

## Displays & Touch Screens

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# DATA IMAGE CORPORATION

## TFT Module Specification

ITEM NO.: FG0700W0DSSWAGL1

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Customer Companies	R&D Dept.	Q.C. Dept.	Eng. Dept.	Prod. Dept.
	<i>Alex</i>	<i>Joe</i>	<i>Ging.</i>	<i>Ken</i>
Approved by	Version:	Issued Date:	Sheet Code:	Total Pages:
	C	19/SEP/14'		25

## 2. RECORD OF REVISION

Rev	Date	Item	Page	Comment
1	27/MAR/13'			Initial Preliminary
A	6/NOV/13'	15	20	Modify Outline Drawing from Rev.1 to A. Release Rev: A for production.
B	26/AUG/14'	5 12	3 17	Modify High Operating Temperature from +60 to +70.
C	19/SEP/14'	15	20	Modify outline drawing form Rev. A to B.

### 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) x 90.0(H) mm	mm
Dot Pitch	0.05(W) x 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	
Our components and processes are compliant to RoHS standard		

### 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	70	°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

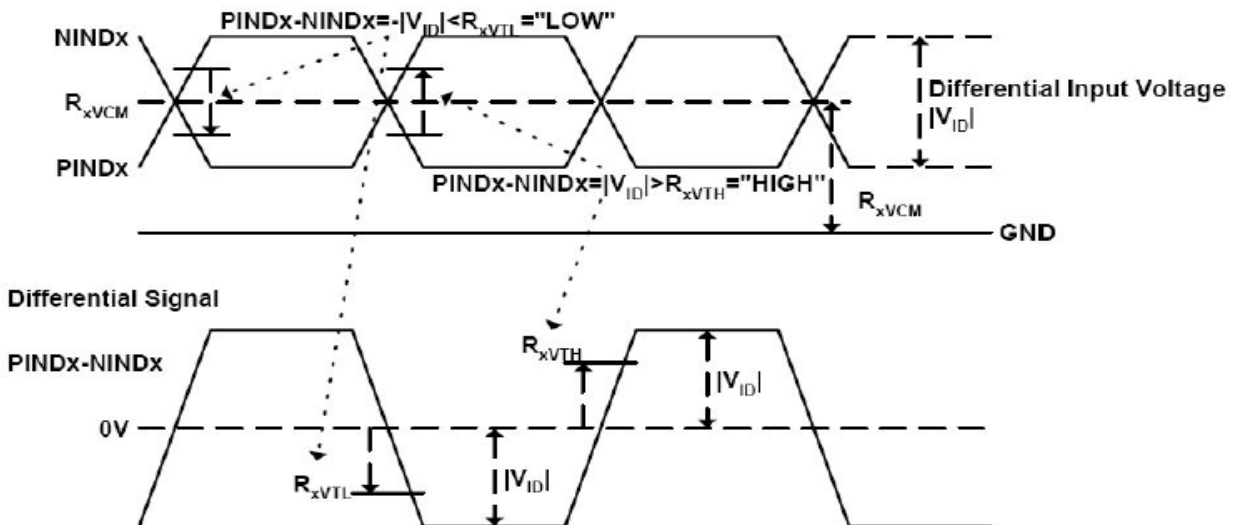
GND=0V, fH=38.1KHz, fV=60Hz, fCLK=50.2MHz, Ta=25°C

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
Differential input Low Threshold	R <sub>xVTL</sub>	-100	-	-	[mV]	Note 2
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>	-	0.25	1.0	mA	VGH=20V
	I <sub>GL</sub>	-	0.25	1.0	mA	VGL=-6.8V
	I <sub>VDD</sub>	-	38	60	mA	VDD=3.3V
	I <sub>AVDD</sub>	-	20	30	mA	AVDD=11V

### 6.3 Backlight Driving Consumption

Ta= 25 °C

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
LED voltage	$V_L$	-	9.9	10.5	V	Note 1
LED current	$I_L$	-	180	--	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  $I_L = 180\text{mA}$ .

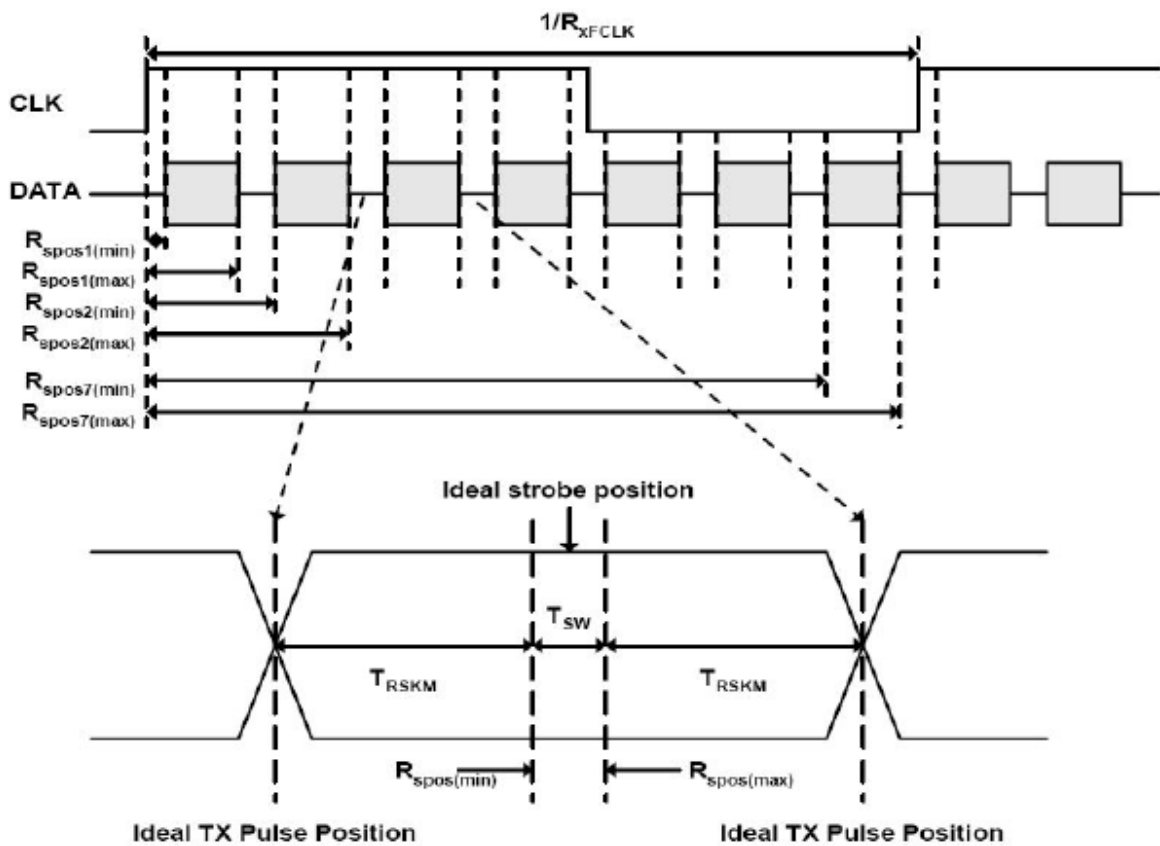
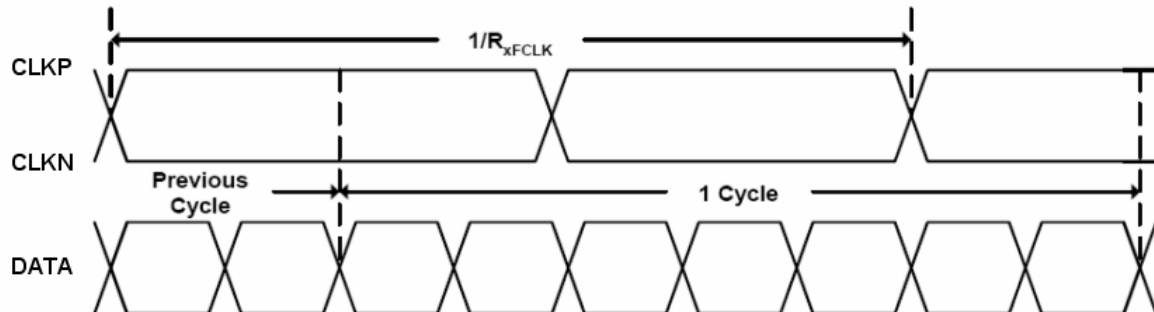
Note 2: The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25 and  $I_L = 180\text{mA}$ . The LED lifetime could be decreased if operating  $I_L$  is larger than 180mA.

## 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	-	$4/(7 \cdot RxFCLK)$	-	ns	
Clock low time	TLVCL	-	$3/(7 \cdot RxFCLK)$	-	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+TDE L	
VS period time	TDE+TDEB	610	635	800	TDEH+TDE L	
VS Blanking	TDEB	10	35	200	TDEH+TDE L	

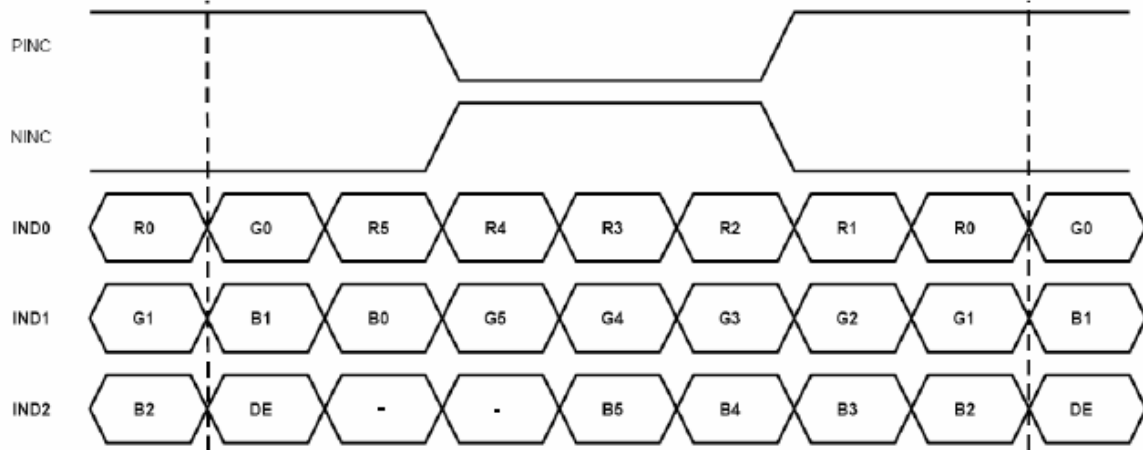
**7.1.2 Input Clock and Data Timing Diagram**


$T_{RSKM}$ : Receiver strobe margin  
 $R_{SPOS}$ : Receiver strobe position  
 $T_{SW}$ : Strobe width (Internal data sampling window)

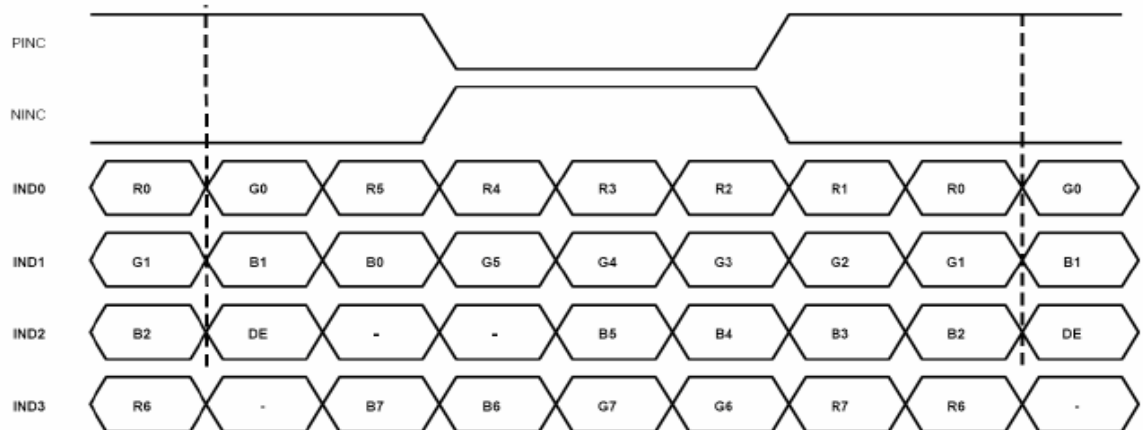
## 7.2 Timing Controller Timing Chart

### 7.2.1 Data Input format

#### 6bit LVDS input



#### 8bit LVDS input



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

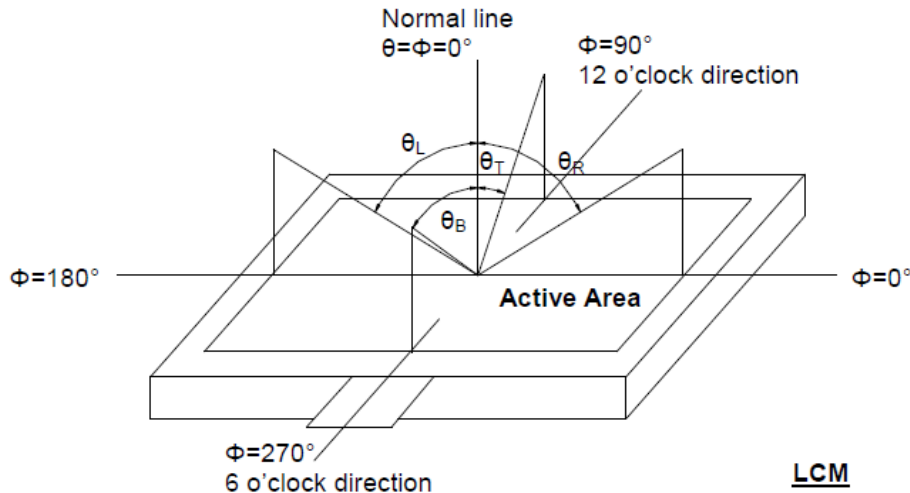


### 8. OPTICAL CHARACTERISTIC

Parameter	Symbol	Condition	MIN.	TYP.	MAX.	Unit	Remarks
Viewing Angle	$\theta_L$	Center $CR \geq 10$	65	75	--	deg	Note 1,2,3
	$\theta_R$		65	75	--		
	$\theta_T$		60	70	--		
	$\theta_B$		65	75	--		
Contrast Ratio	CR	at optimized viewing angle	500	700	--		Note 2,3,4
Response time	Rise	Center $\theta_x = \theta_y = 0^\circ$	-	10	20	ms	Note 2,3,6
	Fall		-	10	20		
Uniformity	B-uni	$\theta_x = \theta_y = 0^\circ$	70	--	--	%	Note 2,3,5
Brightness	L	$\theta_x = \theta_y = 0^\circ$	400	500	--	cd/m <sup>2</sup>	Note 2,3
Chromaticity	$x_w$	Center $\theta_x = \theta_y = 0^\circ$	0.26	0.31	0.36		Note 2,3,7
	$y_w$		0.28	0.33	0.38		
Transmittance	Tr		3.15%	3.5%	-		

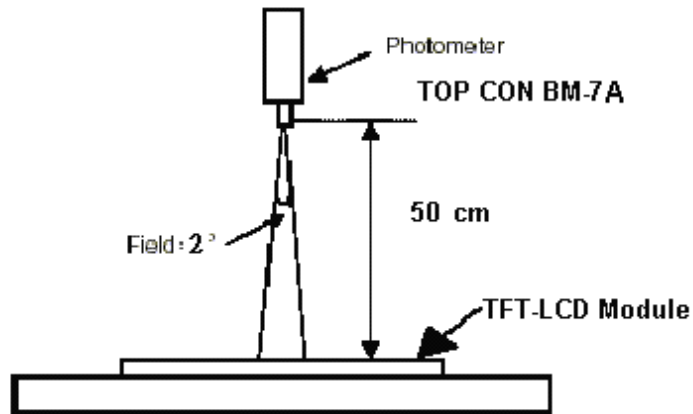
The following optical specifications shall be measured in a darkroom or equivalent state (ambient luminance  $\leq 1$  lux, and at room temperature). The operation temperature is  $25^\circ\text{C} \pm 2^\circ\text{C}$  and LED Backlight Current  $I_L = 160\text{mA}$ . The measurement method is shown in Note 1.

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  $I_L = 160\text{mA}$ .

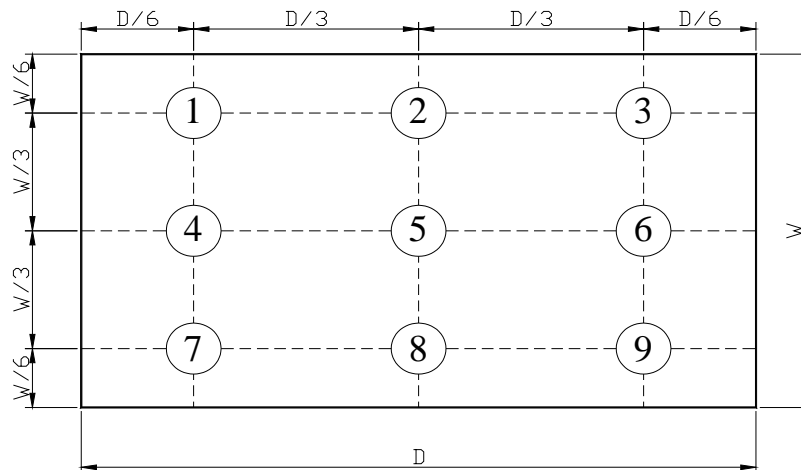
Note 3: Measured at the center area of the panel and at the viewing angle of the  $\theta_x = \theta_y = 0^\circ$



Note 4: Definition of Contrast Ratio (CR):

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

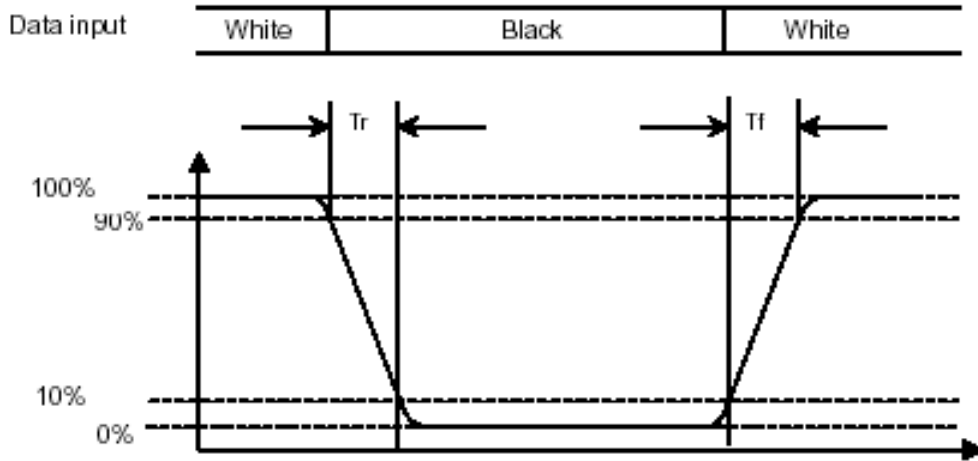
Note 5: Definition of Brightness Uniformity (B-uni):



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

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.



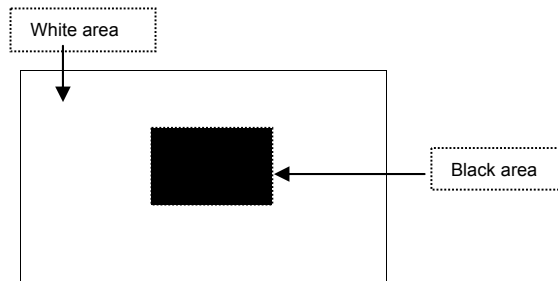
Note 7: Definition of Chromaticity:

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 (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	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	RXNI2+	+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="0", 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.

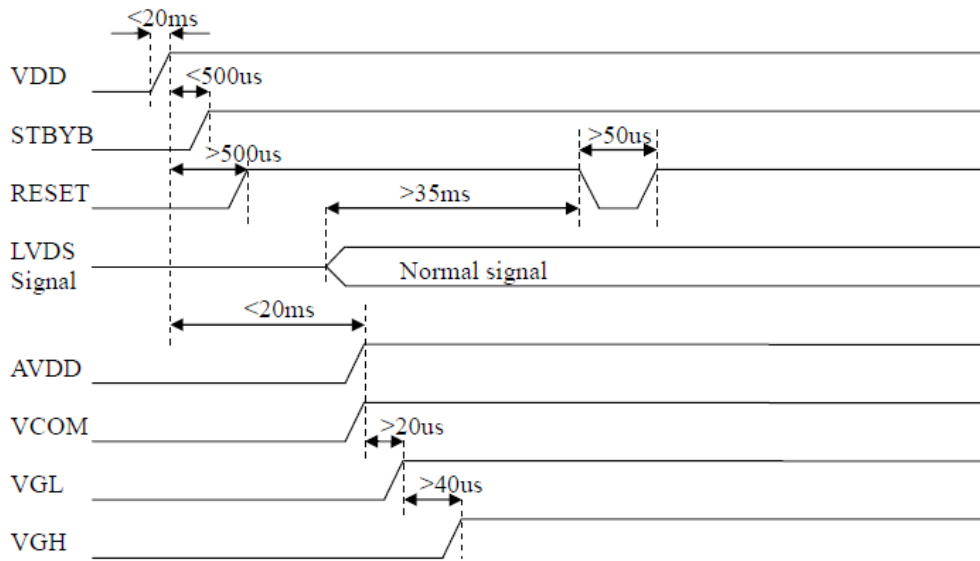
When L/R="1", set left to right scan direction.

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

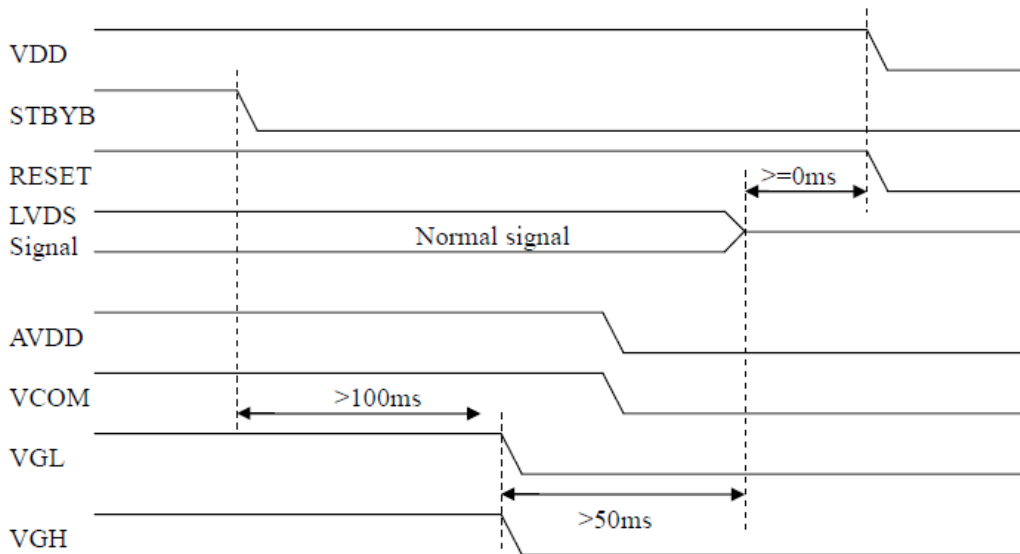
When U/D="1", set bottom to top scan direction.

### 9.1 power ON/OFF sequence:

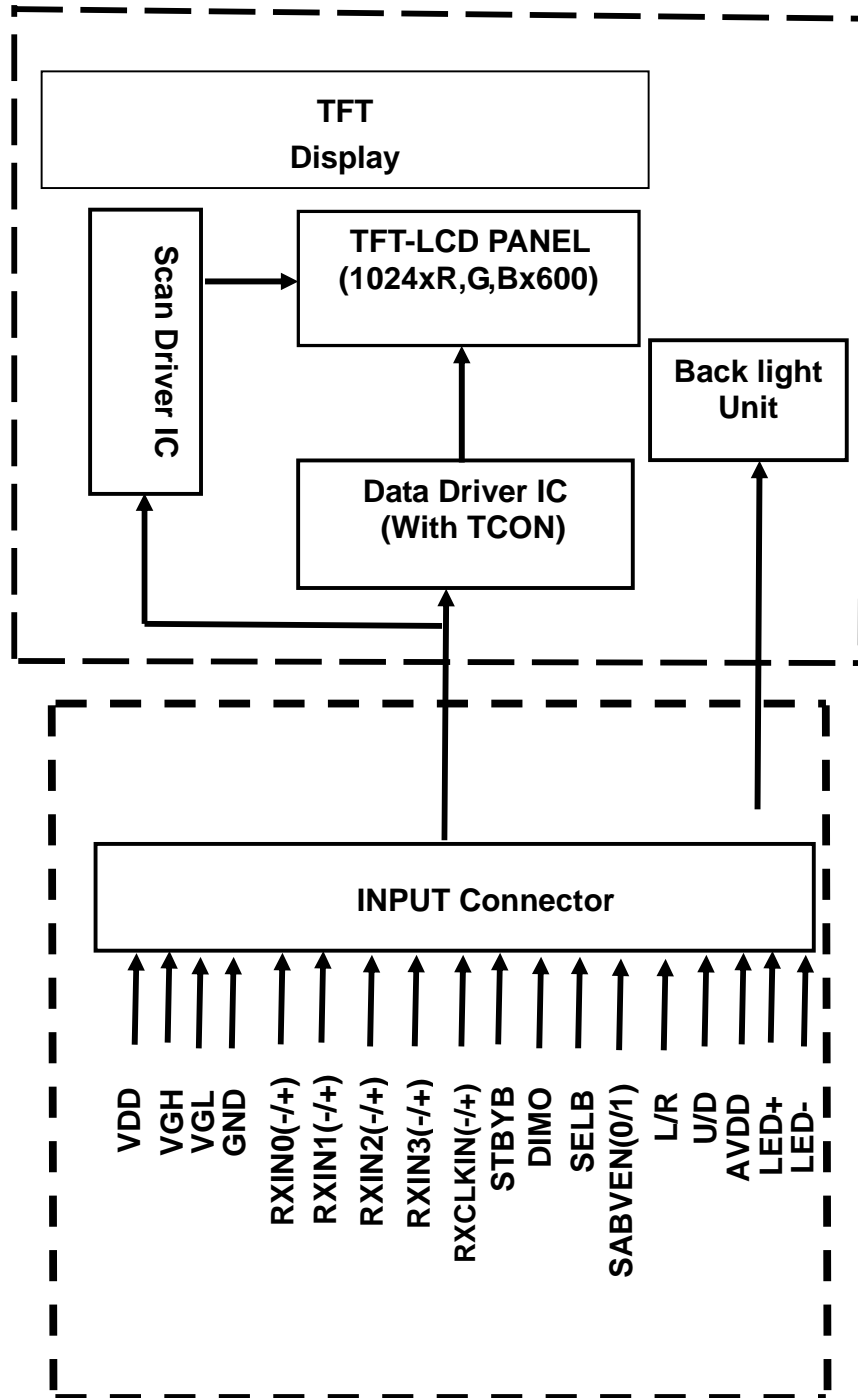
Power on:



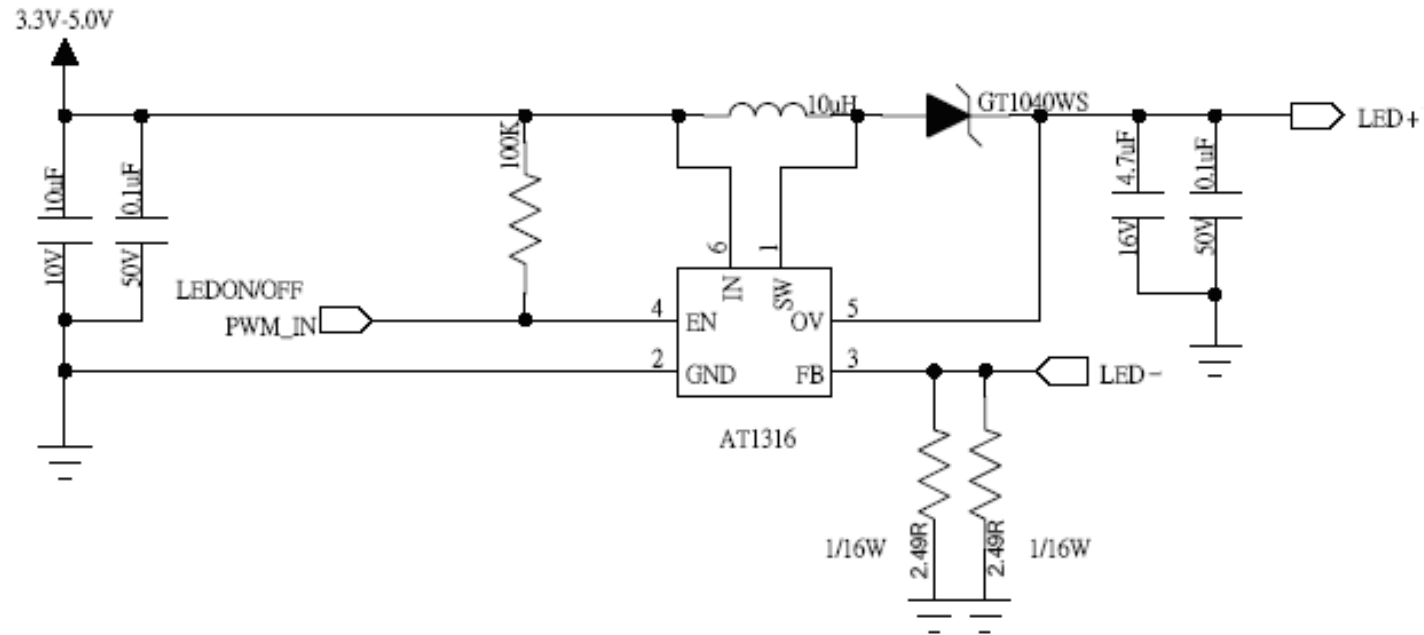
Power off:



## 10. BLOCK DIAGRAM

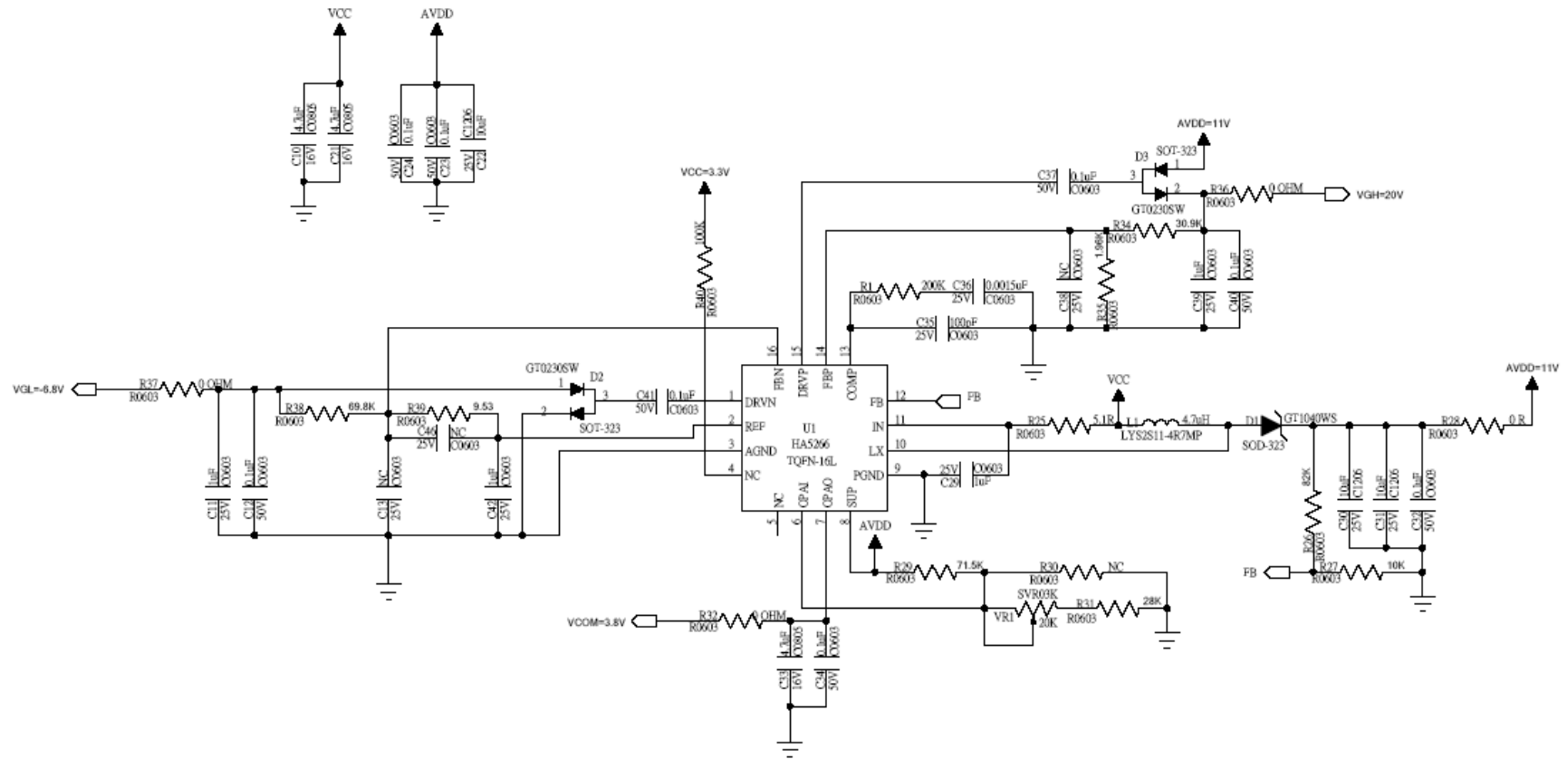


## 11. APPLICATION CIRCUIT



**B/L circuit**





DC-DC circuit

## 12. QUALITY ASSURANCE

### 12.1 RA 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	Remark
No.	Test Item		
1	High Temperature Storage Test	T=70 ,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=40 ,90%RH,240hrs	IEC68-2-3
6	Thermal Cycling Test (No operation)	-30 → +25 → +70 , 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

## 12.2 Inspection condition

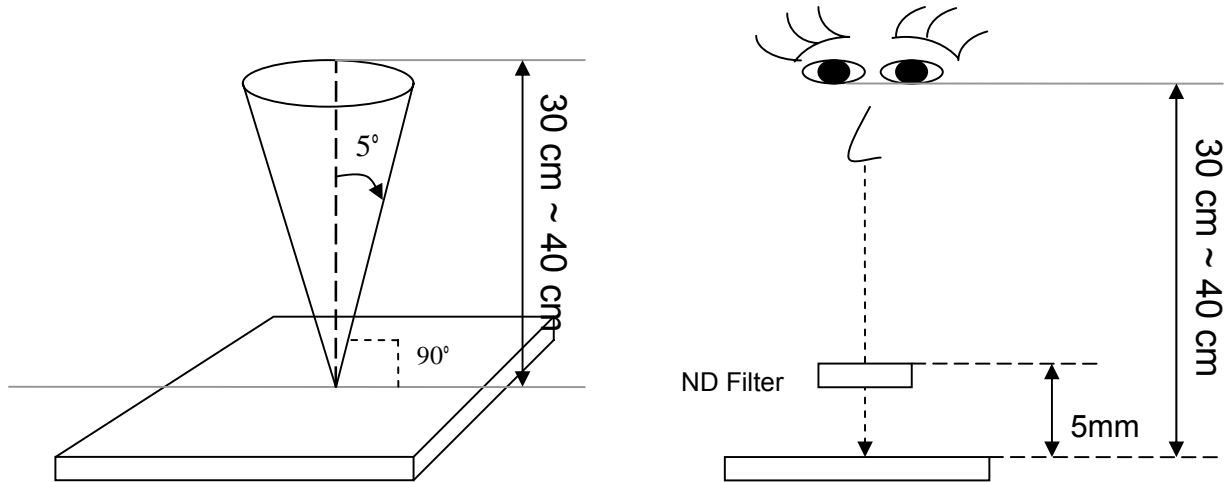
### 12.2.1 Inspection conditions

12.2.1.1 Inspection Distance :  $35 \pm 5$  cm

12.2.1.2 View Angle :

(1) Inspection under operating condition :  $\pm 5^\circ$

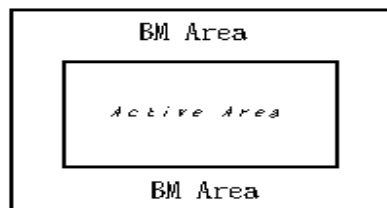
(2) Inspection under non-operating condition :  $\pm 45^\circ$



### 12.2.2 Environment conditions :

Ambient Temperature :		<b><math>25 \pm 5^\circ\text{C}</math></b>
Ambient Humidity :		<b><math>65 \pm 5\%</math></b>
Ambient Illumination	Cosmetic Inspection	<b>more than 600 lux</b>
	Functional Inspection	<b>300 ~ 800 lux</b>

### 12.2.3 Definition of applicable Zones



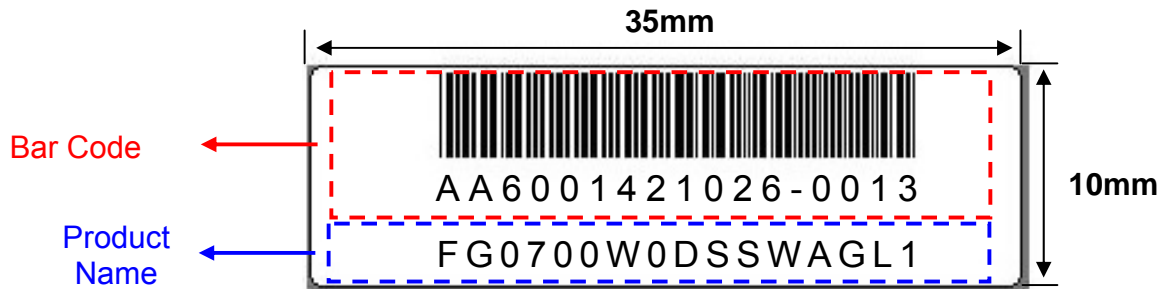
## 12.2.4 Inspection Parameters

No.	Parameter	Criteria																
1	Operating	Display function: No Display malfunction (Major)																
		Contrast ratio (Black, White): Does not meet specified range in the spec. (Major)																
		Line Defect: No obvious Vertical and Horizontal line defect in bright, dark and colored. (Major)																
		Point Defect: Active area 8 dots (Minor) (Note:1)																
		<table border="1"> <thead> <tr> <th colspan="2" rowspan="2">Item</th> <th>Acceptable number</th> <th rowspan="2">Total</th> </tr> <tr> <th>Active Area</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Bright</td> <td>Random</td> <td>3</td> <td rowspan="4">8</td> </tr> <tr> <td>Two dots adjacent</td> <td>1</td> </tr> <tr> <td rowspan="2">Dark</td> <td>Random</td> <td>5</td> </tr> <tr> <td>Two dots adjacent</td> <td>2</td> </tr> </tbody> </table>	Item		Acceptable number	Total	Active Area	Bright	Random	3	8	Two dots adjacent	1	Dark	Random	5	Two dots adjacent	2
		Item			Acceptable number		Total											
				Active Area														
		Bright	Random	3	8													
Two dots adjacent	1																	
Dark	Random	5																
	Two dots adjacent	2																
Non-uniformity: Visible through 2 %ND filter White , R , G ,B and gray 50% pattern. (Minor)																		
Foreign material in Black or White spots shape ( $W > 1/4L$ )																		
<table border="1"> <thead> <tr> <th>Zone Dimension</th> <th>Acceptable number</th> <th>Class of Defects</th> </tr> </thead> <tbody> <tr> <td><math>D &gt; 0.5</math></td> <td>0</td> <td rowspan="3">Minor</td> </tr> <tr> <td><math>0.3 &lt; D \leq 0.5</math></td> <td>5</td> </tr> <tr> <td><math>0.3 \leq D</math></td> <td>*</td> </tr> </tbody> </table> <p style="text-align: center;"><math>D = (\text{Long} + \text{Short}) / 2</math>      *: Disregard</p>	Zone Dimension	Acceptable number	Class of Defects	$D > 0.5$	0	Minor	$0.3 < D \leq 0.5$	5	$0.3 \leq D$	*								
Zone Dimension	Acceptable number	Class of Defects																
$D > 0.5$	0	Minor																
$0.3 < D \leq 0.5$	5																	
$0.3 \leq D$	*																	
Foreign Material in Line or spiral shape ( $W \leq 1/4L$ ) (Note: 4)																		
<table border="1"> <thead> <tr> <th>Zone L (mm)</th> <th>Zone W(mm)</th> <th>Acceptable number</th> <th>Class of Defects</th> </tr> </thead> <tbody> <tr> <td><math>L &gt; 5</math></td> <td><math>W &gt; 0.1</math></td> <td>0</td> <td rowspan="3">Minor</td> </tr> <tr> <td><math>L \leq 5</math></td> <td><math>0.05 &lt; W \leq 0.1</math></td> <td>5</td> </tr> <tr> <td><math>L \leq 5</math></td> <td><math>W \leq 0.05</math></td> <td>*</td> </tr> </tbody> </table> <p style="text-align: center;">L : Length    W : Width      *: Disregard</p>	Zone L (mm)	Zone W(mm)	Acceptable number	Class of Defects	$L > 5$	$W > 0.1$	0	Minor	$L \leq 5$	$0.05 < W \leq 0.1$	5	$L \leq 5$	$W \leq 0.05$	*				
Zone L (mm)	Zone W(mm)	Acceptable number	Class of Defects															
$L > 5$	$W > 0.1$	0	Minor															
$L \leq 5$	$0.05 < W \leq 0.1$	5																
$L \leq 5$	$W \leq 0.05$	*																
2	External	Dimension: Outline (Major)																

	Inspection (non-operating)	Bezel appearance: uneven (Minor)															
		Scratch on the polarize: (Note:2)															
		<table border="1"> <thead> <tr> <th>Zone L (mm)</th> <th>Zone W(mm)</th> <th>Acceptable number</th> <th rowspan="4">Class of Defects</th> </tr> </thead> <tbody> <tr> <td>L &gt; 10</td> <td>W&gt;0.1</td> <td>0</td> </tr> <tr> <td>L 10</td> <td>0.05 &lt; W 0.1</td> <td>5</td> </tr> <tr> <td>L 10</td> <td>W 0.05</td> <td>*</td> </tr> </tbody> </table>	Zone L (mm)	Zone W(mm)	Acceptable number	Class of Defects	L > 10	W>0.1	0	L 10	0.05 < W 0.1	5	L 10	W 0.05	*		
		Zone L (mm)	Zone W(mm)	Acceptable number	Class of Defects												
L > 10	W>0.1	0															
L 10	0.05 < W 0.1	5															
L 10	W 0.05	*															
L : Length    W : Width    * : Disregar																	
		Dent or bubble on the polarize (Note:2)															
		<table border="1"> <thead> <tr> <th>Zone Dimension</th> <th>Acceptable number</th> <th rowspan="4">Class of Defects</th> </tr> </thead> <tbody> <tr> <td>D&gt; 0.8</td> <td>0</td> </tr> <tr> <td>0.3 &lt; D 0.8</td> <td>5</td> </tr> <tr> <td>0.3 D</td> <td>*</td> </tr> </tbody> </table>	Zone Dimension	Acceptable number	Class of Defects	D> 0.8	0	0.3 < D 0.8	5	0.3 D	*						
		Zone Dimension	Acceptable number	Class of Defects													
		D> 0.8	0														
0.3 < D 0.8	5																
0.3 D	*																
D = (Long + Short) / 2    *: Disregar																	
Polarizer flaw or leak out resin : Defect is defined as the active area.																	
3	Others	Issues which is not defined defect :defect must be visible through 2% ND Filter.															

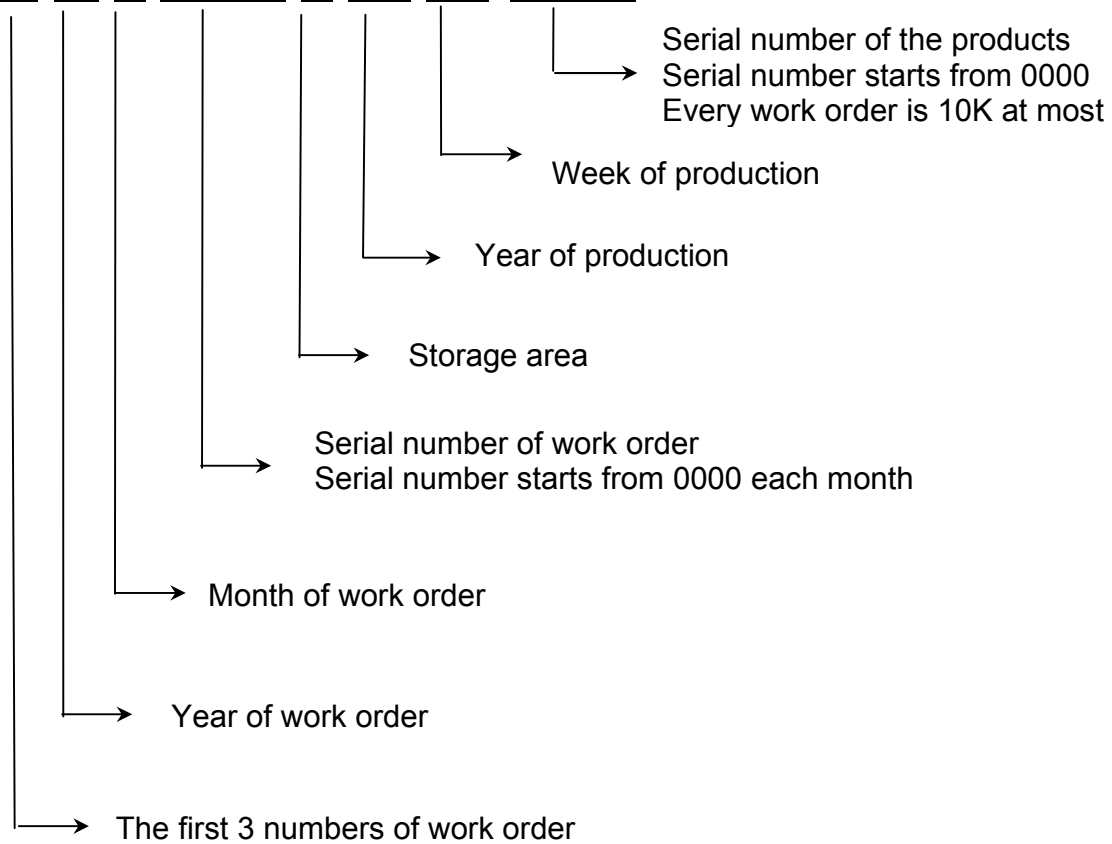
### 13. LCM PRODUCT LABEL DEFINE

Product Label style:

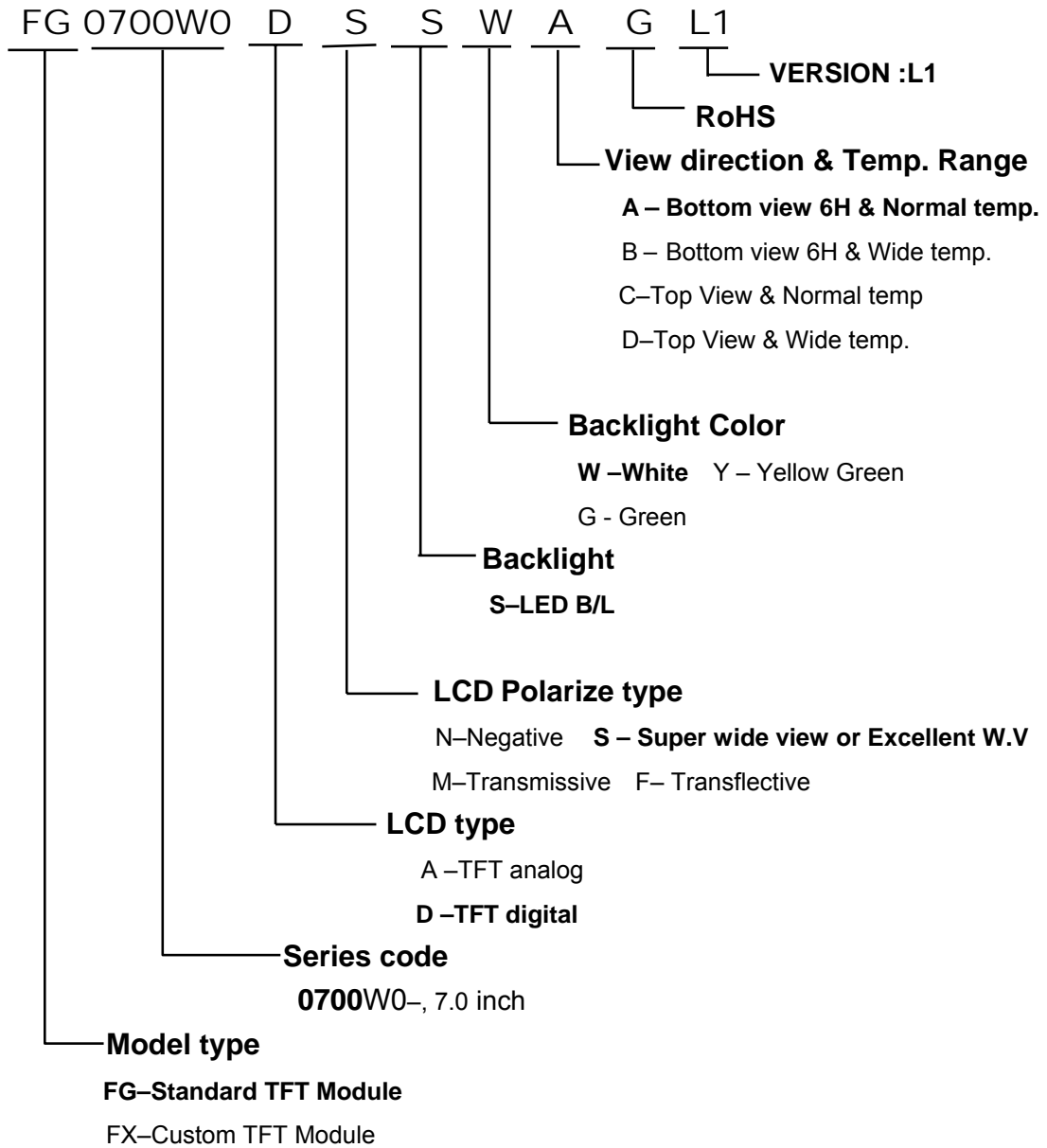


BarCode Define:

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



**Product Name Define:**



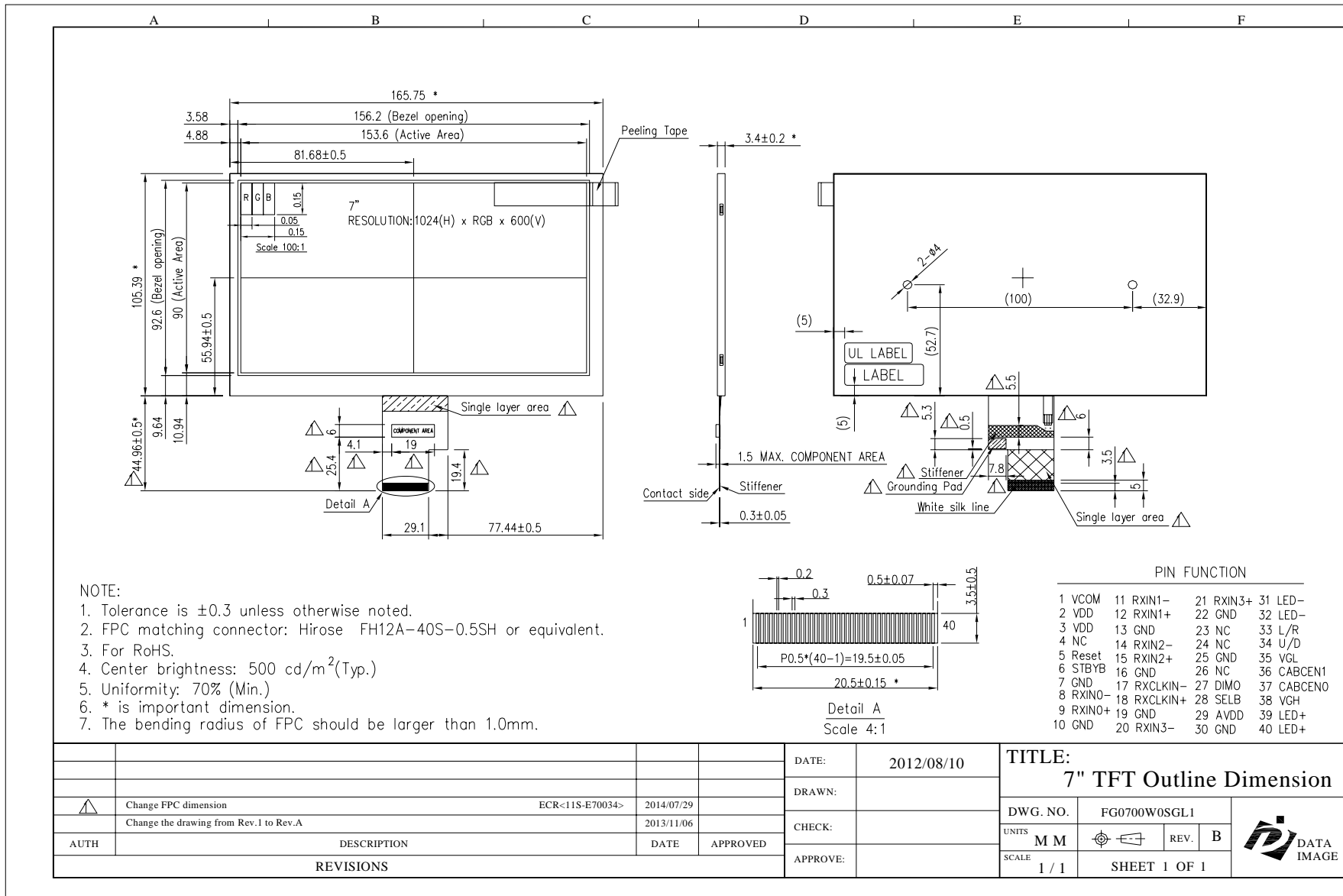
## 14. PRECAUTIONS IN USE LCM

1. 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 Land 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:
  - (4) Please do not pile them up more than 5 boxes. (They are not designed so.) And please do not turn over.
  - (5) Please handle packaging box with care not to give them sudden shock and vibrations. And also please do not throw them up.
  - (6) 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

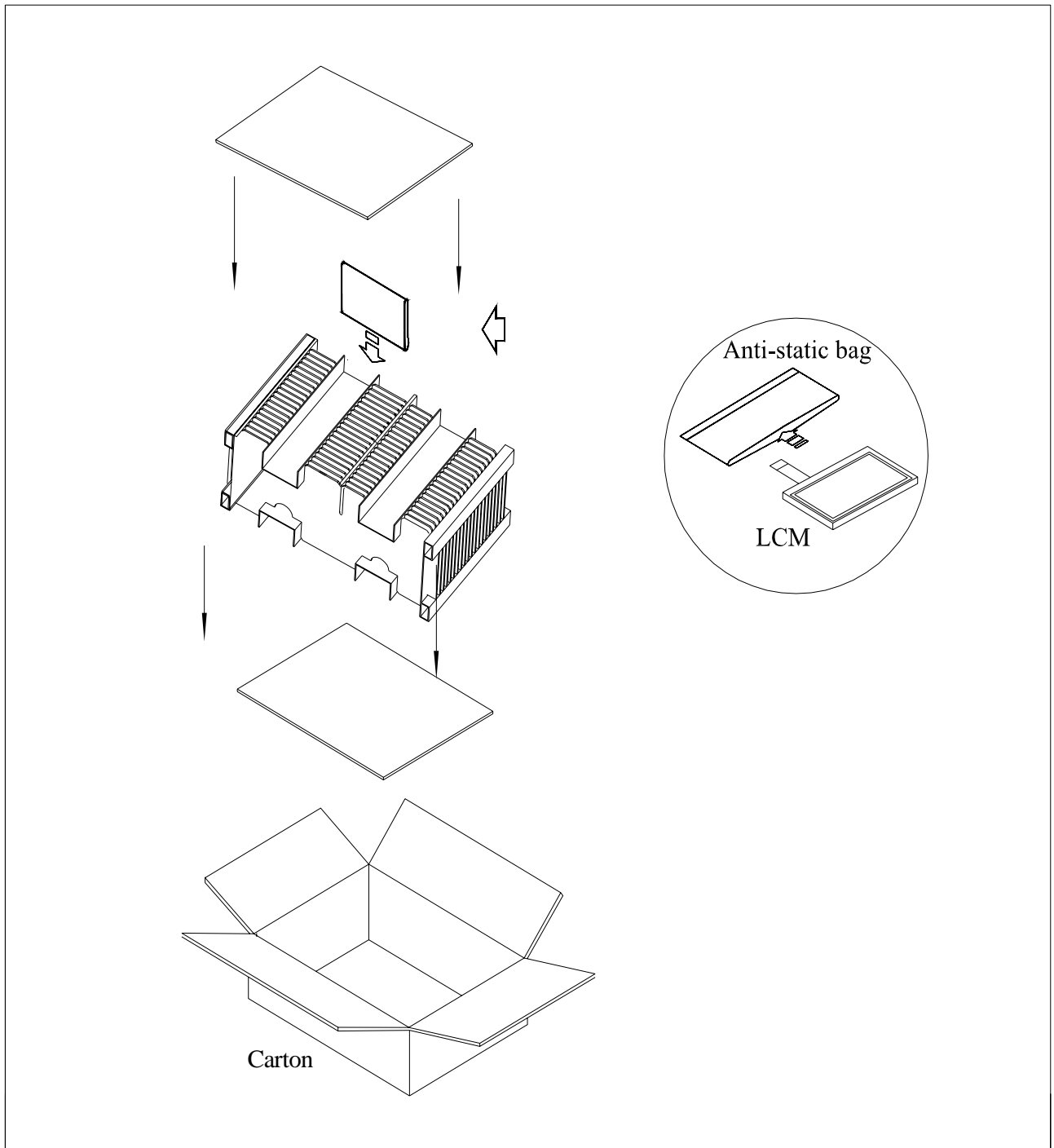
Unless otherwise agreed between DATA IMAGE and customer, DATA IMAGE will replace or repair any of its LCD and LCM which is found to be defective electrically and visually when inspected in accordance with DATA IMAGE acceptance standards, for a period on one year from date of shipment. Confirmation of 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 responsible for any subsequent or consequential events.



# 15. OUTLINE DRAWING



## 16. PACKAGE INFORMATION



Item	Size(L*W*H)	Quantity	Note
Master Carton	482*282*279	1	
Quantity Per Master Carton		38	
N . W	4.1 (kg)	G . W	5.7 (kg)