

# DATA IMAGE CORPORATION

## TFT Module Specification

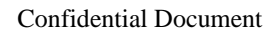
Preliminary

ITEM NO.: FG0700W0DSSWAG01

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	JACK	ERIC	PAUL	HELEN
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Rev	Date	Item	Page	Comment
1	12/FEB/11'			Initial Preliminary

### 3. APPLICATION

DVD player, Car TV, UMPC, POS

### 4. GENERAL SPECIFICATIONS

Parameter	Specifications	Unit
Screen Size	7 (diagonal)	inch
Display Format	1024(H) x (R,G,B) x 600(V)	dot
Active Area	153.6(W) × 90.0(H) mm	mm
Dot Pitch	0.05(W) × 0.15(H) mm	mm
Pixel Configuration	Stripe	
Outline Dimension	165.75(W) x 105.39(H) x 3.4 (D)	mm
Surface treatment	Anti-reflective	
Back-light	LED	
Display mode	Normally white	
Weight	106(typ)	g
View Angle direction	6 o'clock	

### 5. ABSOLUTE MAXIMUM RATINGS

GND=0V

Parameter	Symbol	MIN.	MAX.	Unit	Remark
Power supply voltage	VDD	-0.3	5.0	V	Ta=25°C
	AVDD	6.5	13.5	V	
	VGH	-0.3	42.0	V	
	VGL	-20	0.3	V	
	VGH-VGL	-	40	V	
Operating temperature	Top	-20	60	°C	Module surface*
Storage temperature	Tst	-30	70	°C	-
Humidity	Operation	20%~90% relative humidity			Ta 38°C
	Non Operation	5%~90% relative humidity			Ta 38°C

## 6. ELECTRICAL CHARACTERISTICS

### 6.1 Operating Conditions

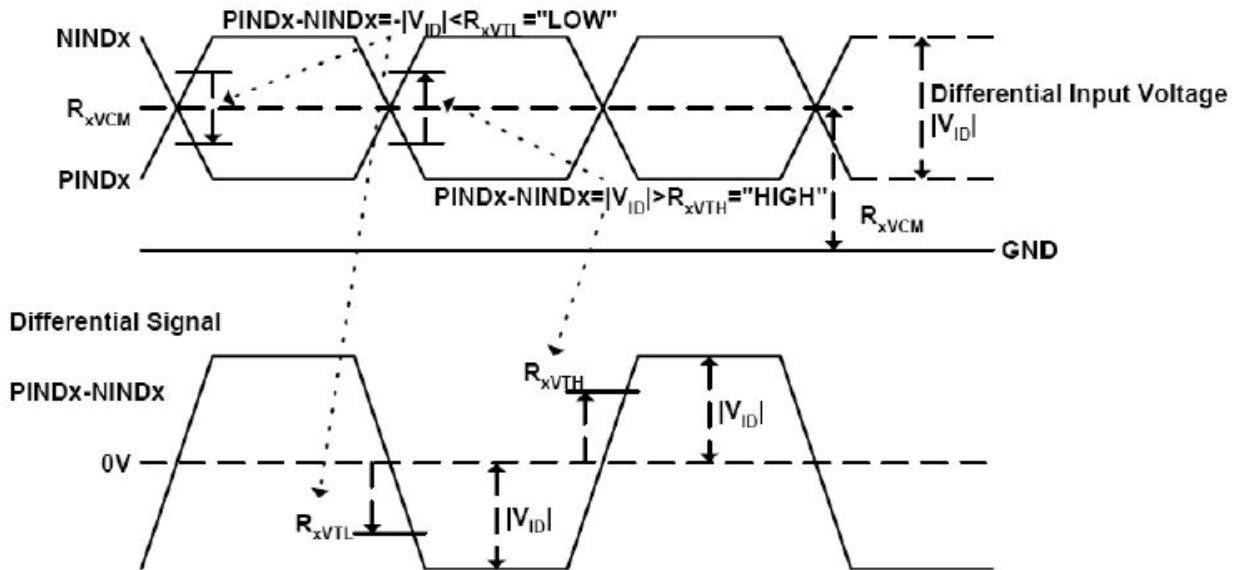
GND=0V, fH=38.1KHz, fV=60Hz, fCLK=50.2MHz, Ta=25°C

Parameter	Symbol	MIN.	Typ.	MAX.	Unit	Remark
Power Supply voltage	VDD	3.0	3.3	3.6	V	
	AVDD	10.8	11	11.2	V	
	VGH	19.7	20	20.3	V	
	VGL	-6.5	-6.8	-7.1	V	
Input signal voltage	VCOM	2.8	3.8	4.8	V	Note3
Differential Input High Threshold	R <sub>xVTH</sub>	-	-	100	[mV]	R <sub>xVCM</sub> =1.2V Note 2
Differential input Low Threshold	R <sub>xVTL</sub>	-100	-	-	[mV]	
Input voltage range (singled-end)	R <sub>xVIN</sub>	0		2.4	V	
Differential input common mode voltage	R <sub>xVCM</sub>	V <sub>ID</sub>  /2		2.4- V <sub>ID</sub>  /2	V	
Differential voltage	V <sub>ID</sub>	0.2		0.6	V	
Differential input leakage current	R <sub>VxIIZ</sub>	-10		+10	uA	
"H" level logical input voltage	V <sub>IH</sub>	0.7VDD	--	VDD	V	Note1
"L" level logical input voltage	V <sub>IL</sub>	0	--	0.3 VDD	V	

Note 1: LVDS, Reset.

Note 2: LVDS Signal Waveform.

#### Single-end Signals



Note 3: Typical VCOM is only a reference value, it must be optimized according to each LCM. Be sure to use VR;

### 6.2 Current Consumption

Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Remark
Current for Driver	I <sub>GH</sub>	-	0.2	1.0	mV	VGH=20V
	I <sub>GL</sub>	-	0.2	1.0	mV	VGL=-6.8V
	I <sub>VDD</sub>	-	50	60	mV	VDD=3.3V
	I <sub>AVDD</sub>	-		0.3	mV	AVDD=11V

## 6.3 Backlight Driving Consumption

Ta= 25 °C

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
LED voltage	$V_L$	-	9.3	10.2	V	Note 1
LED current	$I_L$	-	160	170	mA	
LED life time	-	-	20000	--	hr	Note 2

Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25 and  $I_L = 160\text{mA}$ .

Note 2: The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25 and  $I_L = 160\text{mA}$ . The LED lifetime could be decreased if operating  $I_L$  is larger than 160mA.

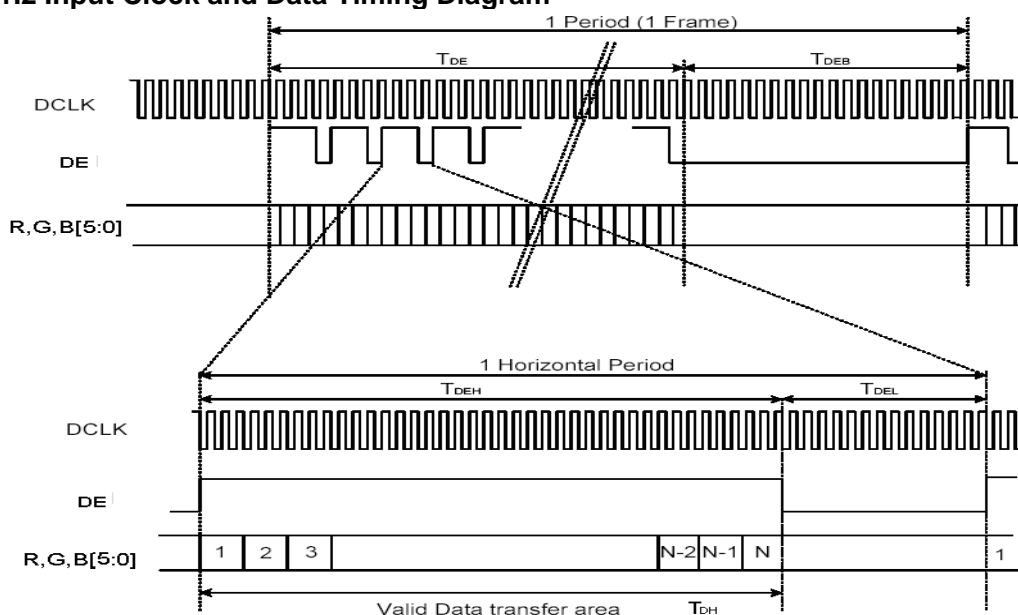
## 7. INPUT SIGNAL CHARACTERISTICS

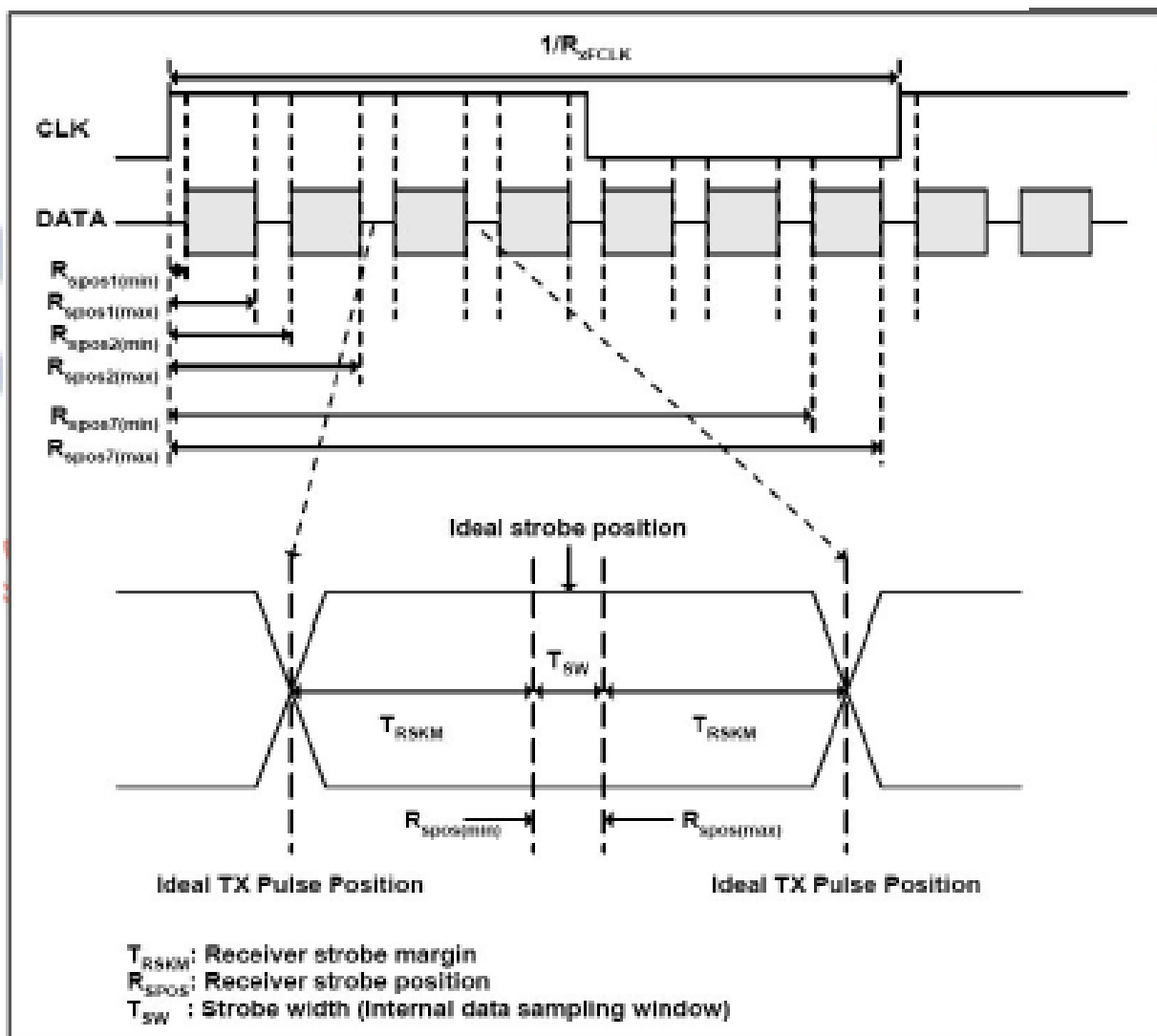
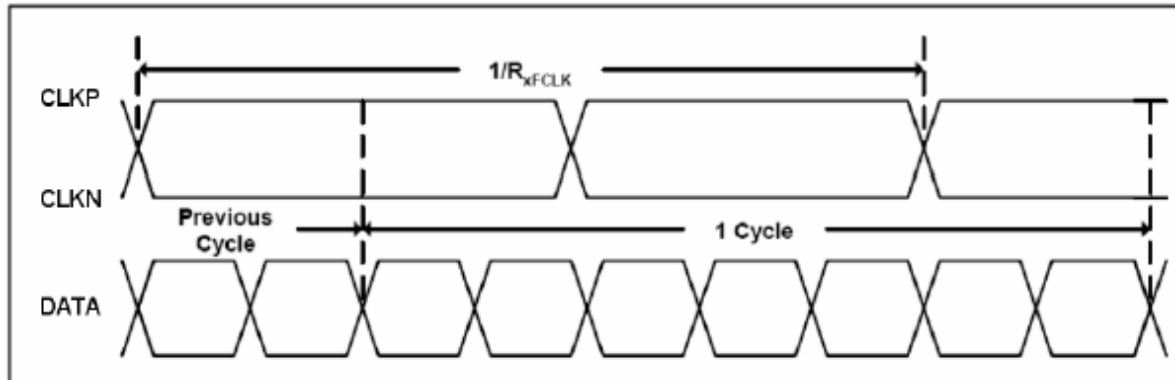
### 7.1 AC Characteristics

#### 7.1.1 AC Electrical Characteristics

Parameter	Symbol	MIN.	Typ.	MAX.	Unit	Remark
Clock Frequency	RxFCLK	40.8	51.2	67.2	MHz	Frame rate =60Hz
Input data skew margin	TRSKM	500	-	-	ps	
Clock high time	TLVCH	-	$4/(7 \cdot R_{xFCLK})$	-	ns	
Clock low time	TLVCL	-	$3/(7 \cdot R_{xFCLK})$	-	ns	
Horizontal display area	TDEH	-	1024		RxFCLK	
HS period time	TDEH+TDEL	1114	1344	1400	RxFCLK	
HS Blanking	TDEL	90	320	376	RxFCLK	
Vertical display area	TDE	-	600	-	TDEH+TDEL	
VS period time	TDE+TDEB	610	635	800	TDEH+TDEL	
VS Blanking	TDEB	10	35	200	TDEH+TDEL	

#### 7.1.2 Input Clock and Data Timing Diagram

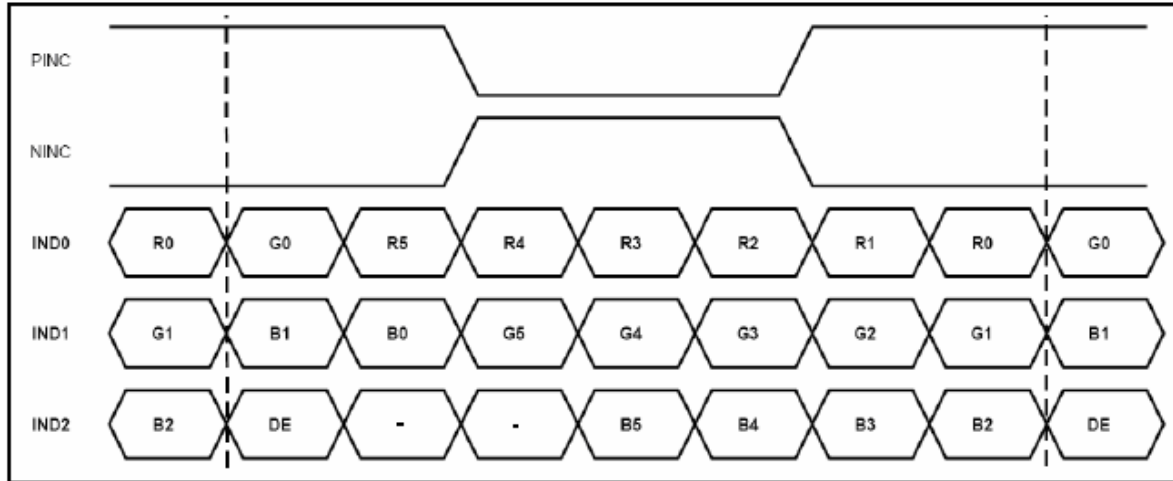




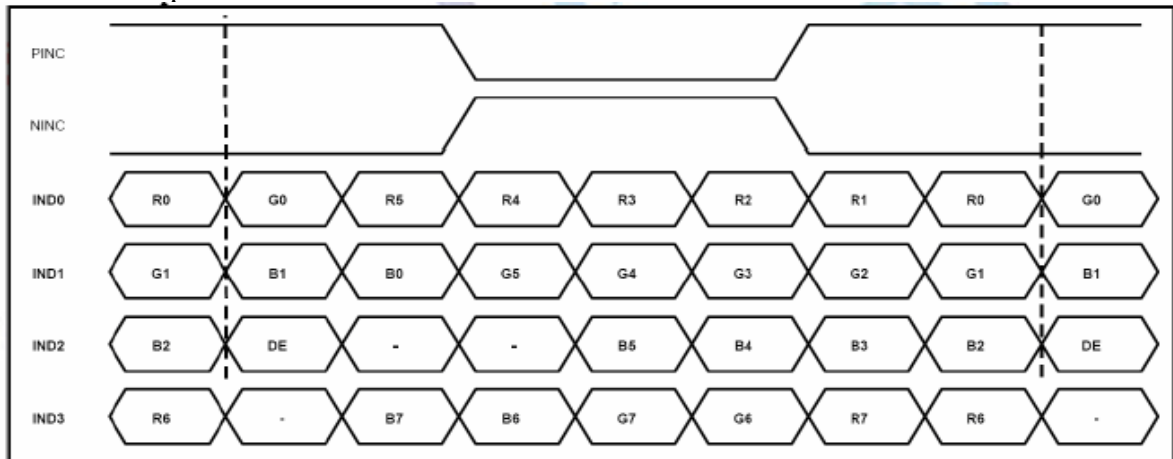
## 7.2 Timing Controller Timing Chart

### 7.2.1 Data Input format

6bit LVDS input



8bit LVDS input



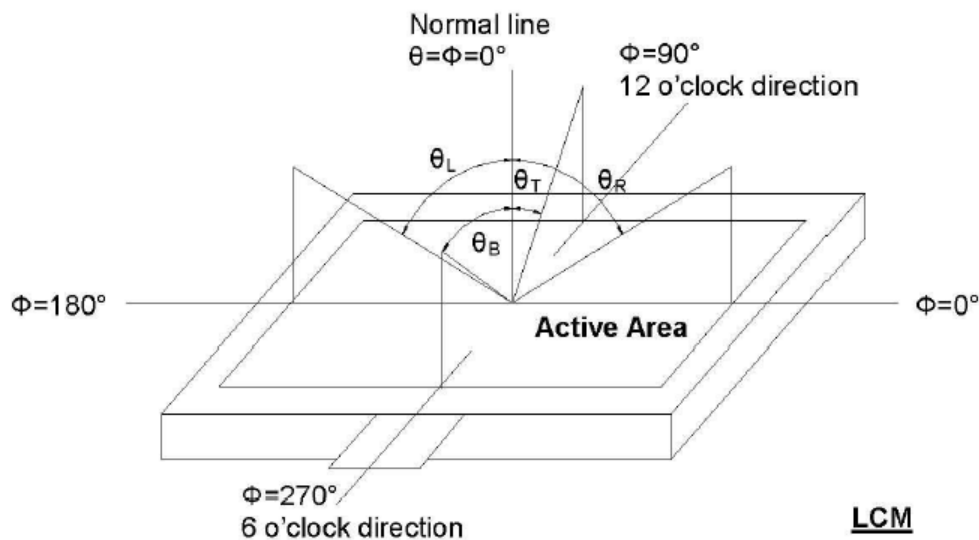
Note: Support DE timing mode only, SYNC mode not supported

## 8. OPTICAL CHARACTERISTIC

Parameter		Symbol	Condition	MIN.	TYP.	MAX.	Unit	Remarks
Viewing Angle		$\theta_L$	Center $CR \geq 10$	-	75	--	deg	Note 1,2,3
		$\theta_R$		-	75	--		
		$\theta_T$		-	70	--		
		$\theta_B$		-	75	--		
Contrast Ratio		CR	at optimized viewing angle	500	700	--		Note 2,3,4
Response time	Rise	$T_r$	Center	-	10	20	ms	Note 2,3,6
	Fall	$T_f$	$\theta_x = \theta_y = 0^\circ$	-	10	20	ms	
Uniformity		B-uni	$\theta_x = \theta_y = 0^\circ$	70	--	--	%	Note 2,3,5
Brightness		L	$\theta_x = \theta_y = 0^\circ$	--	350	--	cd/m <sup>2</sup>	Note 2,3
Chromaticity		$x_w$	Center	0.26	0.31	0.36		Note 2,3,7
		$y_w$	$\theta_x = \theta_y = 0^\circ$	0.28	0.33	0.38		
Image sticking		tis	2 hours					Note 2,3,8

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  $IL=160\text{mA}$ . The measurement method is shown in Note1.

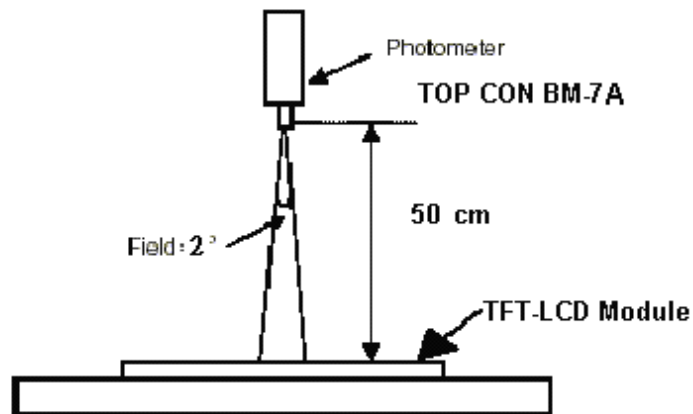
Note 1: Definition of viewing angle range



Note 2: All input terminals LCD panel must be ground while measuring the center area of the panel. The LED driving condition is  $IL=160\text{mA}$ .



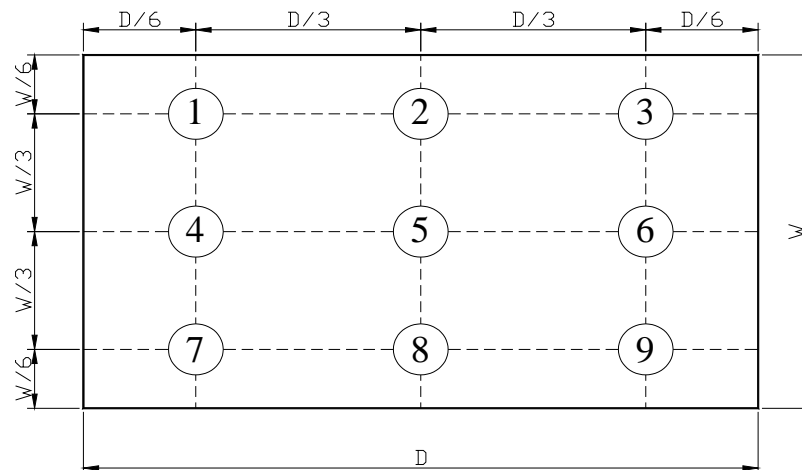
Note 3: Measured at the center area of the panel and at the viewing angle of the  $\theta_x = \theta_y = 0^\circ$



Note 4: Definition of Contrast Ratio (CR):

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

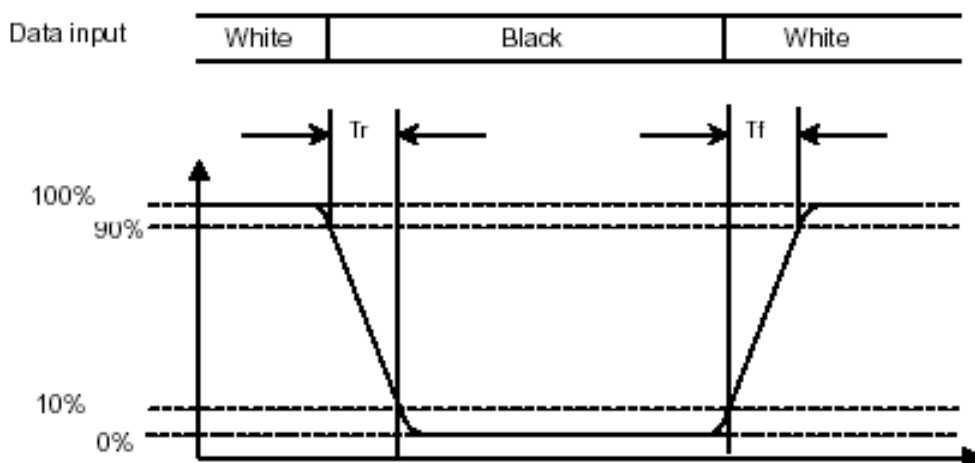
Note 5: Definition of Brightness Uniformity (B-uni):



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

**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.



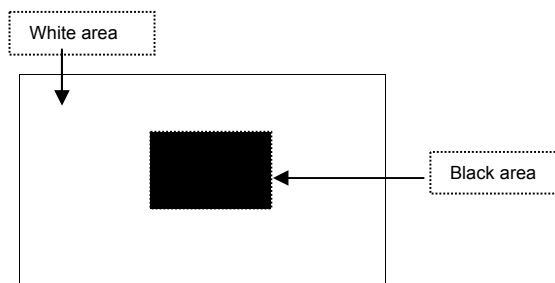
**Note 7: Definition of Chromaticity:**

The color coordinates ( $x_w, y_w$ ) are obtained with all pixels in the viewing field at white states, respectively.

**Note 8: Definition of Image sticking ( $t_{is}$ ):**

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	VCOM	Common Voltage	
2	VDD	Power Voltage for digital circuit	
3	VDD	Power Voltage for digital circuit	
4	NC	No connection	
5	Reset	Global reset pin	
6	STBYB	Standby mode, Normally pulled high STBYB = "1", normal operation STBYB = "0", timing controller, source driver will turn off, all output are High-Z	Note 1
7	GND	Ground	
8	RXIN0-	- LVDS differential data input	
9	RXIN0+	+ LVDS differential data input	
10	GND	Ground	
11	RXIN1-	- LVDS differential data input	
12	RXIN1+	+LVDS differential data input	
13	GND	Ground	
14	RXIN2-	- LVDS differential data input	
15	RXIN2+	+LVDS differential data input	
16	GND	Ground	
17	RXCLKIN-	- LVDS differential data input	
18	RXCLKIN+	+ LVDS differential data input	
19	GND	Ground	
20	RXIN3-	- LVDS differential data input	
21	RXIN3+	+ LVDS differential data input	
22	GND	Ground	
23	NC	No connection	
24	NC	No connection	
25	GND	Ground	
26	NC	No connection	
27	DIMO	Backlight CABC controller signal output	
28	SELB	6bit/8bit mode select	
29	AVDD	Power for Analog Circuit	
30	GND	Ground	
31	LED-	LED Cathode	
32	LED-	LED Cathode	
33	L/R	Horizontal inversion	Note 3
34	U/D	Vertical inversion	Note 3
35	VGL	Gate OFF Voltage	
36	CABCEN1	CABC H/W enable	Note 2
37	CABCEN0	CABC H/W enable	Note 2
38	VGH	Gate ON Voltage	
39	LED+	LED Anode	
40	LED+	LED Anode	

Note 1: If LVDS input data is 6 bits ,SELB must be set to High;

If LVDS input data is 8 bits ,SELB must be set to Low.

Note 2: When CABC\_EN=" 00" , CABC OFF.

When CABC\_EN=" 01" , user interface image.

When CABC\_EN=" 10" , still picture.

When CABC\_EN=" 11" , moving image.

When CABC off, don' t connect DIMO, else connect it to backlight.

Note 3: When L/R=" 0" , set right to left scan direction.

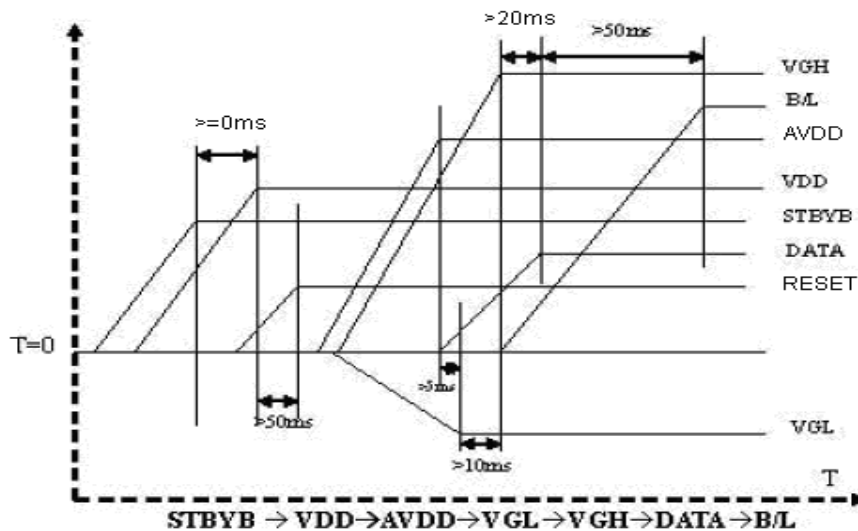
When L/R=" 1" , set left to right scan direction.

When U/D=" 0" , set top to bottom scan direction.

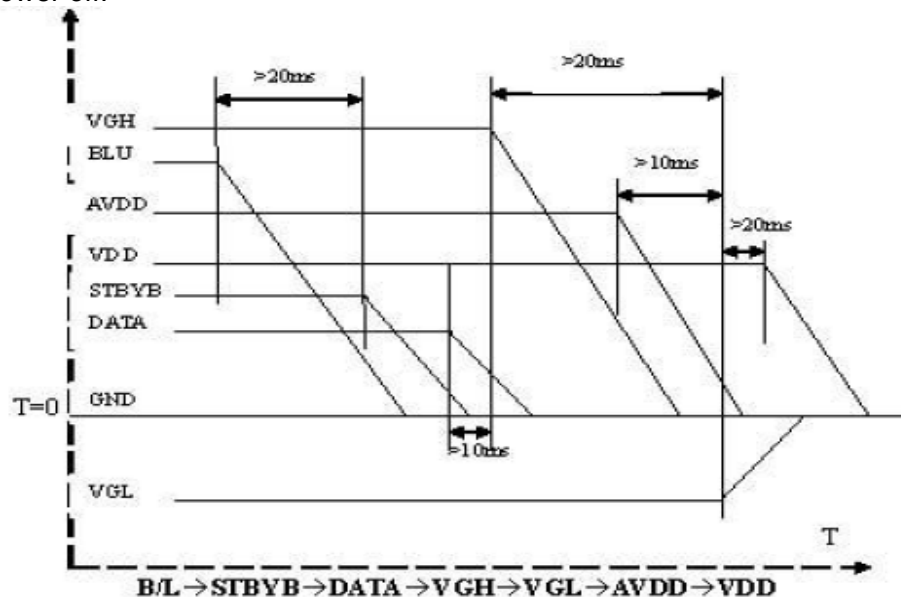
When U/D=" 1" , set bottom to top scan direction.

## 9.1 power ON/OFF sequence:

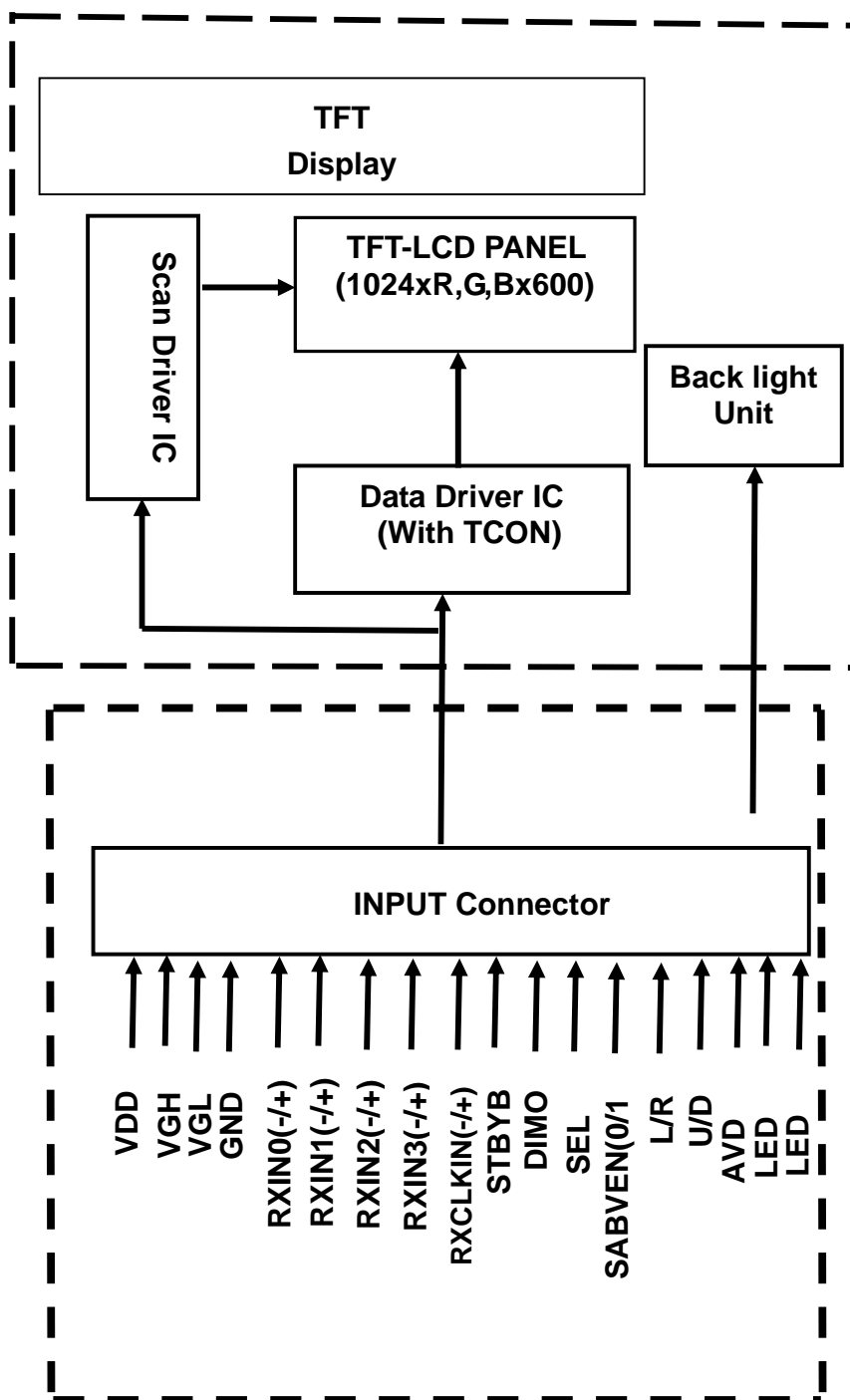
Power on:



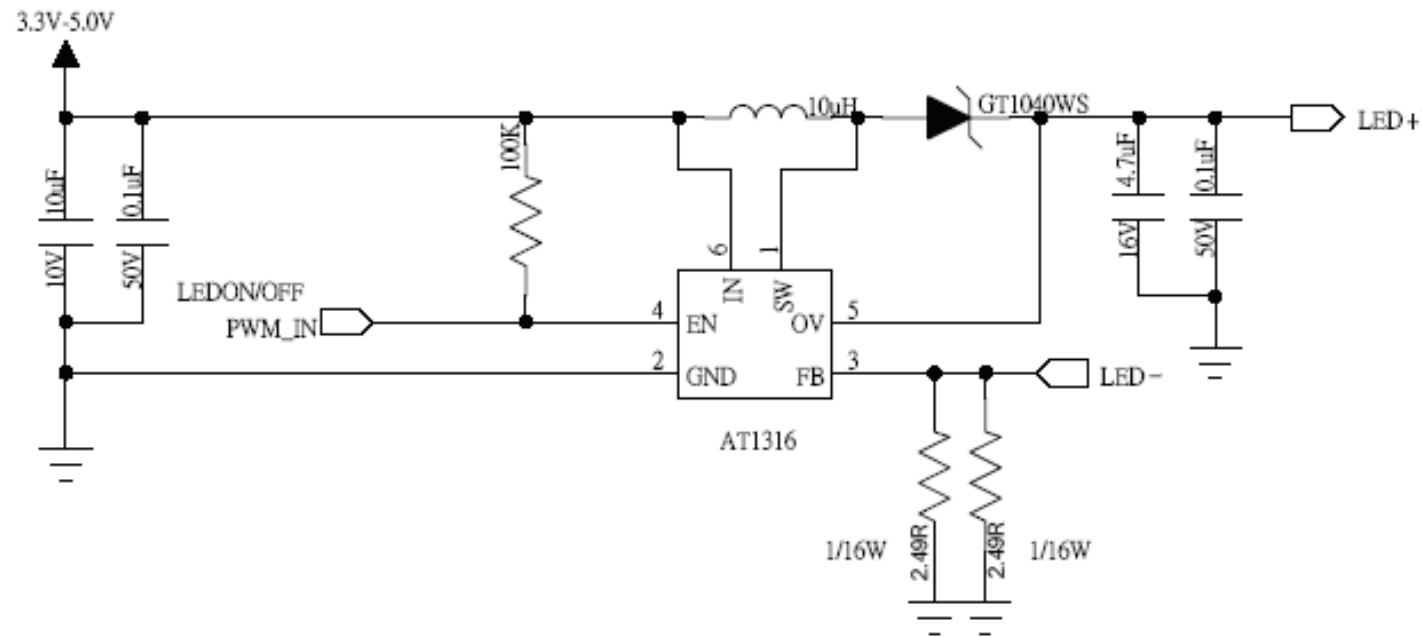
Power off:



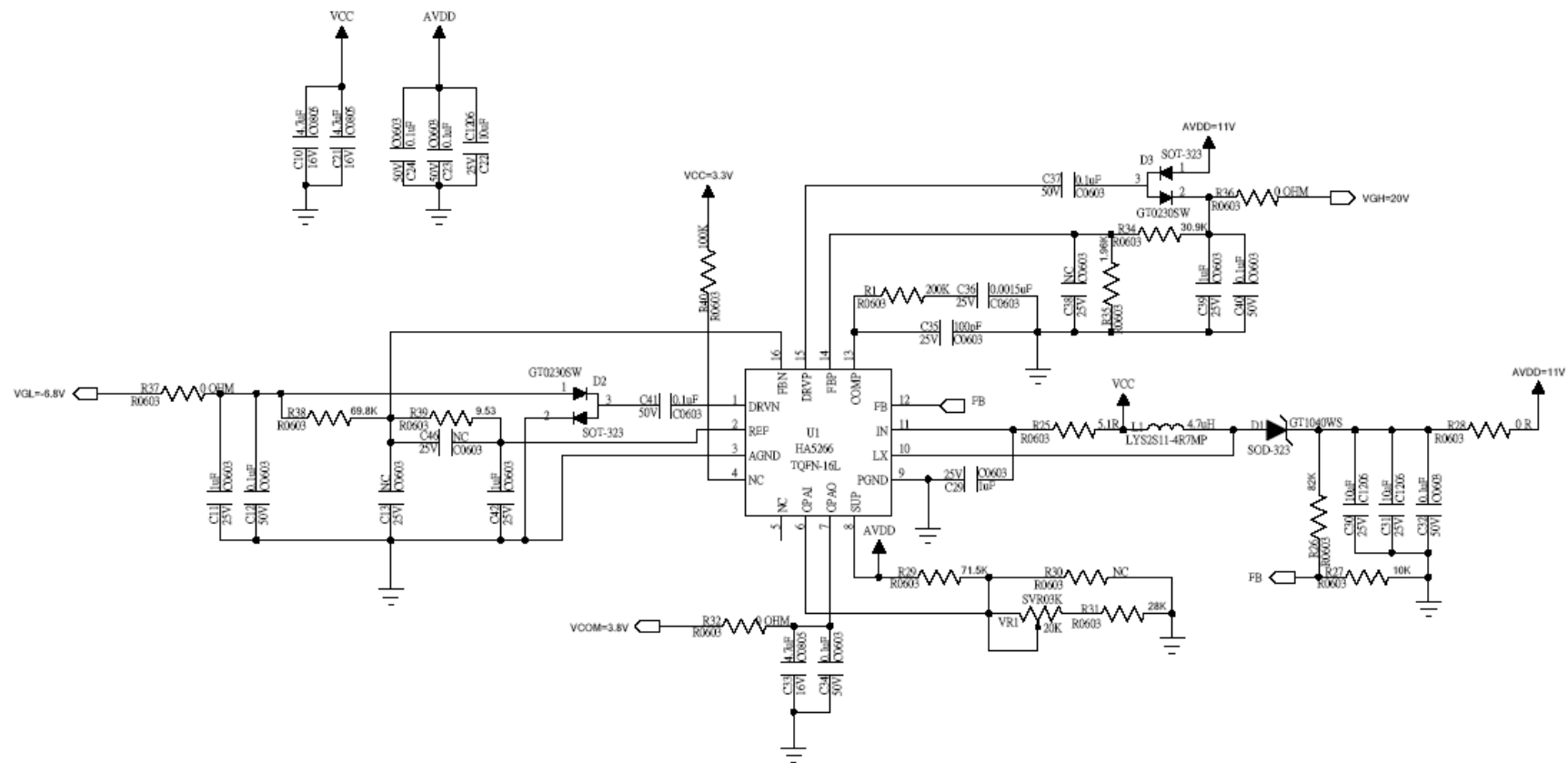
## 10. BLOCK DIAGRAM



## 11. APPLICATION CIRCUIT



B/L circuit



## DC-DC circuit

## 12. QUALITY ASSURANCE

### 12.1 Test Condition

#### 12.1.1 Temperature and Humidity(Ambient Temperature)

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

Humidity :  $65 \pm 5\%$

#### 12.1.2 Operation

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

#### 12.1.3 Container

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

#### 12.1.4 Test Frequency

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

#### 12.1.5 Test Method

Reliability Test Item & Level		Test Level
No.	Test Item	
1	High Temperature Storage Test	T=70 ,240hrs
2	Low Temperature Storage Test	T=-30 ,240hrs
3	High Temperature Operation Test	T=60 ,240hrs
4	Low Temperature Operation Test	T=-20 ,240hrs
5	High Temperature and High Humidity (No operation)	T=40 ,90%RH,240hrs
6	Thermal Cycling Test (No operation)	-30 → +25 → +70 , 100 Cycles 30 min 5 min 30 min
7	Vibration Test (No operation)	Frequency :10 ~ 55 Hz Amplitude :1.5 mm Sweep time : 11 mins Test Period: 6 Cycles for each direction of X, Y, Z

### 12.2 Judgment standard

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

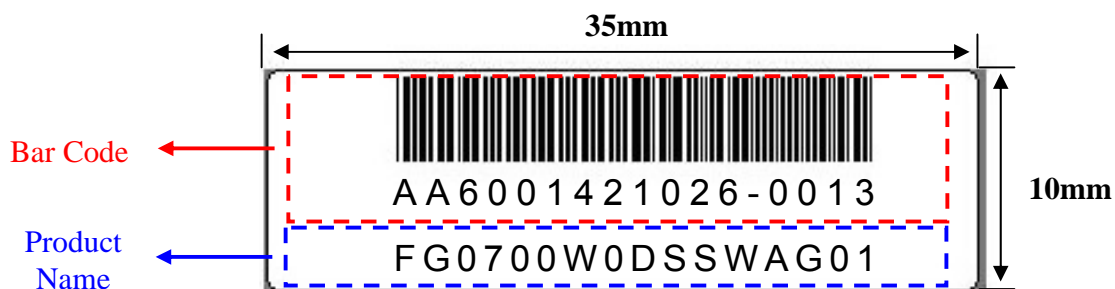
Pass: Normal display image with no obvious non-uniformity and no line defect. Partial transformation of the module parts should be ignored.

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



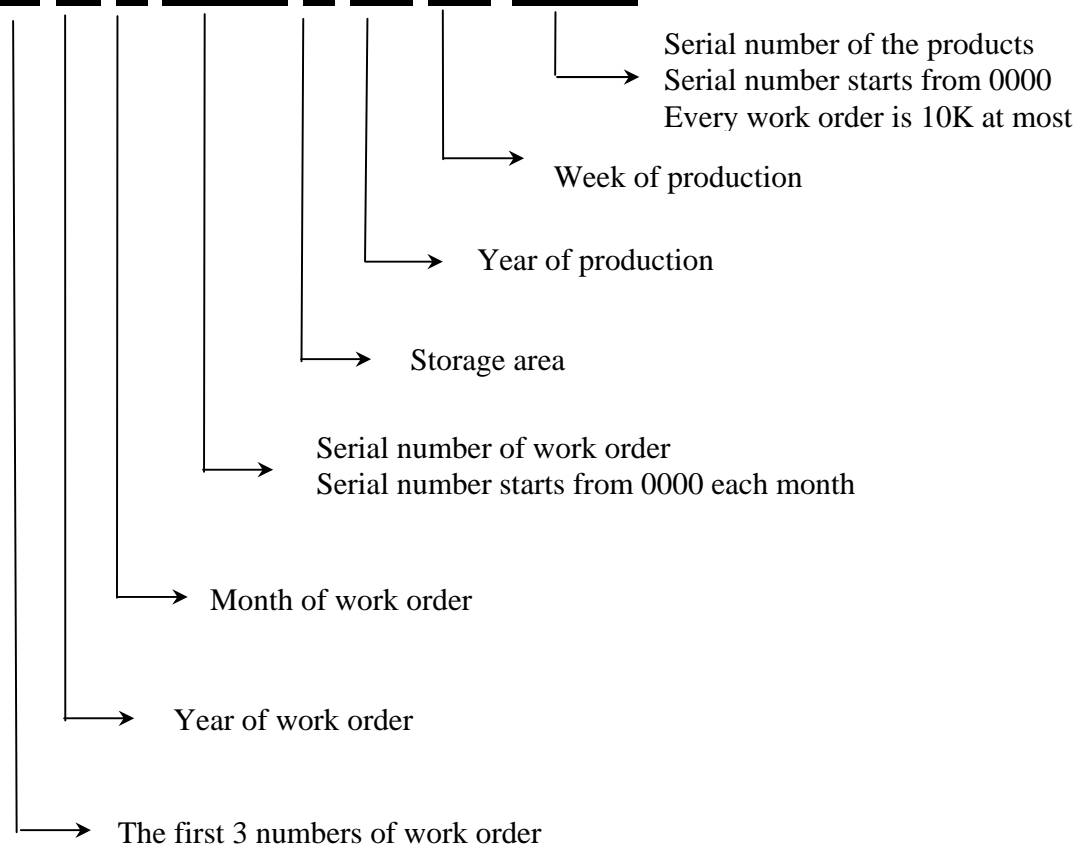
## 13. LCM PRODUCT LABEL DEFINE

Product Label style:

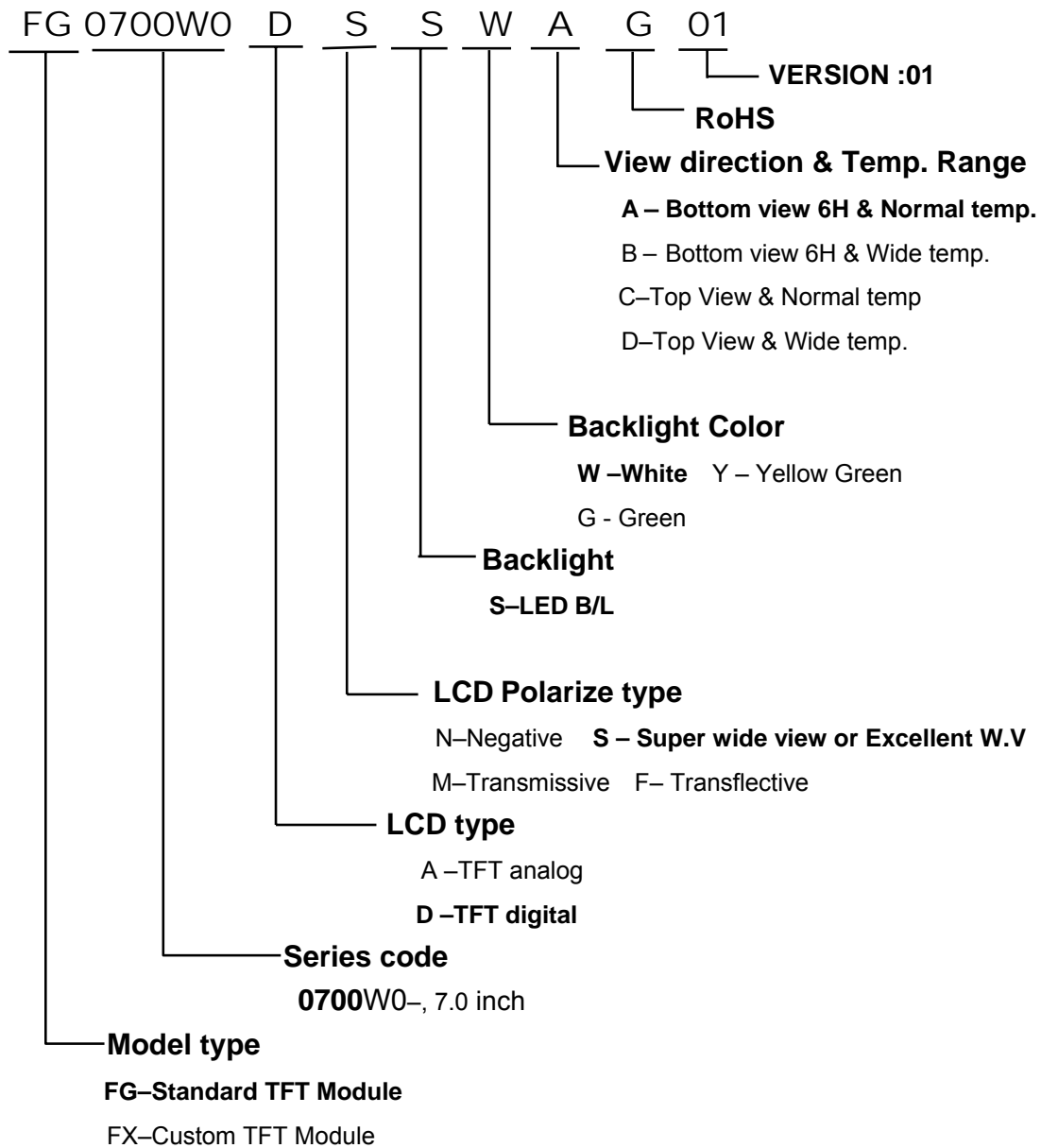


BarCode Define:

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



**Product Name Define:**



## 14. 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".

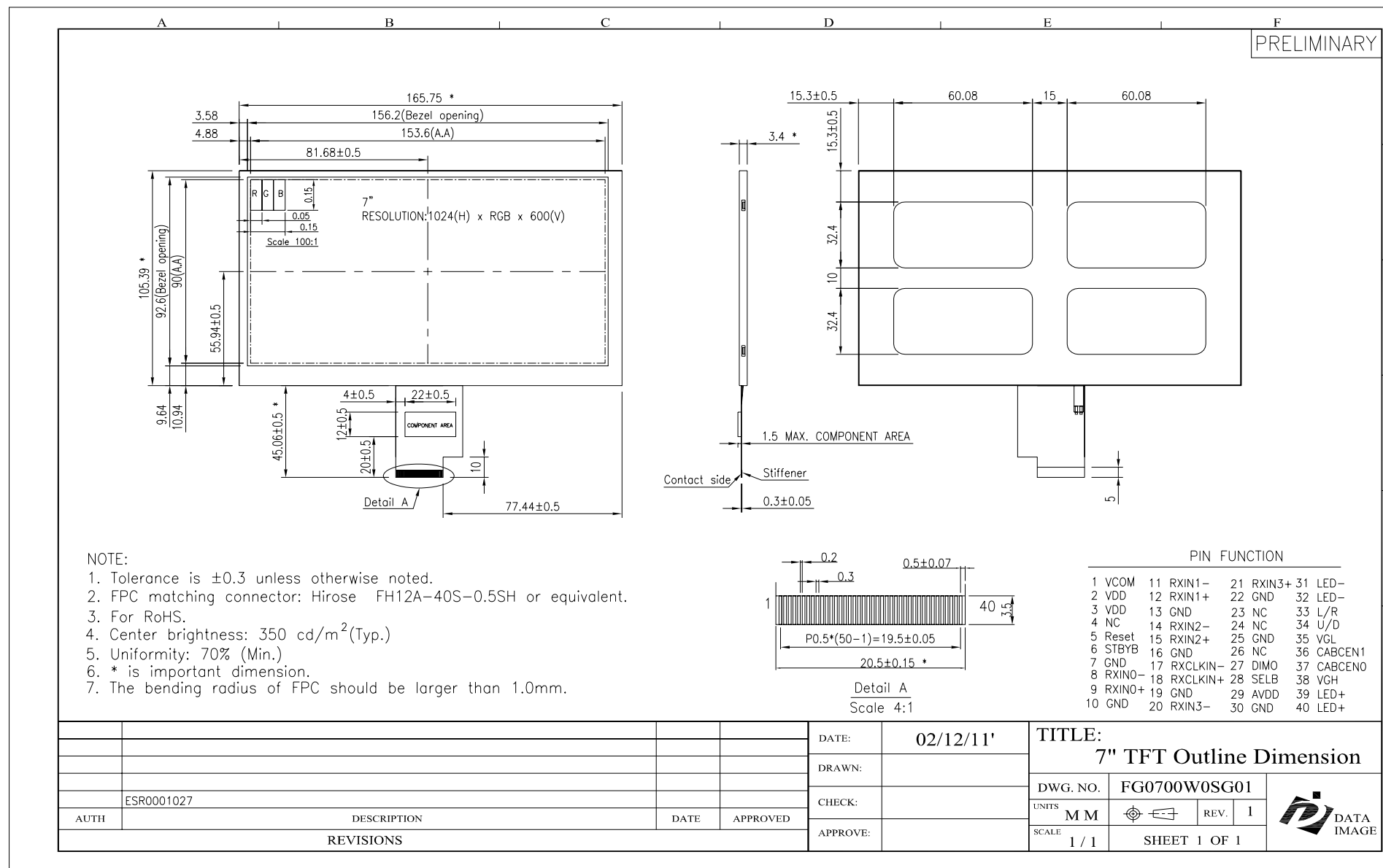
#### 2.5 Storage

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.

## 15. OUTLINE DRAWING



## 16. PACKAGE INFORMATION

