

TFT-Display Datenblatt

Modell FG090052DSSWBGL1

Kurzdaten

Hersteller	Data Image
Diagonale	9" / 22,9 cm
Format	15:9
Auflösung	800 x 480
Backlight	LED / 350 cd/m ²
Interface	RGB
Touchscreen	nein
Temperatur	-20°... +70°C (Betrieb)



DATA IMAGE CORPORATION

TFT Module Specification

Preliminary

ITEM NO.: FG090052DSSWBGL1

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Customer Companies	R&D Dept.	Q.C. Dept.	Eng. Dept.	Prod. Dept.
	JACK	JOE	GRAY	KEN
Approved by	Version:	Issued Date:	Sheet Code:	Total Pages:
	1	12/MAR/12'		18

2. RECORD OF REVISION

Rev	Date	Item	Page	Comment
1	12/MAR/12'			Initial PRELIMINARY

3. APPLICATION

DVD player, Car TV, Notebook PC

4. GENERAL SPECIFICATIONS

Parameter	Specifications	Unit
Screen Size	9 (diagonal)	inch
Display Format	800(H) x (R,G,B) x 480(V)	dot
Active Area	198(H) x 111.696(V)	mm
Dot Pitch	0.0825 (H) x 0.2327 (V)	mm
Pixel Configuration	RGB-Stripe	
Outline Dimension	210.7(W) x 126.4(H) x 5.3 (D)	mm
Surface treatment	Anti-glare	
Back-light	LED	
Display mode	Normally white	
Weight	T.B.D.	g
View Angle direction	6 o'clock	

5. ABSOLUTE MAXIMUM RATINGS

(GND=AVSS=0V, Note 1)

Item	Symbol	MIN.	MAX.	Unit	Remark
Power voltage	DVDD	-0.3	5.0	V	
	AVDD	-0.5	13.5	V	
	V _{GH}	13.0	19.0	V	
	V _{GL}	-12.0	-2.0	V	
	V _{GH} +V _{GL}	-	31.0	V	
Operating temperature	Top	-20	70	°C	
Storage temperature	Tst	-30	80	°C	

Note 1: The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

Note 2: VR Conditions: Zener Diode 20mA

5.1. Typical Operation Conditions

(GND=AVSS=0V, Note 1)

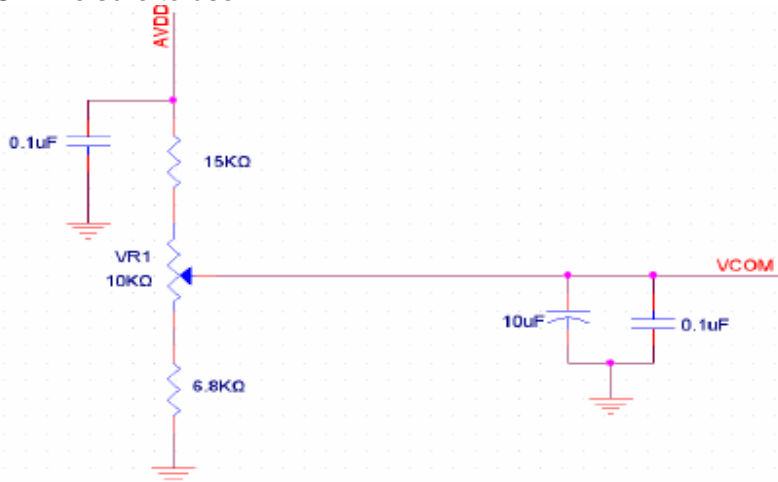
Item	Symbol	MIN.	TYP	MAX.	Unit	Remark
Power voltage	DVDD	3.0	3.3	3.6	V	Note2
	AVDD	10.2	10.4	10.6	V	
	V _{GH}	16.3	17.0	17.7	V	
	V _{GL}	-5.7	-5.0	-4.3	V	
Input signal voltage	V _{com}	3.2	4.2	5.2	V	Note4
Input logic high voltage	V _{IH}	0.7 DVDD	-	DVDD	V	Note3
Input logic low voltage	V _{IL}	0	-	0.3DVDD	V	

Note 1: Be sure to apply DVDD and VGL to the LCD first, and then apply VGH.

Note 2: DVDD setting should match the signals output voltage (refer to Note 3) of Customer's system board.

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

Note 4: Typical VCOM is only a reference value, it must be optimized according to each LCM. Be sure to use VR.



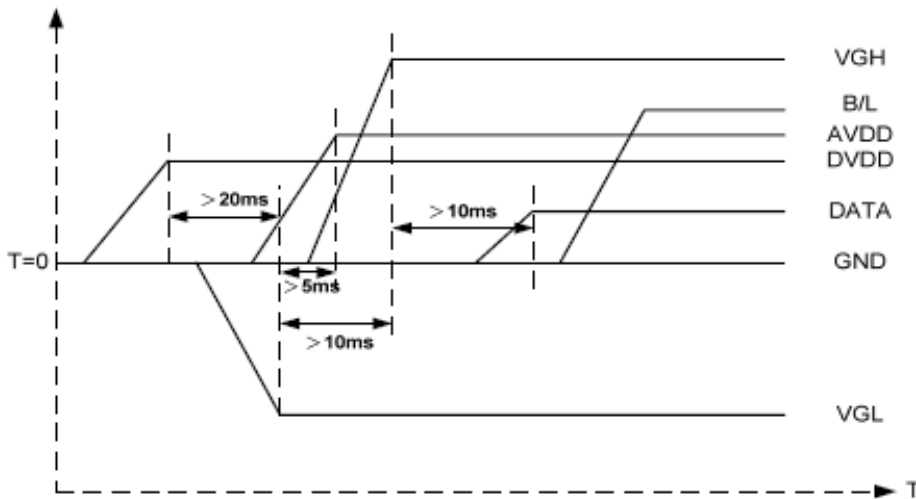
5.2. Current Consumption

(GND=AVSS=0V)

Item	Symbol	MIN.	TYP	MAX.	Unit	Remark
Current for Driver	IGH	-	0.3	1	mA	VGH =17.0V
	IGL	-	0.3	1	mA	VGL = -5.0V
	IDVDD	-	5.5	10	mA	VDD =3.3V
	IAVDD	-	32	50	mA	AVDD =10.4V

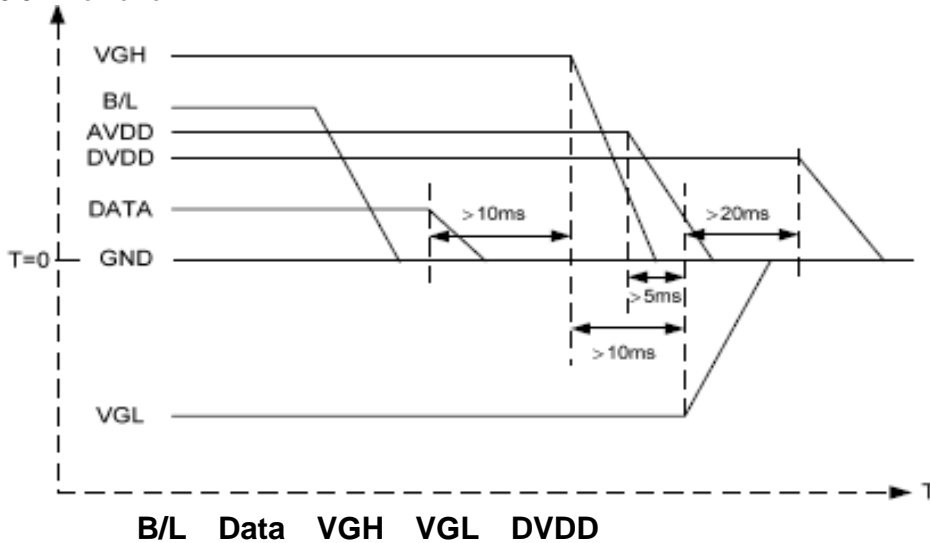
5.3. Power Sequence

5.3.1 Power on:



DVDD → VGL → VGH → Data → B/L

Note: Data include R0~R7, B0~B7, GO~G7, U/D, L/R, DCLK, HS, VS, DE.

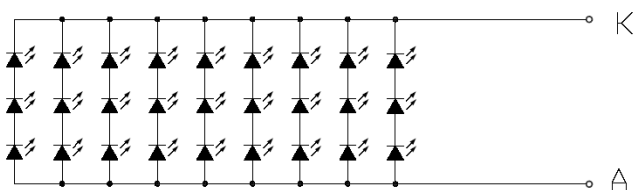
5.3.2 Power off:


Note: Data include R0~R7, B0~B7, GO~G7, U/D, L/R, DCLK, HS, VS, DE.

6. ELECTRICAL CHARACTERISTICS
 $f_H=31.5\text{KHz}$, $F_v=60\text{Hz}$, $f_{\text{CLK}}=33.3\text{MHz}$, $T_a=25^\circ\text{C}$

Parameter	Symbol	MIN.	Typ.	MAX.	Unit	Remark
Power Supply voltage for LCD	DVDD	+3.0	+3.3	+3.6	V	
Power Supply Current for LCD	I_{CC}	--	T.B.D	--	mA	DVDD =3.3V
Ripple voltage	V_{RF}	-	-	100	mV _{P-P}	
"H" level logical input voltage	V_{IH}	0.7DVDD	--	DVDD	V	
"L" level logical input voltage	V_{IL}	0	--	0.3DVDD	V	
LED current	I_{L}	--	180	--	mA	
VLED voltage	V_{L}	9.0	9.9	10.5	V	
LED life time		T.B.D	T.B.D		Hr	Note 1

Note 1: The "LED life time" is defined as the module brightness decrease to 50% original brightness that the ambient temperature is 25 .



7. TIMING SPECIFICATIONS

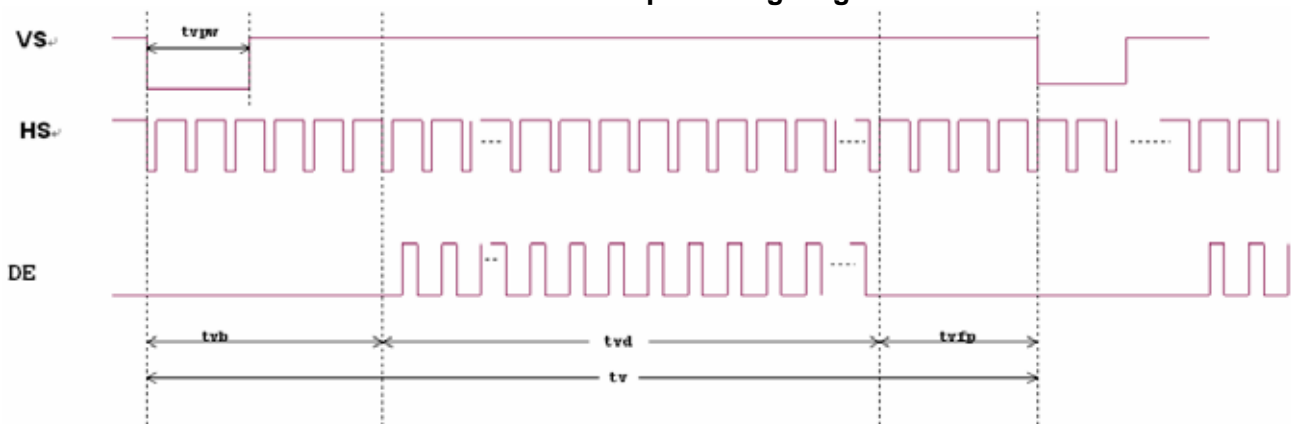
7.1. AC Electrical Characteristics

ITEM	SYMBOL	MIN	TYP.	MAX.	UNIT
HS setup time	T_{hst}	8	-	-	ns
HS hold time	F_{hhd}	8	-	-	ns
VS setup time	T_{vst}	8	-	-	ns
VS hold time	T_{vhd}	8	-	-	ns
Data setup time	T_{dsu}	8	-	-	ns
Data hole time	T_{dhd}	8	-	-	ns
DE setup time	T_{esu}	8	-	-	ns
DE hole time	T_{ehd}	8	-	-	ns
DVDD Power On Slew rate	T_{POR}	-	-	20	ms
RESET pulse width	T_{Rst}	1	-	-	ms
DCLK cycle time	T_{coh}	20	-	-	ns
DCLK pulse duty	T_{cwh}	40	50	60	%

7.2. Data Input Format



Horizontal input timing diagram



Vertical input timing diagram

7.3 Timing

Item	Symbol	MIN.	Typ.	MAX.	Unit	Remark
Horizontal Display Area	thd	-	800	-	DCLK	
DCLK Frequency	fclk	26.4	33.3	46.8	MHz	
One Horizontal Line	th	862	1056	1200	DCLK	
HS pulse width	thpw	1	-	40	DCLK	
HS Blanking	thb	46	46	46	DCLK	
HS Front Porch	thfp	16	210	354	DCLK	

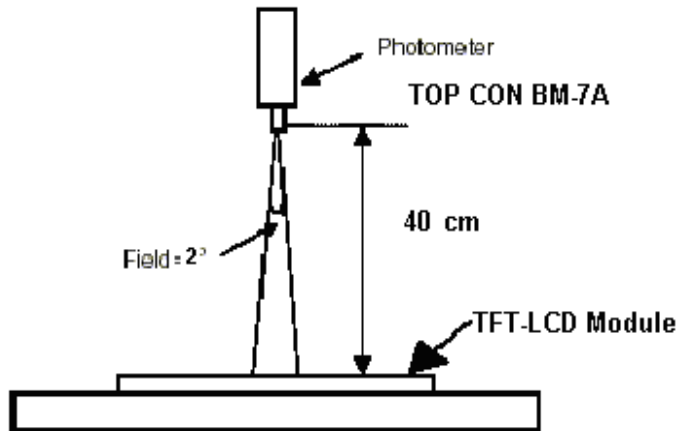
Item	Symbol	MIN.	Typ.	MAX.	Unit	Remark
Vertical Display Area	tvd	-	480	-	TH	
VS period time	tv	510	525	650	TH	
VS pulse width	tvpw	1	-	20	TH	
VS Blanking	tvb	23	23	23	TH	
VS Front Porch	tvfp	7	22	147	TH	

8. OPTICAL CHARACTERISTIC

Parameter		Symbol	Condition	MIN.	TYP.	MAX.	Unit	Remarks
Viewing Angle	Horizontal	θ_{x+}	Center CR \geq 10	60	70	--	deg	Note 1,4
		θ_{x-}		60	70	--		
	Vertical	θ_{y+}		40	50	--		
		θ_{y-}		60	70	--		
Contrast Ratio		CR	at optimized viewing angle	400	500			Note 1,3
Response time	Rise	Tr	Center	-	10	20	ms	Note 1,6
	Fall	Tf	$\theta_x=\theta_y=0^\circ$	-	15	30	ms	
Uniformity		B-uni	$\theta_x=\theta_y=0^\circ$	70	75	--	%	Note 1,5
Brightness				280	350	--		Note 1,2,4
Chromaticity		x_W	Center $\theta_x=\theta_y=0^\circ$	0.26	0.31	0.36		Note 1,7
		y_W		0.28	0.33	0.38		
		x_R		0.53	0.58	0.63		
		y_R		0.29	0.34	0.39		
		x_G		0.31	0.36	0.41		
		y_G		0.54	0.59	0.64		
		x_B		0.10	0.15	0.20		
	y_B	0.04	0.090	0.14				
Image sticking		tis	2 hours			2	Sec	Note 8

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

Note 1: The method of optical measurement:

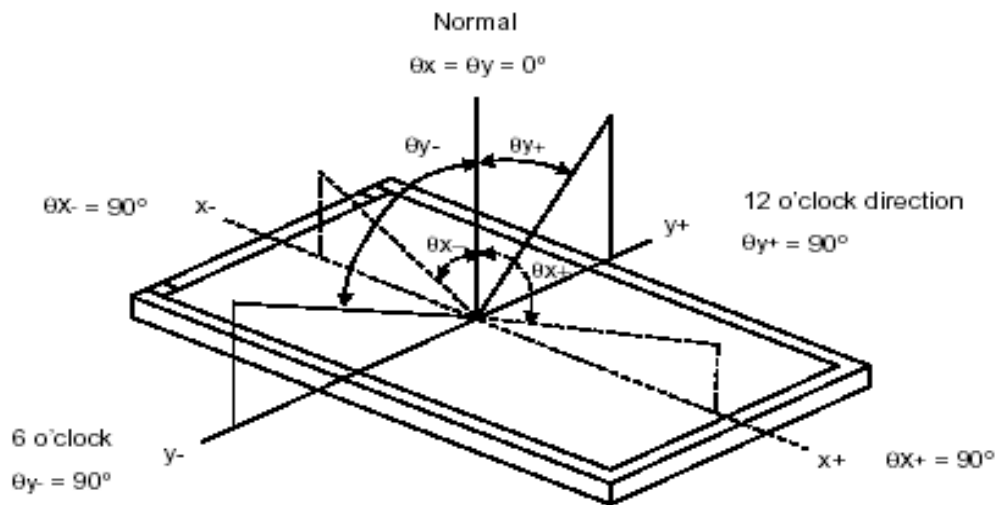


Note 2: Measured at the center area of the panel and at the viewing angle of the $\theta_x = \theta_y = 0^\circ$ (Note4) When all the input terminal of LCD Panel are electrically opened.

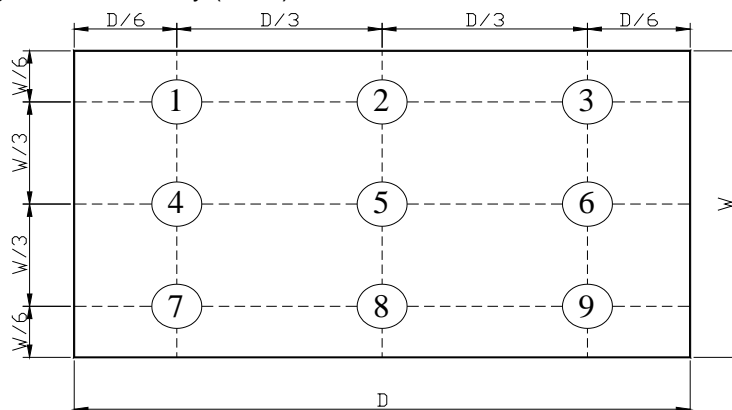
Note 3: Definition of Contrast Ratio (CR):

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

Note 4: Definition of Viewing Angle



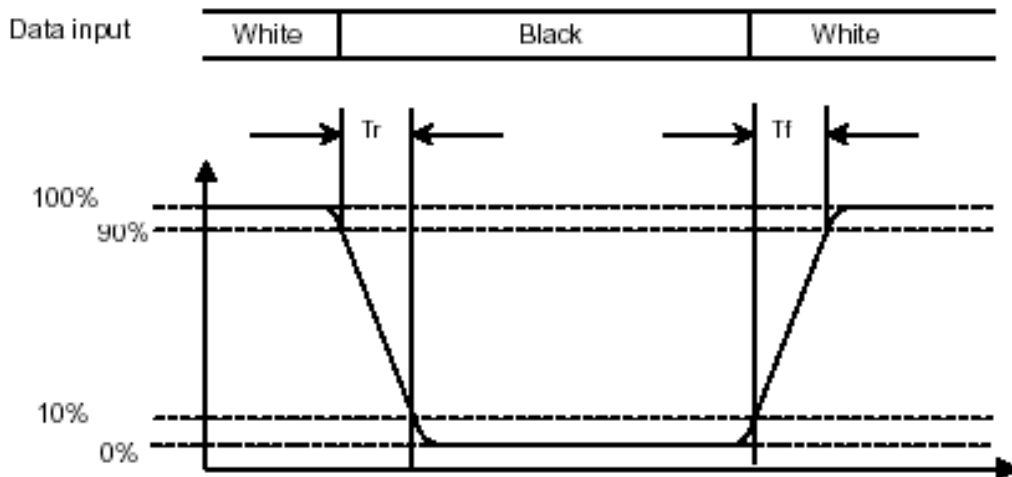
Note 5: Definition of Brightness Uniformity (B-uni):



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

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.



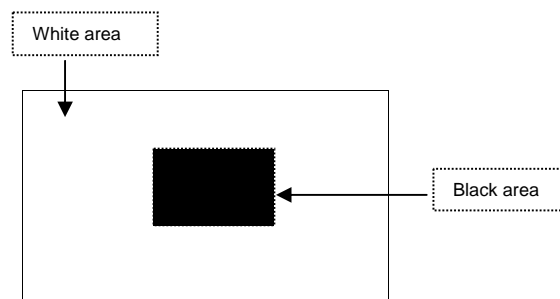
Note 7: Definition of Chromaticity:

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	I/O	DESCRIPTION	Remark
1	NC	-	No connection	Note 8
2	NC	-	No connection	Note 8
3	NC	-	No connection	Note 8
4	NC	-	No connection	Note 8
5	GND	P	Power Ground	
6	VCOM	I	Common voltage	
7	DVDD	P	Power for Digital Circuit	
8	MODE	I	DE/SYNC mode select	Note 1
9	DE	I	Data Enable signal	
10	VS	I	Vertical Sync Input	
11	HS	I	Horizontal Sync Input	
12	B7	I	Blue Data 7 (MSB)	
13	B6	I	Blue Data 6	
14	B5	I	Blue Data 5	
15	B4	I	Blue Data 4	
16	B3	I	Blue Data 3	
17	B2	I	Blue Data 2	
18	B1	I	Blue Data 1	Note 2
19	B0	I	Blue Data 0 (LSB)	Note 2
20	G7	I	Green Data 7 (MSB)	
21	G6	I	Green Data 6	
22	G5	I	Green Data 5	
23	G4	I	Green Data 4	
24	G3	I	Green Data 3	
25	G2	I	Green Data 2	
26	G1	I	Green Data 1	Note 2
27	G0	I	Green Data 0 (LSB)	Note 2
28	R7	I	Red Data 7 (MSB)	
29	R6	I	Red Data 6	
30	R5	I	Red Data 5	
31	R4	I	Red Data 4	
32	R3	I	Red Data 3	
33	R2	I	Red Data 2	
34	R1	I	Red Data 1	Note 2
35	R0	I	Red Data 0 (LSB)	Note 2
36	GND	P	Power Ground	
37	DCLK	I	Sample clock	Note 3
38	GND	P	Power Ground	
39	L/R	I	Left / right selection	Note 4,5
40	U/D	I	Up/down selection	Note 4,5
41	VGH	P	Gate ON Voltage	
42	VGL	P	Gate OFF Voltage	
43	AVDD	P	Power for Analog Circuit	
44	RESET	I	Global reset pin	Note 6
45	NC	-	No connection	

46	VCOM	I	Common Voltage	
47	DITHB	I	Dithering function	Note 7
48	GND	P	Power Ground	
49	NC	-	No connection	
50	NC	-	No connection	

I: input, O: output, P: Power

Note 1: DE/SYNC mode select. Normally pull high.

When select DE mode, MODE= " 1 " , VS and HS must pull high.

When select SYNC mode, MODE= " 0 " , DE must be grounded.

Note 2: When input 18 bits RGB data, the two low bits of R,G and B data must be grounded.

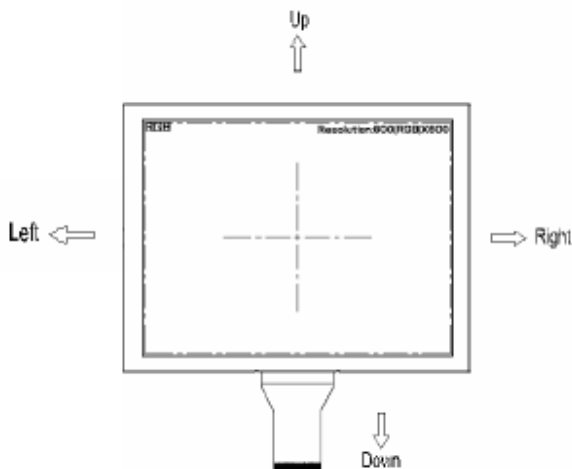
Note 3: Data shall be latched at the falling edge of DCLK.

Note 4: Selection of scanning mode

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

Note 5: Definition of scanning direction.

Refer to the figure as below:



Note 6: Global reset pin. Active low to enter reset state. Suggest to connect with an RC reset circuit for stability. Normally pull high.

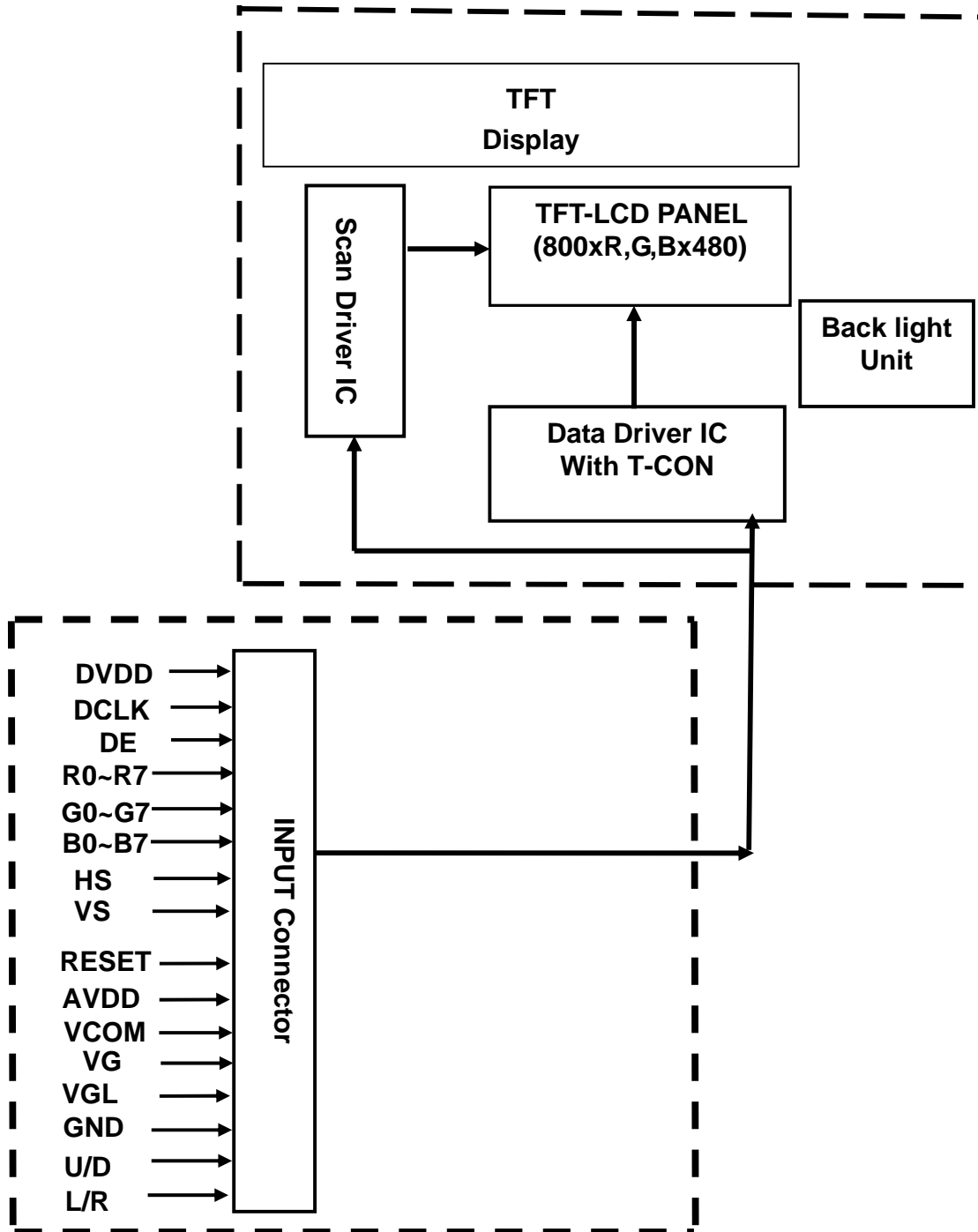
Note 7: Dithering function enable control, normally pull high.

When DITHB= " 1 " ,Disable internal dithering function,

When DITHB= " 0 " ,Enable internal dithering function,

Note 8: Reserve for LED power input.

10. BLOCK DIAGRAM



11. QUALITY ASSURANCE

11.1 Test Condition

11.1.1 Temperature and Humidity(Ambient Temperature)

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

Humidity : $65 \pm 5\%$

11.1.2 Operation

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

11.1.3 Container

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

11.1.4 Test Frequency

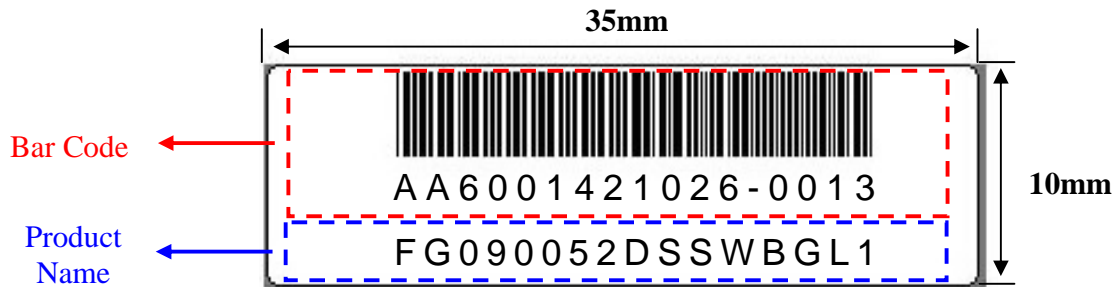
In case of related to deterioration such as shock test. It will be conducted only once.

11.1.5 Test Method

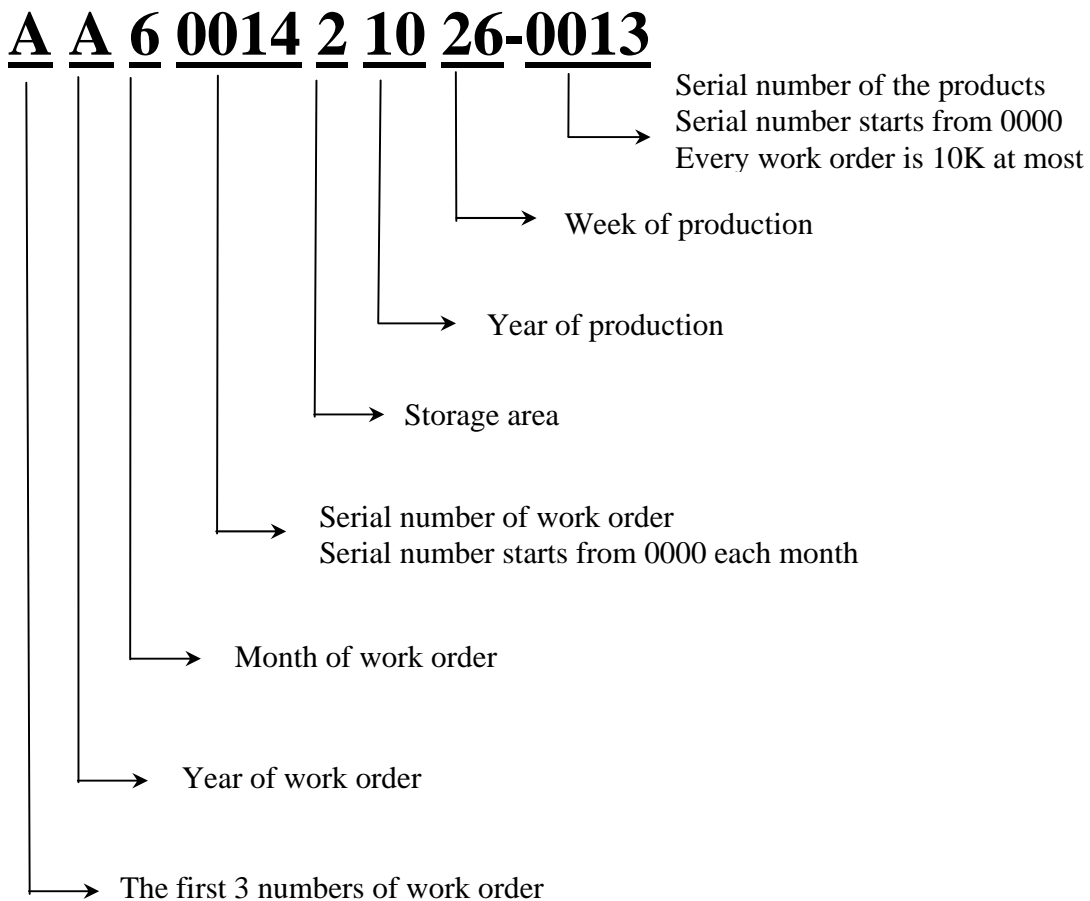
Reliability Test Item & Level		
No.	Test Item	Test Level
1	High Temperature Storage Test	T=+80°C,240hrs
2	Low Temperature Storage Test	T=-30°C,240hrs
3	High Temperature Operation Test	T=+70°C,240hrs
4	Low Temperature Operation Test	T=-20°C,240hrs
5	High Temperature and High Humidity Operation Test	T=60°C,90%RH,240hrs
6	Thermal Cycling Test (No operation)	-30 /30 min ~ +80 /30 min for a total 100 cycles, Start with cold temperature and end with high temperature.
7	Vibration Test (No operation)	Frequency:10 ~ 57 Hz Amplitude:1.0 mm 58 ~ 500 Hz, 1G Sweep Time:11min Test Period:3hrs (1hrs for each Direction of X,Y,Z)

12. LCM PRODUCT LABEL DEFINE

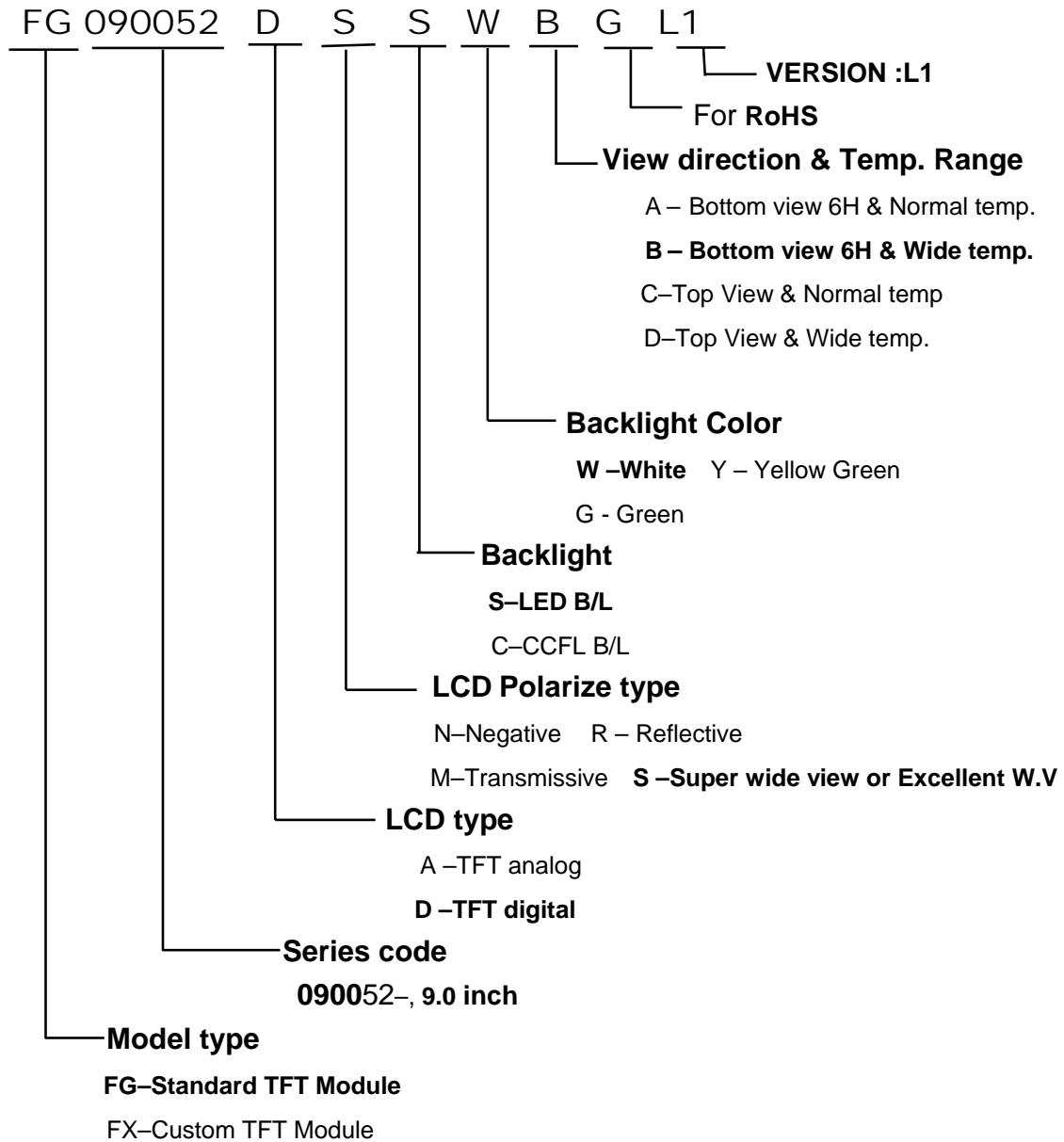
Product Label style:



BarCode Define:



Product Name Define:



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 V_0 .
- (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".

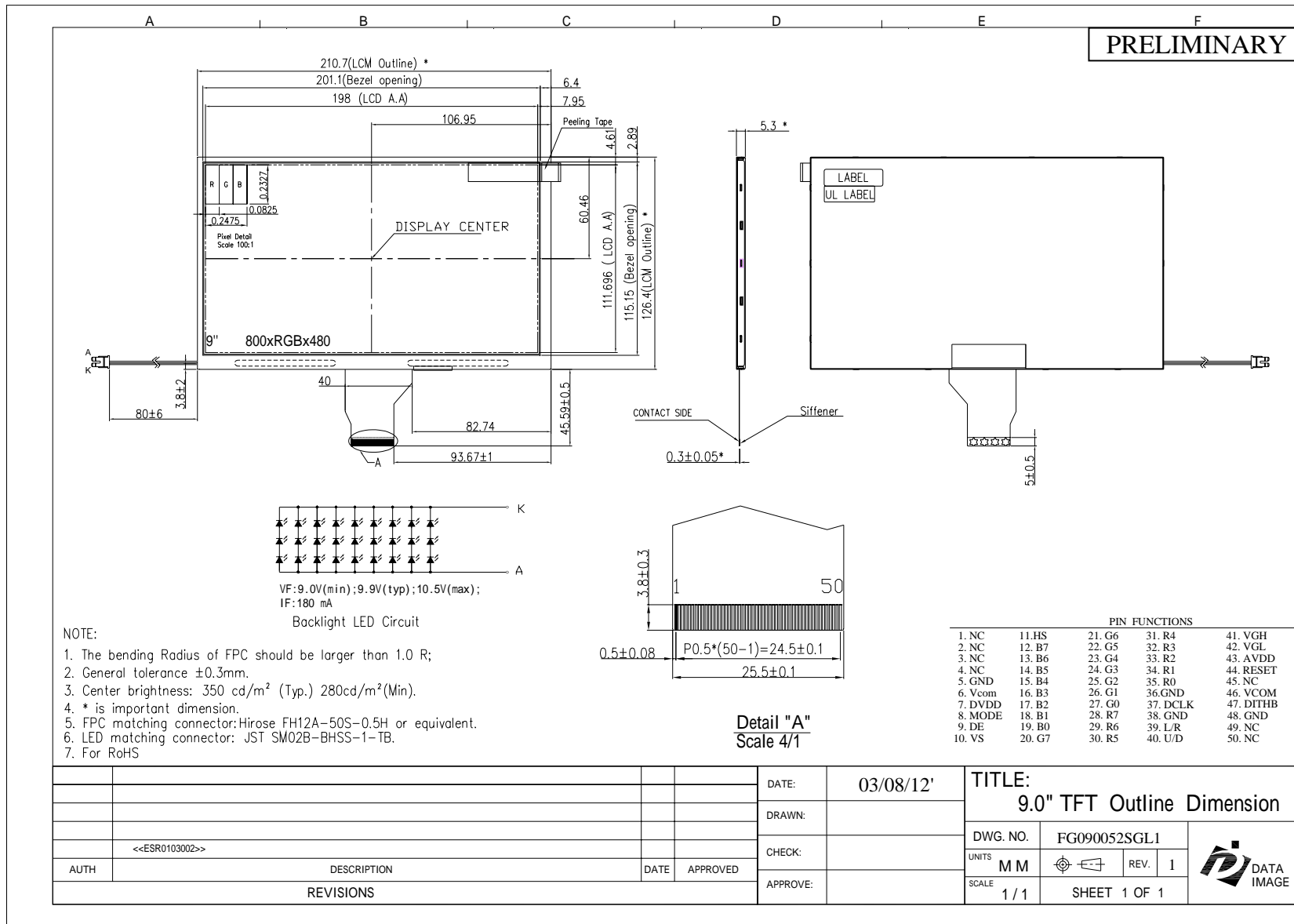
2.5 Storage

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.

Confidential Document
14. OUTLINE DRAWING



15. PACKAGE INFORMATION**T.B.D**