

## ***TFT-Display Datenblatt***

Modell FG080070DSSWBG01

### **Kurzdaten**

|            |                          |
|------------|--------------------------|
| Hersteller | Datamagic                |
| Diagonale  | 8,0" / 20,3cm            |
| Format     | 4:3                      |
| Auflösung  | 800x600                  |
| Backlight  | LED/250cd/m <sup>2</sup> |
| Temperatur | -20...+70°C (Betrieb)    |



# DATA IMAGE CORPORATION

## TFT Module Specification Preliminary

ITEM NO.: FG080070DSSWBG01

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|                    |           |              |             |              |
|--------------------|-----------|--------------|-------------|--------------|
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| Approved by        | Version:  | Issued Date: | Sheet Code: | Total Pages: |
|                    | 1         | 2010/4/1     |             | 17           |

**2. RECORD OF REVISION**

| Rev | Date        | Item | Page | Comment             |
|-----|-------------|------|------|---------------------|
| 1   | 1/April/10' |      |      | Initial PRELIMINARY |
|     |             |      |      |                     |

### 3. APPLICATION

Digital equipments which need color display, such as P.O.S, medical equipments and industrial equipments.

### 4. GENERAL SPECIFICATIONS

| Parameter   | Specifications           | Unit |
|---|--------------------------|------|
| Display resolution  | 800(W) x 600(H)          | dot  |
| Active area   | 162(W) x 121.5(H)        | mm   |
| Screen size   | 8.0"(Diagonal)           | inch |
| Dot pitch   | 0.0675(W) x 0.2025(H)    | mm   |
| Color configuration   | R.G.B. Stripe            |      |
| Overall dimension   | 183(W) x 141(H) x 6.3(D) | mm   |
| Weight  | 258                      | g    |
| Surface treatment   | Anti-glare               |      |
| View Angle direction  | 6 o'clock                |      |
| Our components and processes are compliant to RoHS standard |                          |      |

### 5. ABSOLUTE MAXIMUM RATINGS

| Parameter             | Symbol              | MIN.  | MAX. | Unit | Remark  |
|-----------------------|---------------------|-------|------|------|---------|
| Power supply voltage  | V <sub>CC</sub>     | -0.3  | 5.0  | V    | Ta=25°C |
|                       | AVDD                | -0.5  | 13.5 | V    |         |
|                       | V <sub>GH</sub>     | 13.0  | 19.0 | V    |         |
|                       | V <sub>GL</sub>     | -12.0 | -2.0 | V    |         |
|                       | V <sub>GH-VGL</sub> | --    | 31.0 | V    |         |
| Operating temperature | Top                 | -20   | 70   | °C   |         |
| Storage temperature   | Tst                 | -30   | 80   | °C   |         |

### 6. ELECTRICAL CHARACTERISTICS

Ta=25°C

| Parameter                | Symbol           | MIN.               | Typ. | MAX.               | Unit | Remark |
|--------------------------|------------------|--------------------|------|--------------------|------|--------|
| Power Supply voltage     | V <sub>CC</sub>  | 3.0                | 3.3  | 3.6                | V    | Note 2 |
|                          | AVDD             | 10.2               | 10.4 | 10.6               | V    |        |
|                          | V <sub>GH</sub>  | 15.3               | 16.0 | 16.7               | V    |        |
|                          | V <sub>GL</sub>  | -7.7               | -7.0 | -6.3               | V    |        |
| Input signal voltage     | V <sub>COM</sub> | 3.5                | 3.7  | 3.9                |      |        |
| Input logic high voltage | V <sub>IH</sub>  | 0.7V <sub>CC</sub> | --   | V <sub>CC</sub>    |      | Note 3 |
| Input logic low voltage  | V <sub>IL</sub>  | 0                  | --   | 0.3V <sub>CC</sub> |      |        |

Note 1: Be sure to apply V<sub>CC</sub> and V<sub>GL</sub> to the LCD first, and then apply V<sub>GH</sub>.

Note 2: V<sub>CC</sub> setting should match the signals output voltage (refer to Note 3) of customer's system board .

Note 3: R0~R7,G0~G7,B0~B7,DCLK,HS,VS, RESET, U/D,L/R,MODE,DITHB,DE.

### 6.1 Current Consumption

(GND=AVSS=0V)

| Parameter          | Symbol     | min | TYP. | MAX  | Unit | Remark             |
|--------------------|------------|-----|------|------|------|--------------------|
| Current for Driver | $I_{GH}$   | --  | 0.2  | 0.5  | mA   | $V_{GH} = 16V$     |
|                    | $I_{GL}$   | --  | 0.2  | 1.0  | mA   | $V_{GL} = -7.0V$   |
|                    | $I_{CC}$   | --  | 5.5  | 10.0 | mA   | $V_{CC} = +3.3V$   |
|                    | $I_{AVDD}$ | --  | 32.0 | 50.0 | mA   | $AV_{DD} = +10.4V$ |

### 6.2 Backlight Driving for Power Consumption

Ta= 25 °C

| Parameter                  | Symbol | 4.8   | Typ. | Max. | Unit | Remark |
|----------------------------|--------|-------|------|------|------|--------|
| VLED voltage               | $V_L$  | 9.3   | 9.9  | 10.5 | V    | Note 1 |
| LED current                | $I_L$  | 162   | 180  | 198  | mA   |        |
| LED Life Time decay to 50% |        | 20000 | --   | --   | hr   | Note 2 |

Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25 and IL =180mA.

Note 2: The “ LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25 and IL =180mA. The LED lifetime could be decreased if operating IL is larger than 180 mA.

## 7. Timing Characteristics

### 7.1 AC Electrical Characteristics

| Item                   | Symbol | Values |     |     | Unit. | Remark |
|------------------------|--------|--------|-----|-----|-------|--------|
|                        |        | min    | Typ | Max |       |        |
| HS setup time          | Thst   | 8      | --  | --  | ns    |        |
| HS hold time           | Thhd   | 8      | --  | --  | ns    |        |
| VS setup time          | Tvst   | 8      | --  | --  | ns    |        |
| VS hold time           | Tvhd   | 8      | --  | --  | ns    |        |
| Data setup time        | Tdsu   | 8      | --  | --  | ns    |        |
| Data hole time         | Tdhd   | 8      | --  | --  | ns    |        |
| DE setup time          | Tesu   | 8      | --  | --  | ns    |        |
| DE hole time           | Tehd   | 8      | --  | --  | ns    |        |
| VDD Power On Slew rate | TPOR   | --     | --  | 20  | ms    |        |
| RSTB pulse width       | TRst   | 10     | --  | --  | us    |        |
| CLKIN cycle time       | Tcoh   | 20     | --  | --  | ns    |        |
| CLKIN pulse duty       | Tcwh   | 40     | 50  | 60  | %     |        |
| Output stable time     | Tsst   | --     | --  | 6   | us    |        |

### 7.2 Timing

| Item                     | Symbol | Values |      |      | Unit. | Remark |
|--------------------------|--------|--------|------|------|-------|--------|
|                          |        | min    | Typ  | Max  |       |        |
| Horizontal Display Area  | thd    | --     | 800  | --   | DCLK  |        |
| DCLK Frequency           | fclk   | --     | 40   | 50   | MHz   |        |
| One Horizontal Line      | th     | 862    | 1056 | 1200 | DCLK  |        |
| HS pulse width           | thpw   | 1      | --   | 40   | DCLK  |        |
| HS Back Porch (Blanking) | thb    | 46     | 46   | 46   | DCLK  |        |
| HS Front Porch           | thfp   | 16     | 210  | 354  | DCLK  |        |

| Item                    | Symbol | Values |     |     | Unit. | Remark |
|-------------------------|--------|--------|-----|-----|-------|--------|
|                         |        | min    | Typ | Max |       |        |
| Vertical Display Area   | tvd    | --     | 600 | --  | TH    |        |
| VS period time          | tv     | 624    | 635 | 700 | TH    |        |
| VS pulse width          | tvpw   | 1      | --  | 20  | TH    |        |
| VS Back Porch(Blanking) | tvb    | 23     | 23  | 23  | TH    |        |
| VS Front Porch          | tvfp   | 1      | 12  | 77  | TH    |        |

### 7.3 Timing Diagram

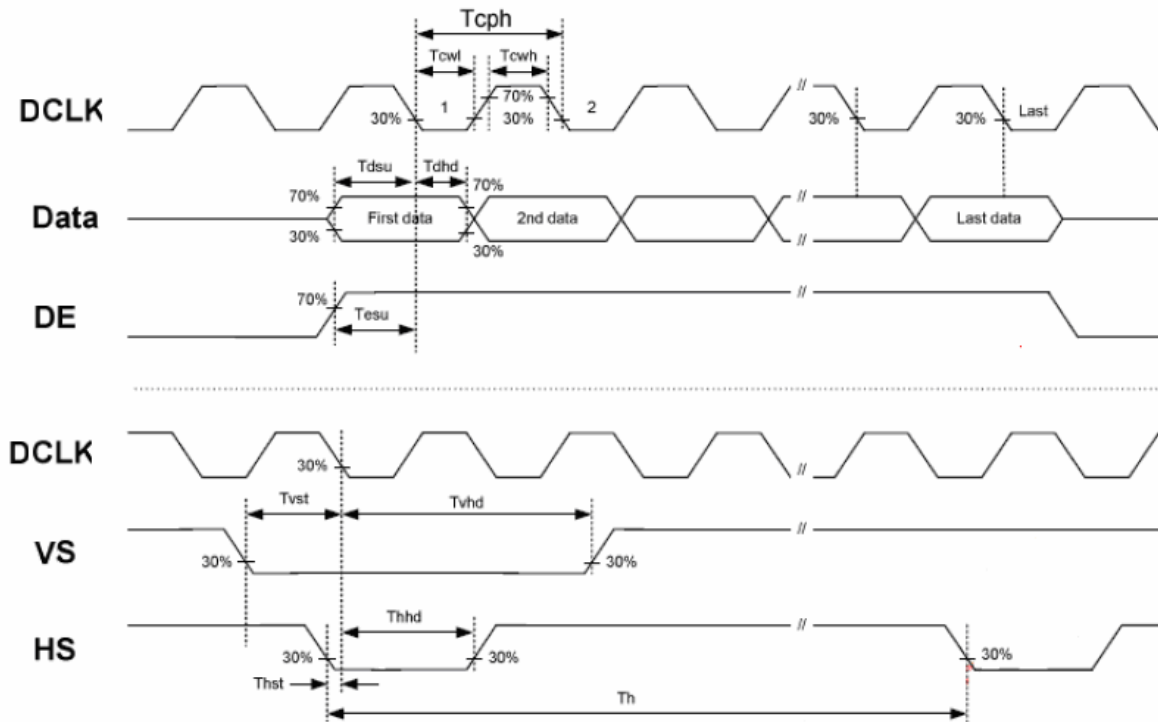


Figure 7.1 Input Clock and Data Timing Diagram

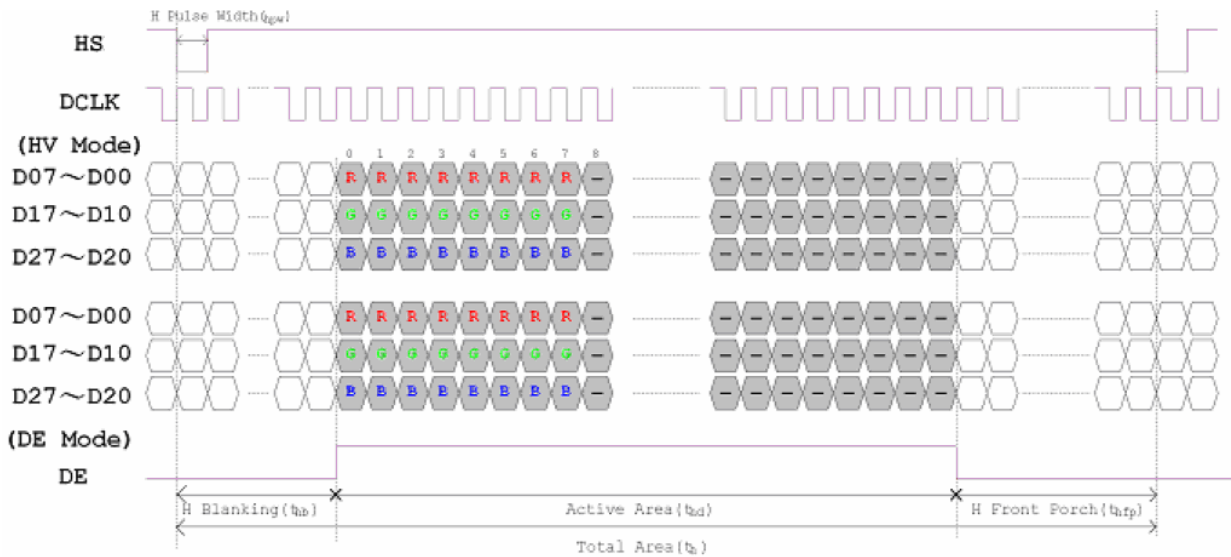


Figure 7.2 Horizontal input timing diagram

## 8. PIN CONNECTIONS

### 8.1 Input Pins Function

| Pin No. | Symbol | Function                  | Remark  |
|---------|--------|---------------------------|---------|
| 1       | NC     | No connection             |         |
| 2       | NC     | No connection             |         |
| 3       | NC     | No connection             |         |
| 4       | NC     | No connection             |         |
| 5       | GND    | Power ground              |         |
| 6       | VCOM   | Common voltage            |         |
| 7       | VCC    | Power for Digital circuit |         |
| 8       | MODE   | DE/SYNC mode select       | Note3   |
| 9       | DE     | Data Input Enable         |         |
| 10      | VS     | Vertical Sync Input       |         |
| 11      | HS     | Horizontal Sync Input     |         |
| 12      | B7     | Blue data(MSB)            |         |
| 13      | B6     | Blue data                 |         |
| 14      | B5     | Blue data                 |         |
| 15      | B4     | Blue data                 |         |
| 16      | B3     | Blue data                 |         |
| 17      | B2     | Blue data                 |         |
| 18      | B1     | Blue data                 |         |
| 19      | B0     | Blue data(LSB)            |         |
| 20      | G7     | Green data (MSB)          |         |
| 21      | G6     | Green data                |         |
| 22      | G5     | Green data                |         |
| 23      | G4     | Green data                |         |
| 24      | G3     | Green data                |         |
| 25      | G2     | Green data                |         |
| 26      | G1     | Green data                |         |
| 27      | G0     | Green data (LSB)          |         |
| 28      | R7     | Red data (MSB)            |         |
| 29      | R6     | Red data                  |         |
| 30      | R5     | Red data                  |         |
| 31      | R4     | Red data                  |         |
| 32      | R3     | Red data                  |         |
| 33      | R2     | Red data                  |         |
| 34      | R1     | Red data                  |         |
| 35      | R0     | Red data (LSB)            |         |
| 36      | GND    | Power ground              |         |
| 37      | DCLK   | Sample clock              |         |
| 38      | GND    | Power ground              |         |
| 39      | L/R    | Right/ left selection     | Note2,5 |
| 40      | U/D    | Up/down selection         | Note2,5 |
| 41      | VGH    | Gate ON voltage           |         |



|    |       |                          |        |
|----|-------|--------------------------|--------|
| 42 | VGL   | Gate OFF voltage         |        |
| 43 | AVDD  | Power for Analog circuit |        |
| 44 | RESET | Global reset pin.        | Note1  |
| 45 | NC    | No connection            |        |
| 46 | VCOM  | Common voltage           |        |
| 47 | DITHB | Dithering function       | Note 4 |
| 48 | GND   | Power ground             |        |
| 49 | NC    | No connection            |        |
| 50 | NC    | No connection            |        |

I: input, O: output, P: Power

Note 1: Global reset pin. Active Low to enter Reset State. Suggest to connecting with an RC reset circuit for stability. Normally pull high.

Note 2: Selection of scanning mode

| Setting of scan control input |     | Scanning direction        |
|-------------------------------|-----|---------------------------|
| U/D                           | R/L |                           |
| GND                           | Vcc | Up to down, left to right |
| Vcc                           | GND | Down to up, right to left |
| GND                           | GND | Up to down, right to left |
| Vcc                           | Vcc | Down to up, left to right |

Note 3: DE/SYNC mode select, Normally pull high.

H: DE mode.

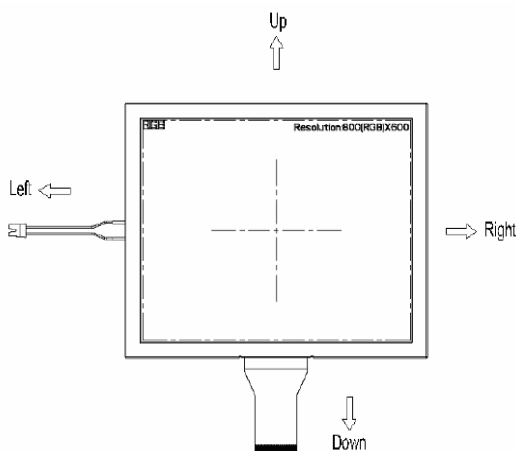
L: HS/VS mode.

Note4: Dithering function enable control. Normally pull high.

DITHB=" 1" ,Disable internal dithering function. For 18bit RGB interface, connect two LSB bits of all the R/G/B data buses to GND.

DITHB=" 0" ,Enable internal dithering function, For TTL 24bit parallel RGB image data input.

Note 5: Definition of scanning direction. Refer to the figure as below:

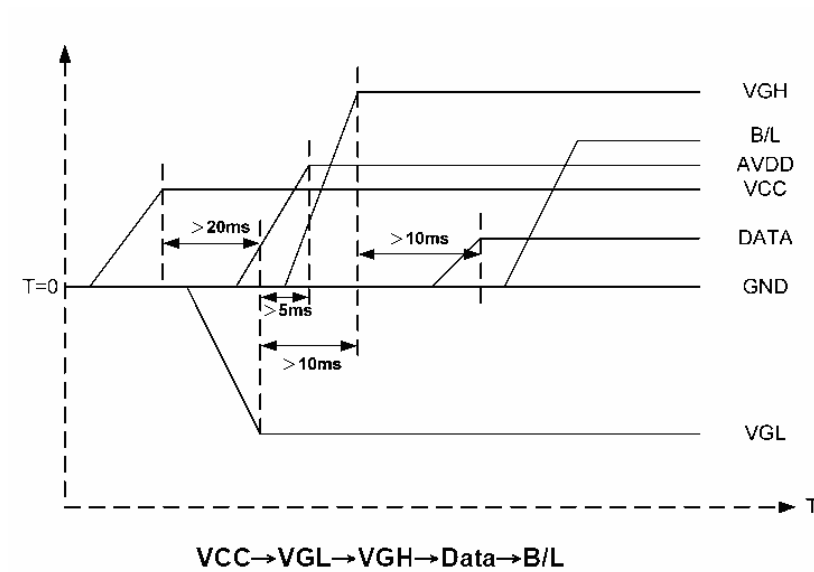


## 8.2 Backlight Unit Section

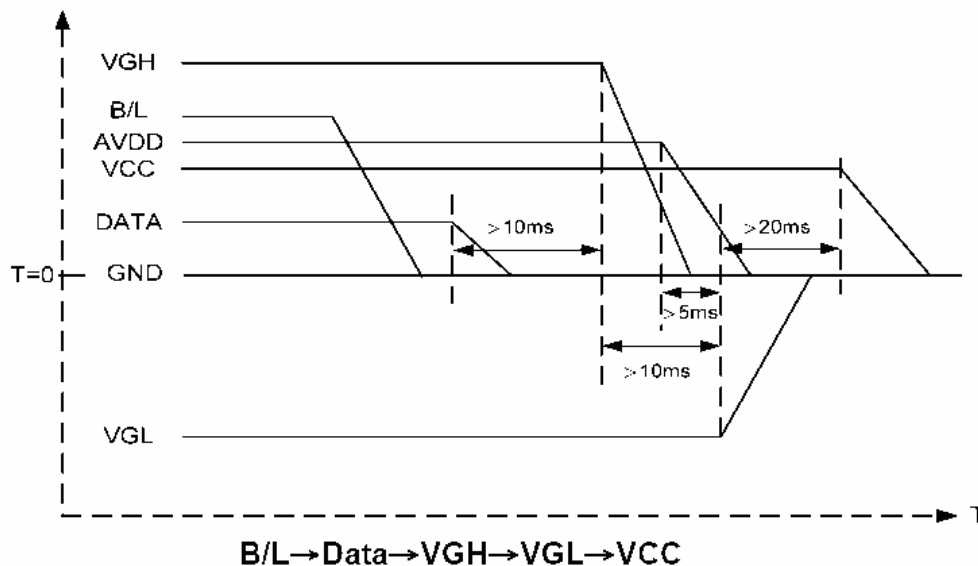
| Pin No | Symbol            | I/O | Description                     | Remark |
|--------|-------------------|-----|---------------------------------|--------|
| 1      | V <sub>LED+</sub> | P   | Power for LED backlight anode   | Pink   |
| 2      | V <sub>LED-</sub> | P   | Power for LED backlight cathode | Black  |

## 8.3 Power Sequence

### 8.3.1 Power on:



### 8.3.22 Power off:



**Note:** Data include R0~R7,G0~G7,B0~B7,DCLK,HS,VS, RESET, U/D,L/R,MODE,DITHB,DE

## 9. OPTICAL CHARACTERISTIC

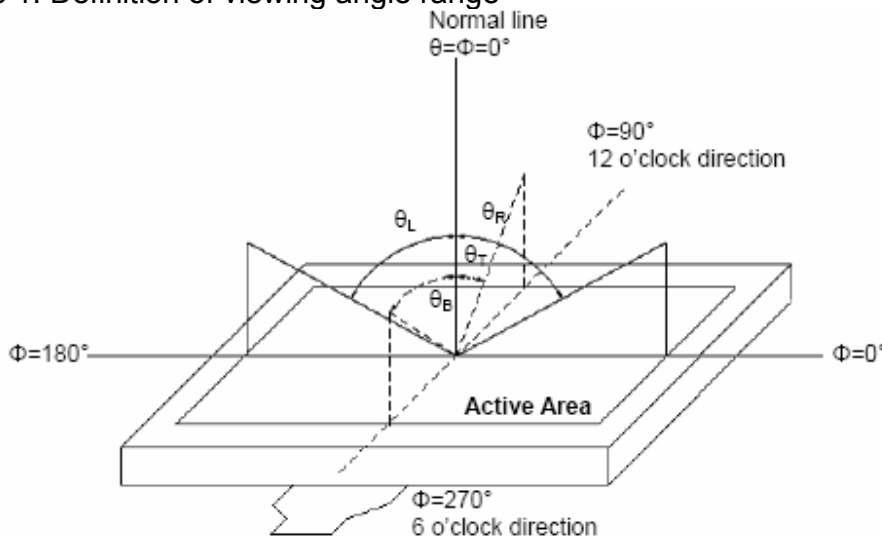
### 9.1. Specification:

| Item               | Symbol     | Condition                       | Min.                            | Typ. | Max. | Unit              | Remark |           |
|--------------------|------------|---------------------------------|---------------------------------|------|------|-------------------|--------|-----------|
| Response time      | Rise       | T <sub>ON</sub>                 | Normal<br>$\theta=\Phi=0^\circ$ | -    | 10   | 20                | ms     | Note 3    |
|                    | Fall       | T <sub>OFF</sub>                |                                 | -    | 15   | 30                | ms     |           |
| Contrast ratio     | CR         |                                 |                                 | 400  | 500  |                   |        | Note 4    |
| White chromaticity | X          |                                 |                                 | 0.26 | 0.31 | 0.36              |        | Note2,5,6 |
|                    | y          |                                 | 0.28                            | 0.33 | 0.38 |                   |        |           |
| Viewing angle      | $\theta_L$ | $\Phi=180^\circ$ (9 o'clock)    | 60                              | 70   | -    | Deg.              | Note 1 |           |
|                    | $\theta_R$ | $\Phi=0^\circ$ (3 o'clock)      | 60                              | 70   | -    |                   |        |           |
|                    | $\theta_T$ | $\Phi=90^\circ$ (12 o'clock)    | 40                              | 50   | -    |                   |        |           |
|                    | $\theta_B$ | $\Phi=270^\circ$ (6 o'clock)    | 60                              | 70   | -    |                   |        |           |
| Brightness         |            | Normal<br>$\theta=\Phi=0^\circ$ | 200                             | 250  | --   | cd/m <sup>2</sup> | Note 6 |           |
| Uniformity         |            |                                 | 70                              | 75   |      | %                 | Note 7 |           |

Test Conditions:

- VCC=3.3V, IL=180mA (Backlight current), the ambient temperature is 25 .
- The test systems refer to Note 2.

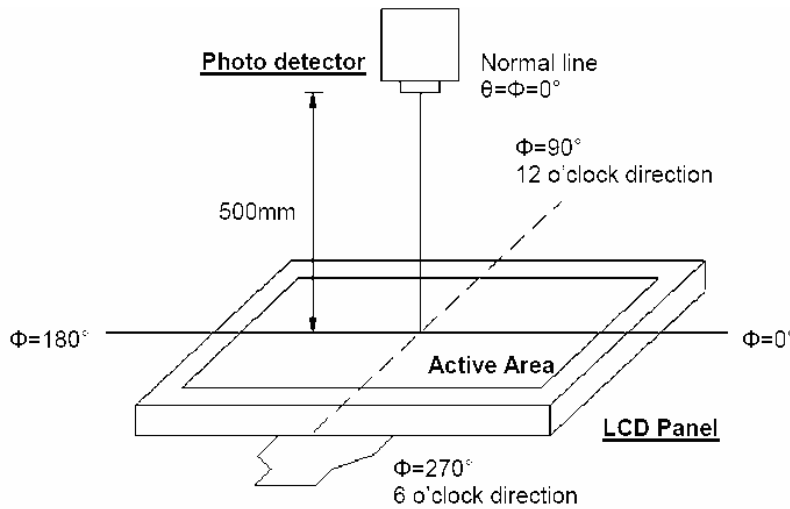
Note 1: Definition of viewing angle range



**Fig.9-1 Definition of viewing angle**

Note 2: Definition of optical measurement system.

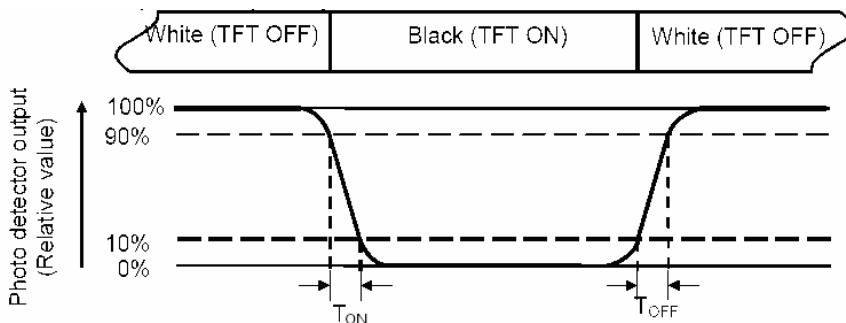
The optical characteristics should be measured in dark room. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen. (Response time is measured by Photo detector TOPCON BM-7A, other items are measured by BM-7A/Field of view: 1° /Height: 500mm.)



**Fig. 9-2 Optical measurement system setup**

**Note 3: 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%.



**Fig. 8-3 Definition of response time**

**Note 4: Definition of contrast ratio**

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

**Note 5: Definition of color chromaticity (CIE1931)**

Color coordinates measured at center point of LCD.

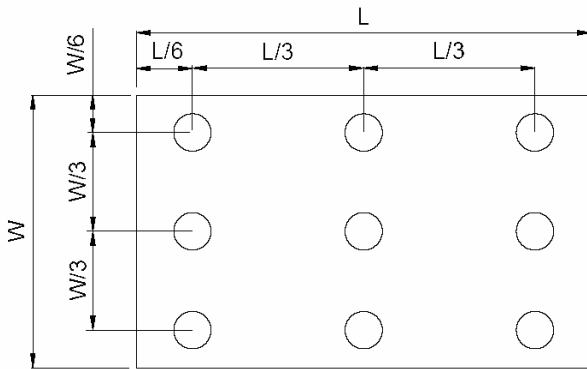
**Note 6:** All input terminals LCD panel must be ground while measuring the center area of the panel. The LED driving condition is IL=180mA .

**Note 7: Definition of Luminance Uniformity**

Active area is divided into 9 measuring areas (Refer to Fig. 9-4 ).Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity (Yu)} = \frac{B_{min}}{B_{max}}$$

L-----Active area length W----- Active area width



**Fig. 9-4 Definition of measuring points**

$B_{max}$ : The measured maximum luminance of all measurement position.

$B_{min}$ : The measured minimum luminance of all measurement position.

## 10. QUALITY ASSURANCE

| No. | Item                                     | Test Conditions   | Remark    |
|-----|--|---|-----------|
| 1   | High Temperature Storage                 | Ta = 80 240 hrs   | Note 1, 4 |
| 2   | Low Temperature Storage                  | Ta = -30 240hrs   | Note 1,4  |
| 3   | High Temperature Operation               | Ts = 70 240hrs  | Note 2,4  |
| 4   | Low Temperature Operation                | Ta = -20 240hrs   | Note 1,4  |
| 5   | Operate at High Temperature and Humidity | +40 , 90%RH 240 hrs   | Note 4    |
| 6   | Thermal Shock                            | -30 /30 min ~ + 80 /30 min for a total 100 cycles, Start with cold temperature and end with high temperature                                | Note 4    |
| 7   | Vibration Test                           | Frequency range:10~55Hz<br>Stroke:1.5mm<br>Sweep:10Hz~55Hz~10Hz<br>2 hours for each direction of X. Y. Z.<br>(6 hours for total)            |           |
| 8   | Mechanical Shock                         | 100G 6ms,±X, ±Y, ±Z 3 times for each direction  |           |
| 9   | Package Vibration Test                   | Random Vibration :<br>0.015G*G/Hz from 5-200HZ, -6dB/Octave from 200-500HZ<br>2 hours for each direction of X. Y. Z.<br>(6 hours for total) |           |
| 10  | Package Drop Test                        | Height:60 cm<br>1 corner, 3 edges, 6 surfaces   |           |
| 11  | Electro Static Discharge                 | ± 2KV, Human Body Mode, 100pF/1500Ω   |           |

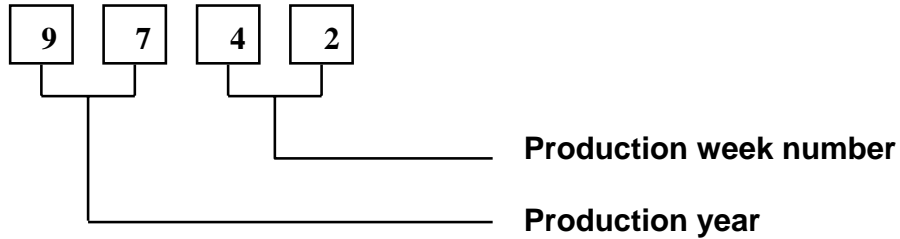
Note 1: Ta is the ambient temperature of samples.

Note 2: Ts is the temperature of panel's surface.

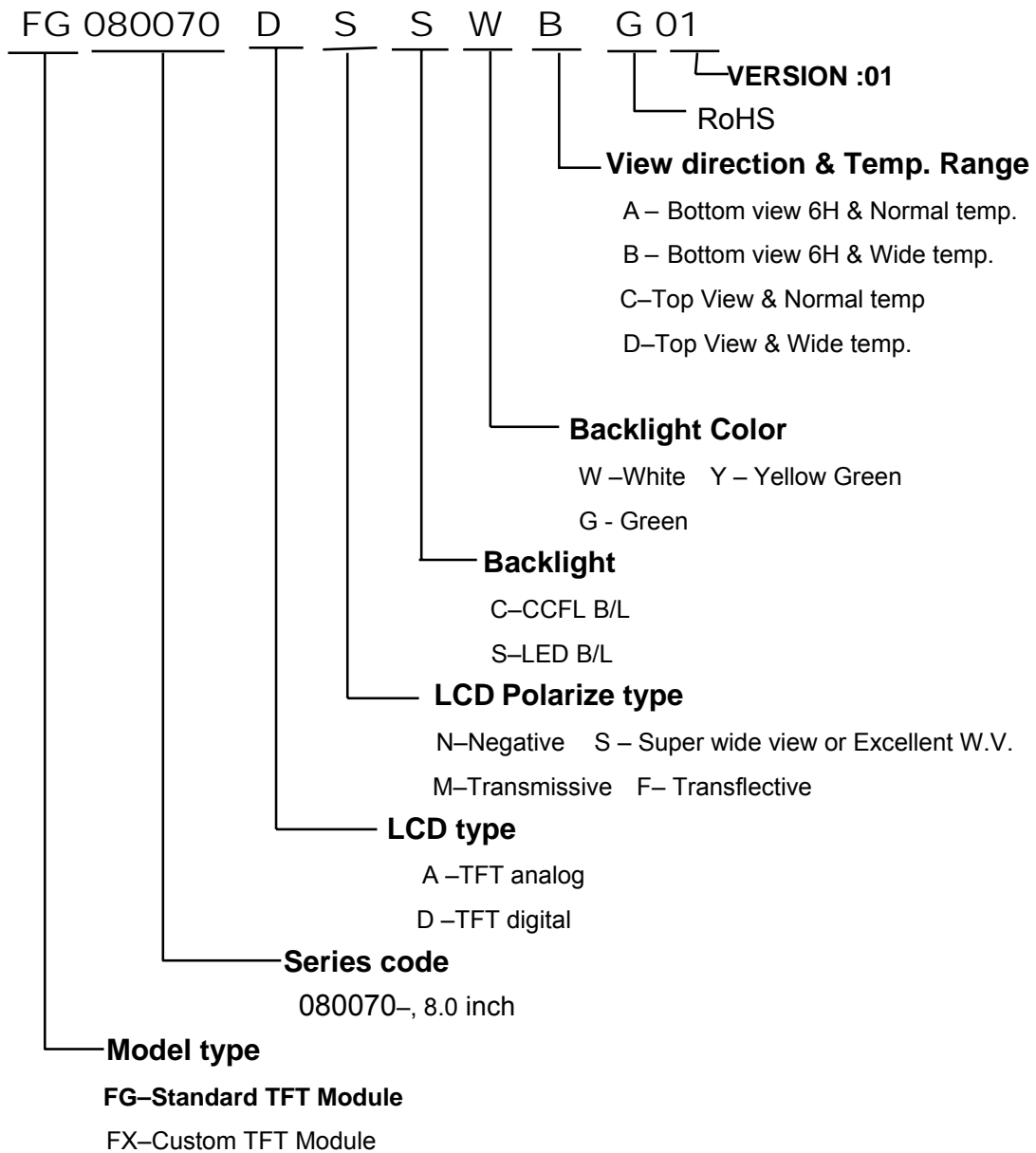
Note 3: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but doesn't guarantee all the cosmetic specification.

Note 4: Before cosmetic and function tests, the product must have enough recovery time, at least 2 hours at room temperature.

### 11. LOT NUMBERING SYSTEM



### 12. LCM NUMBERING SYSTEM



## 13. 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 benzin.
- (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 after wards.

#### 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

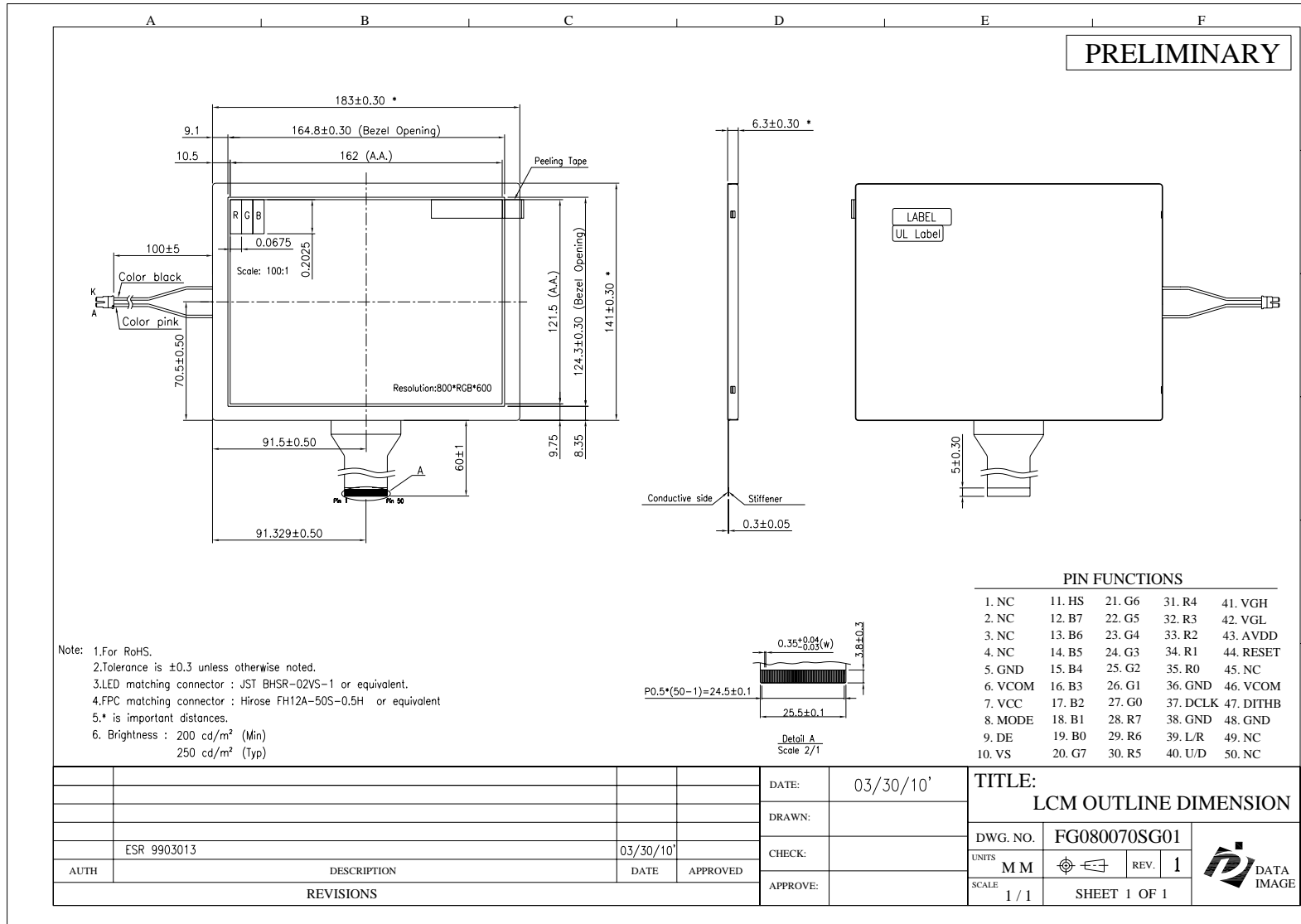
If any fluid leaks out of a damaged glass cell, wash off any human part that comes into contact with soap and water. Never swallow the fluid. The toxicity is extremely low but caution should be exercised at all the time.

#### 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.



### 14. OUTLINE DRAWING



**15. PACKAGE INFORMATION**

TBD