SAMSUNG

ELECTRONICS

TO : General

DATE : May. 30, 2003

SAMSUNG TFT-LCD
MODEL NO. : LTN106W2-L01

NOTE :

Any Modification of Spec is not allowed without SEC s permission、

APPROVED BY : *K. H. Shin*

PREPARED BY : **Technical Customer Service Team, AMLCD Division**

SAMSUNG ELECTRONICS CO., LTD.

wise view™

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REVISION HISTORY

Date	Rev.No.	Page	Summary		
Jan. 28, 2003	000	All	LTN106W2-L01 model was First issued.		

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GENERAL DESCRIPTION

DESCRIPTION

LTN106W2-L01 is a color active matrix TFT (Thin Film Transistor) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching devices. This model is composed of a TFT LCD panel, a driver circuit, a back-light system. The resolution of a 10.6″ contains 1280 x 768 pixels and can display up to 262,144colors. 6 o'clock direction is the optimum viewing angle.

FEATURES

- Thin and light weight
- High contrast ratio, high aperture structure
- WXGA (1280x768 pixels) resolution
- Low power consumption
- Single CCFL
- DE(Data Enable) only mode
- 3.3V LVDS Interface (1chip)

APPLICATIONS

- Ultra Portable Notebook PC
- Display terminals for AV application products
- Monitors for Industrial machine
- If the usage of this product is not for PC application, but for others, please contact SEC

GENERAL INFORMATION

ITEM	SPECIFICATION	UNIT	NOTE
Display area	230.4(H) x 138.24(V) (10.6″ diagonal)	mm	
Driver element	a-Si TFT active matrix		
Display colors	262,144		
Number of pixel	1280 x 768	pixel	
Pixel arrangement	RGB vertical stripe		
Pixel pitch	0.180(H) x 0.180(V)	mm	
Display Mode	Normally white		
Surface treatment	ARC150T, HAZE 40, HARDNESS 2H		

Mechanical Information

	ITEM	MIN.	TYP.	MAX.	NOTE
Module size	Horizontal (H)	243.0	243.4	243.8	
	Vertical (V)	151.6	152.0	152.4	
	Thickness (T)	-	-	5.3	
Weight		-	235	250	

1. ABSOLUTE MAXIMUM RATINGS

1.1 ENVIRONMENTAL ABSOLUTE RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	NOTE
Storage temperature	T_{STG}	-25	60	$°C$	(1)
Operating temperature (Temperature of glass surface)	T_{OPR}	0	50	$°C$	(1)
Shock (non-operating)	Snop	-	220	G	(2),(4)
Vibration (non-operating)	Vnop	-	1. 5	G	(3),(4)

Note (1) Temperature and relative humidity range are shown in the figure below.
95 % RH Max. ($40°C \geq$ Ta)
Maximum wet - bulb temperature at $39°C$ or less. (Ta > $40°C$) No condensation.

Relative Humidity (%RH)

Temperature (^{O}C)
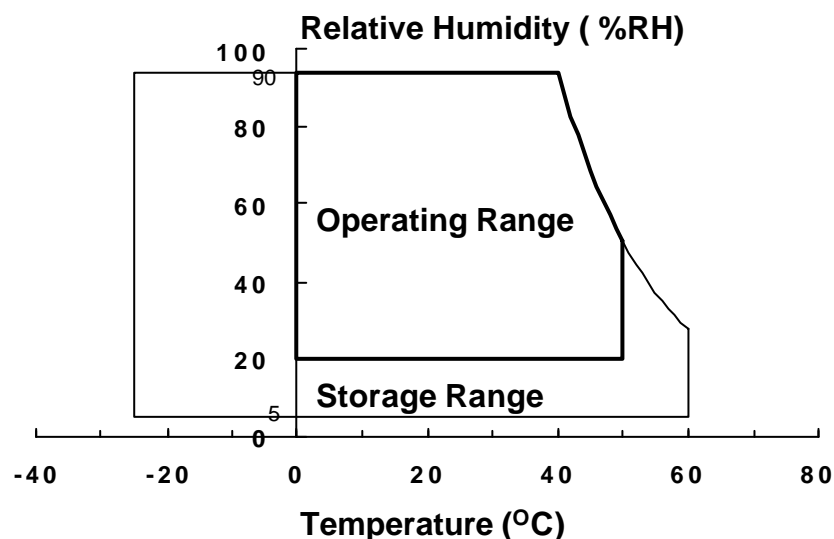
(2) 220G, 2ms, Half sine wave, one time for $\pm X$, $\pm Y$, $\pm Z$ axis
(3) 10 ~ 300 ~ 10 Hz, Sweep rate 10min, 30min for X, Y,Z axis
(4) At testing Vibration and Shock, the fixture in holding the Module to be tested have to be hard and rigid enough so that the Module would not be twisted or bent by the fixture.

1.2 ELECTRICAL ABSOLUTE RATINGS
(1) TFT LCD MODULE

(Vss = GND = 0 V)

ITEM	SYMBOL	MIN.	MAX.	UNIT	NOTE
Power Supply Voltage	Vcc	Vss-0.3	4.0	V	(1)
Logic Input Voltage	V_{IN}	Vss-0.3	Vcc + 0.3	V	(1)

NOTE (1) Within Ta ($25 \pm 2\,^{O}C$)

(2) MTBF : 54000Hr (except   for back-light lamp, Refer to the appendix page 25)

(2) BACK-LIGHT UNIT

Ta = $25 \pm 2\ ^{\circ}C$

ITEM	SYMBOL	MIN.	MAX.	UNIT.	NOTE
Lamp current	I_L	3.0	6.5	mArms	(1)
Lamp frequency	F_L	50	80	KHz	(1)

NOTE (1) Permanent damage to the device may occur if maximum values are exceeded.
Functional operation should be restricted to the conditions described under Normal Operating
Conditions.

2. OPTICAL CHARACTERISTICS

The following items are measured under stable conditions. The optical characteristics should be measured in a dark room or equivalent state with the methods shown in Note (5).
Measuring equipment : TOPCON BM-5A

* Ta = 25 ± 2°C , VDD=3.3V, fv= 60Hz, f_{DCLK}=41MHz, IL = 4.0 mA

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Contrast Ratio (5 Points)		CR	φ = 0, θ = 0 Normal Viewing Angle	150	250	-		(1), (2), (5)
Response Time at Ta	Rising	T_R		-	10	20	msec	(1), (3)
	Falling	T_F		-	30	50		
Average Luminance of White (5 Points)		$Y_{L,AVE}$		150	170	-	cd/m²	(1), (4) at 4.0mA
Color Chromaticity (CIE)	Red	R_X		0.575	0.605	0.635		(1), (5) PR650
		R_Y		0.314	0.342	0.372		
	Green	G_X		0.293	0.323	0.353		
		G_Y		0.493	0.523	0.553		
	Blue	B_X		0.124	0.154	0.184		
		B_Y		0.107	0.137	0.167		
	White	W_X		0.300	0.330	0.360		
		W_Y		0.310	0.340	0.370		
Viewing Angle	Hor.	θ L	CR(at center point) ≥ 10	45	-	-	Degrees	(1), (5)
		θ R		45	-	-		
	Ver.	φ H		15	-	-		
		φ L		30	-	-		
13 Points White Variation		δ L		-	-	1.75		(6)

Note 1) Definition of Viewing Angle :

Normal Line
$\phi = 0^o, \; \theta = 0^o$

θ_L

θ_R

$\theta_L = 90^o$ x

ϕ_L ϕ_H

y

12 O' clock
direction
$\phi_H = 90^o$

6 O' clock
direction
$\phi_L = 90^o$ y'

x'

$\theta_R = 90^o$
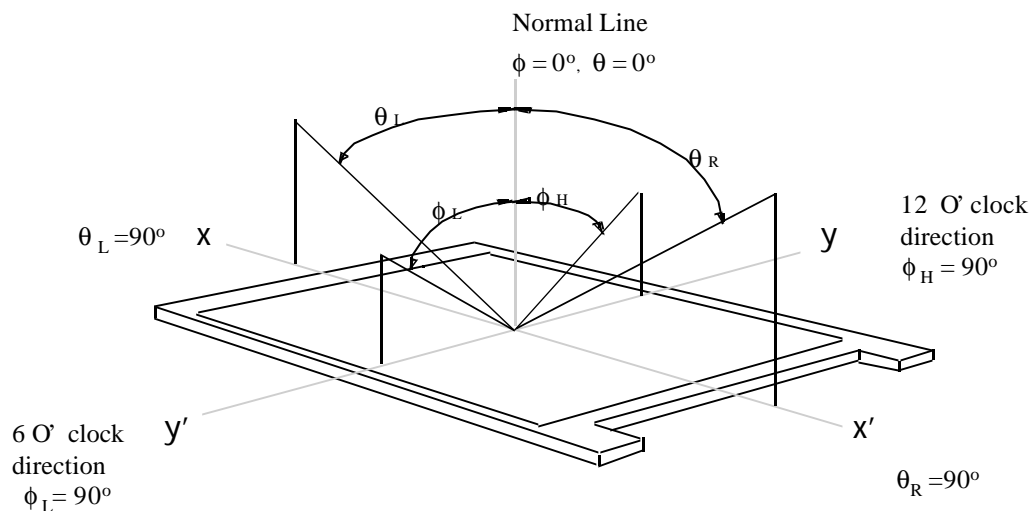
Note 2) Definition of Contrast Ratio (CR) :

$$CR = \frac{CR1 + CR2 + CR3 + CR4 + CR5}{5}$$

POINTS : ④ , ⑤ , ⑦ , ⑨ , ⑩   at FIGURE OF NOTE 6)

Note 3) Definition of Response time :

Display data   White(TFT OFF)   Black(TFT ON)   White(TFT OFF)

T_R T_F

Optical
Response

100%
90%

10%
0%

Time
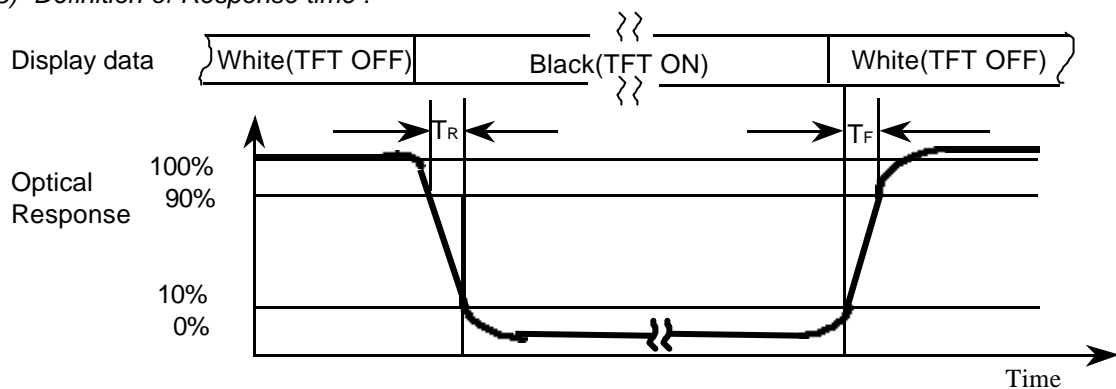
Note 4) Definition of Average Luminance of White : measure the luminance of white at 5 points.

Average Luminance of White ($Y_{L,AVE}$)

$$Y_{L,AVE} = \frac{Y_{L4} + Y_{L5} + Y_{L7} + Y_{L9} + Y_{L10}}{5}$$

POINTS : ④ , ⑤ , ⑦ , ⑨ , ⑩   at FIGURE OF NOTE 6)

Note 5) 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.
30 minutes after lighting the back-light. This should be measured in the center of screen.
Lamp current : 4.0 mA
Environment condition : Ta = 25 ± 2 °C

Photodetector
(TOPCON BM-5A)

Field = 2°

40 cm

TFT-LCD module

LCD panel

Center of the screen

Optical characteristics measurement setup
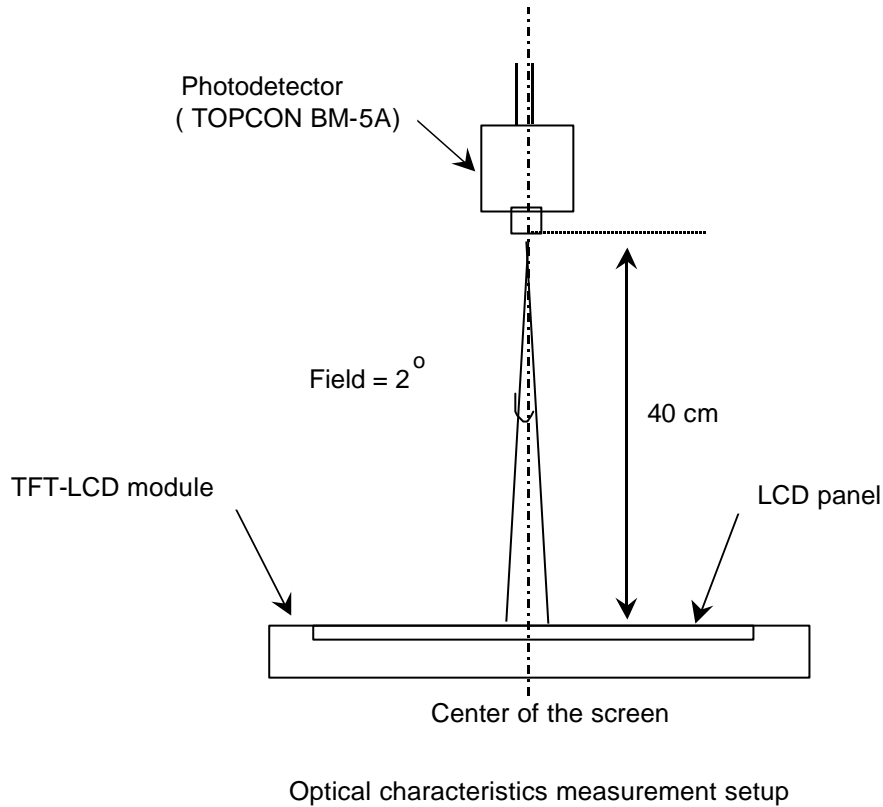
Note 6) Definition of 13 points white variation (δ_L) [① ~ ⑬]

$$\delta_L \quad = \quad \frac{\text{Maximum luminance of 13 points}}{\text{Minimum luminance of 13 points}}$$

45   256   512   768   979   **VIEW AREA**

⑬   ⑫   ⑪   45

⑩   ⑨   192

⑧   ⑦   ⑥   384   ◯ : test point

⑤   ④   576

③   ②   ①   723
(lines)

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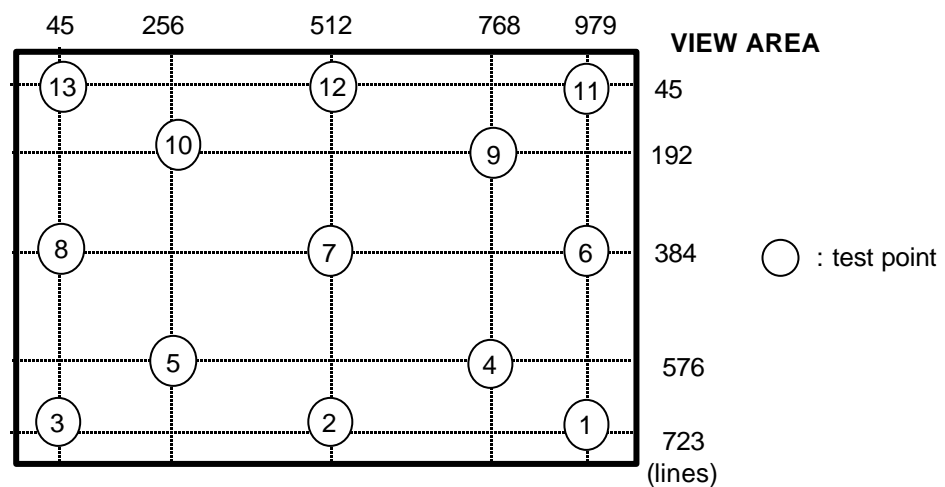
3. ELECTRICAL CHARACTERISTICS

3.1 TFT LCD MODULE

Ta = 25 ± 2 ℃

ITEM		SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Voltage of Power Supply		V_{DD}	3.0	3.3	3.6	V	
Differential Input Voltage for LVDS Receiver Threshold	High	V_{IH}	-	-	+100	mV	(1)
	Low	V_{IL}	-100	-	-	mV	
Vsync Frequency		fv	-	60	-	Hz	
Hsync Frequency		f_H	46.3	48.2	54.0	KHz	
Main Frequency		f_{DCLK}	31.3	41	61.02	MHz	
Rush Current		I_{RUSH}	-	-	1.5	A	(4)
Current of Power Supply	White	I_{DD}	-	310	-	mA	(2),(3)*a
	Mosaic		-	330	-	mA	(2),(3)*b
	Maximum current		-	360	400	mA	(2),(3)*c

Note (1) Condition : V_{CM}=+1.2V(Common mode Voltage)

(2) fv=60Hz, f_{DCLK} =41MHZ,   Vdd = 3.3V , DC Current.

(3) Power dissipation check pattern

*a) White Pattern   *b)Mosaic Pattern

VIEW AREA
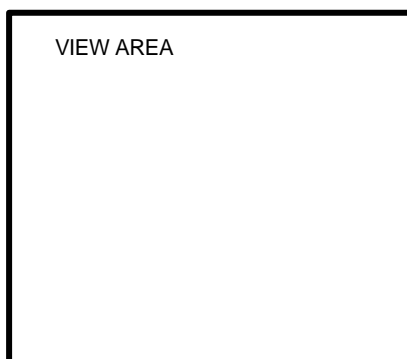
Display Brightest Gray Level

Display Darkest Gray Level
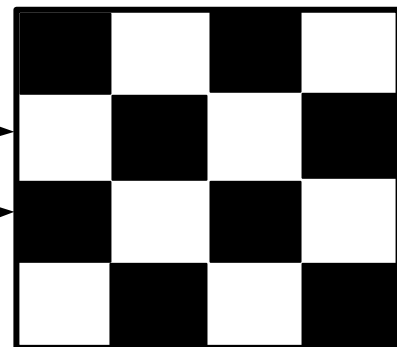
*c) Maximum Power pattern : 1dot vertical stripe

R	B	G	R	B	G	R
G	R	B	G	R	B	G
R	B	G	R	B	G	R
G	R	B	G	R	B	G
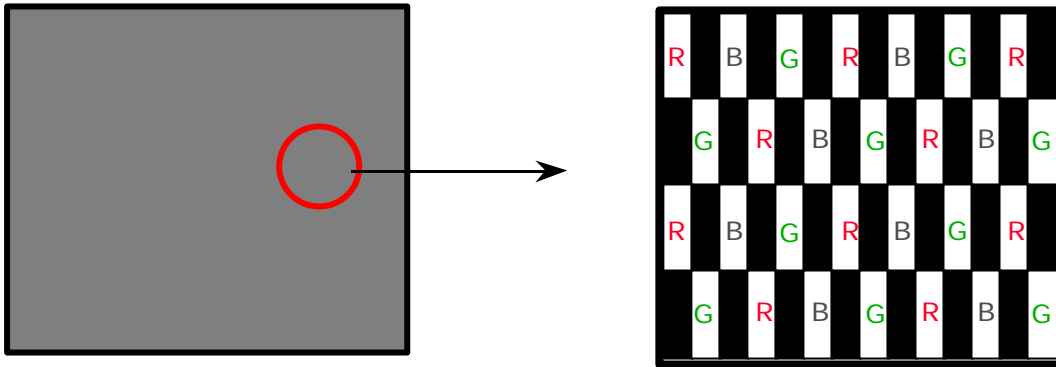
(4) Rush current measurement condition

3.3V

M1
2SK1059

FUSE

V$_{DD}$ (LCD INPUT)

R1
47K

C1
1uF

CONTROL SIGNAL
(HIGH to LOW)

R2
1K

M2
2SK1399

12V

R3
47K

C2
10000pF

C3
1uF

V$_{DD}$ rising time is 470us

0.9V$_{DD}$ 3.3V

0.1V$_{DD}$

GND

470us

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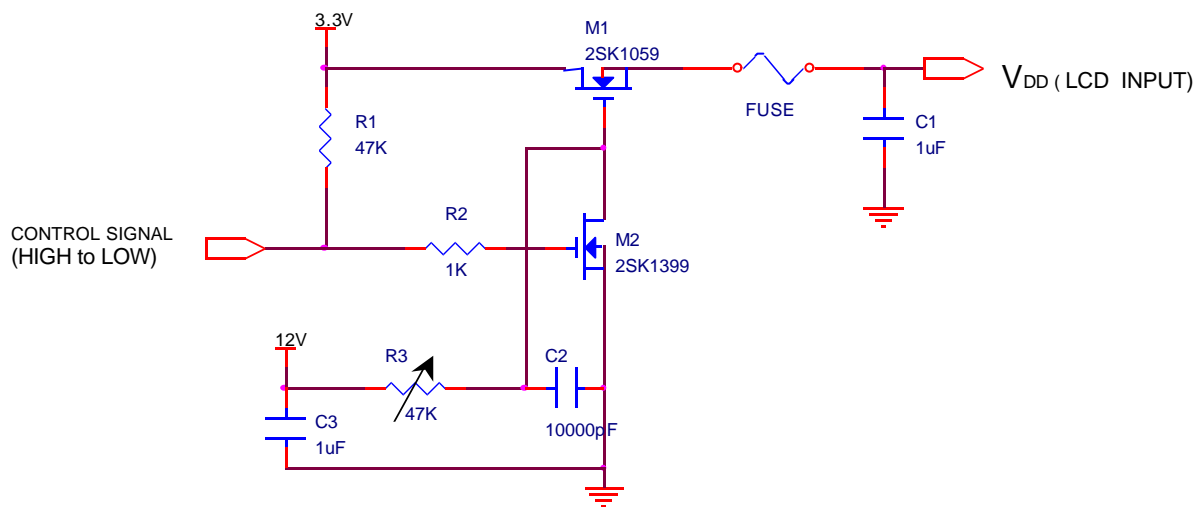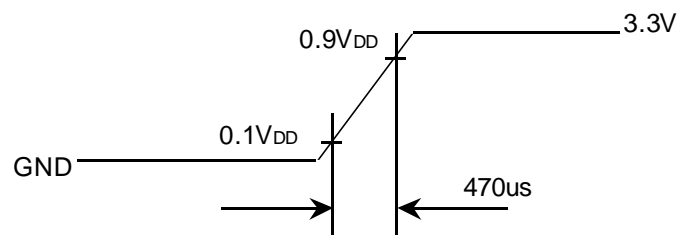
3.2 BACK-LIGHT UNIT

The backlight system is an edge - lighting type with a single CCFT (Cold Cathode Fluorescent Tube). The characteristics of a single lamp are shown in the following tables.

INVERTER : SEM Cc, SIC130T

$Ta = 25 \pm 2°C$

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Lamp Current	I_L	3.0	5.5	6.0	mArms	(1)
Lamp Voltage	V_L	-	530	-	Vrms	I_L=5.5mA
Frequency	f_L	50	60	65	KHz	(2)
Power Consumption	P_L	-	3.0	-	W	(3) I_L=5.5mA
Lamp Operating Life Time	Hr	10,000	-	-	Hour	(4)
Startup Voltage	V_S	-	-	1100	Vrms	25°C
		-	-	1400	Vrms	0°C
Lamp Startup Time	V_S	-	-	1	sec	(5)

Note) **The waveform of the inverter output voltage must be area symmetric and the design of the inverter must have specifications for the modularized lamp.**
The performance of the back-light, for example life time or brightness, is much influenced by the characteristics of the DC-AC inverter for the lamp. So all the parameters of an inverter should be carefully designed so as not to produce too much leakage current from high-voltage output of the inverter.
When you design or order the inverter, please make sure that a poor lighting caused by the mismatch of the back-light and the inverter(miss lighting, flicker, etc.) never occur. When you confirm it, the module should be operated in the same condition as it is installed in your instrument.

Note (1) Lamp current is measured with a high frequency current meter as shown below.

```
                              HOT :  PINK
                    ┌──┐  ┌──────────────┐
  ┌─────────────┐   │ 1│  │              │   ┌──────────────┐
  │    LCD      │───│  │  │ COLD : WHITE │   │   INVERTER   │
  │   MODULE    │───│ 2│──(A)────────────│   │              │
  └─────────────┘   └──┘                     └──────────────┘
                  No 2 Pin is V_LOW.              (SIC130T)
```
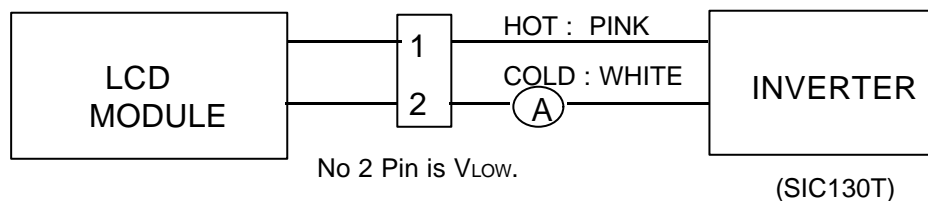
(2) Lamp frequency may produce interference with horizontal synchronous frequency and this may cause line flow on the display. Therefore lamp frequency should be detached from the horizontal synchronous frequency and its harmonics as far as possible in order to avoid interference.

(3) refer to I_L X V_L to calculate.

(4) Life time (Hr) of a lamp can be defined as the time in which it continues to operate under the condition Ta = $25 \pm 2°C$ and I_L = 5.0 mArms until one of the following event occurs.
 1. When the brightness becomes 50% or lower than it's original.
 2. When the Effective ignition length becomes 80% or lower than it's original value.
  (Effective ignition length is defined as an area that has less than 70% brightness compared to the brightness in the center point.)

(5) The voltage above this value should be applied to the lamp for more than 1 second to startup Otherwise the lamp may not be turned on.

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4. BLOCK DIAGRAM

4.1 TFT LCD Module

User-Connector

LVDS → LVDS Receiver & Timing Controller

RSDS →

Source Driver ICs

10.6' W XGA TFT-LCD Panel

DC-DC Converter

Gamma Generator

VCOM Generator

SOURCE PCB

Gate Driver ICs

→ Video Signal
→ Control Signal
→ VCOM
→ Gamma
→ DVDD
→ AVDD
→ Von/Voff
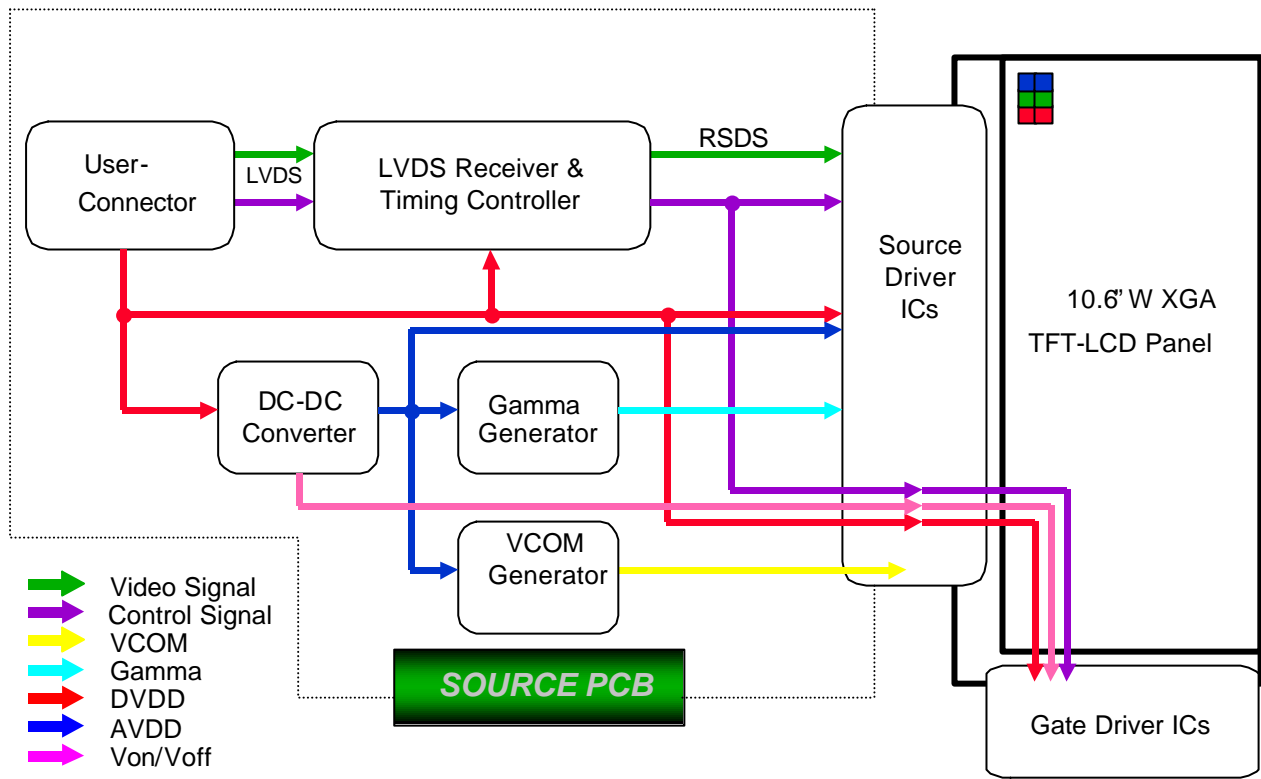
4.2 BACKLIGHT UNIT

Connector :JST BHSR-02VS-1

Reflector

LAMP

1 HOT (PINK)

2 COLD(WHITE)
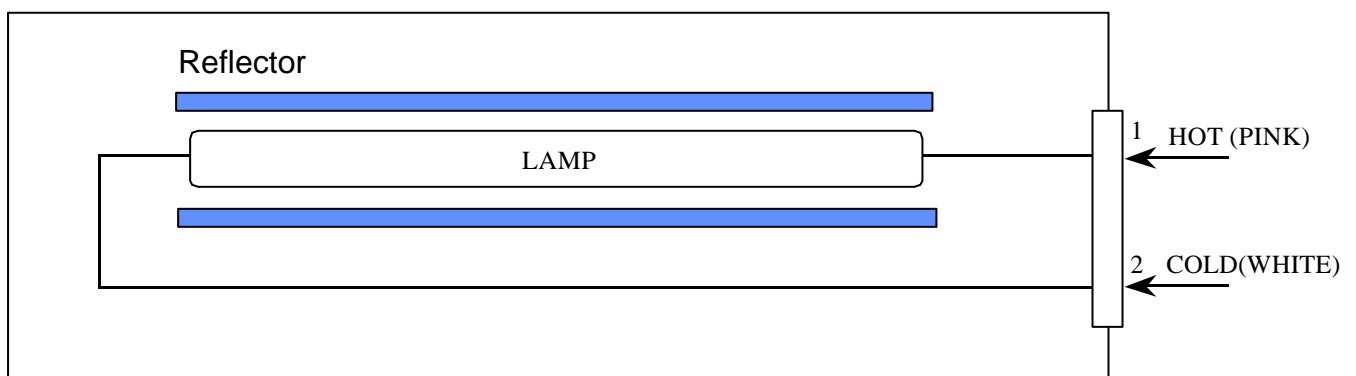
Note) The output of the inverter may change according to the material of the reflector.

5. INPUT TERMINAL PIN ASSIGNMENT

5.1. Input Display Signal & Power

LVDS Connector : Hirose, DF19K-30P-1H(59) or compatible

PIN NO	SYMBOL	FUNCTION	POLARITY	REMARK
1	(Odd)RxIN0-	LVDS Differential Data Input	Negative	R0-R5 G0
2	(Odd)RxIN0+	LVDS Differential Data Input	Positive	
3	GND1	Ground		
4	(Odd)RxIN1-	LVDS Differential Data Input	Negative	G1-G5 B0-B1
5	(Odd)RxIN1+	LVDS Differential Data Input	Positive	
6	GND2	Ground		
7	(Odd)RxIN2-	LVDS Differential Data Input	Negative	
8	(Odd)RxIN2+	LVDS Differential Data Input	Positive	
9	GND3	Ground		
10	(Odd)RxClkIN-	LVDS Differential Clock Input	Negative	B2-B5 HS,VS,DE
11	(Odd)RxClkIN+	LVDS Differential Clock Input	Positive	
12	GND4	Ground		
13	(Even)RxIN0-	LVDS Differential Data Input	Negative	R0-R5 G0
14	(Even)RxIN0+	LVDS Differential Data Input	Positive	
15	GND5	Ground		
16	(Even)RxIN1-	LVDS Differential Data Input	Negative	G1-G5 B0-B1
17	(Even)RxIN1+	LVDS Differential Data Input	Positive	
18	GND6	Ground		
19	(Even)RxIN2-	LVDS Differential Data Input	Negative	B2-B5 HS,VS,DE
20	(Even)RxIN2+	LVDS Differential Data Input	Positive	
21	GND7	Ground		
22	(Even)RxClkIN-	LVDS Differential Clock Input	Negative	
23	(Even)RxClkIN+	LVDS Differential Clock Input	Positive	
24	GND8	Ground		
25	GND9	Ground		
26	NC	No Connection		
27	NC	No Connection		
28	VDD	Power Supply +3.3V		
29	VDD	Power Supply +3.3V		
30	GND10	Ground		

5.2 LVDS Interface : Transmitter DS90C363 or Compatible

LVDS For Odd Pixel

Pin No.	Name	RGB Signal	Pin No.	Name	RGB Signal
44	TxIN0	R00	12	TxIN11	G05
45	TxIN1	R01	13	TxIN12	B00
47	TxIN2	R02	15	TxIN13	B01
48	TxIN3	R03	16	TxIN14	B02
1	TxIN4	R04	18	TxIN15	B03
3	TxIN5	R05	19	TxIN16	B04
4	TxIN6	G00	20	TxIN17	B05
6	TxIN7	G01	22	TxIN18	Hsync
7	TxIN8	G02	23	TxIN19	Vsync
9	TxIN9	G03	25	TxIN20	DE
10	TxIN10	G04	26	TxCLK IN	Clock

LVDS For Even Pixel

Pin No.	Name	RGB Signal	Pin No.	Name	RGB Signal
44	TxIN0	RE0	12	TxIN11	GE5
45	TxIN1	RE1	13	TxIN12	BE0
47	TxIN2	RE2	15	TxIN13	BE1
48	TxIN3	RE3	16	TxIN14	BE2
1	TxIN4	RE4	18	TxIN15	Be3
3	TxIN5	RE5	19	TxIN16	BE4
4	TxIN6	GE0	20	TxIN17	BE5
6	TxIN7	GE1	22	TxIN18	Hsync
7	TxIN8	GE2	23	TxIN19	Vsync
9	TxIN9	GE3	25	TxIN20	DE
10	TxIN10	GE4	26	TxCLK IN	Clock

LVDS INTERFACE

Approval

DF19K -30P -1H(59)

Graphics controller	DS90C363 or Compatible		LPD91821A

136-bit

Graphics controller	Tx pin	TxOUT	DF19K pin	Rx pin	RxO
ODD RED0	TxIN0	TxOUT0-	1	1	RxO0-
ODD RED1	TxIN1				
ODD RED2	TxIN2				100 Ω
ODD RED3	TxIN3	TxOUT0+	2	2	RxO0+
ODD RED4	TxIN4				
ODD RED5	TxIN5			3	
ODD GREEN0	TxIN6	TxOUT1-	4		RxO1-
ODD GREEN1	TxIN7				100 Ω
ODD GREEN2	TxIN8	TxOUT1+	5	4	RxO1+
ODD GREEN3	TxIN9				
ODD GREEN4	TxIN10			5	
ODD GREEN5	TxIN11	TxOUT2-	7		RxO2-
ODD BLUE0	TxIN12				100 Ω
ODD BLUE1	TxIN13	TxOUT2+	8	6	RxO2+
ODD BLUE2	TxIN14				
ODD BLUE3	TxIN15			7	
ODD BLUE4	TxIN16	TxCLKOUT-	10		RxOC-
ODDBLUE5	TxIN17				100 Ω
ODD Hsync	TxIN18	TxCLKOUT+	11	8	RxOC+
ODD Vsync	TxIN19				
ODD Enable	TxIN20				
ODD CLOCK	TxClkIN				

Graphics controller	DS90C363 or Compatible		LPD91821A

| Graphics controller	Tx pin	TxOUT	DF19K pin	Rx pin	RxE
EVEN RED0	TxIN0	TxOUT0-	13	16	RxE0-
EVEN RED1	TxIN1				
EVEN RED2	TxIN2				100 Ω
EVEN RED3	TxIN3	TxOUT0+	14	17	RxE0+
EVEN RED4	TxIN4				
EVEN RED5	TxIN5			18	
EVEN GREEN0	TxIN6	TxOUT1-	16		RxE1-
EVEN GREEN1	TxIN7				100 Ω
EVEN GREEN2	TxIN8	TxOUT1+	17	19	RxE1+
EVEN GREEN3	TxIN9				
EVEN GREEN4	TxIN10			20	
EVEN GREEN5	TxIN11	TxOUT2-	19		RxE2-
EVEN BLUE0	TxIN12				100 Ω
EVEN BLUE1	TxIN13	TxOUT2+	20	21	RxE2+
EVEN BLUE2	TxIN14				
EVEN BLUE3	TxIN15			22	
EVEN BLUE4	TxIN16	TxCLKOUT-	22		RxEC-
EVENBLUE5	TxIN17				100 Ω
EVEN Hsync	TxIN18	TxCLKOUT+	23	23	RxEC+
EVEN Vsync	TxIN19				
EVEN Enable	TxIN20				
EVEN CLOCK	TxClkIN				

5.3 BACK LIGHT UNIT

Connector : JST BHSR - 02VS –1 or Compatible
Mating Connector : JST SM02B-BHSS-1 or Compatible

Pin NO.	Symbol	Color	Function
1	HOT	PINK	High Voltage
2	COLD	WHITE	Low Voltage

5.4 Timing Diagrams of LVDS For Transmission
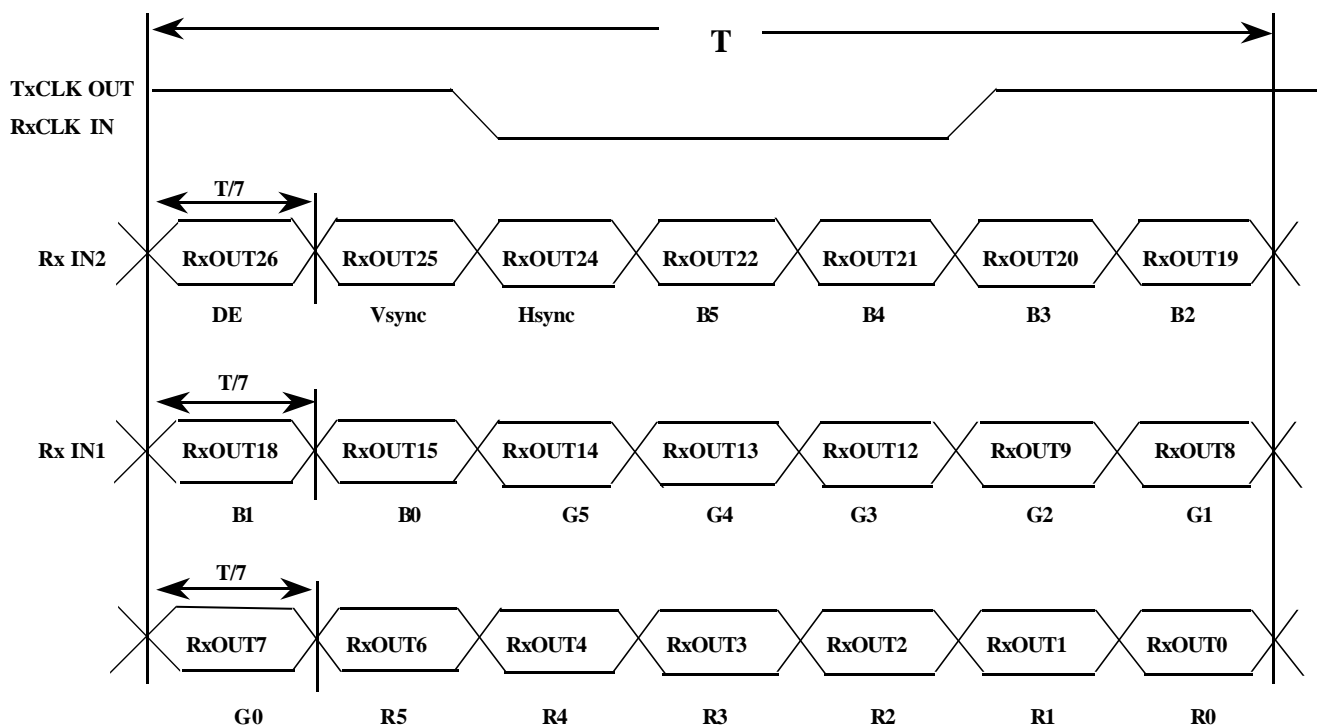
5.5 Input Signal,Basic Display Colors and Gray Scale of Each Colors

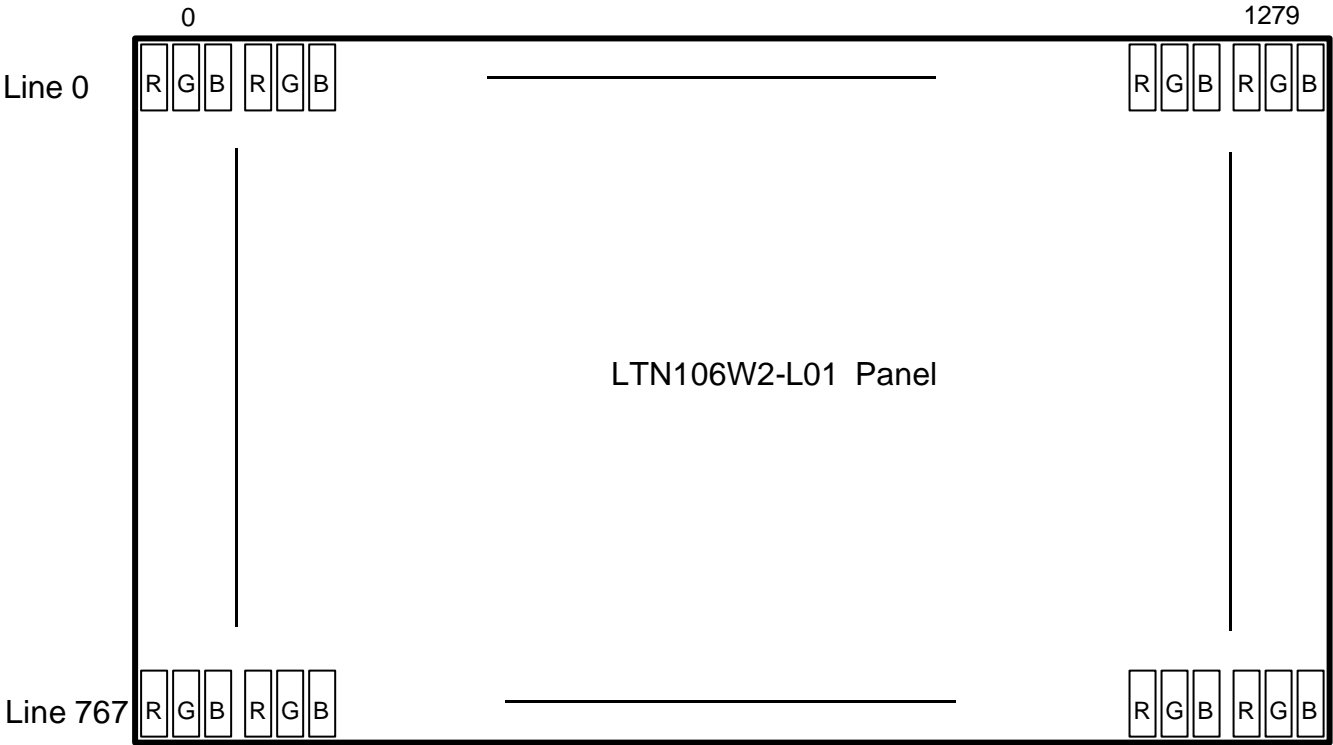| COLOR	DISPLAY	DATA SIGNAL																		GRAY SCALE LEVEL
		RED						GREEN						BLUE						
		R0	R1	R2	R3	R4	R5	G0	G1	G2	G3	G4	G5	B0	B1	B2	B3	B4	B5	
BASIC COLOR	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-
	BLUE	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	-
	GREEN	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	-
	CYAN	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	-
	RED	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	-
	MAGENTA	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1	-
	YELLOW	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	-
	WHITE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
GRAY SCALE OF RED	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R0
	DARK ↑	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R1
		0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R2
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	R3~R60
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	↓ LIGHT	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	R61
		0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	R62
	RED	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	R63
GRAY SCALE OF GREEN	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G0
	DARK ↑	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	G1
		0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	G2
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	G3~G60
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	↓ LIGHT	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0	0	G61
		0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	G62
	GREEN	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	G63
GRAY SCALE OF BLUE	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	B0
	DARK ↑	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	B1
		0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B2
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	B3~B60
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	↓ LIGHT	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	B61
		0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	B62
	BLUE	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	B63

Note

(1) Definition of Gray : Rn : Red Gray, Gn : Green Gray, Bn : Blue Gray (n = Gray level)

(2) Input Signal : 0 = Low level voltage, 1 = High level voltage

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5.6 PIXEL FORMAT

0   1279

Line 0   R G B R G B   R G B R G B

LTN106W2-L01 Panel

Line 767 R G B R G B   R G B R G B

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6. INTERFACE TIMING

6.1 Timing Parameters

Signal	Item	Symbol	MIN	TYP	MAX	Unit	Note
Frame Frequency	Cycle	T_V	772	806	1000	lines	
Vertical Active Display Term	Display Period	T_{VD}		768		lines	
One Line Scanning Time	Cycle	T_H	670	844	875	clocks	
Horizontal Active Display Term	Display Period	T_{HD}		640		clocks	

6.2 Timing diagrams of interface signal
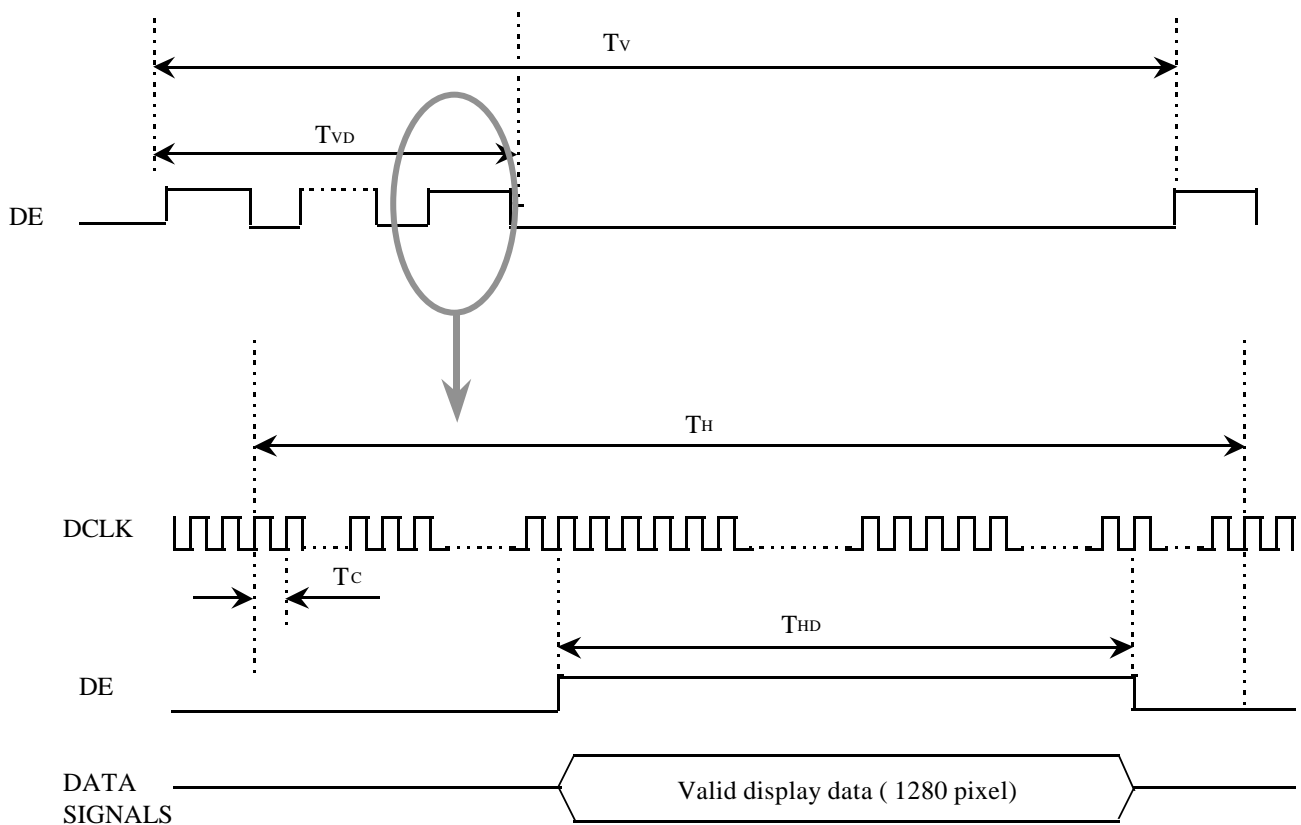
6.3 Power ON/OFF Sequence

: To prevent a latch-up or DC operation of the LCD module, the power on/off sequence
shall be as shown below.

Power Supply V$_{DD}$

0.9 V$_{DD}$ 0.9 V$_{DD}$

0.1 V$_{DD}$ 0.1 V$_{DD}$

0V

$0 < T_1 \pounds 10$ msec
$0 < T_2 \pounds 50$ msec
$0 < T_3 \pounds 50$ msec
400msec $\pounds T_4$

T$_1$ T$_3$
T$_2$ T$_4$

Signals

0 V

VALID

Power On   Power Off

Back-light
200 msec $\pounds T_5$
200 msec $< T_6$

50%   50%

T$_5$ T$_6$
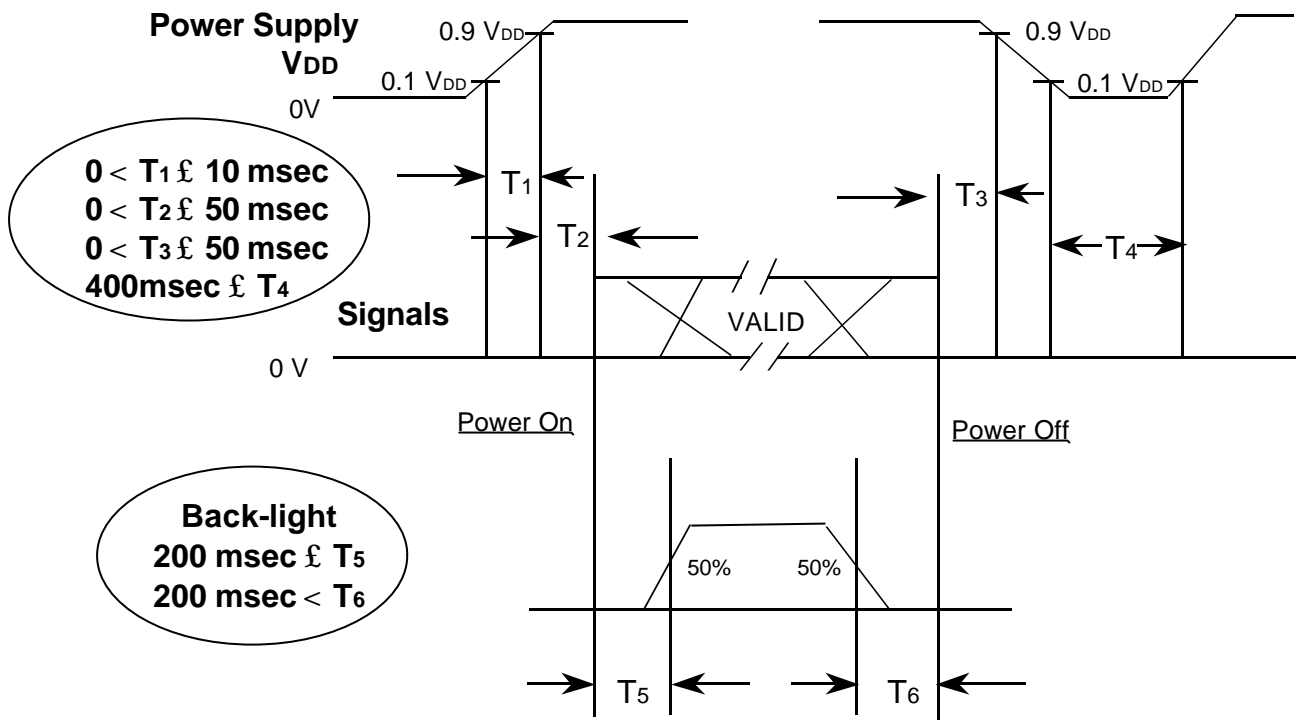
Power ON/OFF Sequence

T1 : Vdd rising time from 10% to 90%

T2 : The time from Vdd to valid data at power ON.

T3 : The time from valid data off to Vdd off at power Off.

T4 : Vdd off time for Windows restart

T5 : The time from valid data to B/L enable at power ON.

T6 : The time from valid data off to B/L disable at power Off.

NOTE.

(1) The supply voltage of the external system for the module input should be the same
as the definition of V$_{DD}$.

(2) Apply the lamp voltage within the LCD operation range. When the backlight turns on
before the LCD operation or the LCD turns off before the backlight turns off, the
display may momentarily become white.

(3) In case of V$_{DD}$ = off level, please keep the level of input signals on the low or keep
a high impedance.

(4) T4 should be measured after the module has been fully discharged between power
off and on period.

(5) Interface signal shall not be kept at high impedance when the power is on.

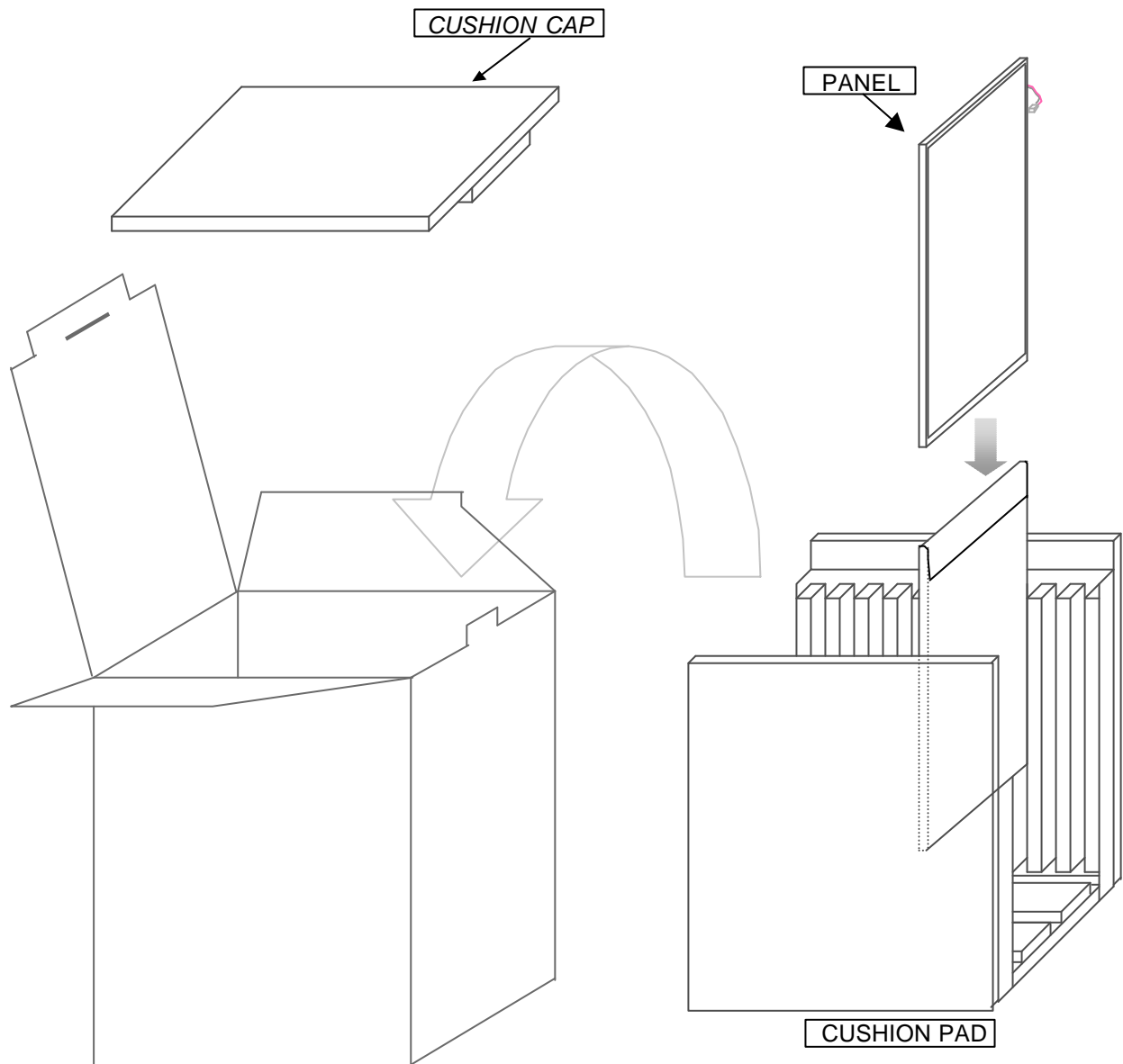# 7. Mechanical Outline Dimension

[Refer to the next page]

8. Packing

8.1 Packing

CARTON(Internal Package)

(1)Packing Form

Corrugated fiberoard box and corrugated cardboard as shock absorber

(2)Packing Method

CUSHION CAP

PANEL

CUSHION PAD

Note (1)Total : Approx.   4.0Kg

(2)Acceptance number of piling : 10 sets

(3)Carton size : 285(W) X 240(D) X 352(H)

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(3)Packing Material

NO.	Parts name	Quantity
1.	Static eletric protective sack	10
2.	Cushion pad(inner box) included shock absorber	1 set
3.	Pictorial marking	2 pcs
4.	Desiccant (50g X 1)	1
5.	Carton	1 set

9. Markings & Others

A nameplate bearing followed by is affixed to a shipped product at the specified location on each product.
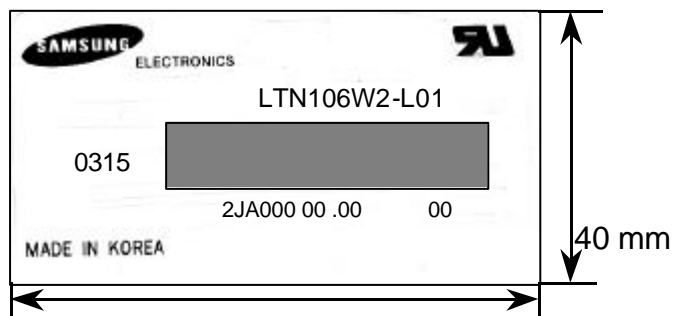
(1)Parts number : LTN106W2-L01
(2)Revision   : One letter
(3)Control code : One letter
(4)Lot number   : 2 T A 0 <u>XXX XX XX</u>

Cell Position No.(In the one Glass)
Glass No.(In the one Lot)
Lot No.(Glass)
Month
Year(Note 1)
Product Code
Line

(5) Nameplate Indication

SAMSUNG ELECTRONICS

LTN106W2-L01

0315

2JA000 00 .00   00

MADE IN KOREA

40 mm

80 mm
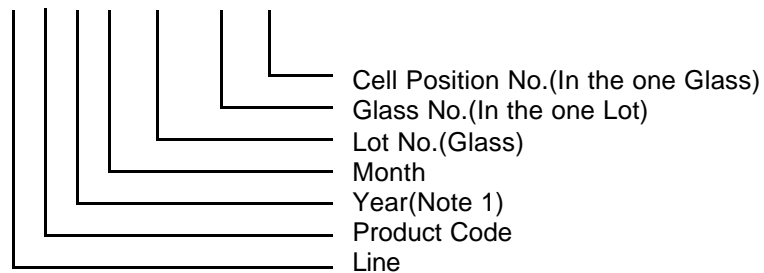
LTN... : TFT-LCD model name
2TA …: Lot number
0315 : Inspected work week

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High voltage caution label

⚠	HIGH VOLTAGE CAUTION RISK OF ELECTRIC SHOCK DISCONNECT THE ELECTRIC POWER BEFORE SERVICE	THIS COVER CONTAINS FLUORESCENT LAMP. PLEASE FOLLOW LOCAL ORDINANCES OR REGULATIONS FOR ITS DISPOSAL

↕ 10mm   High voltage caution

←——————— 70mm ———————→

(6) Packing box attach

SAMSUNG ELECTRONICS   UL

DEVICE   : LTN106W2-L01
TYPE   :
QUANTITY   : 10 PCS

MADE IN KOREA   XXXXXXXXXX

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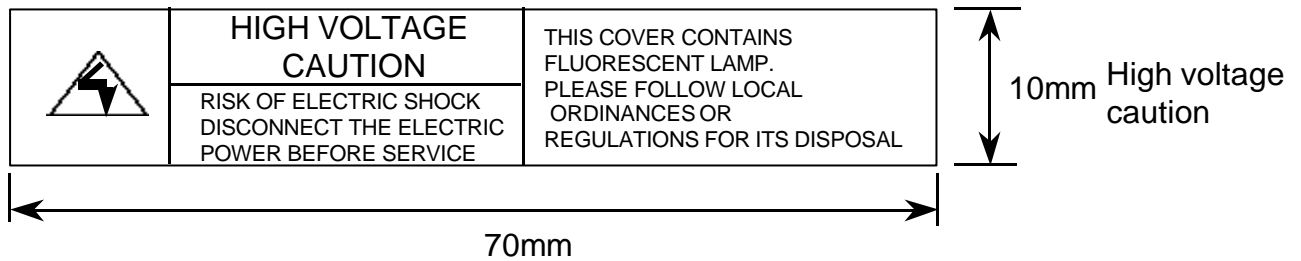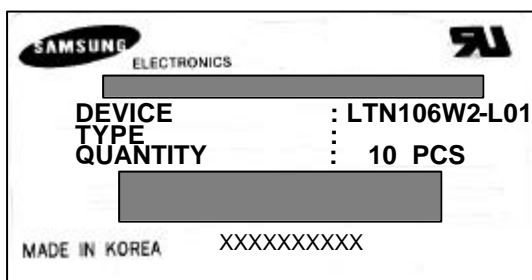
10. GENERAL PRECAUTIONS

1. Handling

   (a) When the module is assembled, It should be attached to the system firmly
       using every mounting holes. Be careful not to twist and bend the modules.

   (b) Refrain from strong mechanical shock and / or any force to the module. In addition to
       damage, this may cause improper operation or damage to the module and CCFT back-light.

   (c) Note that polarizers are very fragile and could be easily damaged. Do not press or scratch
       the surface harder than a HB pencil lead.

   (d) Wipe off water droplets or oil immediately. If you leave the droplets for a long time,
       Staining and discoloration may occur.

   (e) If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.

   (f) The desirable cleaners are water, IPA(Isoprophyl Alcohol) or Hexane.
       Do not use Ketone type materials(ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl
       chloride. It might permanent damage to the polarizer due to chemical reaction.

   (g) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or
       mouth . In case of contact with hands, legs or clothes, it must be washed away thoroughly
       with soap.

   (h) Protect the module from static , it may cause damage to the C-MOS Gate Array IC.

   (i) Use fingerstalls with soft gloves in order to keep display clean during the incoming
       inspection and assembly process.

   (j) Do not disassemble the module.

   (k) Do not pull or fold the lamp wire.

   (l) Do not adjust the variable resistor which is located on the back side.

   (m) Protection film for polarizer on the module shall be slowly peeled off just before use so
       that the electrostatic charge can be minimized.

   (n) Pins of I/F connector shall not be touched directly with bare hands.

2. STORAGE

  (a) Do not leave the module in high temperature, and high humidity for a long time.
It is highly recommended to store the module with temperature from 0 to 35 °C and
relative humidity of less than 70%.

  (b) Do not store the TFT-LCD module in direct sunlight.

  (c) The module shall be stored in a dark place. It is prohibited to apply sunlight or fluorescent
light during the store.

3. OPERATION

  (a) Do not connect,disconnect the module in the" Power On" condition.

  (b) Power supply should always be turned on/off by following item 6.3
" Power on/off sequence ".

  (c) 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.

  (d) The cable between the back-light connector and its inverter power supply shall be a
minimized length and be connected directly . The longer cable between the back-light
and the inverter may cause lower luminance of lamp(CCFT) and may require higher
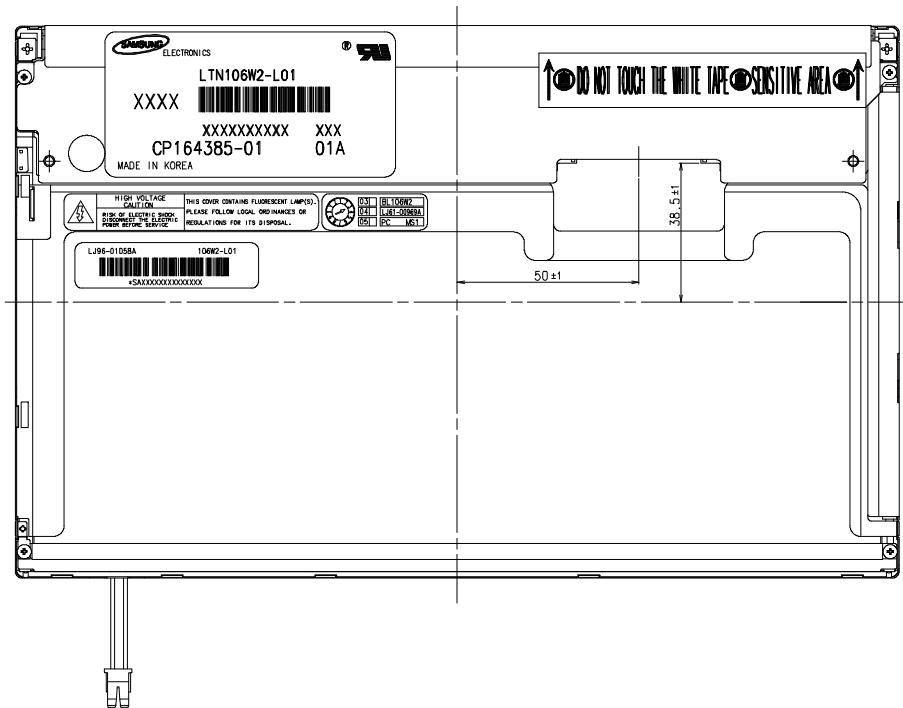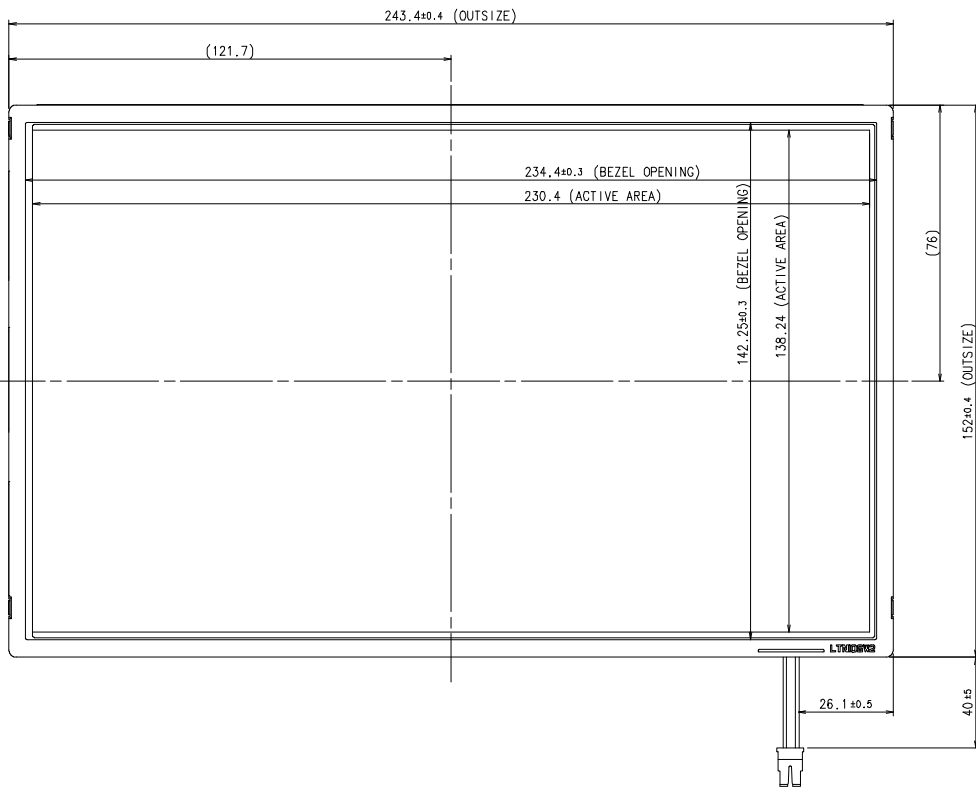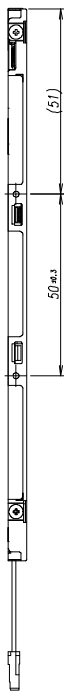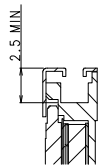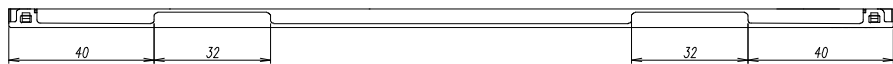startup voltage(Vs).

4. OTHERS

  (a) Ultra-violet ray filter is necessary for outdoor operation.

  (b) Avoid condensation of water. It may result in improper operation or disconnection
of electrode.

  (c) Do not exceed the absolute maximum rating value. (the supply voltage variation, input
voltage variation, variation in part contents and environmental temperature, so on)
Otherwise the module may be damaged.

  (d) If the module displays the same pattern continuously for a long period of time,it can be
the situation when the image" sticks" to the screen.

  (e) This module has its circuitry PCB's on the rear side and should be handled carefully in
order not to be stressed.

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NO	PART NAME	CODE NO	SPECIFICATION	Q'TY	SPEC NO	REMARK
1	OUTLINE DIMENSION		LTN106W2-L01	1PC		

APPROVAL

2.5 MIN.

40 32 32 40

243.4±0.4 (OUTSIZE)

(121.7)

234.4±0.3 (BEZEL OPENING)
230.4 (ACTIVE AREA)

142.25±0.3 (BEZEL OPENING)
138.24 (ACTIVE AREA)

(76)

152±0.4 (OUTSIZE)

(51)

50 ±3

26.1±0.5

40±5

5±0.3

(51)

50 ±3

A A

SAMSUNG
ELECTRONICS
LTN106W2-L01
XXXX XXXXXXXXXX XXX
CP164385-01 01A
MADE IN KOREA

HIGH VOLTAGE CAUTION

THIS COVER CONTAINS FLUORESCENT LAMP(S).
PLEASE FOLLOW LOCAL ORDINANCES OR
REGULATIONS FOR ITS DISPOSAL.

LJ96-01058A 106W2-L01
*SAXXXXXXXXXXXXXX

DO NOT TOUCH THE WHITE TAPE. SENSITIVE AREA.

38.5±1
50 ±1

NOTE
1.SIGNAL INTERFACE CONNECTOR TO BE SPECIFIED AS BELOW.
  -MAKER: HIROSE
  -PART NO: DF19K-30P-1H
2.CCFT CONNECTOR FOR BACKLIGHT TO BE SPECIFIED AS BELOW.
  -MAKER: JST
  -PART NO: BHSR-02VS-1
3.ALLOWED DEPTH OF USERHOLE SCREW INSERTION IS 2.5mm MIN.

GENERAL TOLERANCE				REV	DATE	DESCRIPTION OF REVISION			REASON		CHG'D BY
STEP	LEVEL 1	LEVEL 2	LEVEL 3	UNIT mm	DRA'N BY	DES'D BY	CHK'D BY	APP'D BY	MODEL NAME	LTN106W2-L01	
0 < X ≤ 4	±0.05	±0.1	±0.2	SCALE 1/1	JUNU.YOU	JUNU,YOU	J.H.WON	J.H.CHUN			
4 < X ≤ 16	±0.08	±0.15	±0.3	TOLERANCE LEVEL2	2003.04.11	2002.12.18	2003.04.11	2003.04.11	PART/SHEET NAME	OUTLINE DIMENSION	SHEET 1/1
16 < X ≤ 64	±0.12	±0.25	±0.5	SPEC. NO							
64 < X ≤ 256	±0.25	±0.4	±0.8	SAMSUNG ELECTRONICS					CODE NO.		VER. 000

REVISION VER. 000