

TFT-Display Datenblatt

Modell FG0403G0GDSSWVG01

Kurzdaten

Hersteller	Data Image
Diagonale	4,3" / 10,9 cm
Format	16:9
Auflösung	480 x 800 LED /
Backlight	400 cd/m ²
Interface	RGB
Touchscreen	nein
Temperatur	-20... +70°C (Betrieb)



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DATA IMAGE CORPORATION

TFT Module Specification Preliminary

ITEM NO.: FG0403G0DSSWMG01

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3. INTRODUCTION

The FG0403G0 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	56.16(W) × 93.6 (H) mm	mm
Pixel Pitch	0.117(W) × 0.117(H) mm	mm
Pixel Configuration	Stripe	
Outline Dimension	61.6(W) x107 (H) x2.6 (D)	Mm
Back-light	LED	
TFT-LCD Display mode	Normally Black	
Weight	32	g
View Angle direction(TFT)	All	

5. ABSOLUTE MAXIMUM RATINGS

GND=0V

Parameter	Symbol	MIN.	MAX.	Unit	Remark
Power supply voltage	VDD	-0.3	5.5	V	
	VDDI	-0.3	5.5	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	VDDI		3.3	V	
	VDDI	2.5		3.3	V	
"H" level logical input voltage	V _{IH}	0.7*VDDI	-	VDDI	V	
"L" level logical input voltage	V _{IL}	0	-	0.3*VDDI	V	

6.2 Current Consumption

Ta= 25°C

Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Remark
Current for Power Supply Voltage	VDD		TBD		mA	
	VDDI		TBD		mA	

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.)

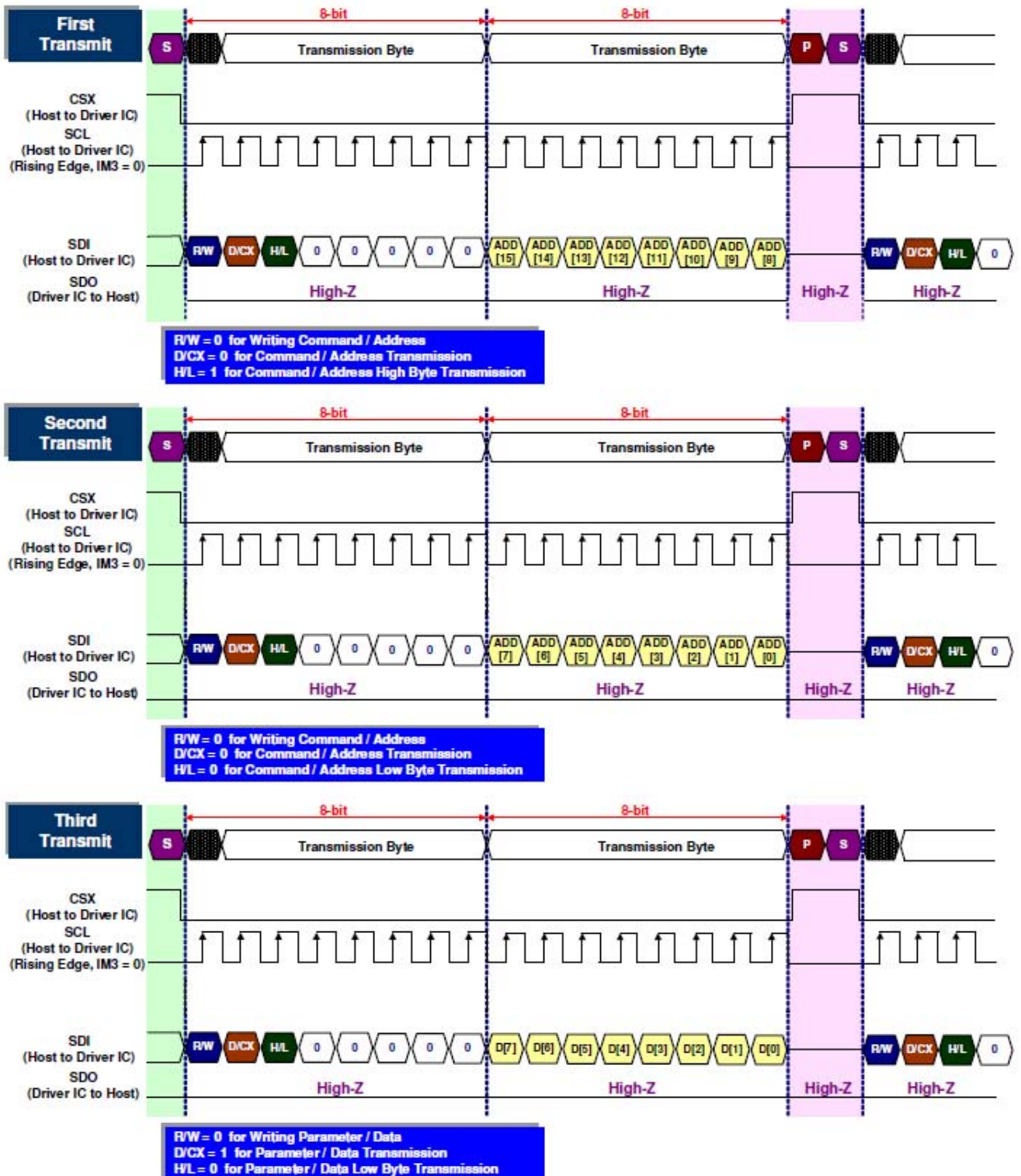
backlight circuit

Note 2:

The "LED dice life time" is defined as the brightness decrease to 50% original brightness that the ambient temperature is 25°C and LED dice current=20mA.

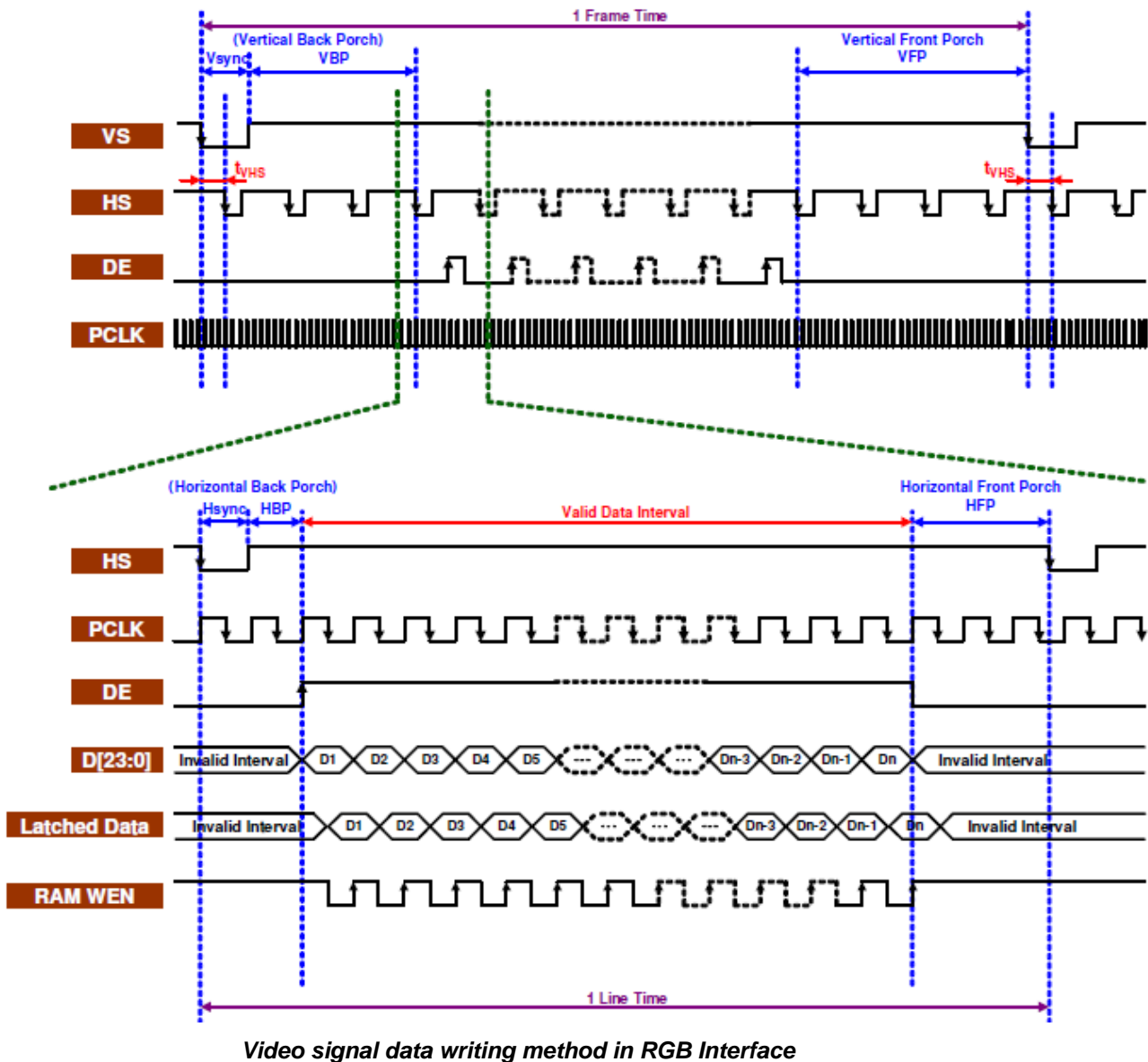
7. FUNCTIONAL DESCRIPTION

7.1 Serial Interface (Write mode)



Serial bus protocol for register write mode

7.2 RGB Interface



Notes:

1. Constraint:

V-Back Porch ($V_{sync} + VBP$) ≥ 5 HS lines, V-Front-Porch (VFP) ≥ 2 HS lines

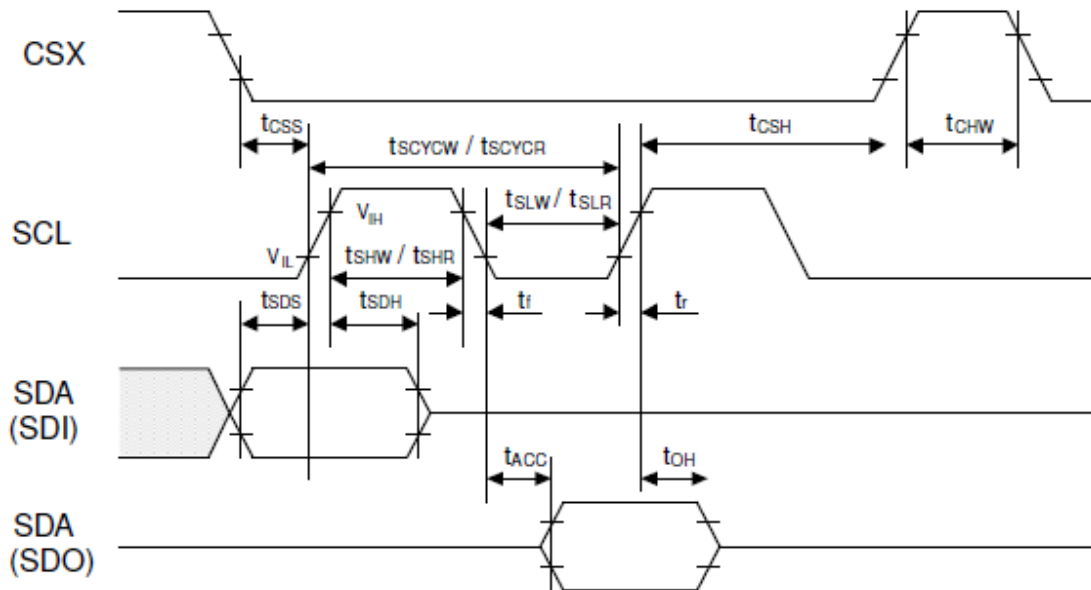
$V_{sync} + VBP + VFP$ (porch of RGB signal) $> VBPA/B/C[7:0]$ (internal display back porch)

H-Back Porch ($H_{sync} + HBP$) ≥ 5 PCLK clocks, H-Front-Porch (HFP) ≥ 2 PCLK clocks

2. $t_{vhs} \geq 0ns$

7.3 AC Characteristics

7.3.1 Serial Interface Characteristics

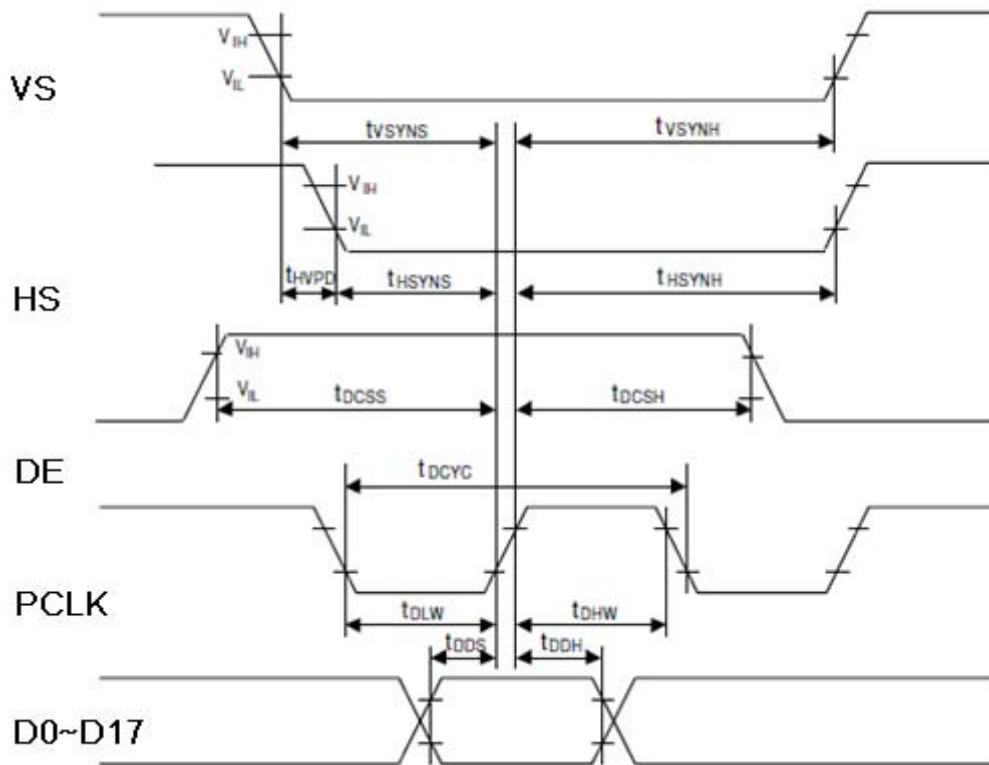


3-pin serial interface characteristics

(VDD1=2.5V to 3.3V, VDD=2.5V to 3.3V, GND=0V)

Signal	Symbol	Parameter	Min.	Max.	Unit	Remark
SCL	t_{SCYCW}	Serial clock cycle (Write)	100	-	ns	
	t_{SHW}	SCL "H" pulse width (Write)	40	-	ns	
	t_{SLW}	SCL "L" pulse width (Write)	40	-	ns	
	t_{SCYCR}	Serial clock cycle (Read GRAM)	300	-	ns	
	t_{SHR}	SCL "H" pulse width (Read GRAM)	140	-	ns	
	t_{SLR}	SCL "L" pulse width (Read GRAM)	140	-	ns	
	t_{SCYCR}	Serial clock cycle (Read ID)	300	-	ns	
	t_{SHR}	SCL "H" pulse width (Read ID)	140	-	ns	
	t_{SLR}	SCL "L" pulse width (Read ID)	140	-	ns	
SDI (SDO)	t_{SDS}	Data setup time	20	-	ns	
	t_{SDH}	Data hold time	20	-	ns	
	t_{ACC}	Access time	-	120	ns	
	t_{OH}	Output disable time	5	-	ns	
CSX	t_{CHW}	Chip select "H" pulse width	45	-	ns	
	t_{CSS}	Chip select setup time	20	-	ns	
	t_{CSH}	Chip select hold time	50	-	ns	

Note 1) The input signal rise time and fall time (t_r , t_f) is specified at 15 ns or less.

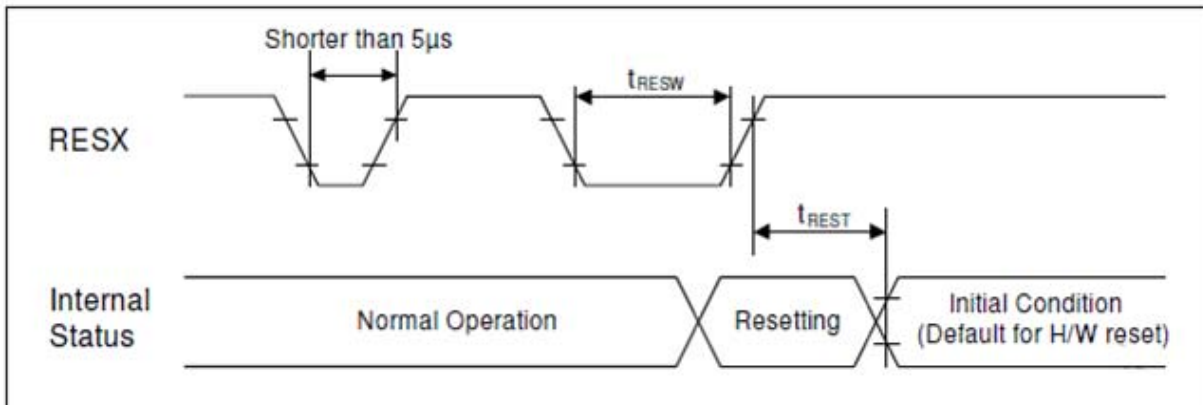
7.3.2 RGB Interface Characteristics

RGB interface characteristics

(VDDI=2.5V to 3.3V, VDD=2.5V to 3.3V,GND=0V)

Signal	Symbol	Parameter	Min.	Typ.	Max.	Unit	Remark
VS	t_{vSYNS}	VSYNC setup time	10	-	-	ns	
	t_{shw}	VSYNC hold time	10	-	-	ns	
HS	t_{hSYNS}	HSYNC setup time	10	-	-	ns	
	t_{scycr}	HSYNC hold time	10	-	-	ns	
	t_{hVPD}	HSYNC to VSYNC falling edge	0	-	-	ns	
PCLK	t_{dCYC}	PCLK cycle time	33	-	125	ns	
	t_{dLW}	PCLK_L pulse width	11	-	-	ns	
	t_{dHW}	PCLK_H pulse width	11	-	-	ns	
	f_{dFREQ}	PCLK frequency	8	-	30	MHz	
DE	t_{dCSS}	DE setup time	10	-	-	ns	
	t_{dCSH}	DE hold Time	10	-	-	ns	
D0~D17	t_{dDS}	RGB Data setup time	10	-	-	ns	
	t_{dDH}	RGB Data hold time	10	-	-	ns	

 Note 1) The input signal rise time and fall time (t_r , t_f) is specified at 15 ns or less.

7.4 Reset Input Timing



Reset input timing

(VDDI=2.5V to 3.3V, VDD=2.5V to 3.3V, GND=0V)

Signal	Symbol	Parameter	Min.	Typ.	Max.	Unit	Remark
RESX	t_{RESW}	Reset_L_pulse width (Note 1)	10	-	-	μ s	
	t_{REST}	Reset complete time (Note 2)	-	-	5	ms	When reset applied during Sleep In Mode
			-	-	120	ms	When reset applied during Sleep Out Mode

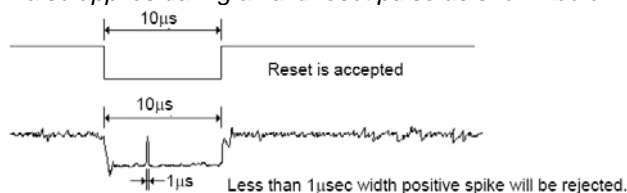
Note 1) Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below.

RESX Pulse	Action
Shorter than 5 μ s	Reset Rejected
Longer than 10 μ s	Reset
Between 5 μ s and 10 μ s	Reset Start

Note 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 return to Default condition for H/W reset.

Note 3) During Reset Complete Time, values in OTP memory will be latched to internal register during this period. This loading is done every time when there is H/W reset complete time (t_{REST}) within 5ms after a rising edge of RESX.

Note 4) Spike Rejection also applies during a valid reset pulse as shown below:



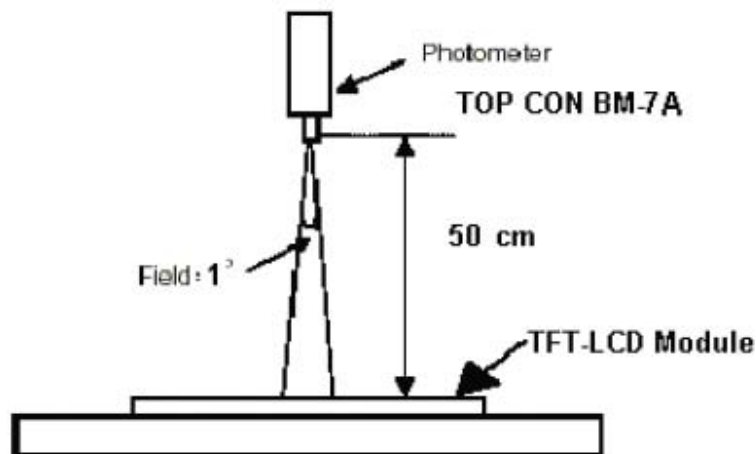
Note 5) It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.

8. OPTICAL CHARACTERISTIC

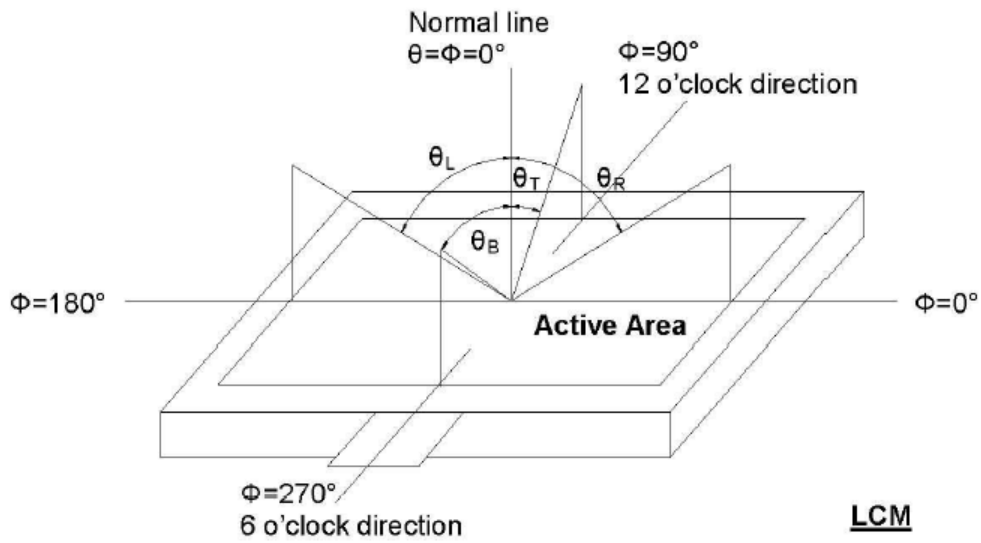
Parameter	Symbol	Condition	MIN.	TYP.	MAX.	Unit	Remarks
Viewing Angle	θ_L	Center $CR \geq 10$	70	80	-	deg	Note 1,2
	θ_R		70	80	-		
	θ_T		70	80	-		
	θ_B		70	80	-		
Contrast Ratio	CR	at optimized viewing angle	-	800	-		Note 1,4
Response time	Tr+Tf	Center $\theta_x = \theta_y = 0^\circ$	-	25	-	ms	Note 1,6
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 ²	Note 1,3
Chromaticity	W	x_W	Center $\theta_x = \theta_y = 0^\circ$	TYP- 0.05	0.310	TYP+ 0.05	Note 1,7
		y_W			0.330		
	R	x_R	Center $\theta_x = \theta_y = 0^\circ$		0.663		
		y_R			0.325		
	G	x_G	Center $\theta_x = \theta_y = 0^\circ$		0.300		
		y_G			0.587		
	B	x_B	Center $\theta_x = \theta_y = 0^\circ$		0.146		
		y_B			0.072		

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 $25^\circ\text{C} \pm 2^\circ\text{C}$ and LED Backlight Current $I_L = 20\text{mA}$. The measurement method is shown in Note 1.

Note 1: The method of optical measurement:



Note 2: Definition of viewing angle range

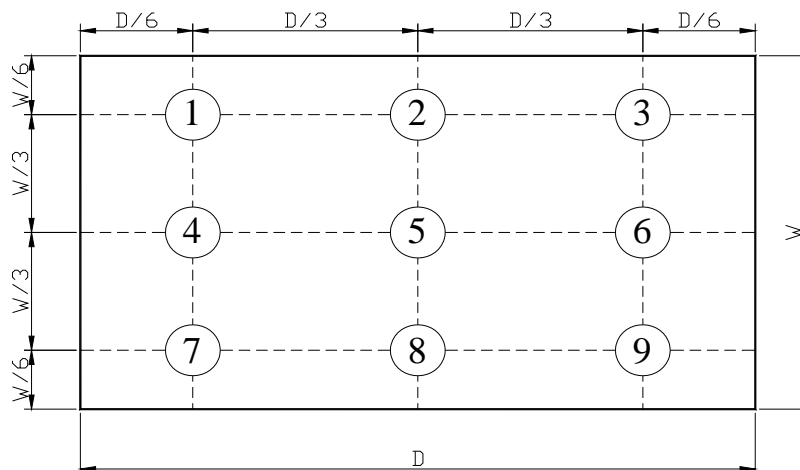


Note 3: Measured at the center area of the panel and at the viewing angle of the $\theta_x = \theta_y = 0^\circ$

Note 4: Definition of Contrast Ratio (CR):

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

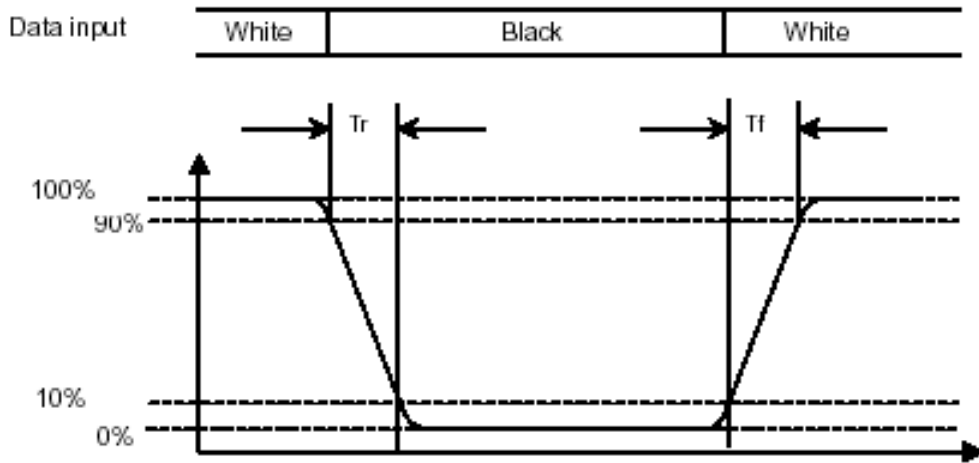
Note 5: Definition of Brightness Uniformity (B-uni):



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

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.



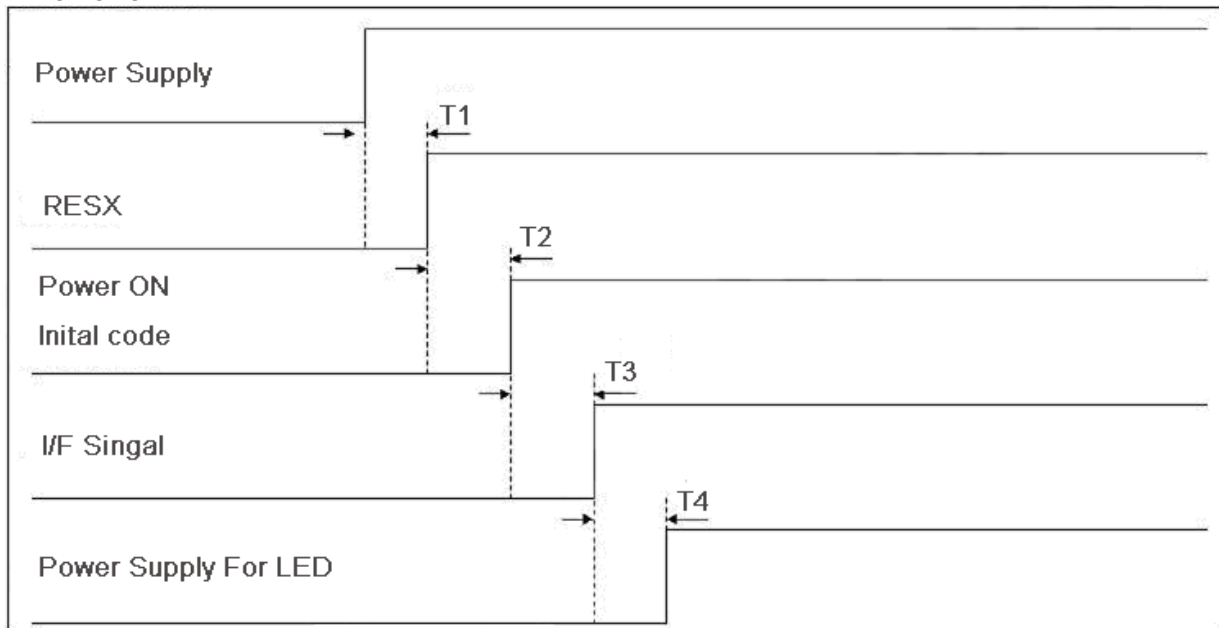
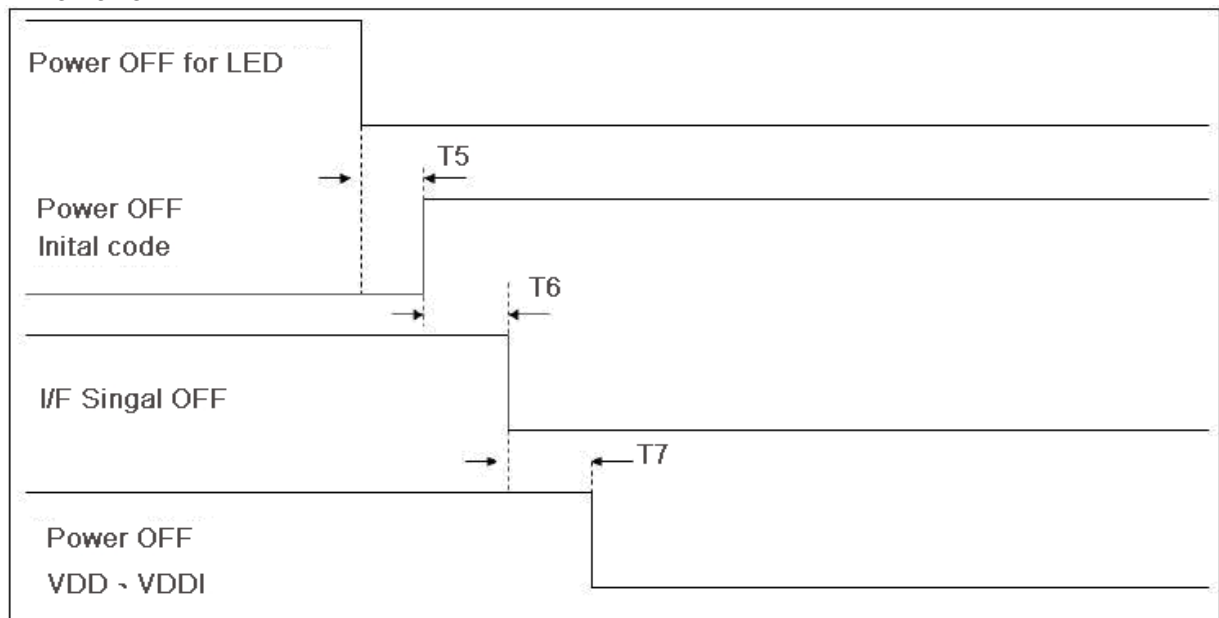
Note 7: The color coordinates (X_w, Y_w), (X_R, Y_R), (X_G, Y_G), and (X_B, Y_B) are obtained with all pixels in the viewing field at white, red, green, and blue states, respectively.

9. PIN CONNECTIONS

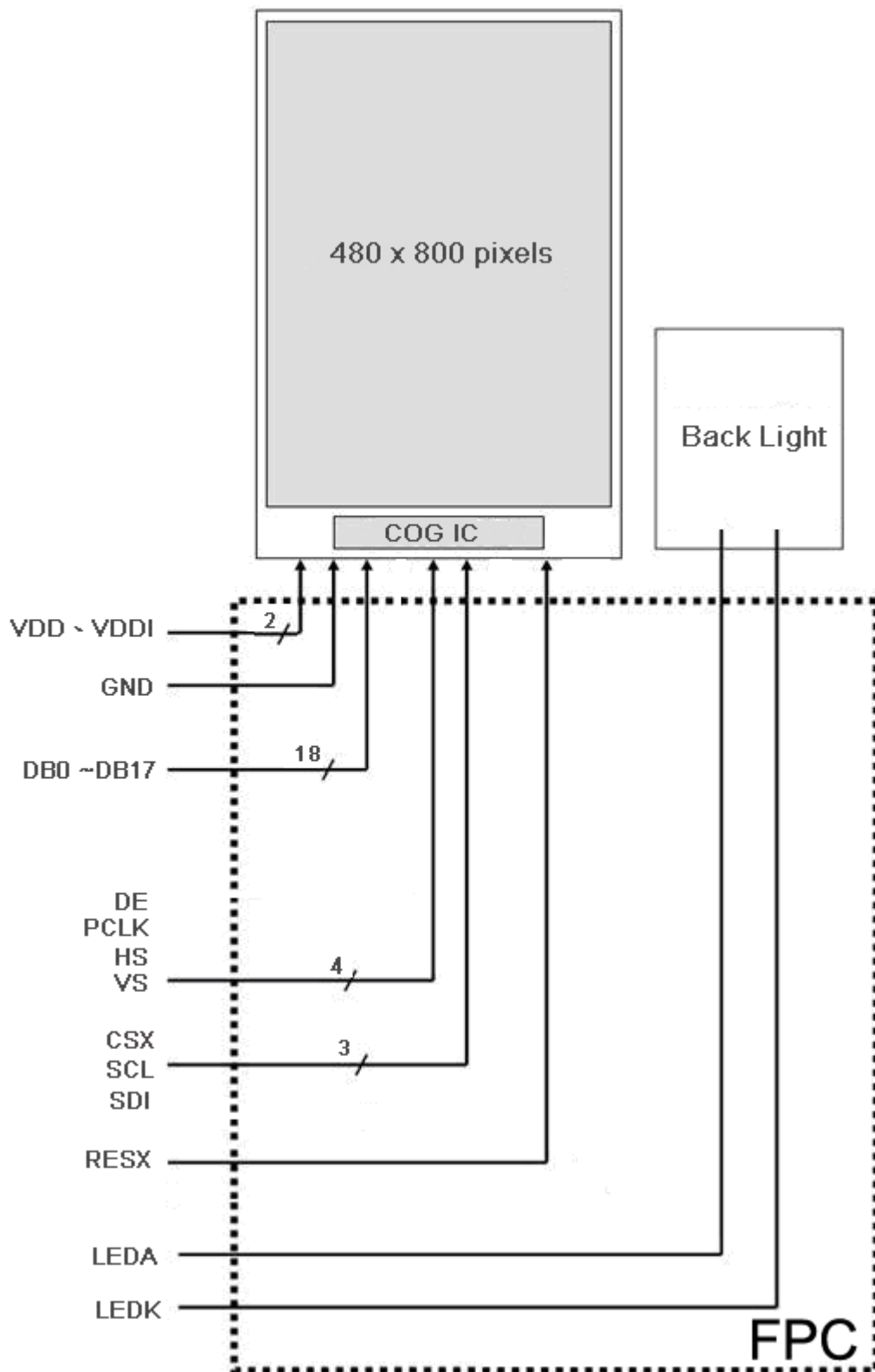
9.1 TFT-LCD PIN CONNECTIONS

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	Serial data input signal .	
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+	

9.2 power ON/OFF sequence:
Power on:

 $10\text{ms} \leq T1 \leq 20\text{ms}$; $50\text{ms} \leq T2 \leq 100\text{ms}$
 $100\text{ms} \leq T3 \leq 200\text{ms}$; $100\text{ms} \leq T4 \leq 200\text{ms}$
Power off:

 $50\text{ms} \leq T5 \leq 100\text{ms}$; $50\text{ms} \leq T6 \leq 100\text{ms}$
 $100\text{ms} \leq T7 \leq 200\text{ms}$

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°C,90%RH,240hrs	IEC68-2-3
6	Thermal Cycling Test (No operation)	-30°C → +25°C → +80°C, 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 Judgment standard

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

Pass: Normal display image and no line defect. Partial transformation of the module parts should be ignored.

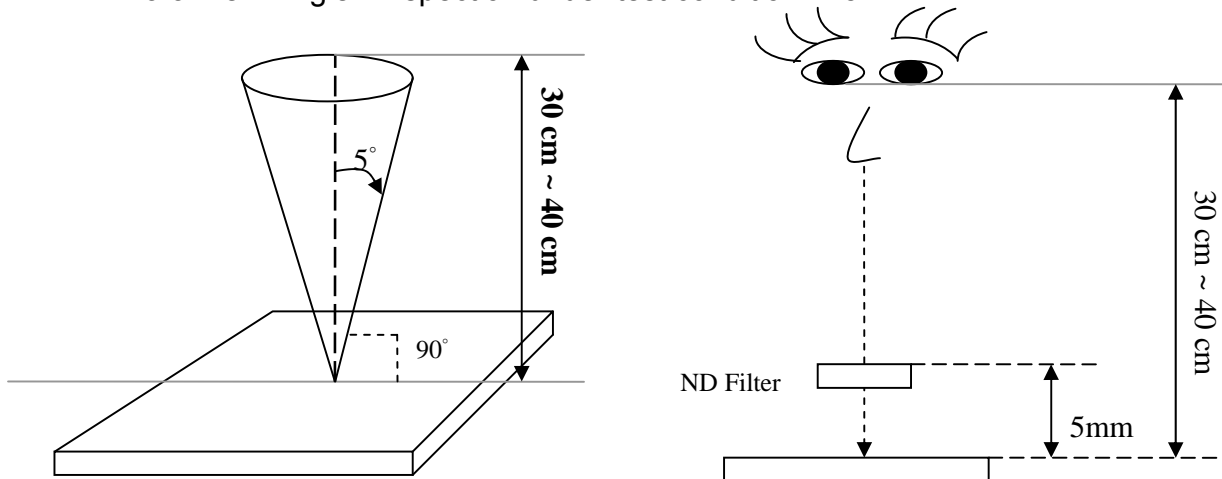
Fail: No display image or line defect.

11.3 Inspection condition

11.3.1 Inspection conditions

11.3.2 Inspection Distance : 35 ± 5 cm

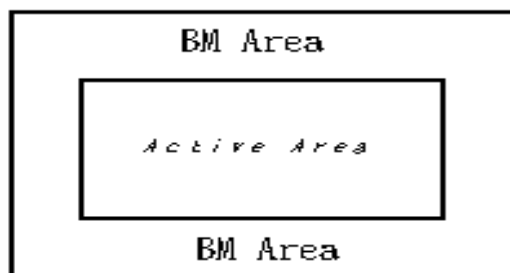
11.3.3 View Angle : Inspection under test condition : $\pm 5^\circ$



11.3.4 Environment conditions :

Ambient Temperature :		$25 \pm 5^\circ\text{C}$
Ambient Humidity :		$65 \pm 5\%$
Ambient Illumination	Functional Inspection	300~ 500 lux

11.3.5 Definition of applicable Zones



11.3.6 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: Active area ≤ 5 dots (Minor)(Note:1)														
		<table border="1"> <thead> <tr> <th>Item</th> <th>Acceptable number</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>Bright</td> <td>3</td> <td rowspan="2">5</td> </tr> <tr> <td>Dark</td> <td>4</td> </tr> </tbody> </table>	Item	Acceptable number	Total	Bright	3	5	Dark	4						
		Item	Acceptable number	Total												
		Bright	3	5												
		Dark	4													
		Non-uniformity: Visible through 2%ND filter. (Minor)														
		Foreign material in Black or White spots shape ($W > 1/4L$)														
<table border="1"> <thead> <tr> <th>Zone Dimension</th> <th>Acceptable number</th> <th>Class Of Defects</th> <th>AQL Level</th> </tr> </thead> <tbody> <tr> <td>$D > 0.5$</td> <td>0</td> <td rowspan="3">Minor</td> <td rowspan="3">1.5</td> </tr> <tr> <td>$0.3 \leq D \leq 0.5$</td> <td>4</td> </tr> <tr> <td>$D \leq 0.3$</td> <td>*</td> </tr> </tbody> </table> <p>$D = (\text{Long} + \text{Short}) / 2$ * : Disregard</p>	Zone Dimension	Acceptable number	Class Of Defects	AQL Level	$D > 0.5$	0	Minor	1.5	$0.3 \leq D \leq 0.5$	4	$D \leq 0.3$	*				
Zone Dimension	Acceptable number	Class Of Defects	AQL Level													
$D > 0.5$	0	Minor	1.5													
$0.3 \leq D \leq 0.5$	4															
$D \leq 0.3$	*															
Foreign Material in Line or spiral shape ($W \leq 1/4L$) (Note: 4)																
<table border="1"> <thead> <tr> <th>L (mm)</th> <th>Zone W(mm)</th> <th>Acceptable number</th> <th>Class Of Defects</th> <th>AQL Level</th> </tr> </thead> <tbody> <tr> <td>$L > 5$</td> <td>$W > 0.1$</td> <td>0</td> <td rowspan="3">Minor</td> <td rowspan="3">1.5</td> </tr> <tr> <td>$2 < L \leq 5$</td> <td>$0.05 < W \leq 0.1$</td> <td>3</td> </tr> <tr> <td>$L \leq 2$</td> <td>$W \leq 0.05$</td> <td>*</td> </tr> </tbody> </table> <p>L : Length W : Width * : Disregard</p>	L (mm)	Zone W(mm)	Acceptable number	Class Of Defects	AQL Level	$L > 5$	$W > 0.1$	0	Minor	1.5	$2 < L \leq 5$	$0.05 < W \leq 0.1$	3	$L \leq 2$	$W \leq 0.05$	*
L (mm)	Zone W(mm)	Acceptable number	Class Of Defects	AQL Level												
$L > 5$	$W > 0.1$	0	Minor	1.5												
$2 < L \leq 5$	$0.05 < W \leq 0.1$	3														
$L \leq 2$	$W \leq 0.05$	*														
2	External Inspection (non-operating)	Dimension: Outline (Major)														
		Bezel appearance: uneven (Minor)														
		Scratch on the polarize: (Note:2)														
		<table border="1"> <thead> <tr> <th>W (mm)</th> <th>Zone L(mm)</th> <th>Acceptable number</th> <th>Class Of Defects</th> <th>AQL Level</th> </tr> </thead> <tbody> <tr> <td>$W > 0.1$</td> <td>$L \leq 2$</td> <td>0</td> <td rowspan="2">Minor</td> <td rowspan="2">1.5</td> </tr> <tr> <td>$W \leq 0.1$</td> <td>$L \leq 5$</td> <td>3</td> </tr> </tbody> </table> <p>L : Length W : Width * : Disregard</p>	W (mm)	Zone L(mm)	Acceptable number	Class Of Defects	AQL Level	$W > 0.1$	$L \leq 2$	0	Minor	1.5	$W \leq 0.1$	$L \leq 5$	3	
		W (mm)	Zone L(mm)	Acceptable number	Class Of Defects	AQL Level										
		$W > 0.1$	$L \leq 2$	0	Minor	1.5										
$W \leq 0.1$	$L \leq 5$	3														
Dent or bubble on the polarize (Note:2)																
<table border="1"> <thead> <tr> <th>Zone Dimension</th> <th>Acceptable number</th> <th>Class Of Defects</th> <th>AQL Level</th> </tr> </thead> <tbody> <tr> <td>$D \leq 0.05$</td> <td>*</td> <td>Minor</td> <td>1.5</td> </tr> <tr> <td>$D \leq 0.3$</td> <td>3</td> <td></td> <td></td> </tr> </tbody> </table> <p>$D = (\text{Long} + \text{Short}) / 2$ * : Disregard</p>	Zone Dimension	Acceptable number	Class Of Defects	AQL Level	$D \leq 0.05$	*	Minor	1.5	$D \leq 0.3$	3						
Zone Dimension	Acceptable number	Class Of Defects	AQL Level													
$D \leq 0.05$	*	Minor	1.5													
$D \leq 0.3$	3															

Class of defects			Definition
	Major	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.
Minor	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 $>1/2$ dot respectively

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

(c)Definition of distribution of point defect is as follows:

- minumum separation between dark point defects should be larger than 5mm.
- minumum separation between bright point defects should be larger than 5mm.

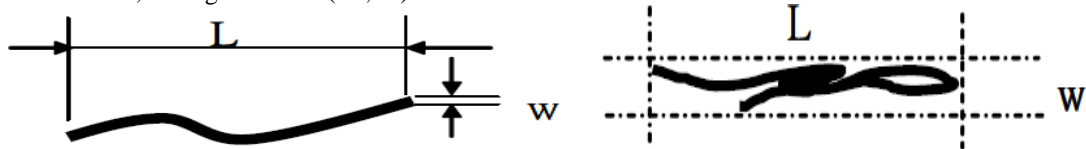
(d)Definition of joined bright point defect and joined dark point defect are as follows:

- Two or more joined bright point defects must be nil.
- Three joined dark point defects must be nil.
- Coupling of one dark and one bright point in junction is counted as one dark and bright spot with 1 pair maximum.
- Two Joined dark point is counted as two dark point with 2 pair maximum.

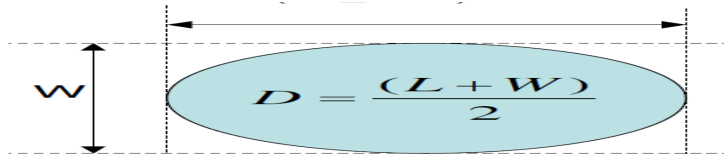
Note:2 The external inspection should be conducted at the distance 35 ± 5 cm between the eyes of inspector and the panel .

Note:3 Luminance measurement for contrast ratio is at the distance 50 ± 5 cm between the detective head and the panel with ambient illuminance 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 ($W \geq L/4$)



11.4 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.

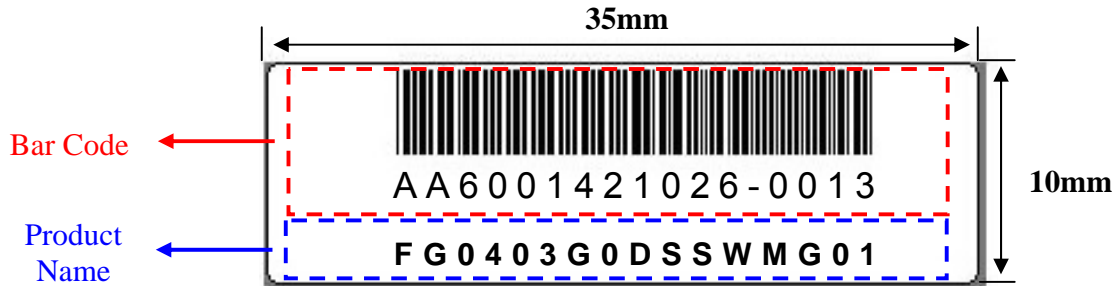
Sampling type: normal inspection, single sampling

Sampling table: MIL-STD-105E

Inspection level: Level II

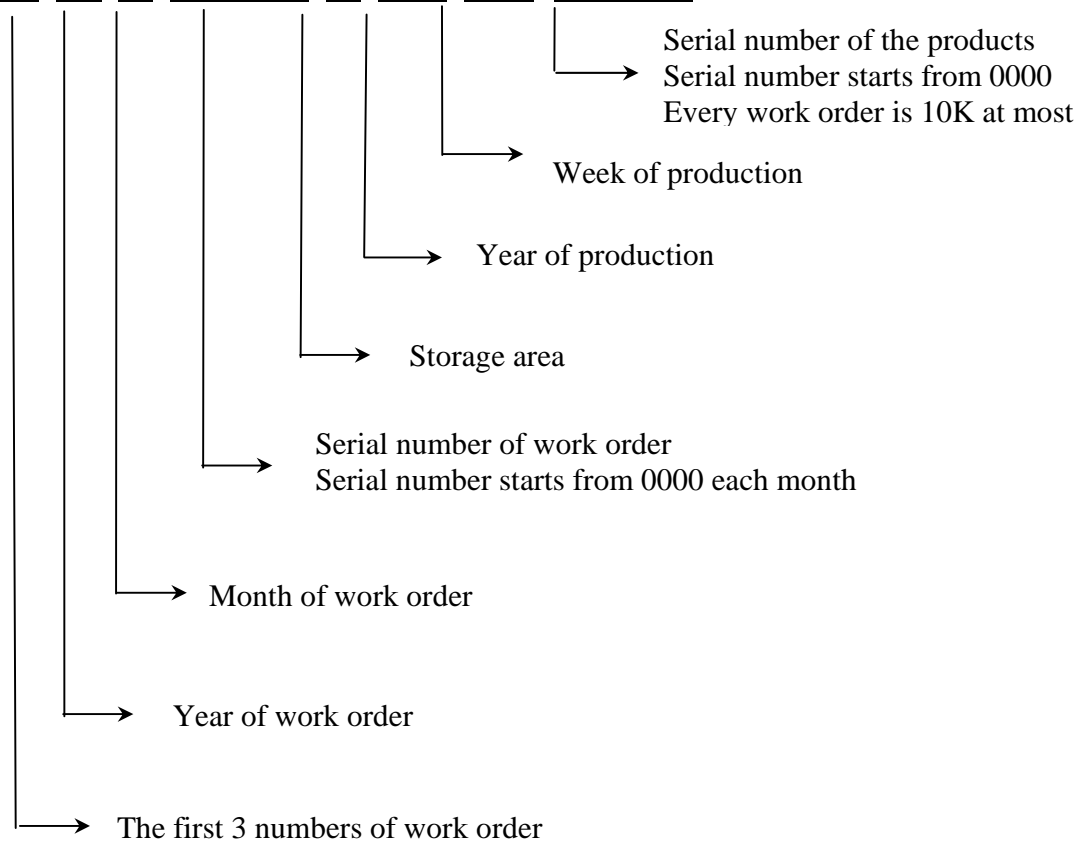
12. LCM PRODUCT LABEL DEFINE

Product Label style:

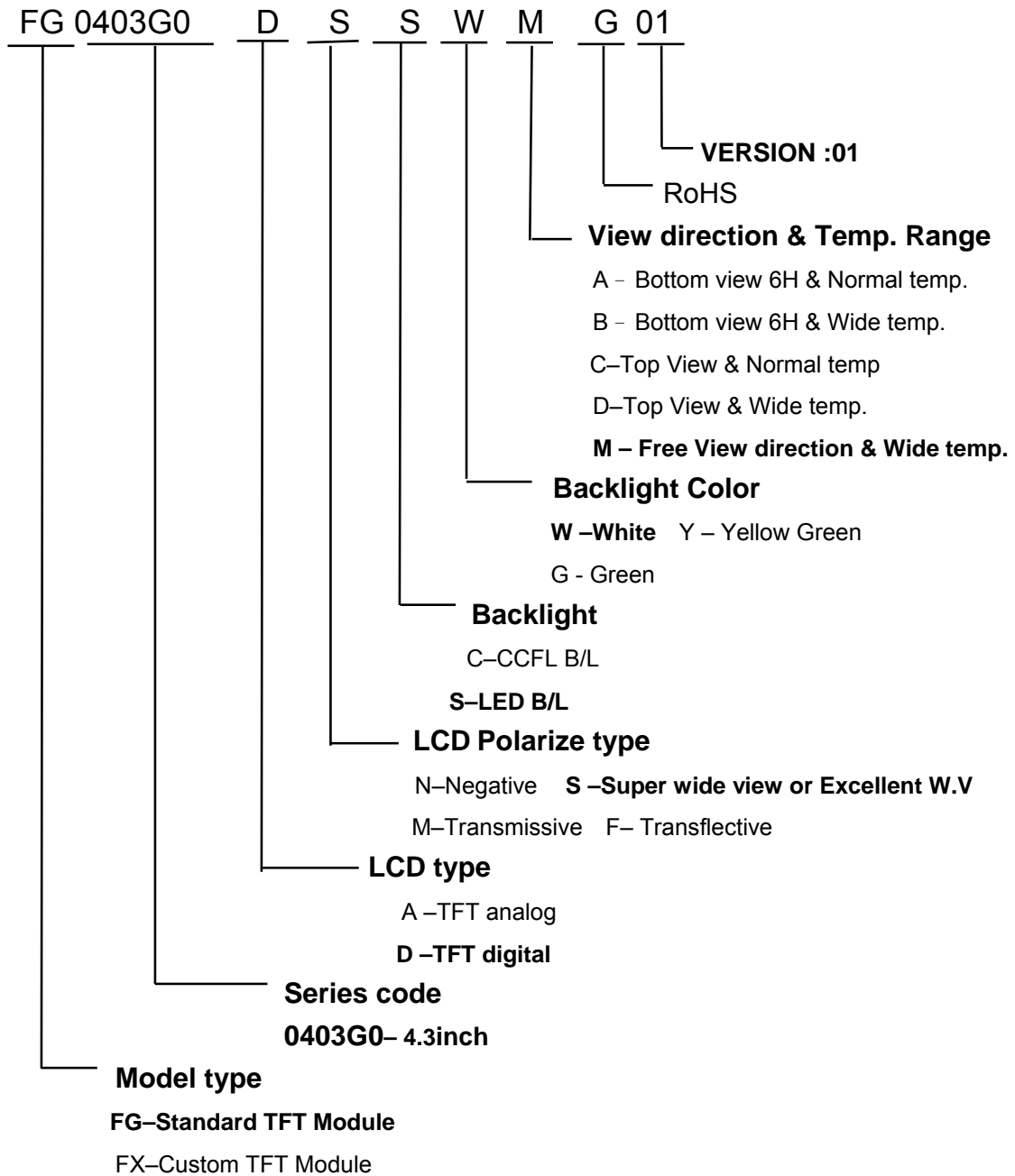


BarCode Define:

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.

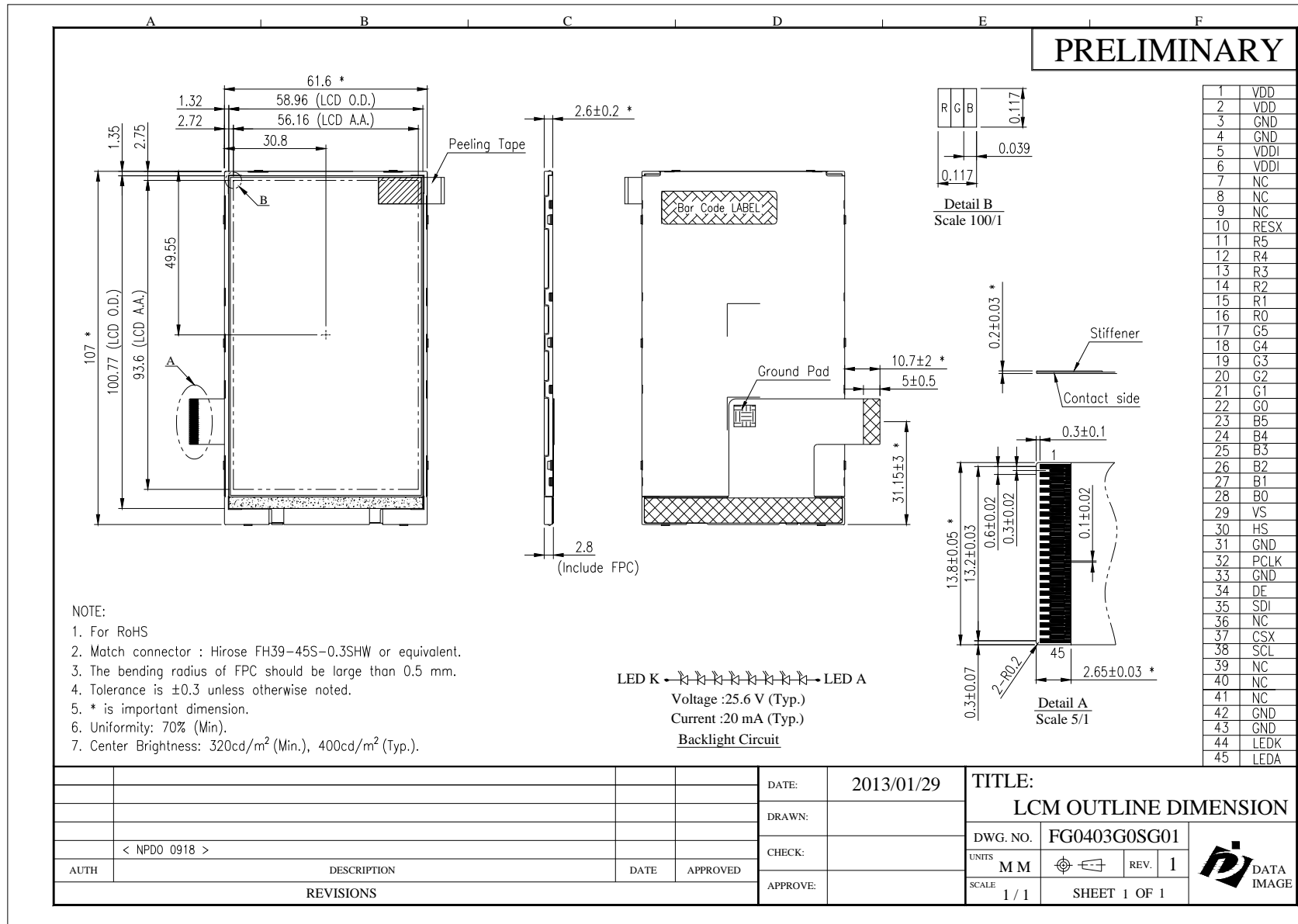
5. OTHERS

- (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.)

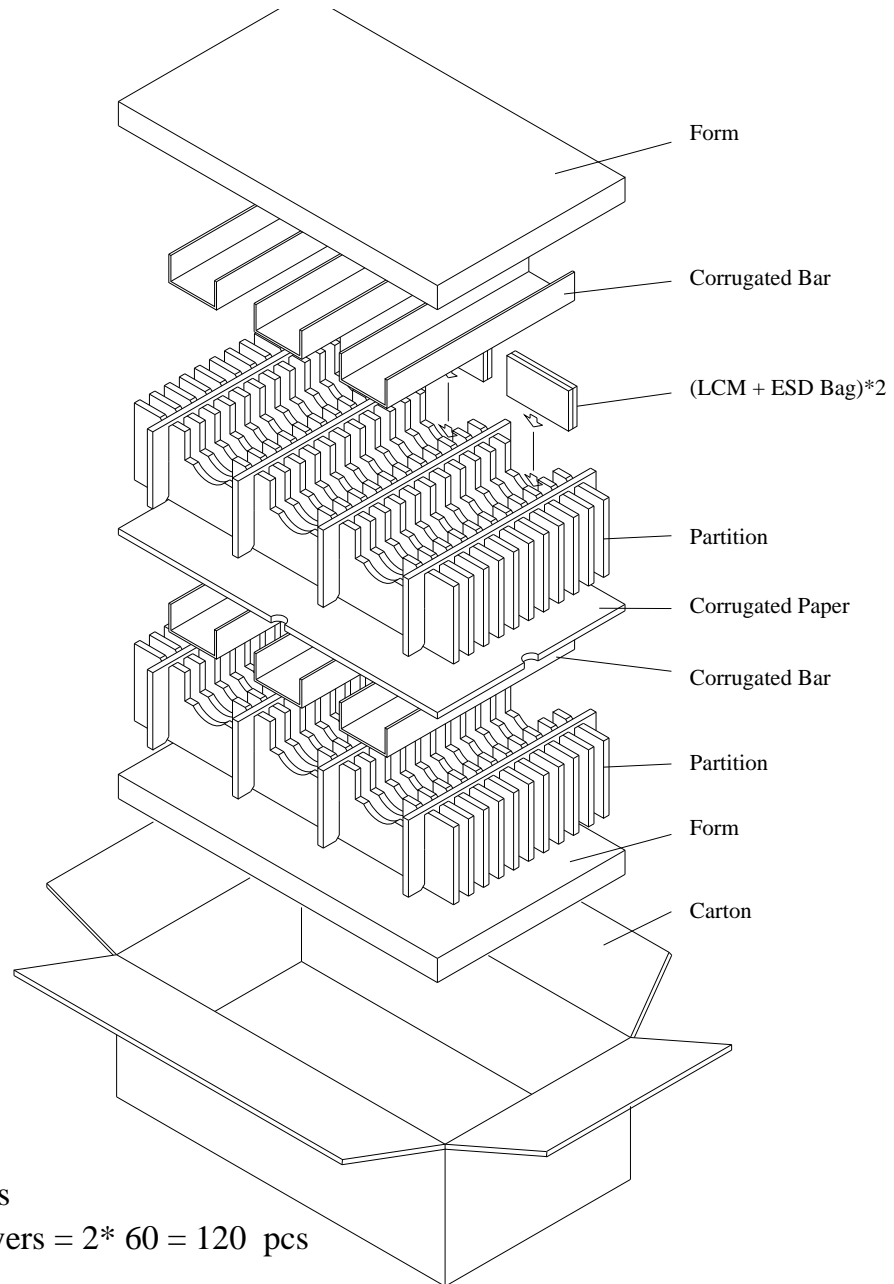
6. LIMITED WARRANTY

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



1 Layer = 60 pcs

1 Carton = 2 Layers = 2 * 60 = 120 pcs