



# DATA IMAGE CORPORATION

## TFT Module Specification Preliminary

ITEM NO.: FG0403J0DSSWMG01

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	1	20/MAR/14'		24

**2. RECORD OF REVISION**

Rev	Date	Item	Page	Comment
1	20/MAR/14'			Initial Preliminary

### 3. INTRODUCTION

The FG0403J0 is a kind of Transmissive TFT, active matrix color liquid crystal display (LCD) comprising an amorphous silicon TFT attached to each signal electrode. This module is consisting of TFT-LCD module, a driver circuit, a back-light unit. The resolution of a 4.3" contains 480x(RGB)x800 pixels.

### 4. GENERAL SPECIFICATIONS

Parameter	Specifications	Unit
Screen Size	4.3 (diagonal)	inch
Display Format	480(H) x (R,G,B) x 800(V)	dot
Active Area	55.8(W) ×93 (H) mm	mm
Pixel Pitch	0.11625(W) × 0.11625(H) mm	mm
Pixel Configuration	Stripe	
Outline Dimension	62.54(W) x107.6 (H) x2.7 (D)	Mm
Back-light	LED	
TFT-LCD Display mode	Normally Black	
Weight	TBD	g
View Angle direction(TFT)	All	

### 5. ABSOLUTE MAXIMUM RATINGS

GND=0V

Parameter	Symbol	MIN.	MAX.	Unit	Remark
Power supply voltage	VDD	-0.3	4.6	V	
	VDDI	-0.3	4.6	V	
Operating temperature	Top	-20	70	°C	
Storage temperature	Tst	-30	80	°C	

### 6. ELECTRICAL CHARACTERISTICS

#### 6.1 Operating Conditions

GND=0V, Ta=25°C

Parameter	Symbol	MIN.	Typ.	MAX.	Unit	Remark
Power Supply voltage	VDD	2.5	-	3.3	V	
	VDDI	1.65	-	3.3	V	
"H" level logical input voltage	V <sub>IH</sub>	0.7*VDDI	-	VDDI	V	
"L" level logical input voltage	V <sub>IL</sub>	0	-	0.3*VDDI	V	

**6.3 Backlight Driving Consumption**

Ta= 25°C

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
LED voltage	$V_L$		25.6		V	Note1
LED current	$I_L$	-	20	-	mA	Note1
LED dice Life Time		15000			hr	Note2

Note 1 :



Voltage :25.6 V (Typ.)

Current :20 mA (Typ.)

## backlight circuit

Note 2 : The “LED dice life time” is defined as the brightness decrease to 50% original brightness that the ambient temperature is 25 and LED dice current=20mA.

## 7. FUNCTIONAL DESCRIPTION

### 7.1 AC Characteristics

Serial interface characteristic

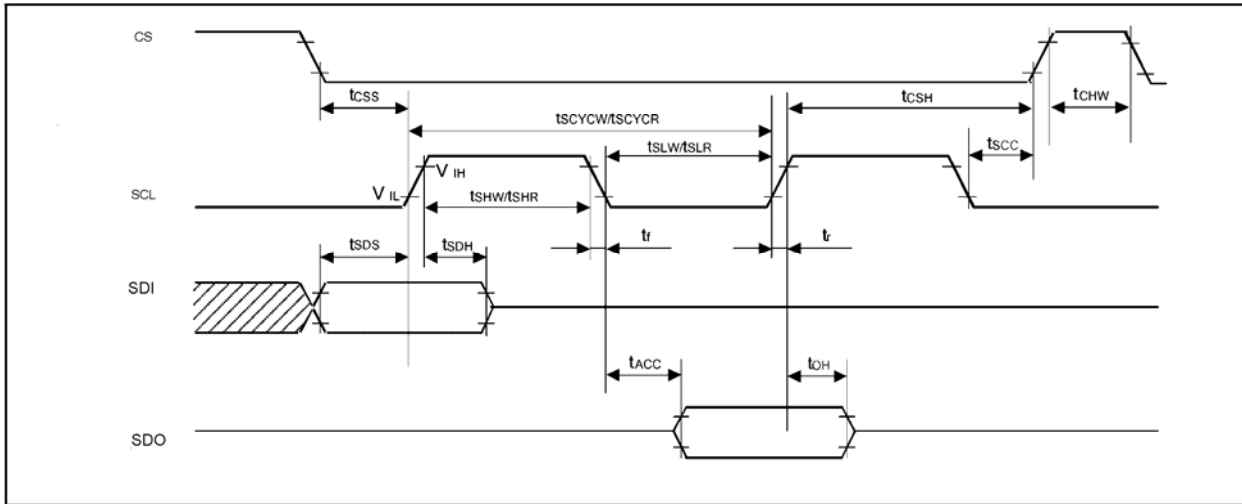


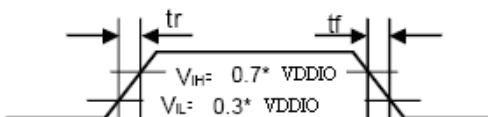
Figure 7.1-1 Serial Interface Characteristics

Parameter	Symbol	Conditions	MIN	TYP	MAX	Unit
Serial clock cycle (Write)	$t_{SCYCW}$		80			
SCL "H" pulse width (Write)	$t_{SHW}$	SCL	30		--	ns
SCL "L" pulse width (Write)	$t_{SLW}$	SCL	30			
Data setup time (Write)	$t_{SDS}$	SDI	10		--	ns
Data hold time (Write)	$t_{SDH}$	SDI	10			
Serial clock cycle (Read)	$t_{SCYCR}$		150			
SCL "H" pulse width (Read)	$t_{SHR}$	SCL	60		--	ns
SCL "L" pulse width (Read)	$t_{SLR}$	SCL	60			
Access rime	$t_{ACC}$	SDO For maximum $C_L=30pF$ For maximum $C_L=8pF$	10		60	ns
Output disable time	$t_{OH}$	SDO For maximum $C_L=30pF$ For maximum $C_L=8pF$	15		100	ns
SCL to Chip select	$t_{SCC}$	CS	30		--	ns
CS "H" pulse width	$t_{CHW}$	CS	60		--	ns
CS -SCL time (write)	$t_{CSS}$	CS	30		--	ns
CS -SCL time (write)	$t_{CSH}$	CS	30			
CS -SCL time (Read)	$t_{CSS}$	CS	60		--	ns
CS -SCL time (Read)	$t_{CSH}$	CS	65			

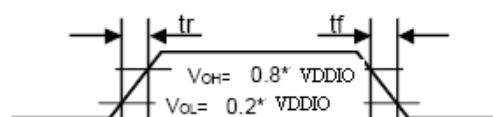
**Note:** The input signal rise time and fall time ( $t_r$ ,  $t_f$ ) is specified at 15 ns or less.

Logic high and low levels are specified as 30% and 70% of VDDIO for Input signals.

Input Signal Slope



Output Signal Slope



## 7.2 RGB interface characteristic

### Vertical Timings for RGB I/F

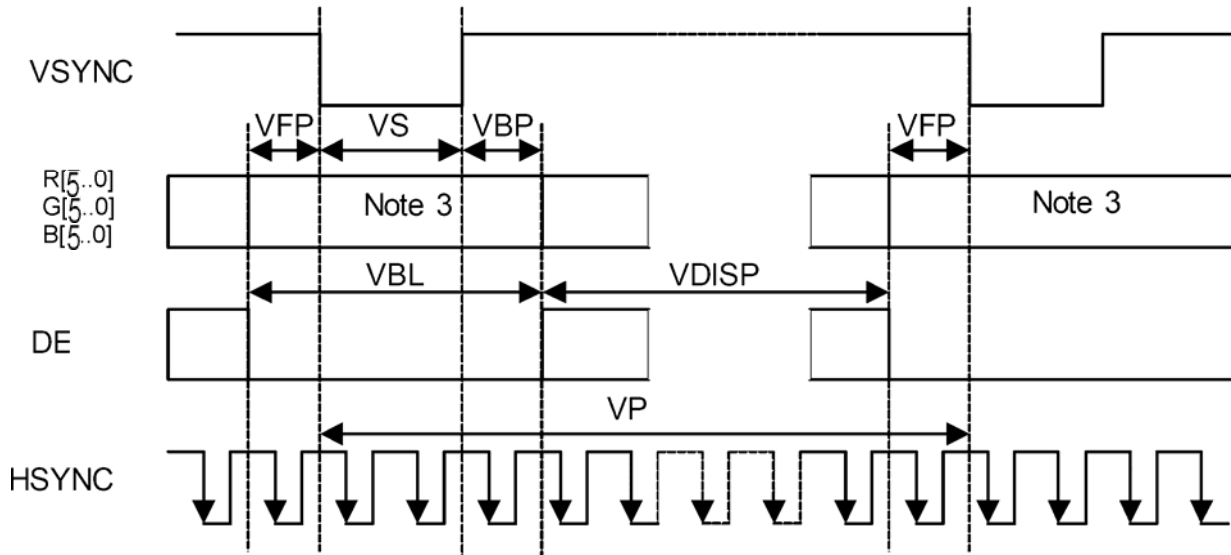


Figure7.1-2 Vertical Timings for RGB I/F

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Vertical cycle	VP	-	806	-	810	Line
Vertical low pulse width	VS	-	2	-	4	Line
Vertical front porch	VFP	-	2	-	4	Line
Vertical back porch	VBP	-	2	-	4	Line
Vertical data start point	-	VS+VBP	4	-	8	Line
Vertical blanking period	VBL	VS+VBP+VFP	6	-	10	Line
Vertical active area	-	VDISP	-	800	-	Line
Vertical Refresh rate	VRR	-	50	-	70	Hz
Vertical Refresh rate	VRR	-	50	-	70	Hz

**Note:** (1) Signal rise and fall times are equal to or less than 20 ns.

(2) Input signals are measured by  $0.30 \times VDDIO$  for low state and  $0.70 \times VDDIO$  for high state.

(3) Data lines can be set to "High" or "Low" during blanking time – Don't care.

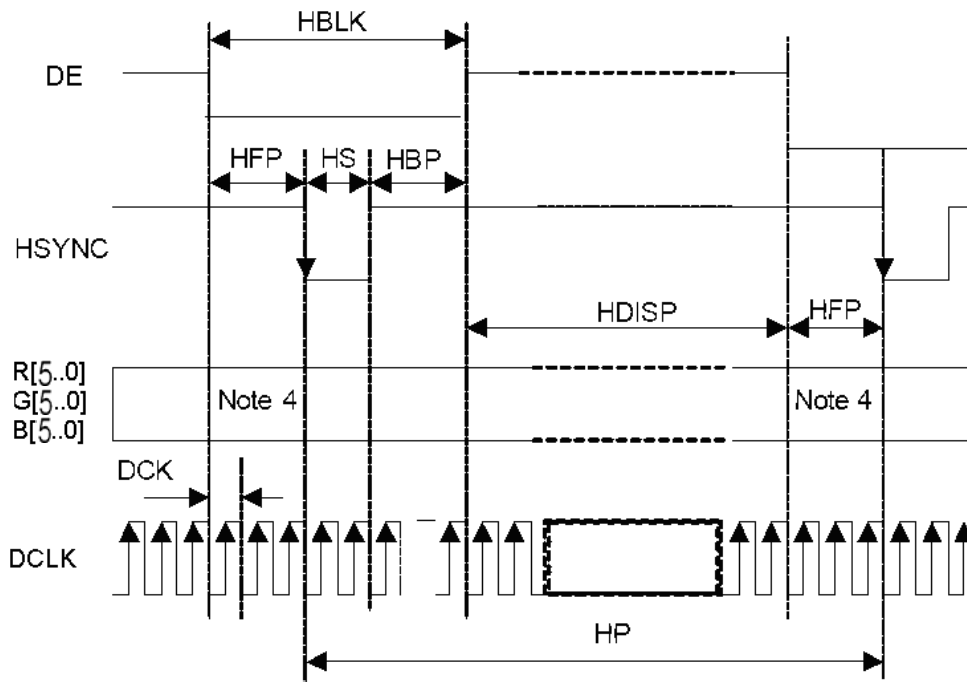
**Horizontal Timings for RGB I/F**


Figure 7.2-3 Horizontal Timing for RGB I/F

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
HSYNC cycle	HP	Note 3	504	-	568	DCLK
HSYNC low pulse width	HS	-	5	-	256	DCLK
Horizontal back porch	HBP	-	5	-	256	DCLK
Horizontal front porch	HFP	-	5	-	256	DCLK
Horizontal data start point	-	HS+HBP	19	-	83	DCLK
			700	-	-	ns
Horizontal blanking period	HBLK	HS+HBP+HFP	24	-	88	DCLK
Horizontal active area	HDISP	-	-	480	-	DCLK
Pixel clock frequency When RGB I/F is running	DCLK	VRR = Min. 50 Hz – Max. 70 Hz	20.3	-	32.2	MHz
			31	-	49.2	ns

**Note:** (1) Signal rise and fall times are equal to or less than 20 ns.

(2) Input signals are measured by  $0.30 \times VDDIO$  for low state and  $0.70 \times VDDIO$  for high state.

(3) HP is multiples of eight DCLK.

(4) Data lines can be set to "High" or "Low" during blanking time – Don't care.

(5) B3h Command (09h): DPL=1, the data is read on the falling edge of DCLK signal.

### 7.3 RGB interface General Timing

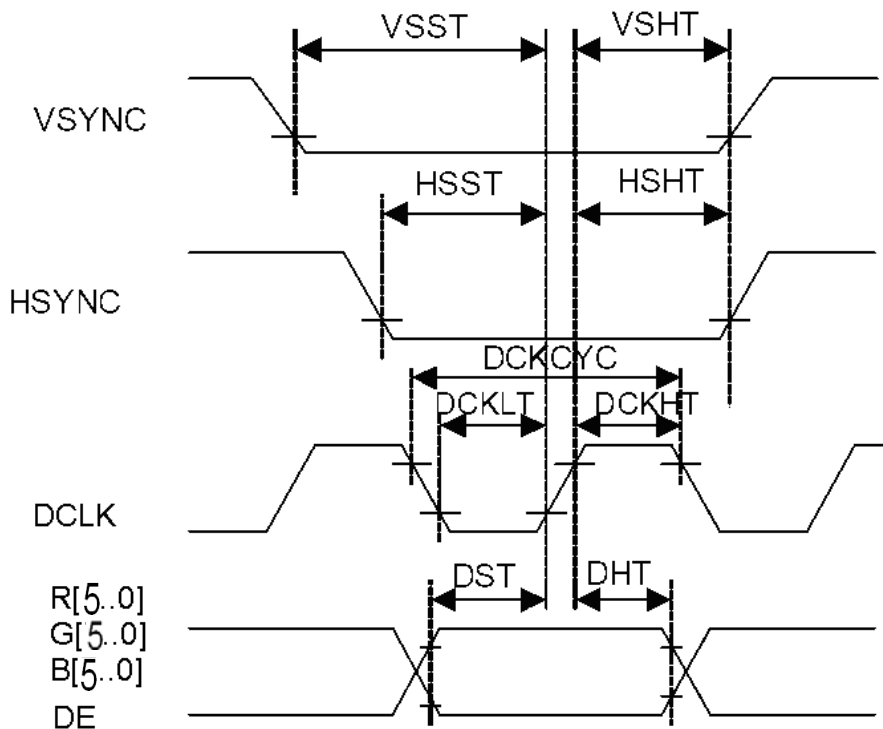


Figure 5.2.3.1 General Timings for RGB I/F

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Vertical sync. Setup time	VSST	-	5	-	-	ns
Vertical sync. Hold time	VSHT	-	5	-	-	ns
Horizontal sync. Setup time	HSST	-	5	-	-	ns
Horizontal sync. Hold time	HSHT	-	5	-	-	ns
Pixel clock cycle When RGB I/F is running	DCKCYC	VRR = Min. 50 Hz Max. 70 Hz	31 (Note3)	-	49.2 (Note 4)	ns
Pixel clock low time	DCKLT	-	5	-	-	ns
Pixel clock high time	DCKHT	-	5	-	-	ns
Data setup time DB[23:0]	DST	-	5	-	-	ns
Data Hold time DB[23:0]	DHT	-	5	-	-	ns

**Note:** (1) Signal rise and fall times are equal to or less than 20 ns.

(2) 32.2 MHz

(3) 20.3 MHz

(4) Input signals are measured by 0.30 x VDDIO for low state and 0.70 x VDDIO for high state.



## 7.4 Reset Input Timing

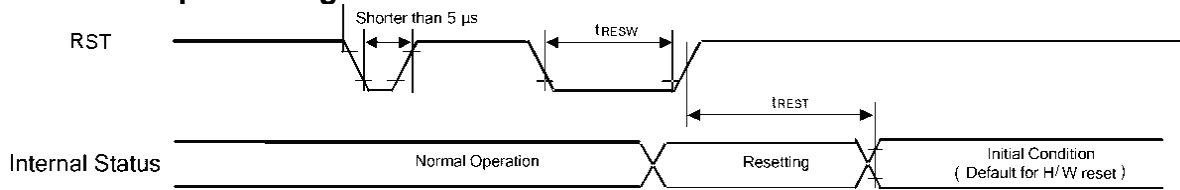


Figure 5.2.4.1 Write to Read and Read to Write Timing

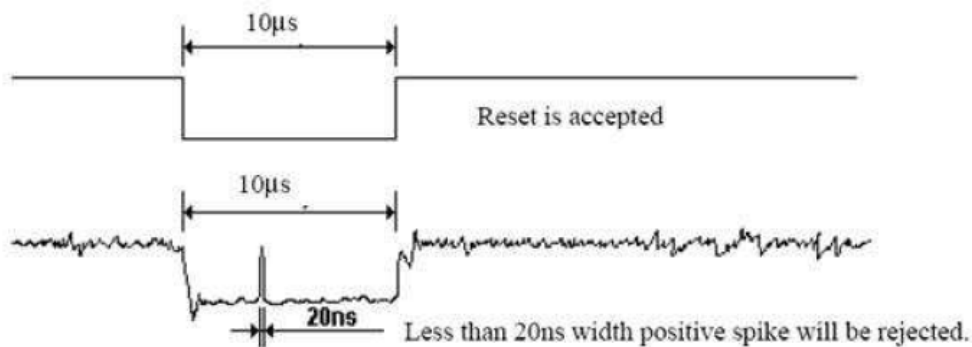
Symbol	Parameter	Related Pins	Min.	Typ.	Max.	Note	Unit
tRESW	Reset low pulse width	RST	10	-	-	-	μs
tREST	Reset complete time	-	-	-	5	When reset applied during STB mode	ms
		-	-	-	120	When reset applied during STB mode	ms

**Note:**

1. Spike due to an electrostatic discharge on RST line does not cause irregular system reset according to the table below.

NRESET Pulse	Action
Shorter than 5 μ	Reset Rejected
Longer than 10 μs	Reset
Between 5 μs and 10 μs	Reset Start

2. During the resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out –mode. The display remains the blank state in Sleep In –mode) and then returns to Default condition for H/W reset.
3. During Reset Complete Time, ID2 value in OTP will be latched to internal register during this period. This loading is done every time when there is H/W reset complete time (tREST) within 5ms after a rising edge of RST.
4. Spike Rejection also applies during a valid reset pulse as shown below:



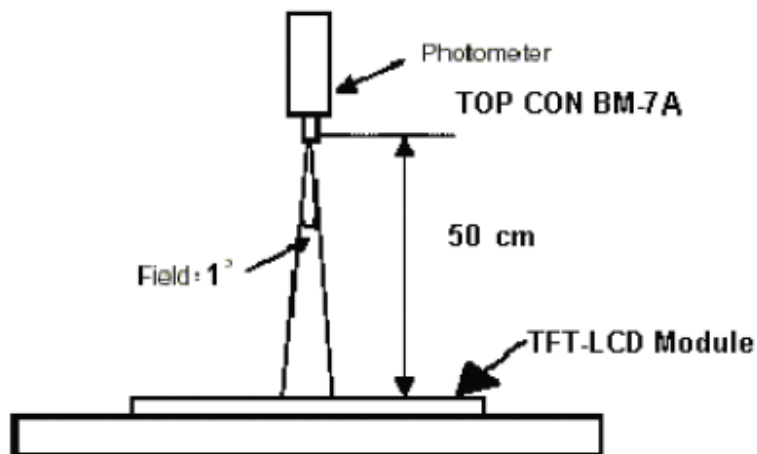
5. When Reset is applied during Sleep In Mode.
6. When Reset is applied during Sleep Out Mode.
7. It is necessary to wait 5msec after releasing RST before sending commands. Also Sleep Out command cannot be sent for 120msec.

**8. OPTICAL CHARACTERISTIC**

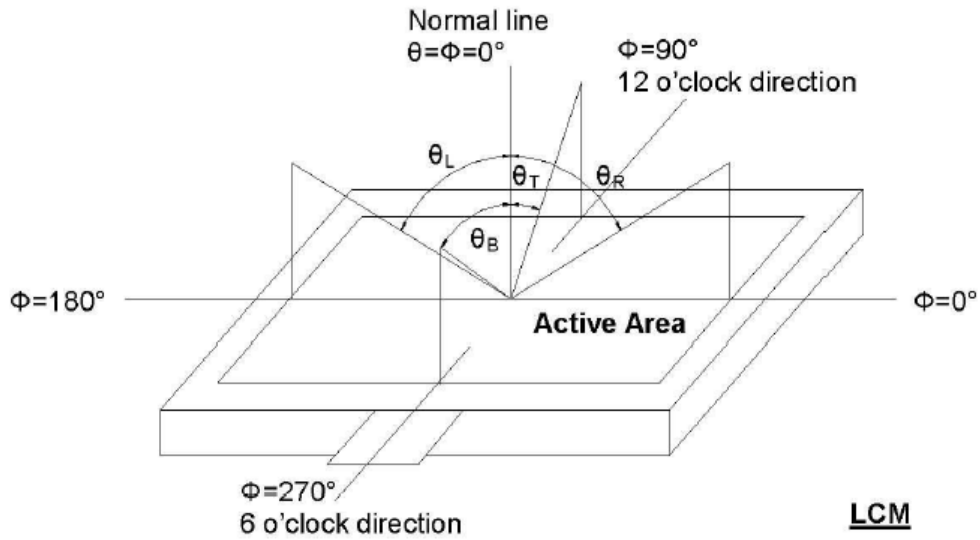
Parameter	Symbol	Condition	MIN.	TYP.	MAX.	Unit	Remarks
Viewing Angle	$\theta_L$	Center $CR \geq 10$	70	80	-	deg	Note 1,2
	$\theta_R$		70	80	-		
	$\theta_T$		70	80	-		
	$\theta_B$		70	80	-		
Contrast Ratio	CR	at optimized viewing angle	-	600:1	-		Note 1,4
Response time	$Tr+Tf$	Center $\theta_x=\theta_y=0^\circ$	-	25	-	ms	Note 1,6
Uniformity	B-uni	$\theta_x=\theta_y=0^\circ$	70		-	%	Note 1,5
Brightness	L	$\theta_x=\theta_y=0^\circ$	320	400	-	cd/m <sup>2</sup>	Note 1,3
Chromaticity	W	$x_W$	Center $\theta_x=\theta_y=0^\circ$	TYP- 0.05	0.32	TYP+ 0.05	Note 1,7
		$y_W$			0.349		
	R	$x_R$	Center $\theta_x=\theta_y=0^\circ$		0.644		
		$y_R$			0.309		
	G	$x_G$	Center $\theta_x=\theta_y=0^\circ$		0.284		
		$y_G$			0.576		
	B	$x_B$	Center $\theta_x=\theta_y=0^\circ$		0.319		
		$y_B$			0.064		

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  $I_L=20\text{mA}$ . The measurement method is shown in Note1.

Note 1: The method of optical measurement:



Note 2: Definition of viewing angle range

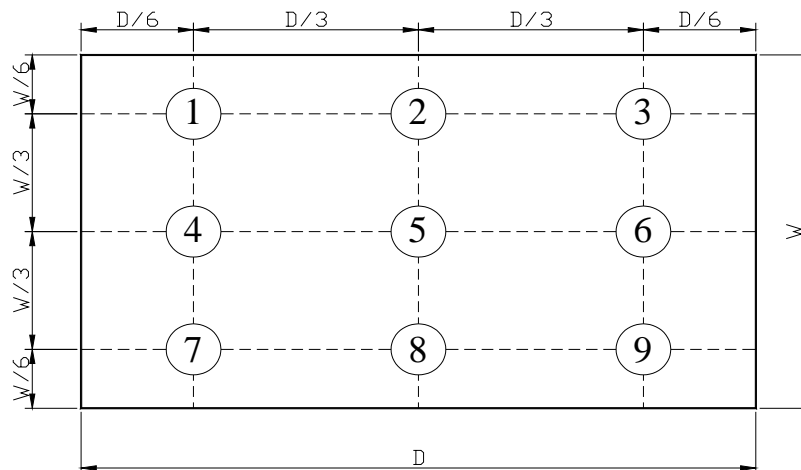


Note 3: Measured at the center area of the panel and at the viewing angle of the  $\theta_x = \theta_y = 0^\circ$

Note 4: Definition of Contrast Ratio (CR):

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

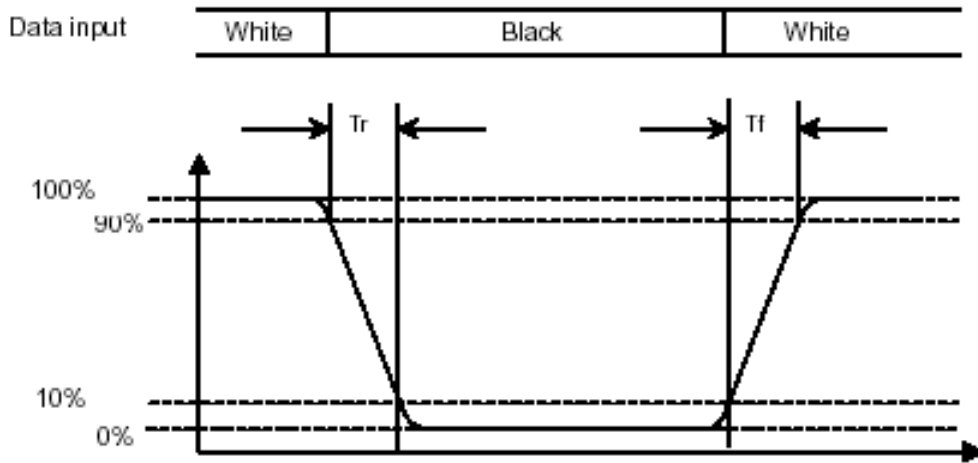
Note 5: Definition of Brightness Uniformity (B-uni):



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

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: 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.

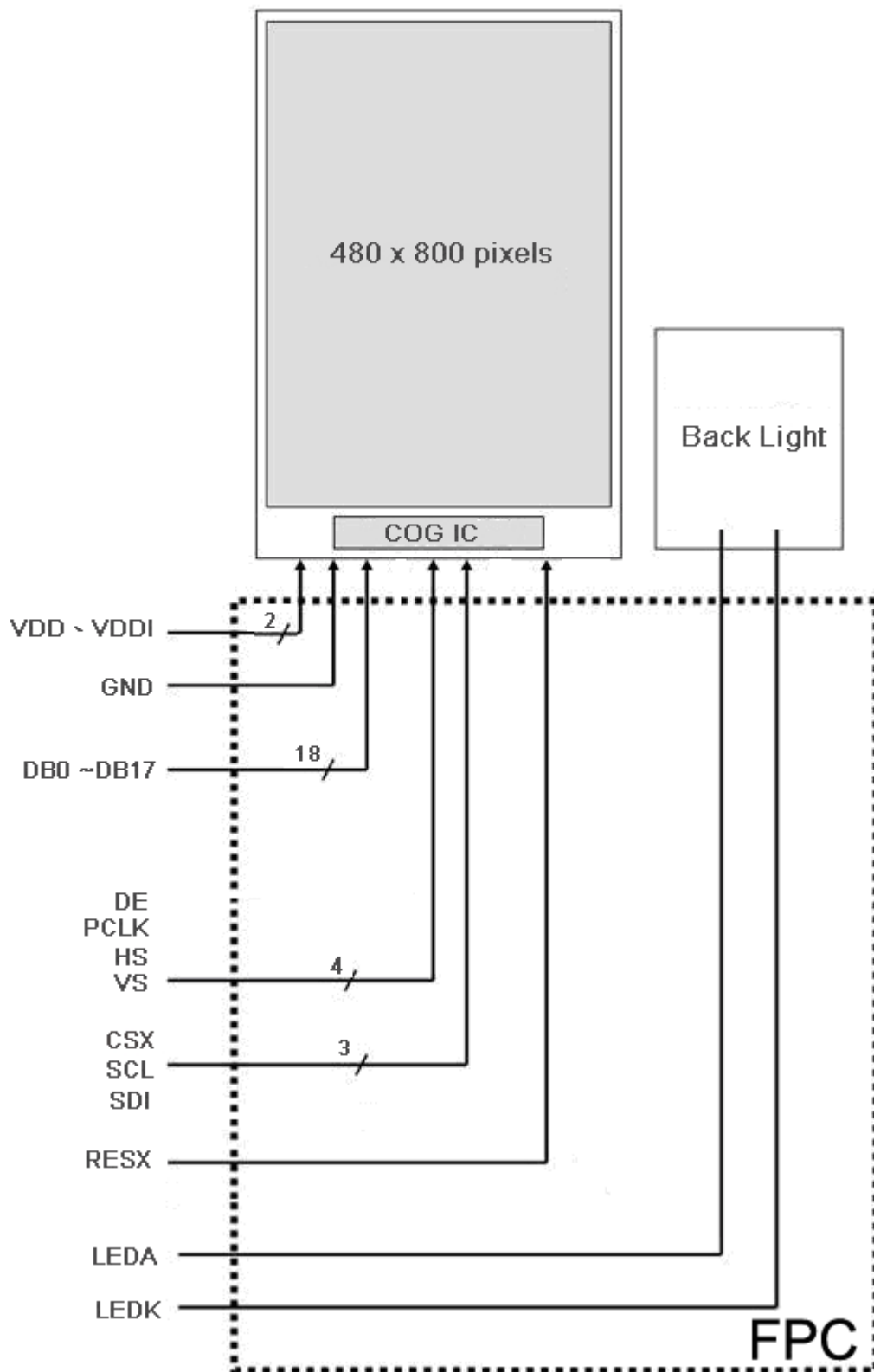
## 9. PIN CONNECTIONS

### 9.1 TFT-LCD PIN CONNECTIONS

Pin No	Symbol	Description	Remark
1	VDD	Power supply for analog system	
2	VDD		
3	GND	Ground	
4	GND		
5	VDDI	Power supply for interface system	
6	VDDI		
7	NC	No Connection.	
8	NC		
9	NC		
10	RESX	This signal will reset the device and must be applied to properly initialize the chip. Signal is active low.	
11	R5(D17)	18-bit bi-directional data bus.	
12	R4(D16)		
13	R3(D15)		
14	R2(D14)		
15	R1(D13)		
16	R0(D12)		
17	G5(D11)		
18	G4(D10)		
19	G3(D9)		
20	G2(D8)		
21	G1(D7)		
22	G0(D6)		
23	B5(D5)		
24	B4(D4)		
25	B3(D3)		
26	B2(D2)		
27	B1(D1)		
28	B0(D0)		
29	VS	Vertical sync.	
30	HS	Horizontal sync.	
31	GND	Ground	
32	PCLK	Pixel clock signal.	
33	GND	Ground	
34	DE	Data enable signal.	
35	SDI/SDA	SDI: Serial data input signal . SDA: Serial data input/output bidirectional pin.	
36	NC	No Connection.	
37	CSX	Chip select input pin ("Low" enable) .	
38	SCL	A synchronous clock signal .	

39	NC	No Connection.	
40	NC		
41	NC		
42	GND	Ground	
43	GND		
44	LEDK	POWER SUPPLY FOR LED-	
45	LEDA	POWER SUPPLY FOR LED+	

### 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		Test Level	Remark
No.	Test Item		
1	High Temperature Storage Test	T=80,240hrs	IEC68-2-2
2	Low Temperature Storage Test	T=-30,240hrs	IEC68-2-1
3	High Temperature Operation Test	T=70,240hrs	IEC68-2-2
4	Low Temperature Operation Test	T=-20,240hrs	IEC68-2-1
5	High Temperature and High Humidity (No operation)	T=60 ,90%RH,240hrs	IEC68-2-3
6	Thermal Cycling Test (No operation)	-30 → +25 → +80 , 100 Cycles 30 min 5 min 30 min	IEC68-2-14
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	IEC68-2-6



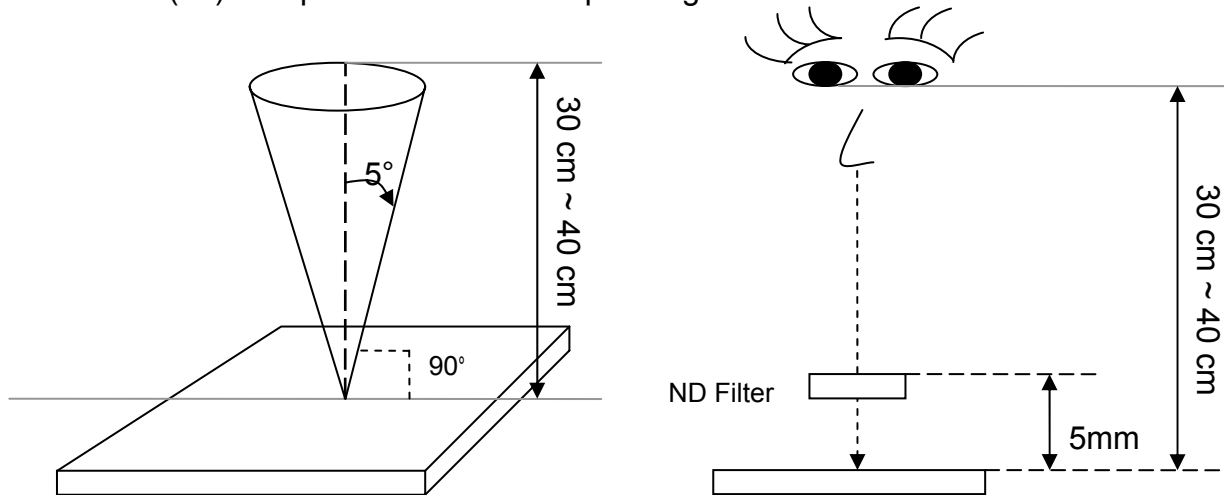
## 11.2 Inspection condition

### 11.2.1 Inspection conditions

11.2.1.1 Inspection Distance:  $35 \pm 5$  cm

11.2.1.2 View Angle:

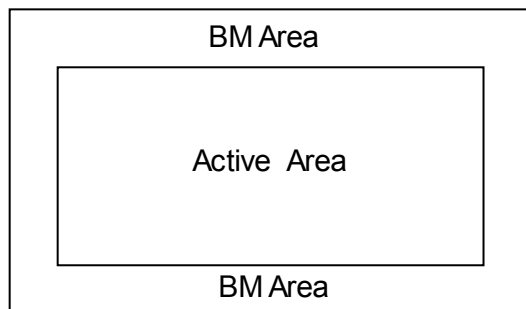
- ( 1 ) Inspection under operating condition :  $\pm 5^\circ$
- ( 2 ) Inspection under non-operating condition :  $\pm 45^\circ$



11.2.1.3 Environment conditions:

Ambient Temperature :		25±5
Ambient Humidity :		65±5%
Ambient Illumination	Cosmetic Inspection	More than 600lux
	Functional Inspection	300 ~ 800lux

### 11.2.2 Definition of applicable Zones



11.2.3 Inspection Parameters

No.	Parameter	Criteria																
1	Operating	Display function: No Display malfunction (Major)																
		Contrast ratio (Black, White): Does not meet specified range in the spec. (Major) (Note:3)																
		Line Defect: No obvious Vertical and Horizontal line defect in bright, dark and colored. (Major) (Note:1)																
		Point Defect (Red, green, blue, dark): Active area $\leq 4$ dots (Minor)(Note:1)																
		<table border="1"> <thead> <tr> <th>Item</th> <th>Acceptable number</th> <th>Total</th> <th>Class Of Defects</th> <th>AQL Level</th> </tr> </thead> <tbody> <tr> <td>Bright</td> <td>2</td> <td rowspan="4">4</td> <td rowspan="4">Minor</td> <td rowspan="4">1.5</td> </tr> <tr> <td>Dark</td> <td>3</td> </tr> <tr> <td>Adjacent Bright</td> <td>1</td> </tr> <tr> <td>Adjacent Dark</td> <td>1</td> </tr> </tbody> </table>	Item	Acceptable number	Total	Class Of Defects	AQL Level	Bright	2	4	Minor	1.5	Dark	3	Adjacent Bright	1	Adjacent Dark	1
		Item	Acceptable number	Total	Class Of Defects	AQL Level												
		Bright	2	4	Minor	1.5												
		Dark	3															
		Adjacent Bright	1															
		Adjacent Dark	1															
Non-uniformity: Visible through 2%ND filter white, R, G, B and gray 50%pattern. (Minor)																		
Foreign material in Black or White spots shape ( $W > 1/4L$ ) (Note: 5)																		
<table border="1"> <thead> <tr> <th>Dimension</th> <th>Acceptable number</th> <th>Class Of Defects</th> <th>AQL Level</th> </tr> </thead> <tbody> <tr> <td><math>D \leq 0.3</math></td> <td>*</td> <td rowspan="3">Minor</td> <td rowspan="3">1.5</td> </tr> <tr> <td><math>0.3 &lt; D \leq 0.5</math></td> <td>3</td> </tr> <tr> <td><math>D &gt; 0.5</math></td> <td>0</td> </tr> </tbody> </table>	Dimension	Acceptable number	Class Of Defects	AQL Level	$D \leq 0.3$	*	Minor	1.5	$0.3 < D \leq 0.5$	3	$D > 0.5$	0						
Dimension	Acceptable number	Class Of Defects	AQL Level															
$D \leq 0.3$	*	Minor	1.5															
$0.3 < D \leq 0.5$	3																	
$D > 0.5$	0																	
D = (Long + Short) / 2 * : Disregard																		
Foreign Material in Line or spiral shape ( $W \leq 1/4L$ ) (Note: 4)																		
<table border="1"> <thead> <tr> <th>Dimension</th> <th>Acceptable number</th> <th>Class Of Defects</th> <th>AQL Level</th> </tr> </thead> <tbody> <tr> <td><math>W &gt; 0.1\text{mm}, L &gt; 5\text{mm}</math></td> <td>0</td> <td rowspan="3">Minor</td> <td rowspan="3">1.5</td> </tr> <tr> <td><math>L \leq 5\text{mm}, 0.05\text{mm} &lt; W \leq 0.1\text{mm}</math></td> <td>3</td> </tr> <tr> <td><math>L \leq 5\text{mm}, W &lt; 0.05\text{mm}</math></td> <td>*</td> </tr> </tbody> </table>	Dimension	Acceptable number	Class Of Defects	AQL Level	$W > 0.1\text{mm}, L > 5\text{mm}$	0	Minor	1.5	$L \leq 5\text{mm}, 0.05\text{mm} < W \leq 0.1\text{mm}$	3	$L \leq 5\text{mm}, W < 0.05\text{mm}$	*						
Dimension	Acceptable number	Class Of Defects	AQL Level															
$W > 0.1\text{mm}, L > 5\text{mm}$	0	Minor	1.5															
$L \leq 5\text{mm}, 0.05\text{mm} < W \leq 0.1\text{mm}$	3																	
$L \leq 5\text{mm}, W < 0.05\text{mm}$	*																	
L : Length W : Width * : Disregard																		
2	External Inspection (non-operating)	Dimension: Outline (Major)																
		Bezel appearance: uneven (Minor)																
		Scratch on the polarize & Touch Panel: (Note:2)																
		<table border="1"> <thead> <tr> <th>Dimension</th> <th>Acceptable number</th> <th>Class Of Defects</th> <th>AQL Level</th> </tr> </thead> <tbody> <tr> <td><math>W &gt; 0.1\text{mm}, L &gt; 5\text{mm}</math></td> <td>0</td> <td rowspan="3">Minor</td> <td rowspan="3">1.5</td> </tr> <tr> <td><math>L \leq 5\text{mm}, 0.05\text{mm} &lt; W \leq 0.1\text{mm}</math></td> <td>3</td> </tr> <tr> <td><math>L \leq 5\text{mm}, W &lt; 0.05\text{mm}</math></td> <td>*</td> </tr> </tbody> </table>	Dimension	Acceptable number	Class Of Defects	AQL Level	$W > 0.1\text{mm}, L > 5\text{mm}$	0	Minor	1.5	$L \leq 5\text{mm}, 0.05\text{mm} < W \leq 0.1\text{mm}$	3	$L \leq 5\text{mm}, W < 0.05\text{mm}$	*				
		Dimension	Acceptable number	Class Of Defects	AQL Level													
		$W > 0.1\text{mm}, L > 5\text{mm}$	0	Minor	1.5													
		$L \leq 5\text{mm}, 0.05\text{mm} < W \leq 0.1\text{mm}$	3															
		$L \leq 5\text{mm}, W < 0.05\text{mm}$	*															
		L : Length W : Width * : Disregard																
		Dent and spots shape on the polarize (Note:2): (Note: 5)																
<table border="1"> <thead> <tr> <th>Dimension</th> <th>Acceptable number</th> <th>Class Of Defects</th> <th>AQL Level</th> </tr> </thead> <tbody> <tr> <td><math>D \leq 0.3</math></td> <td>*</td> <td rowspan="3">Minor</td> <td rowspan="3">1.5</td> </tr> <tr> <td><math>0.3 &lt; D \leq 0.5</math></td> <td>3</td> </tr> <tr> <td><math>D &gt; 0.5</math></td> <td>0</td> </tr> </tbody> </table>	Dimension	Acceptable number	Class Of Defects	AQL Level	$D \leq 0.3$	*	Minor	1.5	$0.3 < D \leq 0.5$	3	$D > 0.5$	0						
Dimension	Acceptable number	Class Of Defects	AQL Level															
$D \leq 0.3$	*	Minor	1.5															
$0.3 < D \leq 0.5$	3																	
$D > 0.5$	0																	
D = (Long + Short) / 2 * : Disregard																		

Class of defects		Definition	
	<b>Major</b>	AQL 0.65%	It is a defect that is likely to result in failure or to reduce materially the usability of the product for the intended function.
	<b>Minor</b>	AQL 1.5%	It is a defect that will not result in functioning problem with deviation classified.

Note:1.(a)Bright point defect is defined as point defect of R,G,B with area >1/2 pixel respectively

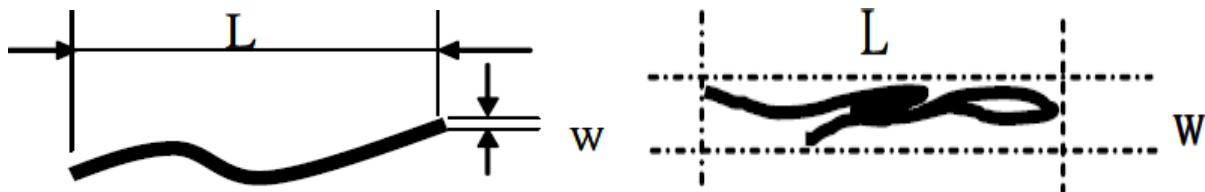
(b)Dark point defect is defined as visible in full white pattern.

(c)The point defect must under 2% ND Filter visible.

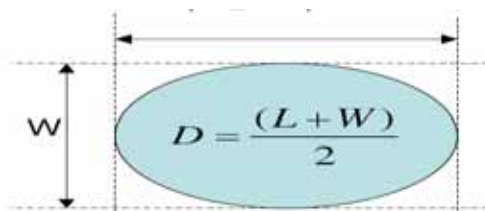
Note:2 The external inspection should be conducted at the distance 30± 5cm between the eyes of inspector and the panel .

Note:3 Luminance measurement for contrast ratio is at the distance 50± 5cm between the detective head and the panel with ambient luminance less than 1 lux. Contrast ratio is obtained at optimum view angle.

Note:4 W-Width in mm , L-length of Max.(L1,L2) in mm.



Note:5 Spot Foreign Material ( $W \leq L/4$ )



### 11.3 Sampling Condition

Unless otherwise agree in written, the sampling inspection shall be applied to the incoming inspection of customer.

Lot size: Quantity of shipment lot per model.

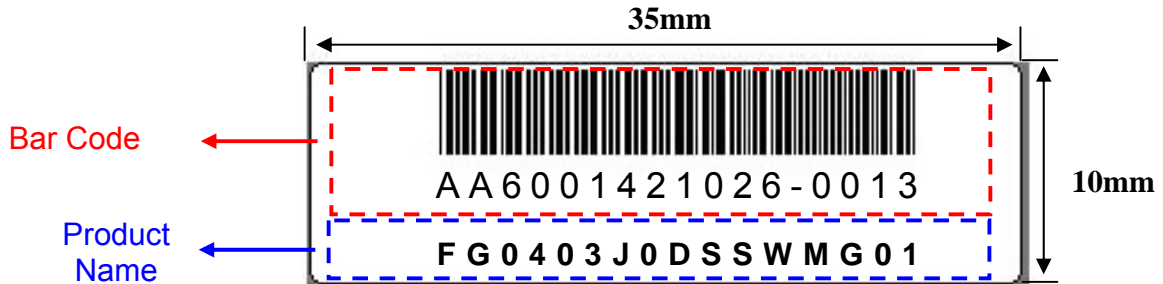
Sampling type: normal inspection, single sampling

Sampling table: MIL-STD-105E

Inspection level: Level II

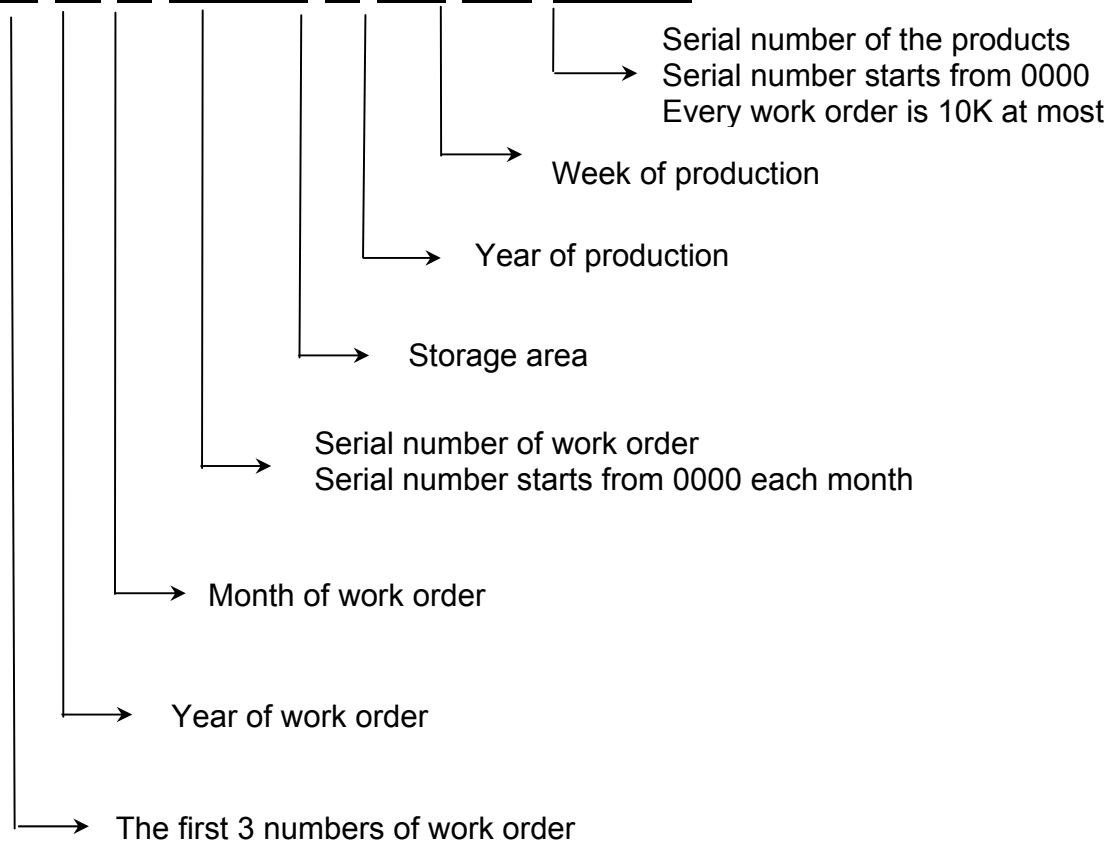
## 12. LCM PRODUCT LABEL DEFINE

Product Label style:

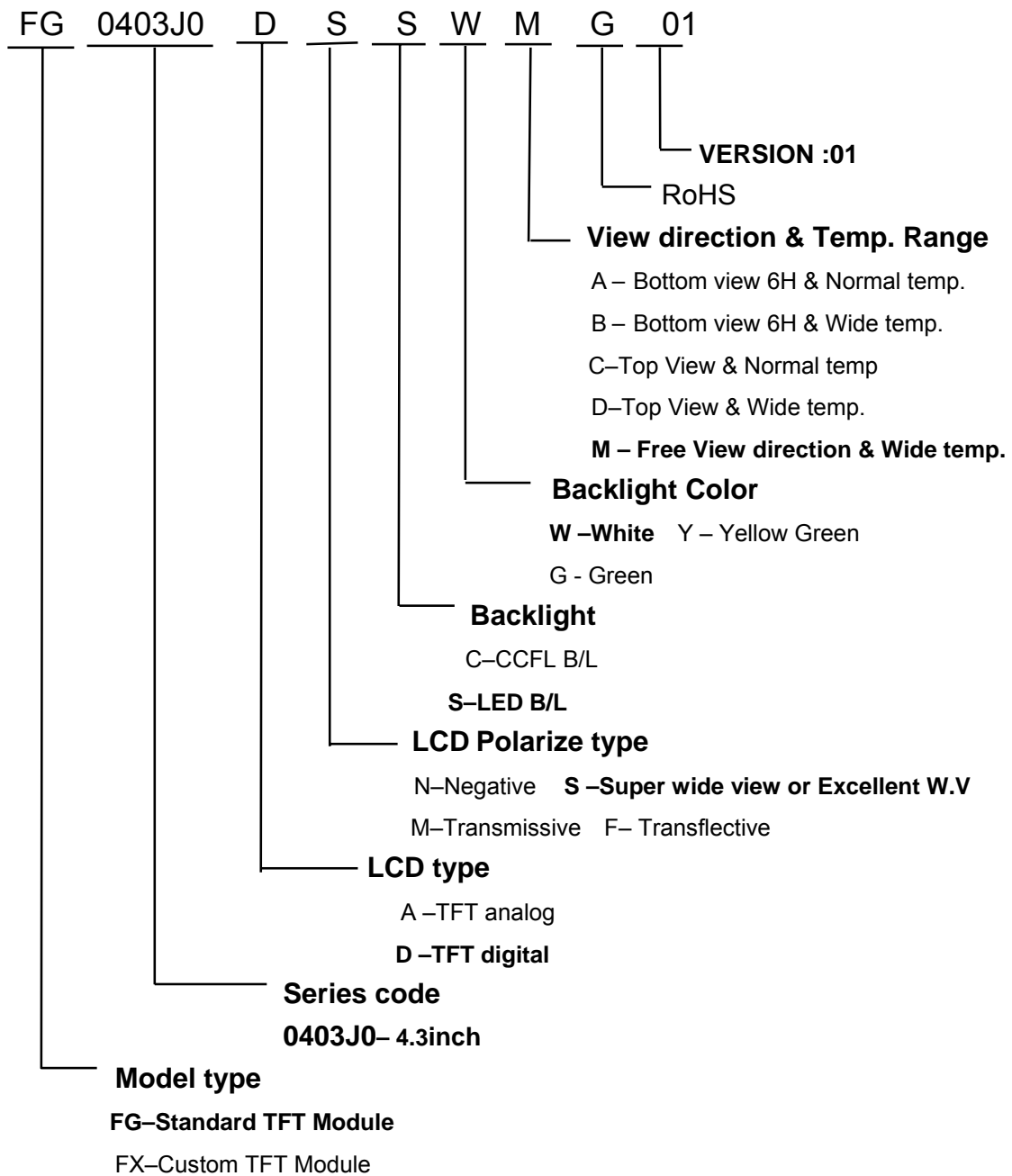


BarCode Define:

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



**Product Name Define:**



### 13. PRECAUTIONS IN USE LCM

#### 1. ASSEMBLY PRECAUTIONS

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

#### 2. OPERATING PRECAUTIONS

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

#### 3. ELECTROSTATIC DISCHARGE CONTROL

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

parts of the human body.

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

#### 4. STORAGE PRECAUTIONS

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

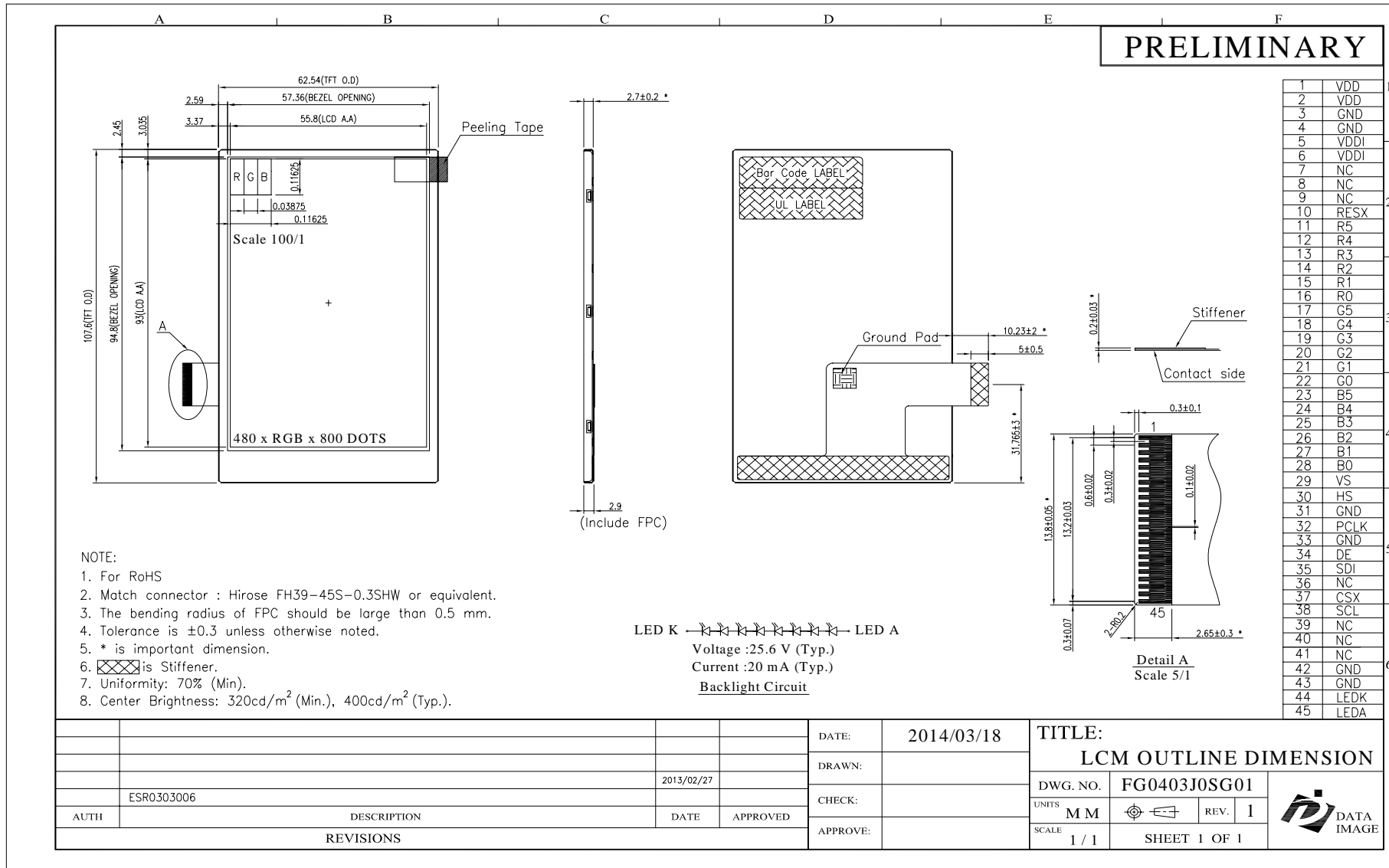
#### 5. OTHERS

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

#### 6. LIMITED WARRANTY

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

Confidential Document  
**14. OUTLINE DRAWING**



## 15. PACKAGE INFORMATION

