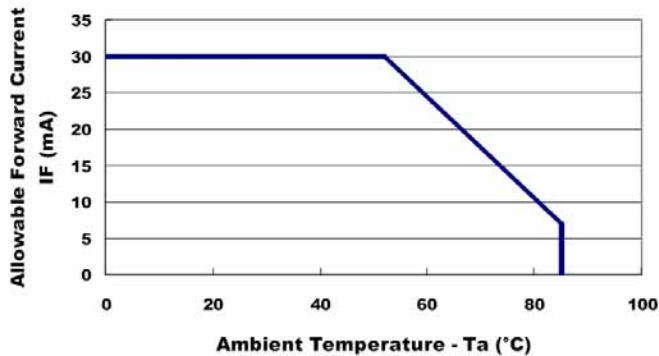


Note1: There are 9 Groups (1 Group of three LEDs).

VLED 1,2,3,4,5,6,7,8,9,=8.4V(min)

Note2: The "LED dice life time" is defined as the brightness decrease to 50% original brightness that the ambient temperature is 18 ~28 and LED dice current=20mA.

Note3: The LED Dice's Ambient Temp. vs. Allowable Forward Current Curve.



## 7. INPUT SIGNAL CHARACTERISTICS

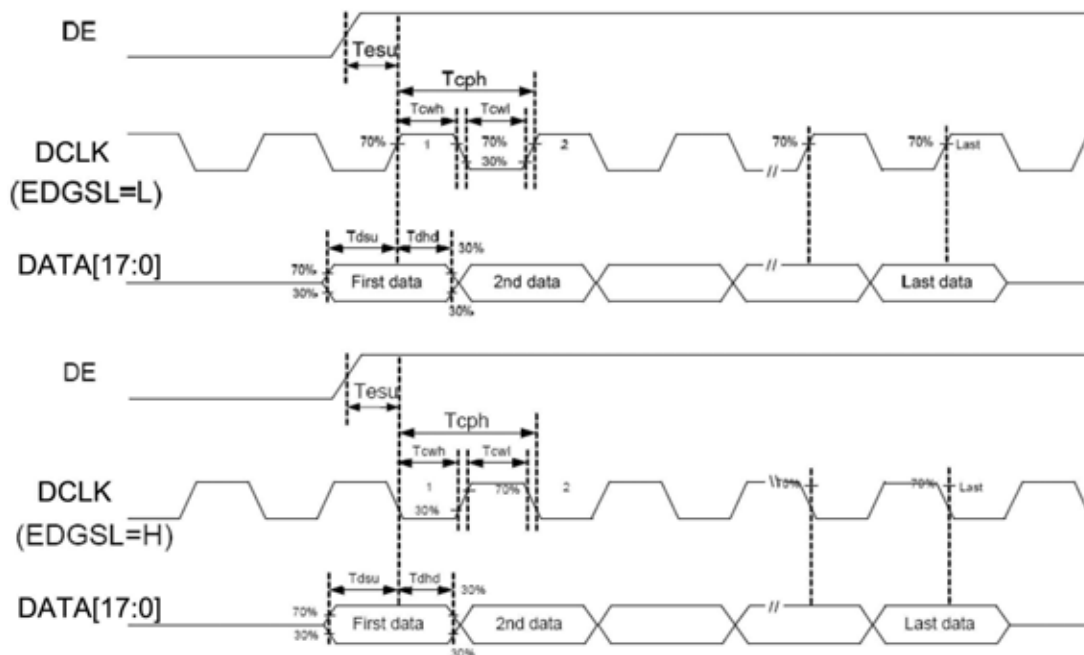
### 7.1 AC Characteristics

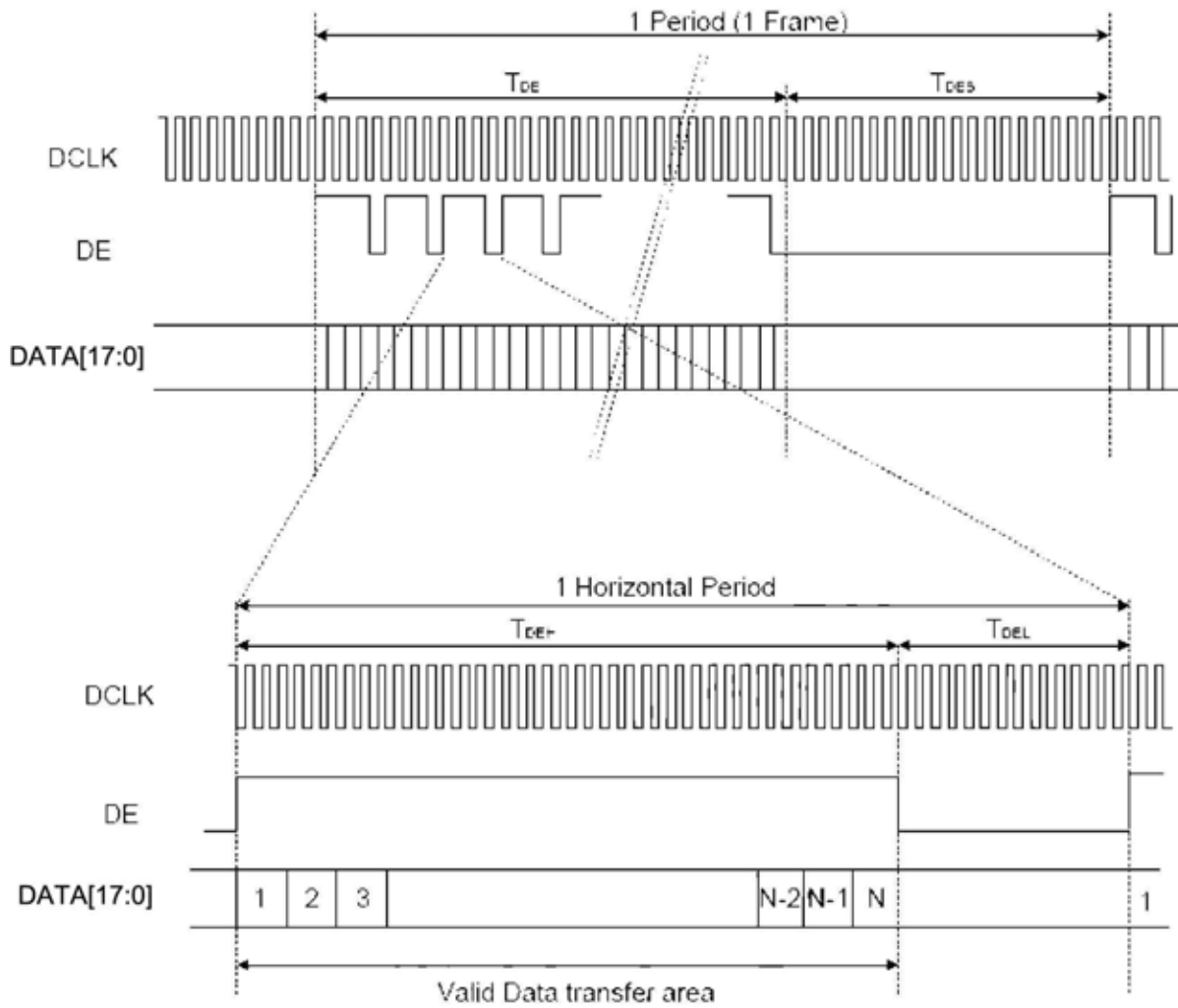
#### 7.1.1 AC Electrical Characteristics

| ITEM              | SYMBOL            | MIN. | TYP.  | MAX. | UNIT              |
|-------------------|-------------------|------|-------|------|-------------------|
| Data setup time   | $T_{dsu}$         | 6    | -     | -    | ns                |
| Data hold time    | $T_{dhd}$         | 6    | -     | -    | ns                |
| DE setup time     | $T_{esu}$         | 6    | -     | -    | ns                |
| DCLK frequency    | $F_{CPH}$         | -    | 33.26 | -    | MHz               |
| DCLK period       | $T_{CPH}$         | -    | 30.06 | -    | ns                |
| DCLK pulse duty   | $T_{CWH}$         | 40   | 50    | 60   | %                 |
| DE period         | $T_{DEH}+T_{DEL}$ | 1000 | 1056  | 1200 | $T_{CPH}$         |
| DE pulse width    | $T_{DH}$          | -    | 800   | -    | $T_{CPH}$         |
| DE frame blanking | $T_{HS}$          | 10   | 45    | 110  | $T_{DEH}+T_{DEL}$ |
| DE frame width    | $T_{EP}$          | -    | 480   | -    | $T_{DEH}+T_{DEL}$ |

### 7.2 Timing Controller Timing Chart

#### 7.2.1 Clock and Data input waveforms



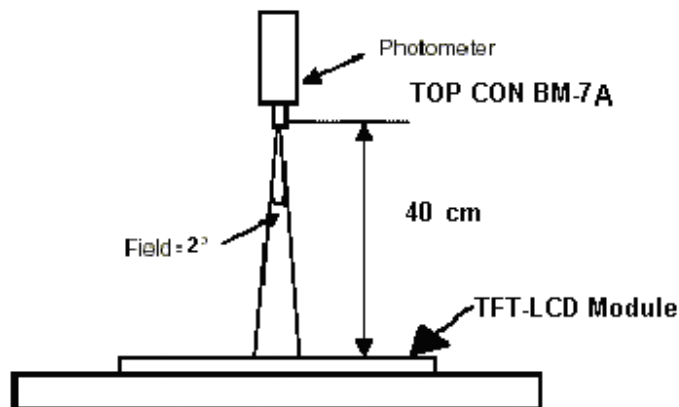
**7.2.2 Data Input format**


**8. OPTICAL CHARACTERISTIC**

| Parameter      |            | Symbol                                | Condition                   | MIN.   | TYP.   | MAX.   | Unit              | Remarks  |
|----------------|------------|---------------------------------------|-----------------------------|--------|--------|--------|-------------------|----------|
| Viewing Angle  | Horizontal | $\theta_{x+}$                         | Center<br>CR $\geq$ 10      | 65     | 70     | --     | deg               | Note 1,4 |
|                |            | $\theta_{x-}$                         |                             | 65     | 70     | --     |                   |          |
|                | Vertical   | $\theta_{y+}$                         |                             | 55     | 60     | --     |                   |          |
|                |            | $\theta_{y-}$                         |                             | 55     | 60     | --     |                   |          |
| Contrast Ratio |            | CR                                    | at optimized viewing angle  | 250    | 400    | --     |                   | Note 1,3 |
| Response time  | Rise       | Tr                                    | Center                      | -      | 5      | 10     | ms                | Note 1,6 |
|                | Fall       | Tf                                    | $\theta_x=\theta_y=0^\circ$ | -      | 11     | 16     | ms                |          |
| Uniformity     |            | B-uni                                 | $\theta_x=\theta_y=0^\circ$ | 70     | 80     | --     | %                 | Note 1,5 |
| Brightness     |            | L                                     | $\theta_x=\theta_y=0^\circ$ | 220    | 280    | --     | cd/m <sup>2</sup> | Note 1,2 |
| Chromaticity   | $x_W$      | Center<br>$\theta_x=\theta_y=0^\circ$ |                             | 0.26   | 0.31   | 0.36   |                   | Note 1,7 |
|                | $y_W$      |                                       |                             | 0.28   | 0.33   | 0.38   |                   |          |
|                | $x_R$      |                                       |                             | 0.5371 | 0.5871 | 0.6371 |                   |          |
|                | $y_R$      |                                       |                             | 0.3060 | 0.3560 | 0.4060 |                   |          |
|                | $x_G$      |                                       |                             | 0.3057 | 0.3557 | 0.4057 |                   |          |
|                | $y_G$      |                                       |                             | 0.5068 | 0.5568 | 0.6068 |                   |          |
|                | $x_B$      |                                       |                             | 0.1037 | 0.1537 | 0.2037 |                   |          |
|                | $y_B$      |                                       |                             | 0.0758 | 0.1258 | 0.1758 |                   |          |
| Image sticking |            | tis                                   | 2 hours                     |        |        | 2      | Sec               | Note 8   |

The following optical specifications shall be measured in a darkroom or equivalent state (ambient luminance  $\leq$ 1 lux, and at room temperature). The operation temperature is  $25^\circ\text{C}\pm 2^\circ\text{C}$  and LED Backlight Current IL=180mA. The measurement method is shown in Note 1.

Note1: The method of optical measurement:



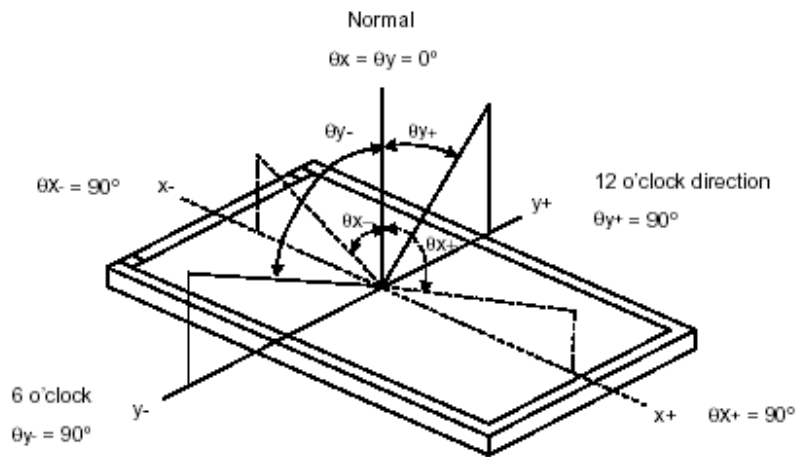


Note2: Measured at the center area of the panel and at the viewing angle of the  $\theta_x = \theta_y = 0^\circ$

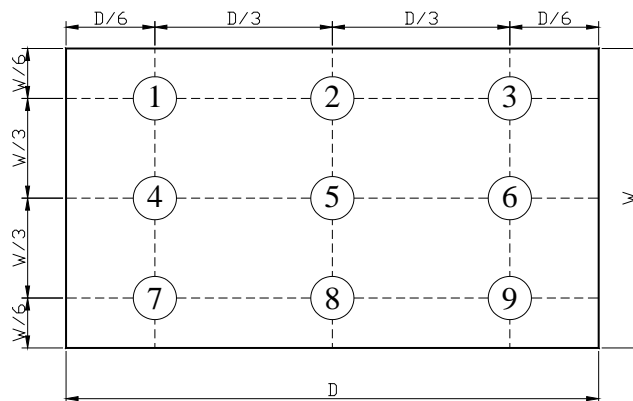
Note3: Definition of Contrast Ratio (CR):

$$CR = \frac{\text{Luminance with all pixels in white state}}{\text{Luminance with all pixels in Black state}}$$

Note4: Definition of Viewing Angle



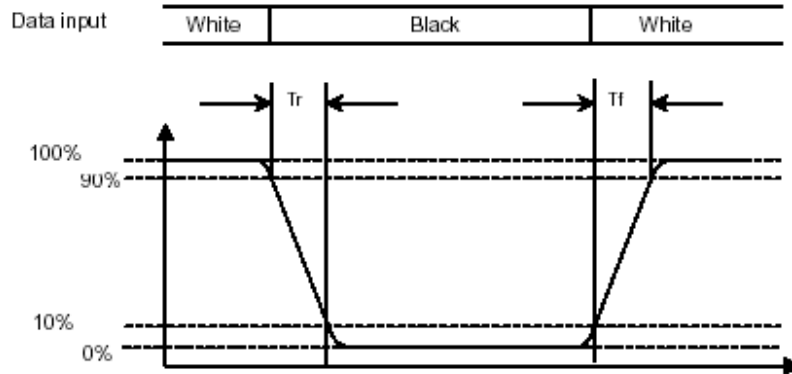
Note 5: Definition of Brightness Uniformity (B-uni):



$$B\text{-uni} = \frac{\text{Minimum luminance of 9 points}}{\text{Maximum luminance of 9 points}} \quad (\text{Note 5}).$$

**Note 6: Definition of Response Time:**

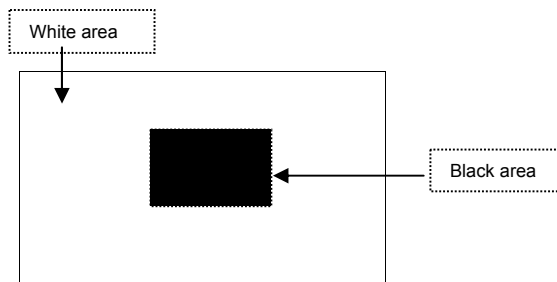
The Response Time is set initially by defining the “Rising Time ( $T_r$ )” and the “Falling Time ( $T_f$ )” respectively.  $T_r$  and  $T_f$  are defined as following figure.


**Note 7: Definition of Chromaticity:**

The color coordinates  $(x_W, y_W)$ ,  $(x_R, y_R)$ ,  $(x_G, y_G)$ , and  $(x_B, y_B)$  are obtained with all pixels in the viewing field at white, red, green, and blue states, respectively.

**Note 8: Definition of Image sticking (tis):**

Continuously display the test pattern shown in the figure below for 2 hours. Then display a completely white screen. The previous image shall not persist more than 2 sec at 25 °C

**Image sticking pattern**


## 9. PIN CONNECTIONS

| Pin No. | Symbol | Description  | Remark |
|---------|--------|--|--------|
| 1       | NC     | No Connection  |        |
| 2       | NC     | No Connection  |        |
| 3       | NC     | No Connection  |        |
| 4       | NC     | No Connection  |        |
| 5       | NC     | No Connection  |        |
| 6       | GND    | Power Ground   |        |
| 7       | EDGSL  | Define Input Clock Polarity.<br>When EDGSL=L, Latch Data By Rising Edge of CLK.<br>( Default Pull Low)<br>When EDGSL=H, CLK Polarity is Inverted, Latch Data by Falling Edge of CLK. |        |
| 8       | VCC    | Digital Power Supply (+3.3V)   |        |
| 9       | V9     | Gamma voltage level 9  |        |
| 10      | VGL    | Gate OFF power supply voltage  |        |
| 11      | V2     | Gamma voltage level 2  |        |
| 12      | VGH    | Gate ON power supply voltage   |        |
| 13      | V6     | Gamma voltage level 6  |        |
| 14      | RESETB | Hardware Global Reset. Low Active. (Default Pull high)   |        |
| 15      | VCOM   | Common electrode voltage input   |        |
| 16      | GND    | Power Ground   |        |
| 17      | AVDD   | Analog Power Supply (+12V)   |        |
| 18      | NC     | No Connection  |        |
| 19      | NC     | No Connection  |        |
| 20      | V8     | Gamma voltage level 8  |        |
| 21      | V5     | Gamma voltage level 5  |        |
| 22      | V3     | Gamma voltage level 3  |        |
| 23      | GND    | Power ground   |        |
| 24      | R5     | Red data (MSB)   |        |
| 25      | R4     | Red data   |        |
| 26      | R3     | Red data   |        |
| 27      | R2     | Red data   |        |
| 28      | R1     | Red data   |        |
| 29      | R0     | Red data (LSB)   |        |
| 30      | GND    | Power ground   |        |
| 31      | GND    | Power ground   |        |
| 32      | G5     | Green data (MSB)   |        |
| 33      | G4     | Green data   |        |
| 34      | G3     | Green data   |        |
| 35      | G2     | Green data   |        |
| 36      | G1     | Green data   |        |

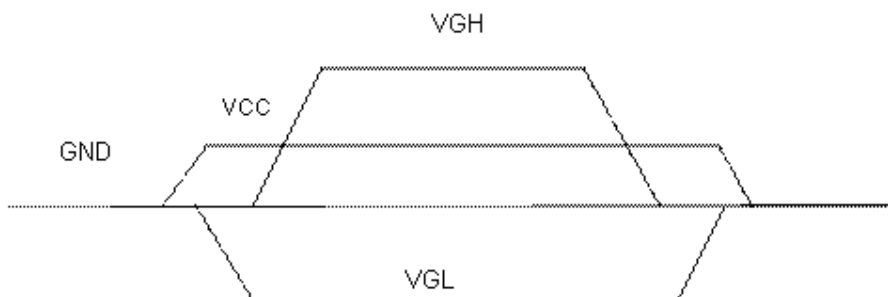
|    |      |   |  |
|----|------|---|--|
| 37 | G0   | Green data (LSB)  |  |
| 38 | DE   | Input Data Enable Control.<br>When DE Mode. Active High To Enable Data Input.<br>(Default Pull Low)   |  |
| 39 | NC   | NC  |  |
| 40 | GND  | Power ground  |  |
| 41 | DCLK | Clock Signal Input. When CLK=H, User Can Input<br>Different Polarity CLK By EDGSL Setting. When CLK=L,<br>User Can Select CLK Rising Or Dual Edge To Latch By<br>EDGSL Setting. |  |
| 42 | VCC  | Digital Power Supply (+3.3V)  |  |
| 43 | NC   | No Connection   |  |
| 44 | NC   | No Connection   |  |
| 45 | B5   | Blue data (MSB)   |  |
| 46 | B4   | Blue data   |  |
| 47 | B3   | Blue data   |  |
| 48 | B2   | Blue data   |  |
| 49 | B1   | Blue data   |  |
| 50 | B0   | Blue data (LSB)   |  |
| 51 | NC   | No Connection   |  |
| 52 | V1   | Gamma voltage level 1   |  |
| 53 | V4   | Gamma voltage level 4   |  |
| 54 | V7   | Gamma voltage level 7   |  |
| 55 | V10  | Gamma voltage level 10  |  |
| 56 | NC   | No Connection   |  |
| 57 | NC   | No Connection   |  |
| 58 | AVDD | Analog Power Supply (12V)   |  |
| 59 | GND  | Power ground  |  |
| 60 | VCOM | Common electrode voltage input  |  |

### 9.1 power ON/OFF sequence:

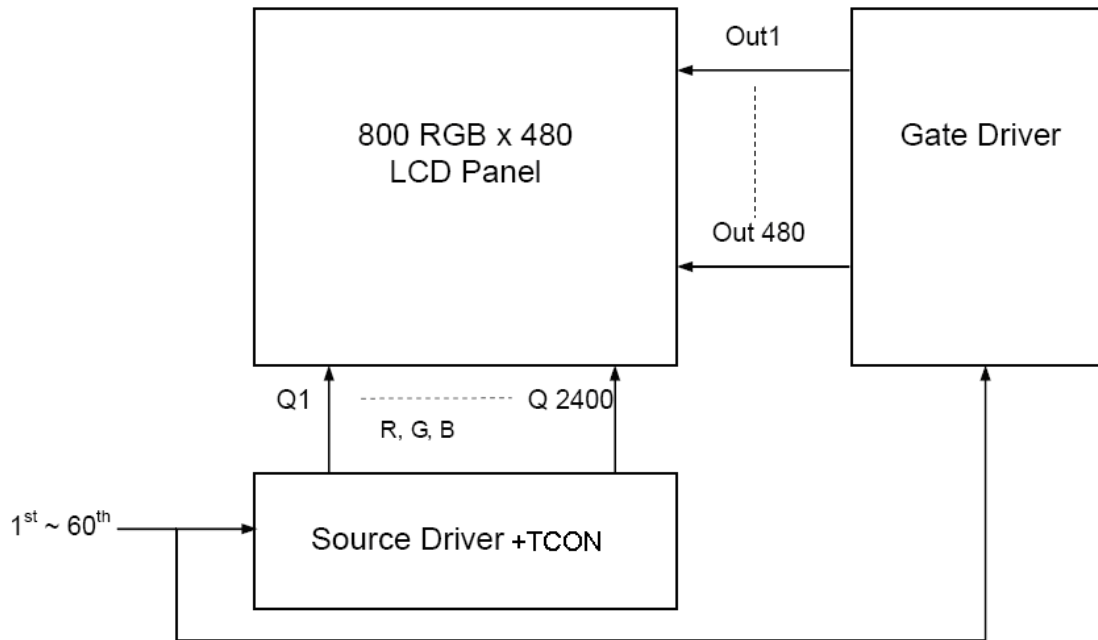
To prevent the device from damage due to latch up, the power ON/OFF sequence shown below must be followed.

When power on: VCC VGL VGH

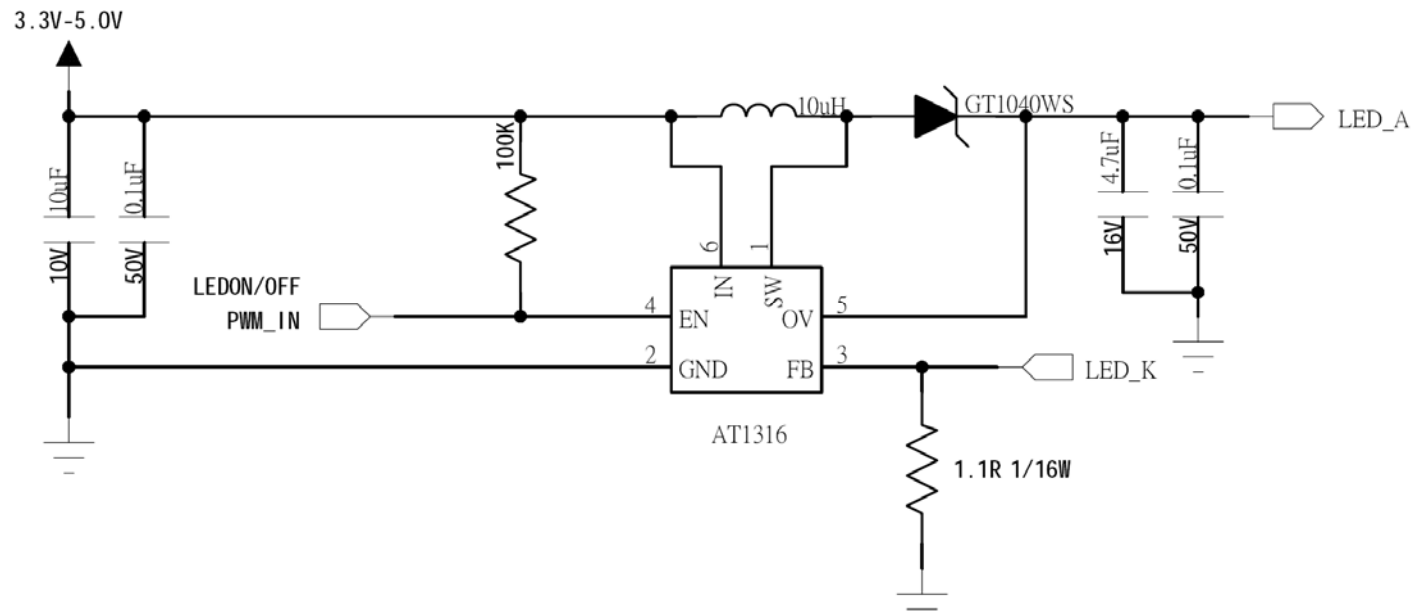
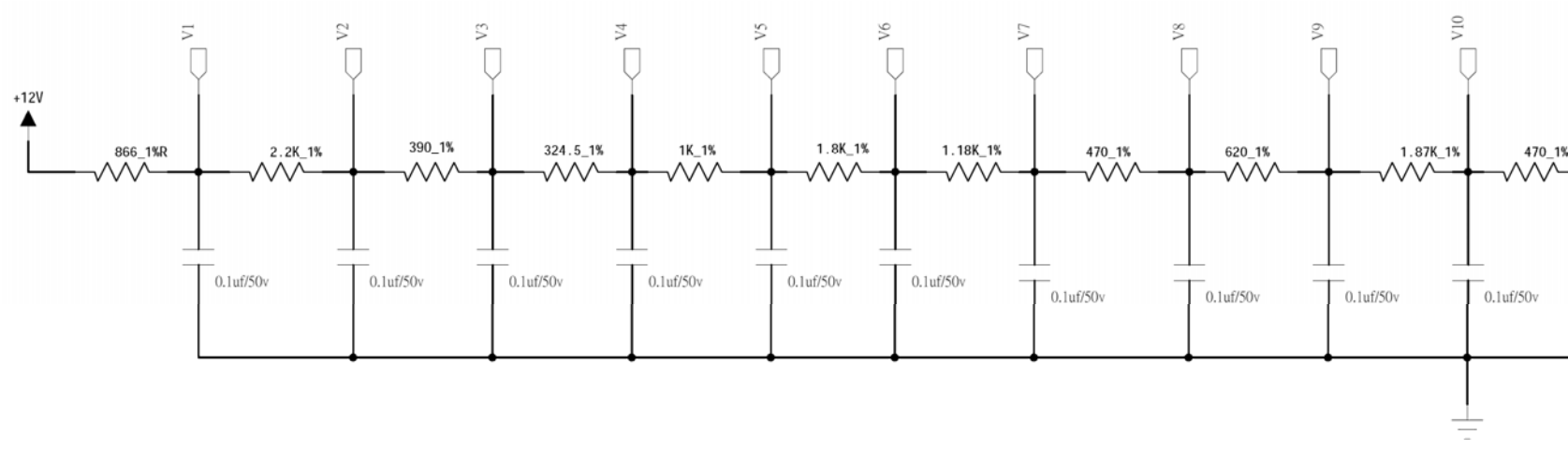
When power off: VGH VGL VCC



### 10. BLOCK DIAGRAM



### 11. APPLICATION CIRCUIT



**Gamma & B/L circuit**



## 12. TOUCH PANEL CHARACTERISTICS

### 1. Input Method and Activation Force

| Input Method                        | Activation Force |
|-------------------------------------|------------------|
| 0.8mm dia. Delrin Polyacetal stylus | 60~100g.         |
| 8.0mm dia. Silicon "finger"         | 60~100g.         |

### 2. Typical Optical Characteristics

| ITEM                       | Parameter |
|----------------------------|-----------|
| Visible Light Transmission | 80%       |
| Haze                       | <8%       |
| Hardness of surface        | 3H        |

### 3. Electrical Specification

| ITEM                     | Parameter       |
|--------------------------|-----------------|
| Operating Voltage        | DC 5V           |
| Contact current          | 1 mA            |
| Circuit close resistance | X 200~600Ω      |
|                          | Y 450~1000Ω     |
| Circuit open resistance  | >20MΩ 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:

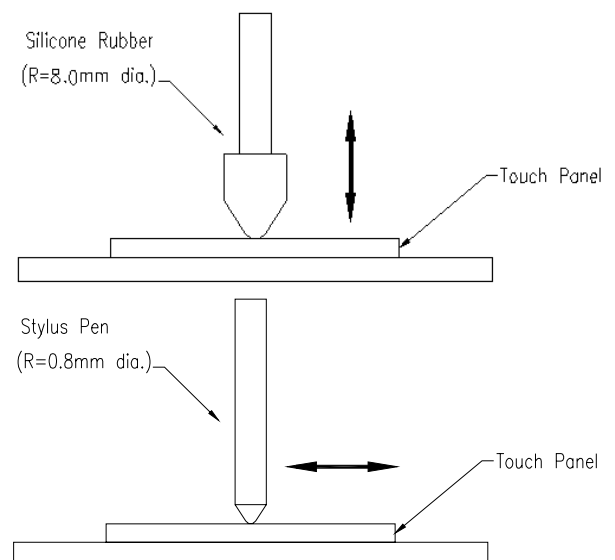
6.1 Touch panel is hit 1 millions times with a silicone rubber of R8 finger, hitting rate is by 200g at 2 times per second. The measurement must satisfy the following:

- Circuit close resistance: x200~600Ω;  
y 450~1000Ω
- Circuit open resistance: >20MΩ 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 250g forces, repeat one inch by 10k times. The measurement must satisfy the following:

- Circuit close resistance: x 200~600ΩΩ ;  
y 450~1000Ω
- Circuit open resistance: >20MΩ at 25V DC
- Contact bounce: <10ms
- Linearity test: <1.5%





## 13. QUALITY ASSURANCE

### 13.1 Test Condition

#### 13.1.1 Temperature and Humidity(Ambient Temperature)

Temperature :  $25 \pm 5^{\circ}\text{C}$

Humidity :  $65 \pm 5\%$

#### 13.1.2 Operation

Unless specified otherwise, test will be conducted under function state.

#### 13.1.3 Container

Unless specified otherwise, vibration test will be conducted to the product itself without putting it in a container.

#### 13.1.4 Test Frequency

In case of related to deterioration such as shock test. It will be conducted only once.

#### 13.1.5 Test Method

| Reliability Test Item & Level |   | Test Level  |
|-------------------------------|---|---|
| No.                           | Test Item   |   |
| 1                             | High Temperature Storage Test                       | T=80 ,240hrs  |
| 2                             | Low Temperature Storage Test                        | T=-30 ,240hrs   |
| 3                             | High Temperature Operation Test                     | T=70 ,240hrs  |
| 4                             | Low Temperature Operation Test                      | T=-20 ,240hrs   |
| 5                             | High Temperature and High Humidity (operation Test) | T=60 ,90%RH,240hrs  |
| 6                             | Thermal Cycling Test (No operation)                 | -30 → +25 → +80 , 100 Cycles<br>30 min 5 min 30 min   |
| 7                             | Vibration Test (No operation)                       | Frequency :10 ~ 55 Hz<br>Amplitude :1.5 mm<br>Sweep time : 11 mins<br>Test Period: 6 Cycles for each direction of X, Y, Z |
| 8                             | Shock Test (No operation)                           | 100G, 6ms Direction: ±X, ±Y, ±Z<br>Cycle: 3 times   |

### 13.2 Judgment standard

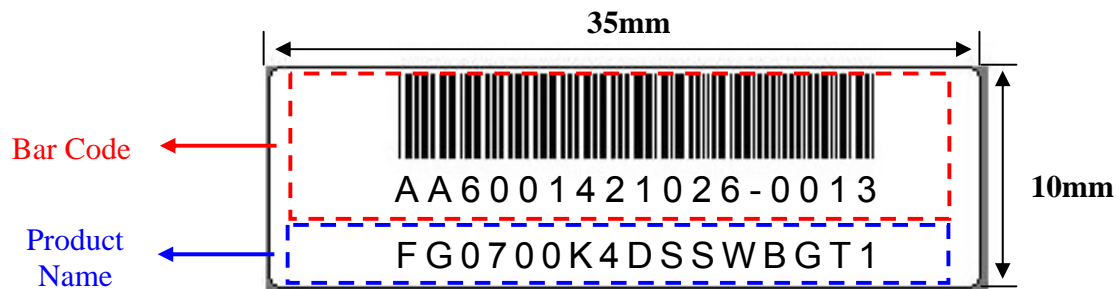
The Judgment of the above test should be made as follow:

Pass: Normal display image with no obvious non-uniformity and no line defect. Partial transformation of the module parts should be ignored.

Fail: No display image, obvious non-uniformity, or line defect.

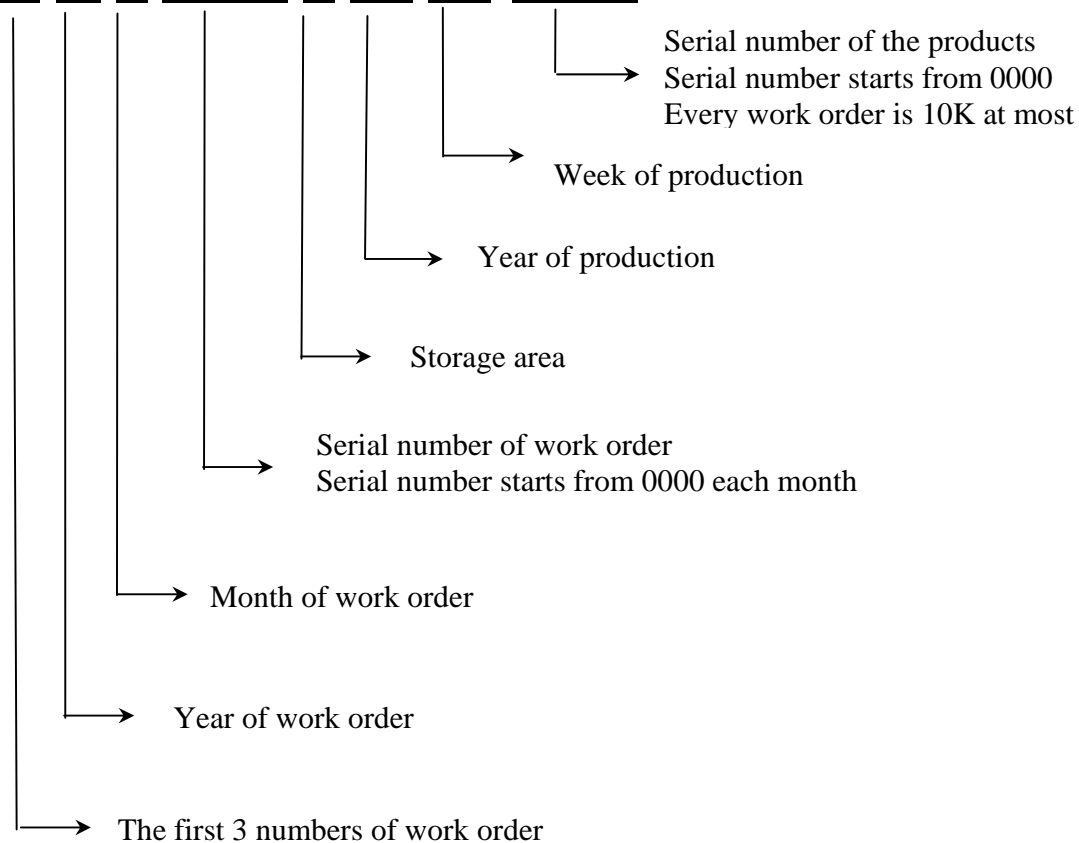
## 14. LCM PRODUCT LABEL DEFINE

### Product Label style:

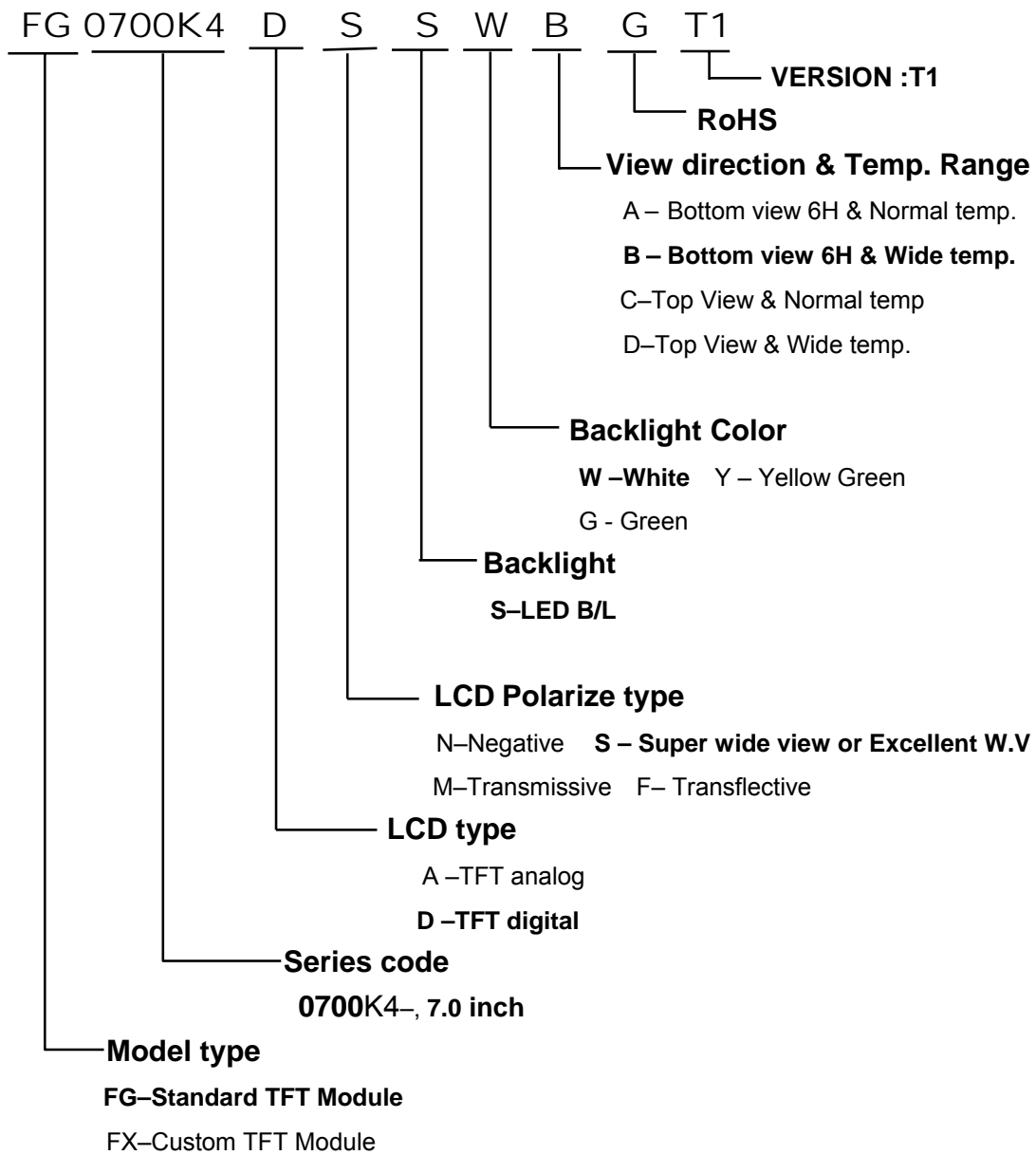


### BarCode Define:

**A A 6 0014 2 10 26 -0013**



**Product Name Define:**



## 15. PRECAUTIONS IN USE LCM

### 1. LIQUID CRYSTAL DISPLAY (LCD)

LCD is made up of glass, organic sealant, organic fluid, and polymer based polarizers. The following precautions should be taken when handling,

- (1). Keep the temperature within range of use and storage. Excessive temperature and humidity could cause polarization degradation, polarizer peel off or bubble.
- (2). Do not contact the exposed polarizers with anything harder than an HB pencil lead. To clean dust off the display surface, wipe gently with cotton, chamois or other soft material soaked in petroleum benzine.
- (3). Wipe off saliva or water drops immediately. Contact with water over a long period of time may cause polarizer deformation or color fading, while an active LCD with water condensation on its surface will cause corrosion of ITO electrodes.
- (4). Glass can be easily chipped or cracked from rough handling, especially at corners and edges.
- (5). Do not drive LCD with DC voltage.

### 2. Liquid Crystal Display Modules

#### 2.1 Mechanical Considerations

LCM are assembled and adjusted with a high degree of precision. Avoid excessive shocks and do not make any alterations or modifications. The following should be noted.

- (1). Do not tamper in any way with the tabs on the metal frame.
- (2). Do not modify the PCB by drilling extra holes, changing its outline, moving its components or modifying its pattern.
- (3). Do not touch the elastomer connector, especially insert an backlight panel (for example, EL).
- (4). When mounting a LCM make sure that the PCB is not under any stress such as bending or twisting. Elastomer contacts are very delicate and missing pixels could result from slight dislocation of any of the elements.
- (5). Avoid pressing on the metal bezel, otherwise the elastomer connector could be deformed and lose contact, resulting in missing pixels.

#### 2.2. Static Electricity

LCM contains CMOS LSI's and the same precaution for such devices should apply, namely

- (1). The operator should be grounded whenever he/she comes into contact with the module. Never touch any of the conductive parts such as the LSI pads, 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.

### 2.3 Soldering

- (1). Solder only to the I/O terminals.
- (2). Use only soldering irons with proper grounding and no leakage.
- (3). Soldering temperature :  $280^{\circ}\text{C} \pm 10^{\circ}\text{C}$
- (4). Soldering time: 3 to 4 sec.
- (5). Use eutectic solder with resin flux fill.
- (6). If flux is used, the LCD surface should be covered to avoid flux spatters. Flux residue should be removed afterwards.

### 2.4 Operation

- (1). The viewing angle can be adjusted by varying the LCD driving voltage V0.
- (2). Driving voltage should be kept within specified range; excess voltage shortens display life.
- (3). Response time increases with decrease in temperature.
- (4). Display may turn black or dark blue at temperatures above its operational range; this is (however not pressing on the viewing area) may cause the segments to appear "fractured".
- (5). Mechanical disturbance during operation (such as pressing on the viewing area) may cause the segments to appear "fractured".

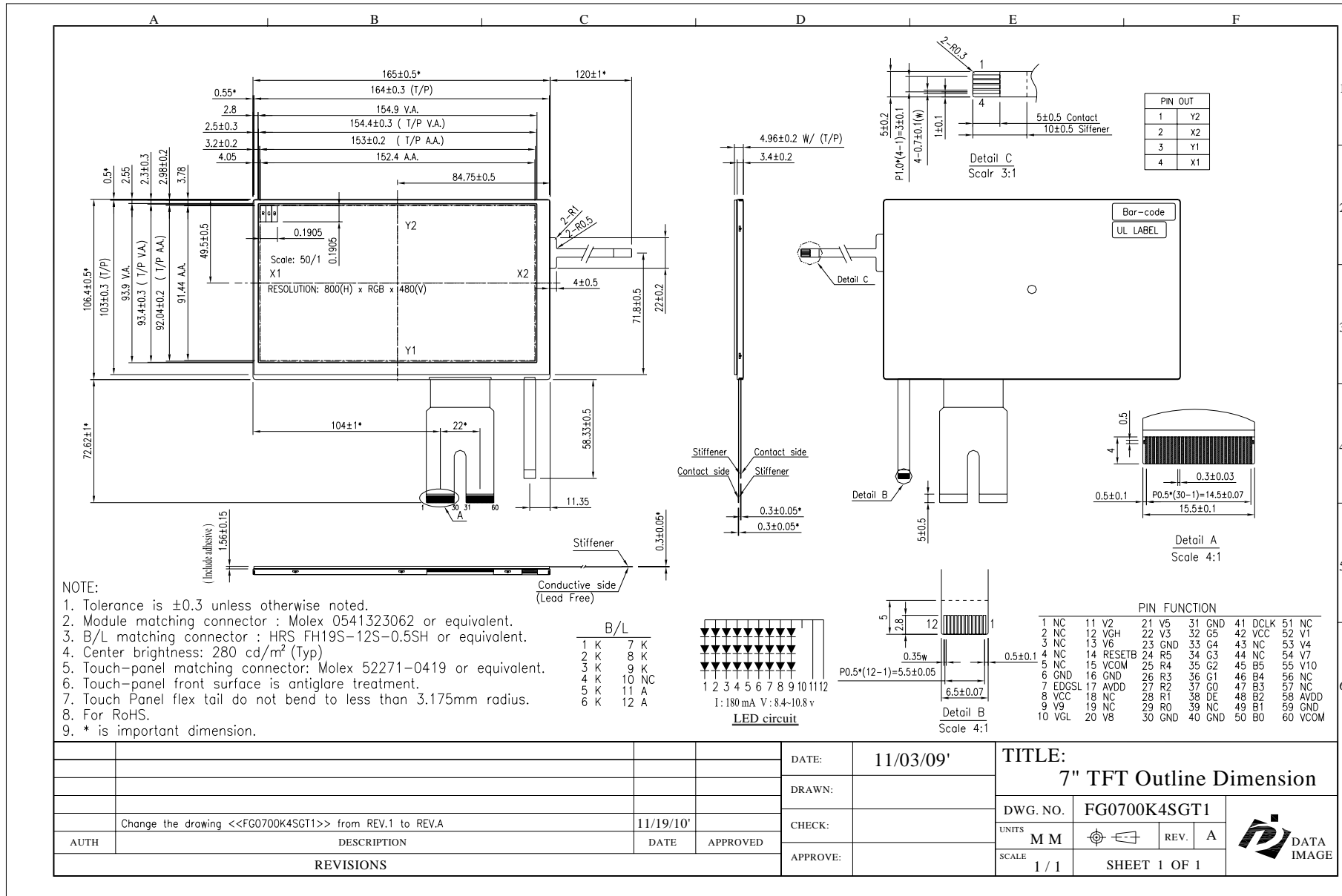
### 2.5 Storage

If any fluid leaks out of a damaged glass cell, wash off any human part that comes into contact with soap and water. Never swallow the fluid. The toxicity is extremely low but caution should be exercised at all the time.

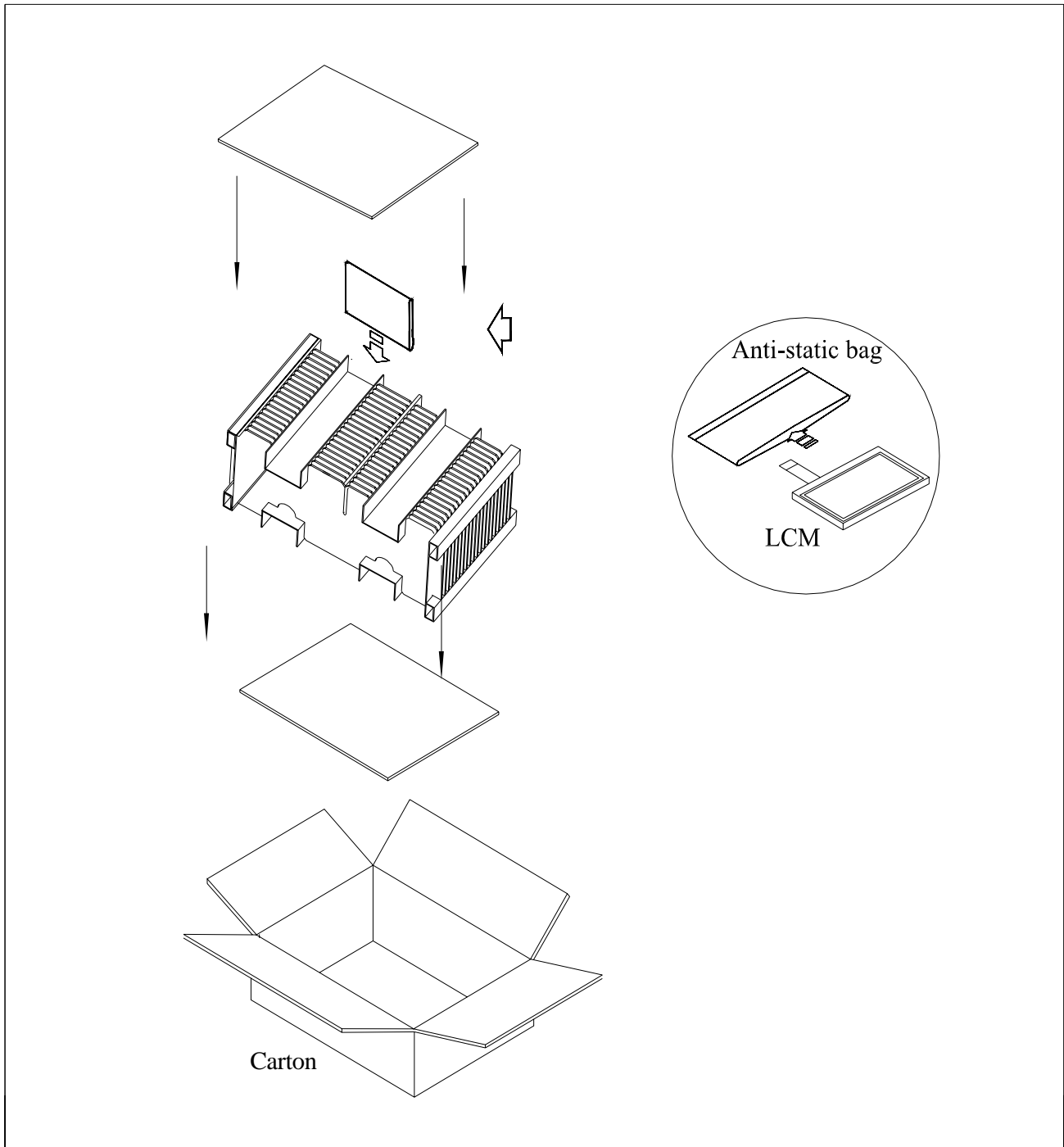
### 2.6 Limited Warranty

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.

### 16. OUTLINE DRAWING



### 17. PACKAGE INFORMATION



| Item                       | Size(L*W*H) | Quantity | Note     |
|----------------------------|-------------|----------|----------|
| Master Carton              | 482*282*279 | 1        |          |
| Quantity Per Master Carton |             | 38       |          |
| N . W                      | 6.8 (kg)    | G . W    | 8.4 (kg) |