DATA IMAGE   CORPORATION

TFT Module Specification

PRELIMINARY

ITEM NO.:   FG100210DNCWA-01

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Customer Companies	R&D Dept.	Q.C. Dept.	Eng. Dept.	Prod. Dept.
	ALEX	ERIC	PAUL	HELEN
Approved by	Version:	Issued Date:	Sheet Code:	Total Pages:
	1	2005/09/14		18

2. RECORD OF REVISION

Rev	Date	Item	Page	Comment
1	13/SEP/05			Initial PRELIMINARY

3. GENERAL Specifications

Parameter	Specifications	Unit
Screen Size	10.2 (diagonal)	inch
Display Format	800(H) x (R,G,B) x 480(V)	dot
Active Area	222(H) x 132.48(V)	mm
Dot Pitch	0.2775 (H) x 0.276 (V)	mm
Pixel Configuration	R.G.B. Stripe	
Outline Dimension (Note 1)	235(W) x 145.8(H) x 6.3 (D)	mm
Surface treatment	Anti-glare	
Back-light	CCFL	
Display mode	Normally white	
Weight	345±10	g

4. Absolute Maximum Ratings:

Parameter	Symbol	MIN.	Typ.	MAX.	Unit	Remark
Power voltage	Vcc	-0.5	-	5	V	Ta=25°C
	AVDD	-0.5	-	12	V	
	VGH	-0.3	-	18	V	
	VGL	-15	-	0.3	V	
	VGH-CGL	-	-	33	V	
Input Signal Voltage	VI	-0.3	-	V_{CC}+0.3	V	
	Vref(V1~V7)	0.4AVDD	-	AVDD+0.3	V	
	Vref(V8~V14)	-0.3	-	0.6AVDD	V	
	Vcom		(4.2)		V	
Operating temperature	Top	0	-	60	°C	
Storage temperature	Tst	-20	-	+70	°C	-

Note:
1."Temperature" and "Humidity" shall be at glass surface of a TFT-LCD Module, not in the system installed
  with the Module.
It's should not be over these absolute maximum ratings at any position of a TFT-LCD Module.
Operating temperature means the temperature a TFT-LCD Module can be driven, not mean guarantee the
screen performance (contrast, brightness, response time etc) is judged at Ta=25   At low temperature the
brightness of CCFL drop and the life time of CCFL become to be short.

2.Ambient temp. Ta   40   : 85%RH Max. Without condensation.
              Ta>40   : Absolute humidity must be lower than the humidity of 85% at 40   . Without
                      condensation.

5. Electrical Characteristics

a. Typical operating conditions (GND=AVSS=0V)   Ta=25°C

ITEM	Symbol	MIN.	Typ.	MAX.	Unit
Power Voltage	VCC	3.0	3.3	3.6	V
	AVDD	(8.2)	(8.8)	(9.2)	V
	VGH	7	15	15.7	V
	Vcom	-	(4.2)	-	V
	VGL	-10.5	-10	-9.5	V
Input Reference Voltage	V1~V7	0.4AVDD	-	AVDD-0.3	V
	V8~V14	0.1	-	0.6AVDD	V
Input H/L level Voltage	VIH	0.8VCC	-	VCC	V
	VIL	0	-	0.2VCC	V

b. Current consumption conditions (GND=AVSS=0V)

Parameter	Symbol	Condition	MIN.	Typ.	MAX.	Unit
Current For Driver	IGH	VGH=15V	-	(50)	(100)	uA
	IGL	VGL=-10V	-	(-0.2)	(-0.6)	uA
	ICC	VCC=3.3V	-	(3.5)	(5)	mA
	IDD	AVDD=(8.4)V	-	(20)	(30)	mA

c. Backlight driving conditions

Parameter	Symbol	Condition	MIN.	Typ.	MAX.	Unit
Lamp Life Time	-	-	(20000)	(30000)	-	Hours
Voltage	VL	-	-	735	808	Vrms
Current	IL	-	-	6.0	7.0	mA
Frequency	FL	-	-	60	64	kHz
Lamp Start Voltage	T=25	-	-	-	1700	Vrms
	T=0	-	-	-	2130	Vs

The" Lamp life time   is defined as the module brightness decrease to 50   original brightness at Ta=25
IL=6mA

6. Optical Characteristics

The following items are measured under stable conditions. The optical characteristics should be measured in dark room or equivalent state with the methods shown in Note 1.

| Parameter		Symbol	Condition	MIN.	TYP.	MAX.	Unit	Remarks
Response time		TR	=0	-	12	24	ms	Note2
		TF		-	18	36	ms	
Contrast ratio		CR	At optimized viewing angle	250	300	-	-	Note3
Brightness		YL	=0	350	400	-	cd/	Note4
Color Chromaticity	White	Wx	=0	0.26	0.31	0.36		Note4
		WY		0.28	0.33	0.38		
Viewing Angle	Hor	θR	CR 10	50	60		Degree	Note5
		θL		50	60			
	Ver	φH		35	45			
		φL		50	60			

Note

1. Teat equipment setup
After stabilizing and leaving the panel alone at a given temperature for 30 minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical characteristics are measured by Topcon BM-5A with a viewing angle of $1°$ at a distance of 50cm and normal direction.

2. Definition of Response Time:
The Response Time is set initially by defining the "Rising Time (Tr)" and the "Falling Time (Tf)" respectively. Tr and Tf are defined as following figure.
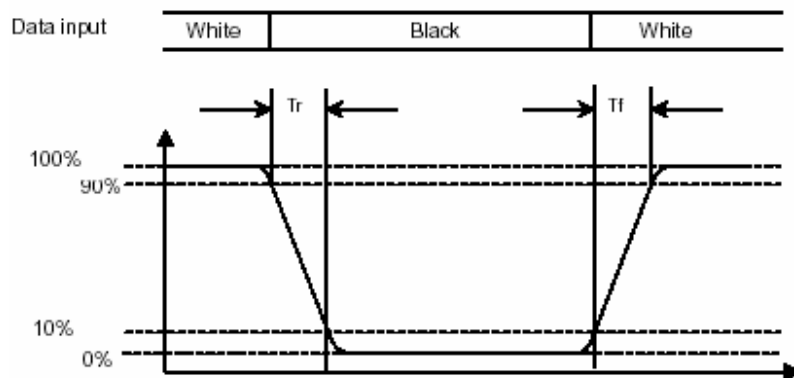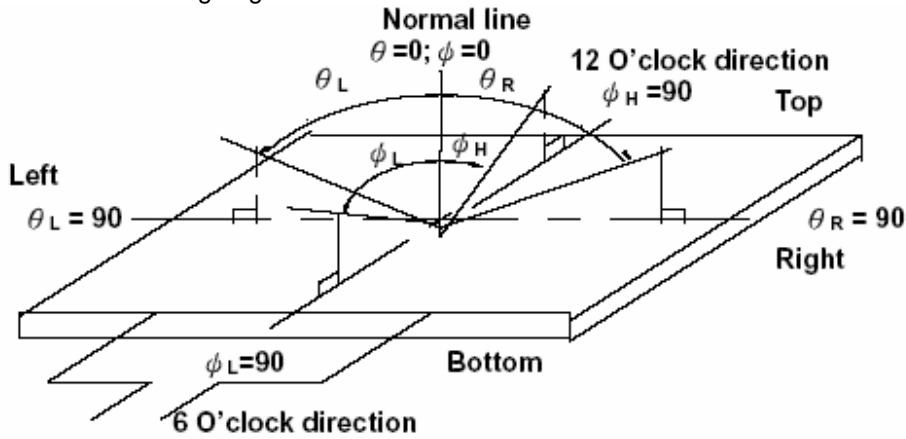

3.Definition of contrast ratio

$$CR = \frac{\text{Brightness measured when LCD is at "white" state}}{\text{Brightness measured when LCD is at "black" state}}$$

4.Measured at the center area of the panel when all the input terminal of LCD panel are electrically opened
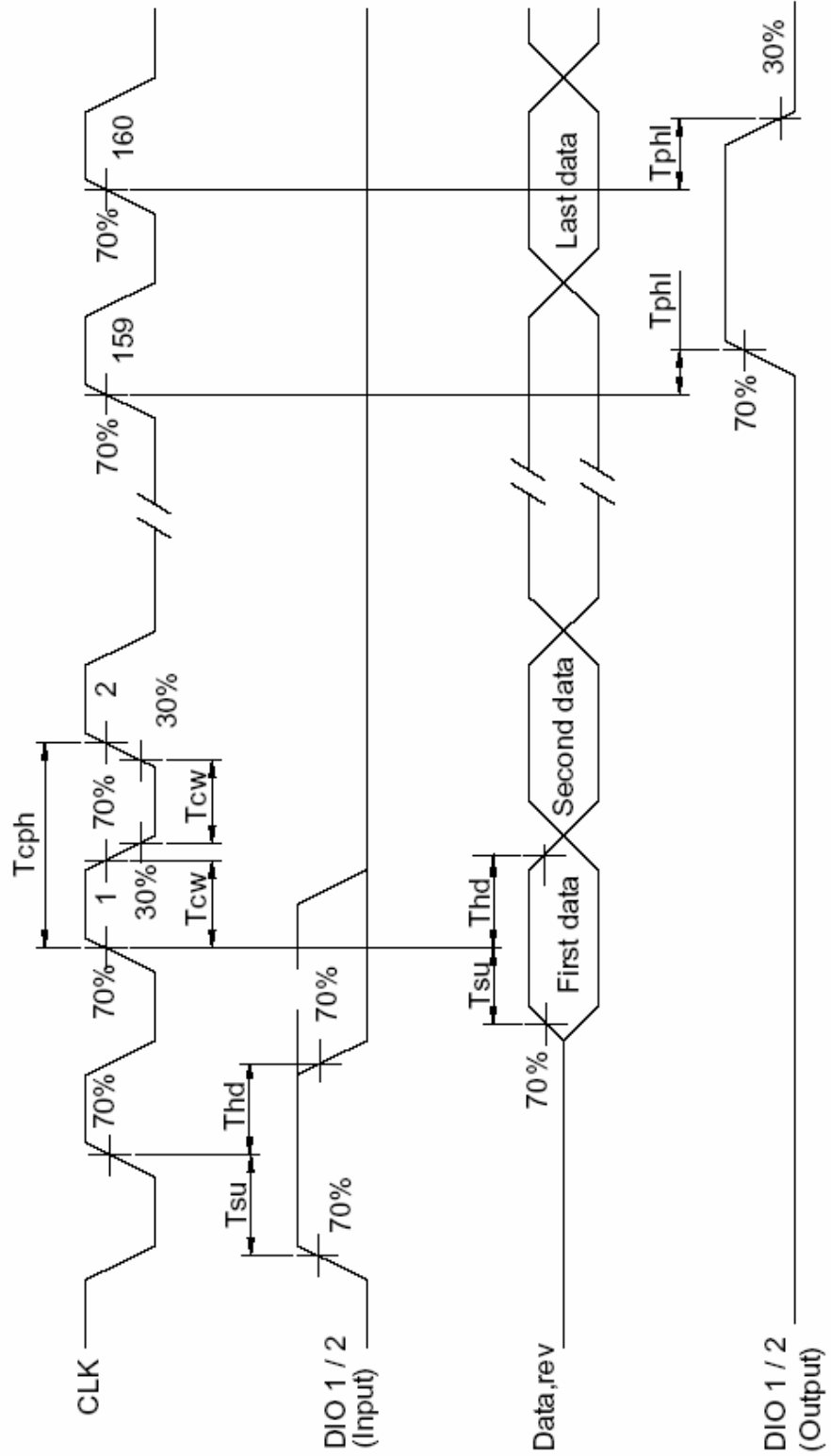
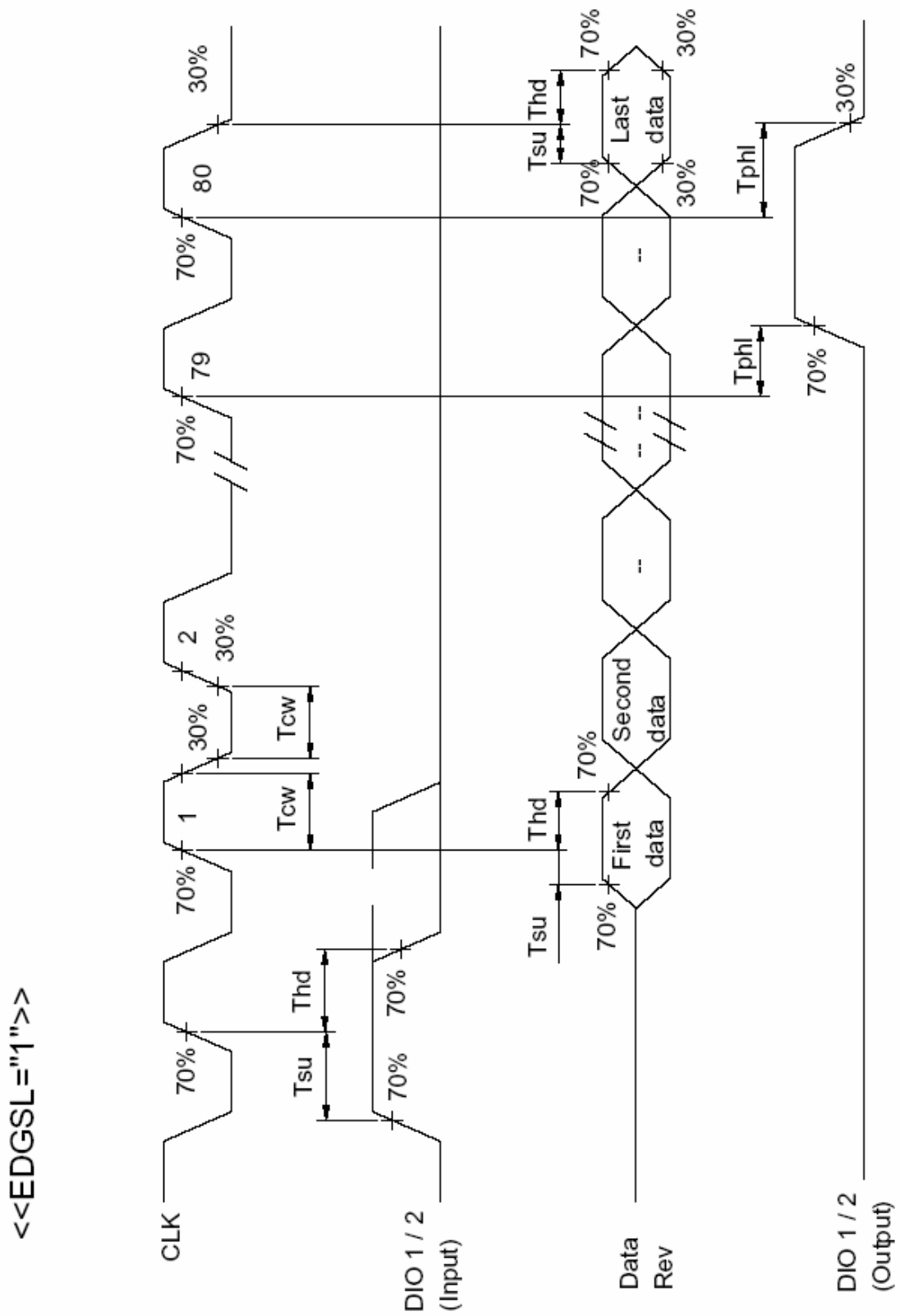5.Definition of viewing angle

7. Timing Conditions
a. AC Electrical Characteristics (VCC=3.3V   AVDD=8.4V   AVSS=GND=0V   Ta=25   )

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
CLK frequency	Fclk	-	40	45	MHz
CLK pulse width	TCW	6	-	-	ns
Data set-up time	Tsu	4	-	-	ns
Data hold time	Thd	2	-	-	ns
Propagation delay of DIO2/1	Tphl	6	10	15	ns
Time that the last data to LD	Tld	1	-	-	Tcw
Pulse width of LD	Twld	2	-	-	Tcw
Time that LD to DIO1/2	Tlds	5	-	-	Tcw
POL set-up time	tpsu	6	-	-	ns
POL hold time	Tphd	6	-	-	ns
OEV pulse width	TOEV		12	-	Tcw
CKV pulse width	TCKV	16	28	40	Tcw
Horizontal display start	TSH	-	0	-	Tcw/3
Horizontal display timing range	TDH	-	800	-	Tcw/3
STV setup time	TSUV	400	-	-	ns
STV hold time	THDV	400	-	-	ns
STV pulse width	TSTV	-	-	1	TDH
Horizontal lines per field	TV	512	525	610	TDH
Vertical display start	TSV	-	3	-	TDH
Ve	TDV	-	480	-	TDH

Timing Diagram 1 (CHNSL="1",DEFAULT)

<<EDGSL="0",Default>>

<<EDGSL="1">>

Timing Diagram 2

CLK

LD

DIO1 / 2 (input)

LD

POL

Odd outputs

Even outputs

Tld, Twld, Tlds, Tpsu, Tphd, Tst, High-Z, Positive, Negative, 70%, 30%, 10%, 90%

STVL(R)

CKV

50%   50%

t_{SUV}

t_{HDV}

t_{CKV}

(HSY)

(VSY)

STVL

POL(Odd Field)
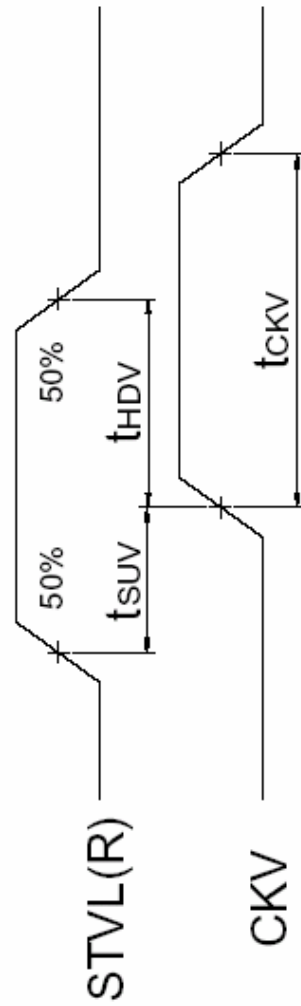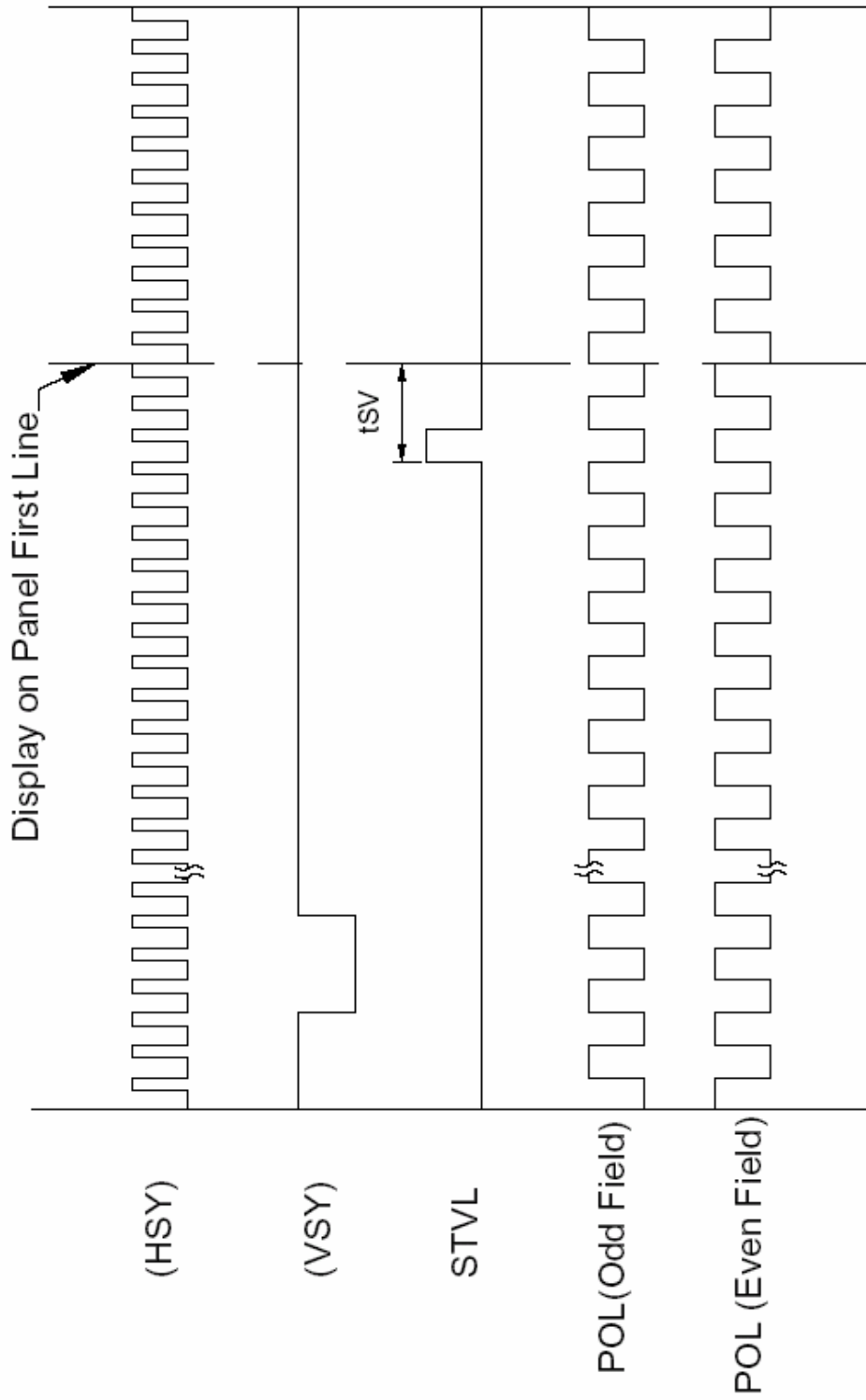
POL (Even Field)

Display on Panel First Line

tSV
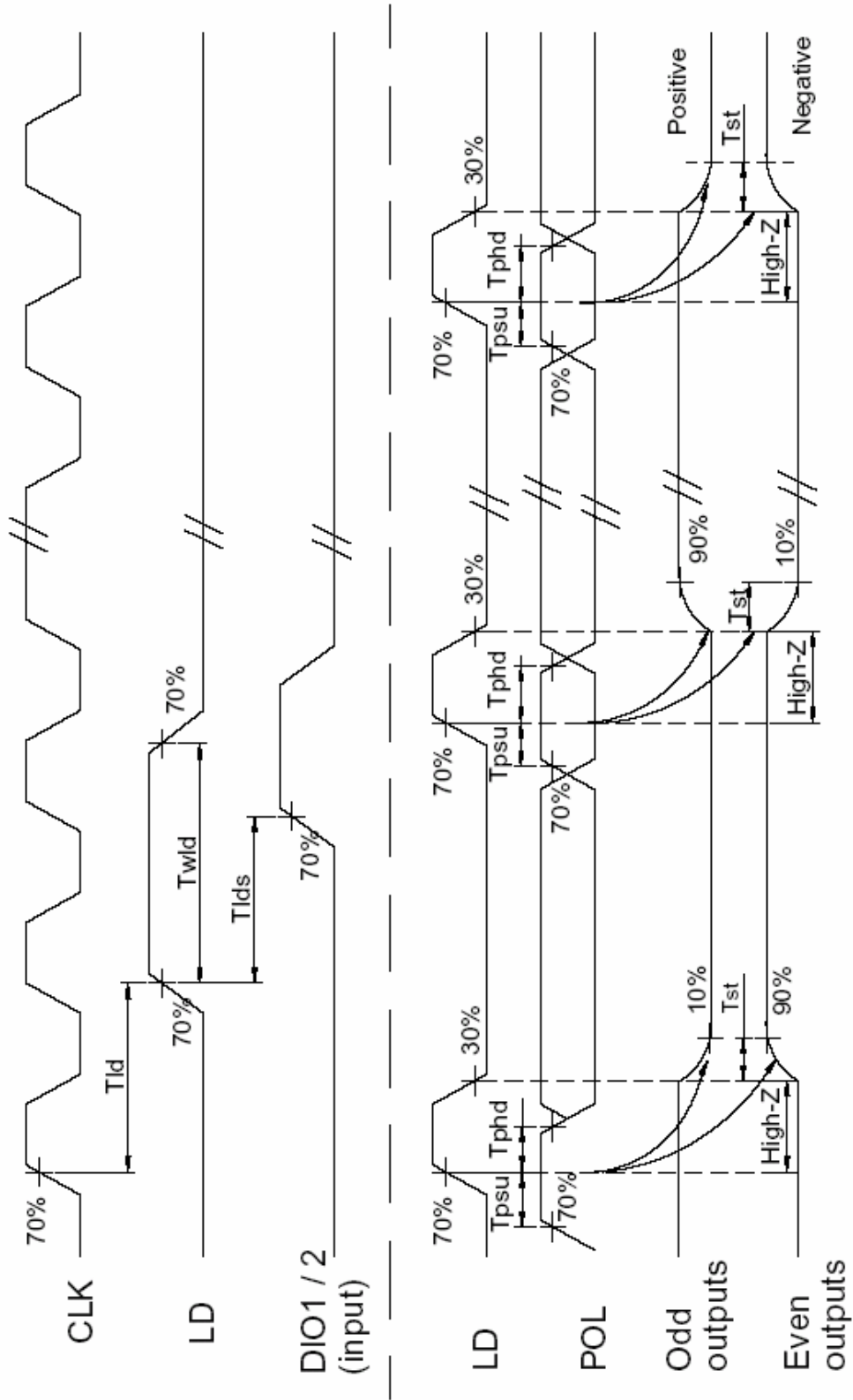
8. Pin Connections
a. TFT-LCD panel driving section
(1.) FH12-30S-0.5SH(Hirose) 2pcs   FPC I/O pin assignment

Pin No	Symbol	I/O	Function	Remark
1	POL	I	Polarity selection	
2	DIO2	I/O	Vertical start pulse signal input or output	
3	OE	I	Output enable	
4	CPV	I	Vertical clock	
5	DIO1	I/O	Vertical start pulse signal input or output	
6	GND	I	Power ground	
7	EDGSL	I	Select rising edge or rising /falling edge	
8	VCC	I	Digital voltage for source driver	
9	V9	I	Gamma voltage level 9	
10	VGL	I	Gate OFF voltage	
11	V2	I	Gamma voltage level 2	
12	VGH	I	Gate on voltage	
13	V6	I	Gamma voltage level 6	
14	U/D	I	Up/down selection	
15	VCOM	I	Common voltage	
16	GND	I	Power ground	
17	AVDD	I	Power supply for analog circuit	
18	V14	I	Gamma voltage level 14	
19	V11	I	Gamma voltage level 11	
20	V8	I	Gamma voltage level 8	
21	V5	I	Gamma voltage level 5	
22	V3	I	Gamma voltage level 3	
23	GND	I	Power ground	
24	R5	I	Red data (MSB)	
25	R4	I	Red data	
26	R3	I	Red data	
27	R2	I	Red data	
28	R1	I	Red data	
29	R0	I	Red data (LSB)	
30	GND	I	Power ground	
31	GND	I	Power ground	
32	G5	I	Green data (MSB)	
33	G4	I	Green data	
34	G3	I	Green data	
35	G2	I	Green data	
36	G1	I	Green data	
37	G0	I	Green data (LSB)	

Pin No	Symbol	I/O	Function	Remark
38	STHL	I/O	Horizontal start pulse signal input or output	
39	INV	I	Control signal are inverted or not	
40	GND	I	Power ground	
41	DCLK	I	Sample clock	
42	DVDD	I	Volt al circuit	
43	STHR	I/O	Horizontal start pulse signal input or output	
44	LD	I	Latches the polarity of outputs and switches the new data to outputs	
45	B5	I	Blue data (MSB)	
46	B4	I	Blue data	
47	B3	I	Blue data	
48	B2	I	Blue data	
49	B1	I	Blue data	
50	B0	I	Blue data (LSB)	
51	R/L	I	Right/left selection	
52	V1	I	Gamma voltage level 1	
53	V4	I	Gamma voltage level 4	
54	V7	I	Gamma voltage level 7	
55	V10	I	Gamma voltage level 10	
56	V12	I	Gamma voltage level 12	
57	V13	I	Gamma voltage level 13	
58	AVDD	I	Voltage for analog circuit	
59	GND	I	Power ground	
60	VCOM	I	Common volt	

b. Backlight Fluorescent Tube Driving Part

Pin NO.	SYMBOL	FUCTION	REMARK
1	HI	Power supply for backlight unit (high voltage)	Note 1
2	GND		Note 2

The backlight interface connector is a model BHSR-02VS-1 manufactured by JST or a model 1674817-1 manufactured by AMP. The matching connector part number is SM02B-BHSS-1-TB manufactured by JST or equivalent. Note 1. The wire color of high voltage side is pink. Note 2. The wire color of low voltage side is white. Connect the low voltage side of the DC/AC inverter used to drive the fluorescent to GND of the inverter circuit.

DATA IMAGE

9. QUALITY ASSURANCE

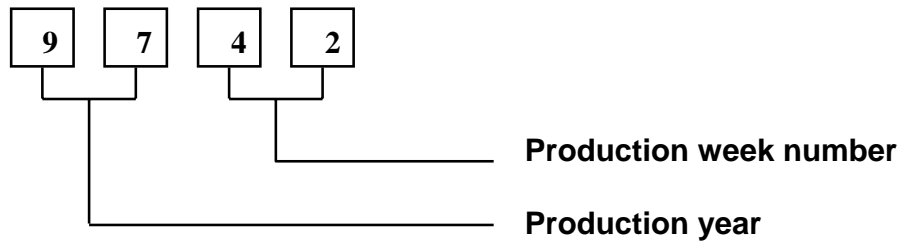| No.	Test Items	Test Condition	Remark
1	High Temperature Storage Test	Ta=70℃ 240h	
2	Low Temperature Storage Test	Ta=-20℃ 240h	
3	High Temperature Operation Test	Ta=60℃ 240h	
4	Low Temperature Operation Test	Ta=0℃ 240h	
5	High Temperature and High Humidity Operation Test	Ta=60℃ 90%RH 240h	
6	Thermal Shock Test (non-operating)	-20℃(0.5h) ~ 70℃(0.5h) / 100 cycles	
7	Vibration Test (with carton)	Random vibration: (Note : No. 3.) 0.015G2/Hz from 5~200Hz -6dB/octave from 200~500Hz	IEC 68-34
8	Shock Test (nDryon-operating)	100G, 6ms,±X,±Y,±Z 3 times for each direction	JIS C7021 A-7 conditionC

Note:
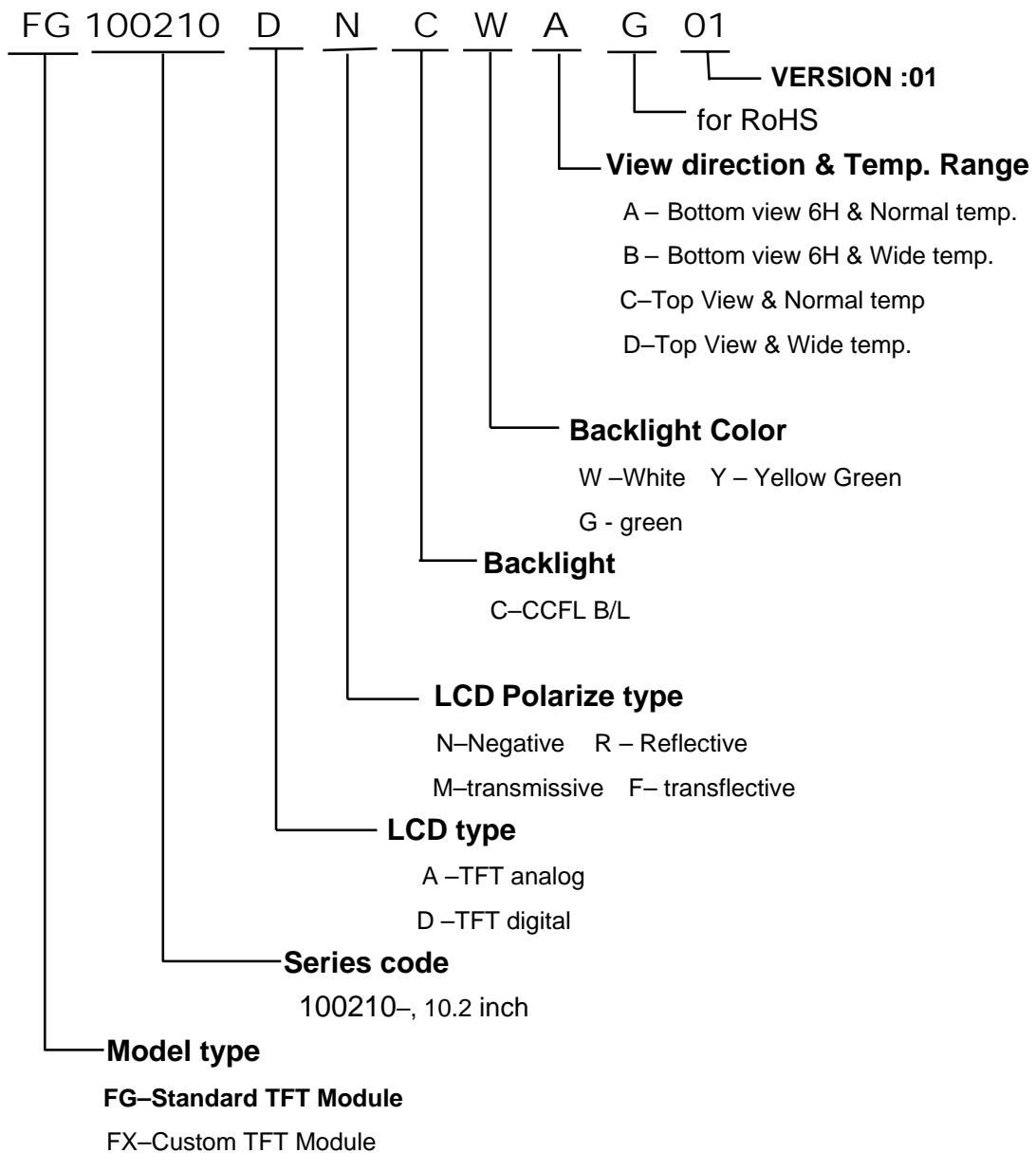1.Ta : Ambient temperature.
Note:
2.In the standard conditions , there is not display function NG issue occurred .All the Cosmetic specification is judged before the reliability stress.
3.Frequency of the vibration shall be between 20 Hz and 50Hz. (except resonance point)

10. LOT NUMBERING SYSTEM

| 9 | 7 | 4 | 2 |

Production week number

Production year

11. LCM NUMBERING SYSTEM

FG 100210 D N C W A G 01

VERSION :01

for RoHS

View direction & Temp. Range

A– Bottom view 6H & Normal temp.

B– Bottom view 6H & Wide temp.

C–Top View & Normal temp

D–Top View & Wide temp.

Backlight Color

W –White   Y – Yellow Green

G - green

Backlight

C–CCFL B/L

LCD Polarize type

N–Negative   R – Reflective

M–transmissive   F– transflective

LCD type

A –TFT analog

D –TFT digital

Series code

100210–, 10.2 inch

Model type

FG–Standard TFT Module

FX–Custom TFT Module

12. Precautions

a. Safety

The liquid crystal in the LCD is poisonous. DO NOT put it in your mouth. If the liquid crystal touches your skin or clothes, wash it off immediately using soap and water.

b. Handling

1) The LCD panel is plate glass. DO NOT subject the panel to mechanical shock or to excessive force on its surface.

2) The polarizer attached to the display is very easy to damage, handle it with careful attention.

3) To avoid contamination on the display surface, DO NOT touch the display surface with bare hands.

4) Provide a space so that the LCD panel does not come into contact with other components.

5) To protect LCD panel from external pressure, put covering glass (acrylic board or similar board) keeping appropriate gap between them.

6) Transparent electrodes may be disconnected if you use the LCD panel under environmental conditions where dew condensation occurs.

7) Property of semiconductor devices may be affected when they are exposed to light, possibly resulting in malfunctioning of the ICs.

8) To prevent such malfunctioning of the ICs, your design and mounting layout done are so that the IC is not exposed to light in actual use.

c. Static electricity

1) Ground soldering iron tips, tools and testers when you operate.

2) Ground your body when handling the products.

3) DO NOT apply voltage to the input terminal without applying power supply.

4) DO NOT apply voltage which exceeds the absolute maximum rating.

5) Store the products in an anti-electrostatic container.

d. Storage

1) Store the products in a dark place at +25 ±10 , low humidity (65 RH or less)

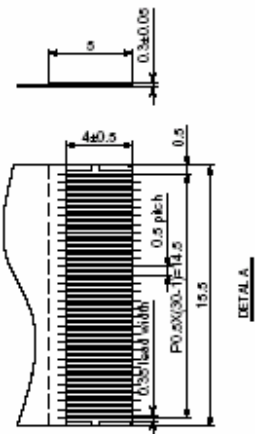2) DO NOT store the products in an atmosphere containing organic solvents or corrosive gases

e. Cleaning

1) DO NOT wipe the polarizer with dry cloth, as it might cause scratch.

2) Wipe the polarizer with a cloth soaked with petroleum IPA, other chemical might damage.

13. OUTLINE DRAWING
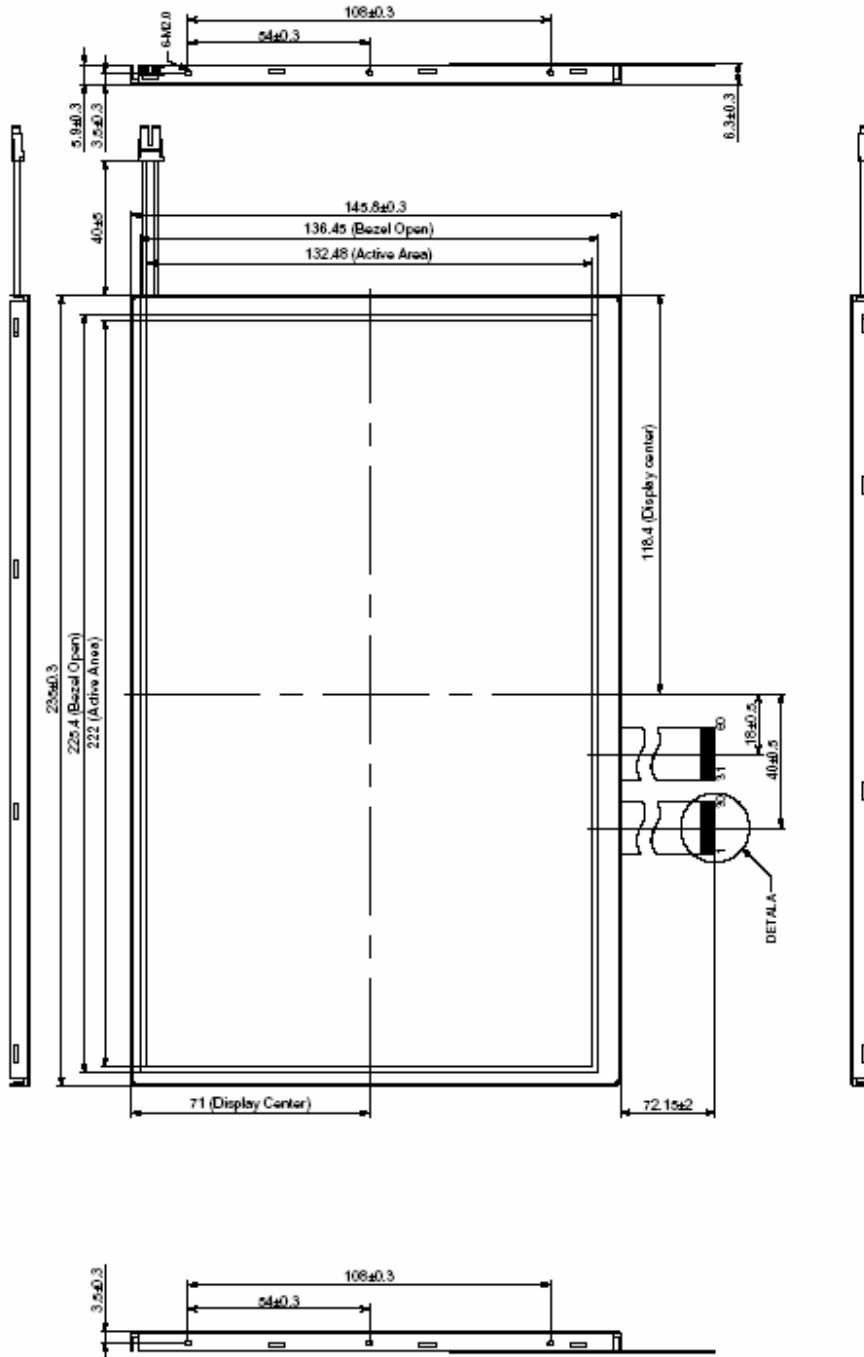
NOTE:
1. CCFL CONNECTOR FOR BACKLIGHT TO BE JST"BHSR-02VS-1".
2. FPC CONNECTOR TO BE HIROSE "FH12-30S-0.5SH" OR EQUIVALENT.
3. ALLOWED DEPTH OF USER HOLE SCREW INSERTION IS 1.5 mm max.
4. GENERAL TOLERANCE ±0.3mm

14. Package

Drier x 2pcs

Form

Antistatic Bag

Form

Carton
(510x310x269mm)