SAMSUNG ELECTRONICS

APPROVAL

TO :

DATE :

SAMSUNG TFT-LCD

MODEL NO. : LTN141XD-L01

NOTE :

Any Modification of Spec is not allowed without SEC' permission

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SAMSUNG ELECTRONICS CO., LTD.

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APPROVAL

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REVISION HISTORY

APPROVAL

Date	Rev.No.	Page	Summary
Jul.28,2000	000 Preliminary	ALL	LTN141XD-L01 model was First issued.
Oct.20,2000	001 Preliminary	5 7 10 11 12	Update the weight Update Optical characteristics - C/R : 150 → 180 - Fill in the color chromaticity - Viewing Angle : 40deg → 45deg(Hor.), 30deg → 40deg(Ver.) - 13 points white variation : 2.0 → 1.75 Fill in the Current of power supply Change Maximum current pattern : 0,7 Gray → 1dot vertical stripe Update the Back Light Unit
Nov.30,2000	000 Approval	ALL	Approval specification
Dec.14,2000	001 Approval	10 13 27,28	Max. current : 455mA → 430mA Add the recommendation of the value of SMB_data for 3.0mA of lamp Change the panel label to Dell PPID label
Jan.12,2001	002 Approval	7	- Average luminance of white(5points) : 160cd/m^2 (typ.) - 13points white variation : 1.75 → 1.6 (max.)
Jan.19,2002	003 Approval	13 27,28	Changed inverter information Update Dell PPID for burst mode inverter Update panel revision code to B00 for burst mode inverter Update Box label for Dell PPID
Jan.21,2002	004 Approval	13	Changed inverter information(from current mode to burst mode)
Jan. 16,2003	005 Approval	27,28 Appendix.	Update Dell PPID and Panel rev. code for Abacus program. Update Dell PPID on the box label. Update Part name rev. code. EDID is attached.

GENERAL DESCRIPTION

DESCRIPTION

LTN141XD-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, inverter, bracket. The resolution of a 14.1″ contains 1024 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
- XGA (1024x768 pixels) resolution
- Low power consumption
- Single CCFL
- DE(Data enable) only mode
- 3.3V LVDS Interface (1chip)
- Onboard EEDID chip
- With burst mode inverter

APPLICATIONS

- Notebook PC and desktop monitors
- 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	285.696(H) x 214.272(V) (14.1″ diagonal)	mm	
Driver element	a-Si TFT active matrix		
Display colors	262,144		
Number of pixel	1024 x 768	pixel	
Pixel arrangement	RGB vertical stripe		
Pixel pitch	0.279(H) x 0.279(V)	mm	
Display Mode	Normally white		
Surface treatment	HAZE 25, HARD-COATING 3H		

Mechanical Information

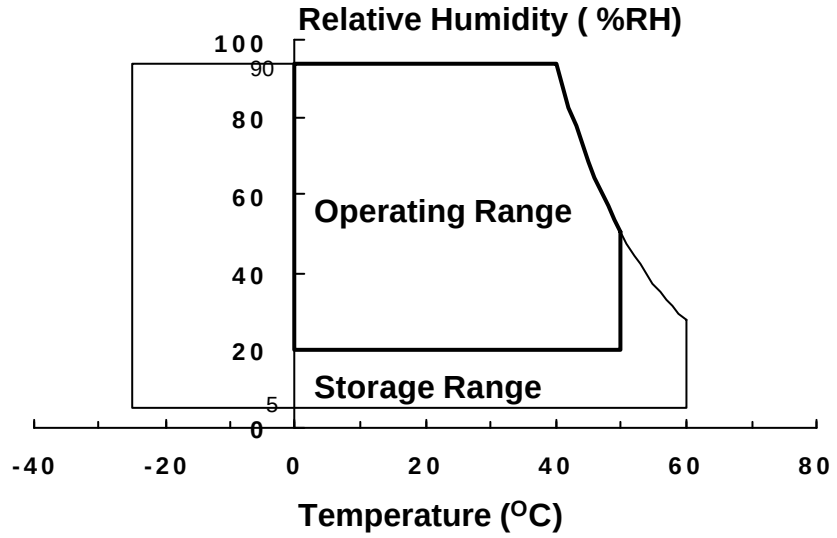
ITEM		MIN.	TYP.	MAX.	NOTE
Module size	Horizontal (H)	298.5	299	299.5	Inverter assembly
	Vertical (V)	227.5	228.0	228.5	
	Depth (D)	-	-	7.0	
Weight		-	550	600	Inverter assembly

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 ≥ Ta)
Maximum wet - bulb temperature at 39°C or less. (Ta > 40°C) No condensation.



(2) 220G, 2ms, Half sine wave, one time for ±X, ±Y, ±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

ITEM	SYMBOL	MIN.	MAX.	UNIT	NOTE
Power Supply Voltage	V_{DD}	– 0.3	4.0	V	(1)
Logic Input Voltage	V_{IN}	– 0.3	3.6	V	(1)

NOTE (1) Within Ta = 25 ± 2 °C

(2) BACK-LIGHT UNIT

Ta = 25 ± 2 °C

ITEM	SYMBOL	MIN.	MAX.	UNIT.	NOTE
Lamp current	I_L	2.0	6.5	mA_{rms}	(1)
Lamp frequency	F_L	45	70	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.

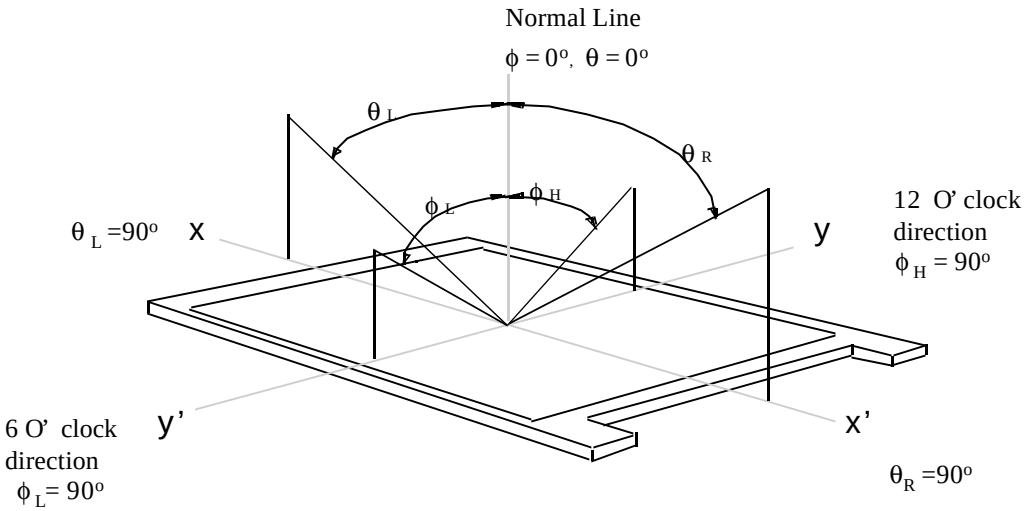
2. OPTICAL CHARACTERISTICS

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 , V_{DD}=3.3V, fv= 60Hz, f_{DCLK}=65MHz, I_L = 6.0 mA

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Contrast Ratio (5 Points)		CR	ϕ = 0, θ = 0 Normal Viewing Angle	180	-	-		(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)		$Y_{L,AVE}$		130	160	-	cd/m^2	(1), (4) at 6mA
Color Chromaticity (CIE)	Red	R_X		0.541	0.571	0.601		(1), (5) PR650
		R_Y		0.305	0.335	0.365		
	Green	G_X		0.278	0.308	0.338		
		G_Y		0.504	0.534	0.564		
	Blue	B_X		0.121	0.151	0.181		
		B_Y		0.108	0.138	0.168		
	White	W_X		0.280	0.310	0.340		
		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		20	-	-		
		ϕ_L		40	-	-		
13 Points White Variation		δ_L		-	-	1.6		(6)

Note 1) Definition of Viewing Angle :

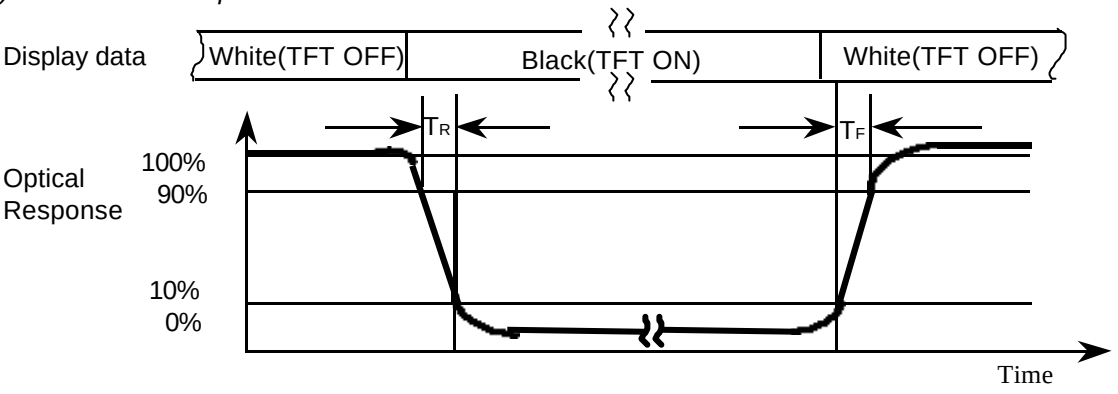


Note 2) Definition of Contrast Ratio (CR) :

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

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

Note 3) Definition of Response time :



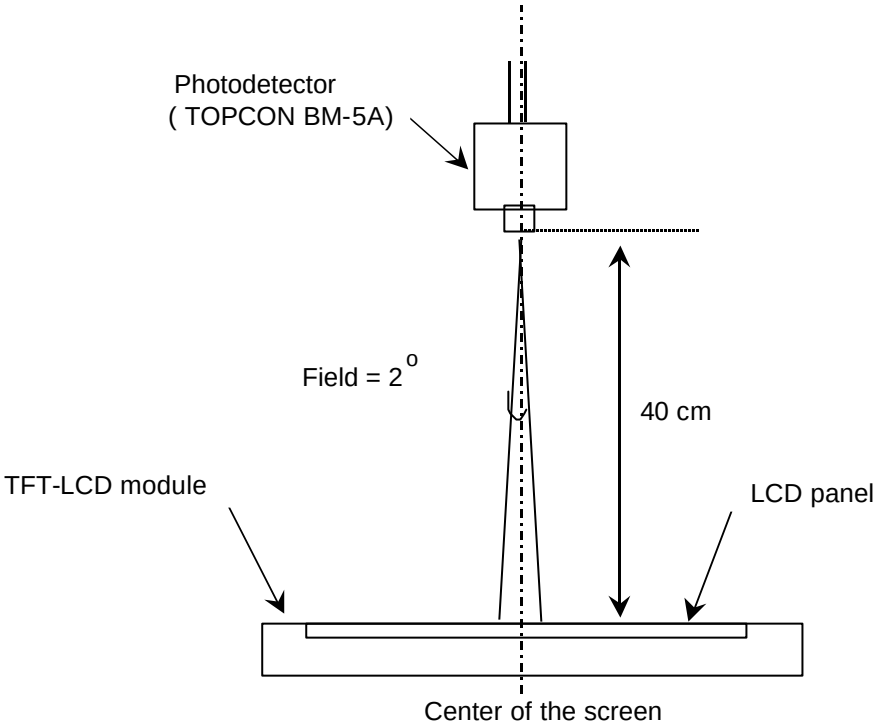
Note 4) Definition of Average Luminance of White : measure the luminance of white at 5 points.

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)

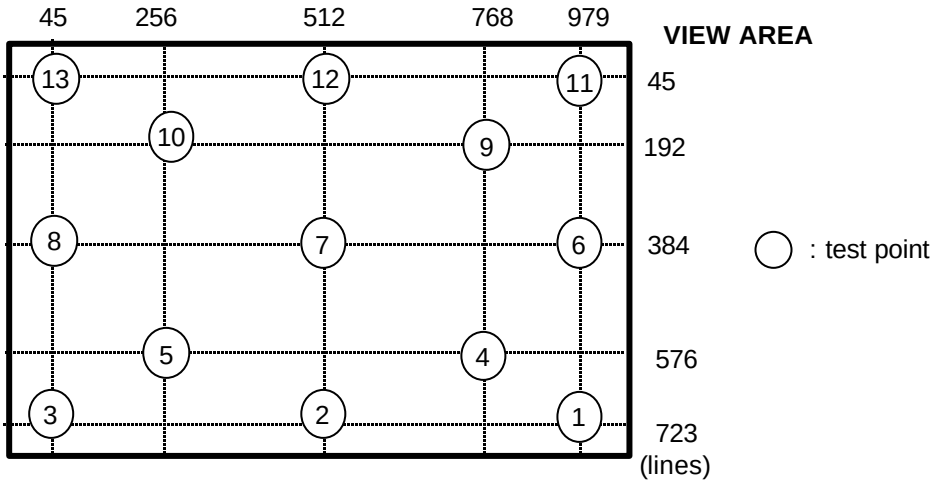
Note 5) After stabilizing and leaving the panel alone at a given temperature for 30 minutes, the measurement should be executed. Measurement should be executed in a stable, windless,and dark room.
30 minutes after lighting the back-light. This should be measured in the center of screen.
Lamp current : 6.0 mA
Environment condition : Ta = 25 ± 2 °C



Optical characteristics measurement setup

Note 6) Definition of 13 points white variation (δW), CR variation(CVER) [① ~ ⑬]

$$\delta_L = \frac{\text{Maximum luminance of 13 points}}{\text{Minimum luminance of 13 points}} \qquad \delta C_R = \frac{\text{Maximum } C_R \text{ of 13 points}}{\text{Minimum } C_R \text{ of 13 points}}$$



3. ELECTRICAL CHARACTERISTICS

3.1 TFT LCD MODULE

Ta = 25 ± 2℃

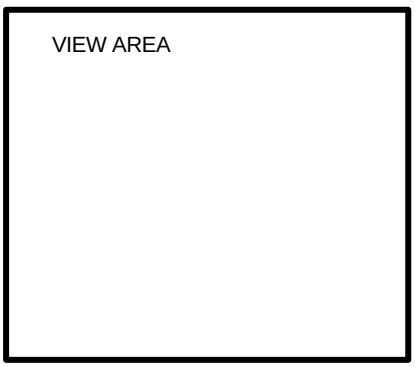
ITEM		SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Voltage of Power Supply		V_{DD}	3.0	3.3	3.6	V	
Differential Input Voltage for LVDS Receiver Threshold	High	V_{IH}	-	-	+100	mV	(1)
	Low	V_{IL}	-100	-	-	mV	
Vsync Frequency		fv	-	60	-	Hz	
Hsync Frequency		f_H	-	48.3	-	KHz	
Main Frequency		f_{DCLK}	-	65	-	MHz	
Rush Current		I_{RUSH}	-	-	1.5	A	(4)
Current of Power Supply	White	I_{DD}	-	340	-	mA	(2),(3)*a
	Mosaic		-	350	-	mA	(2),(3)*b
	Maximum current		-	410	430	mA	(2),(3)*c

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

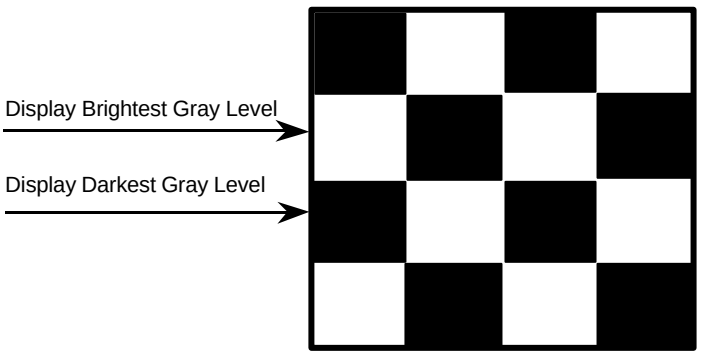
(2) f_V=60Hz, f_{DCLK} =65MHZ, Vdd = 3.3V , DC Current.

(3) Power dissipation check pattern

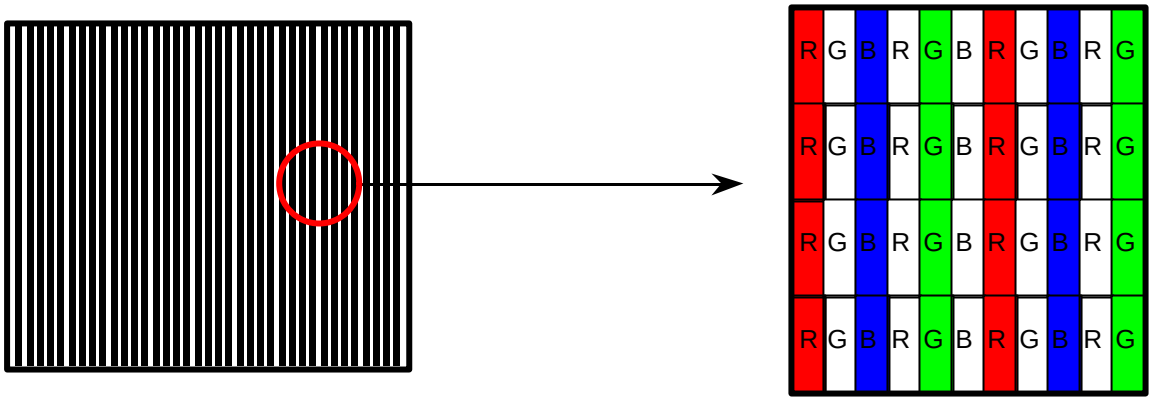
*a) White Pattern



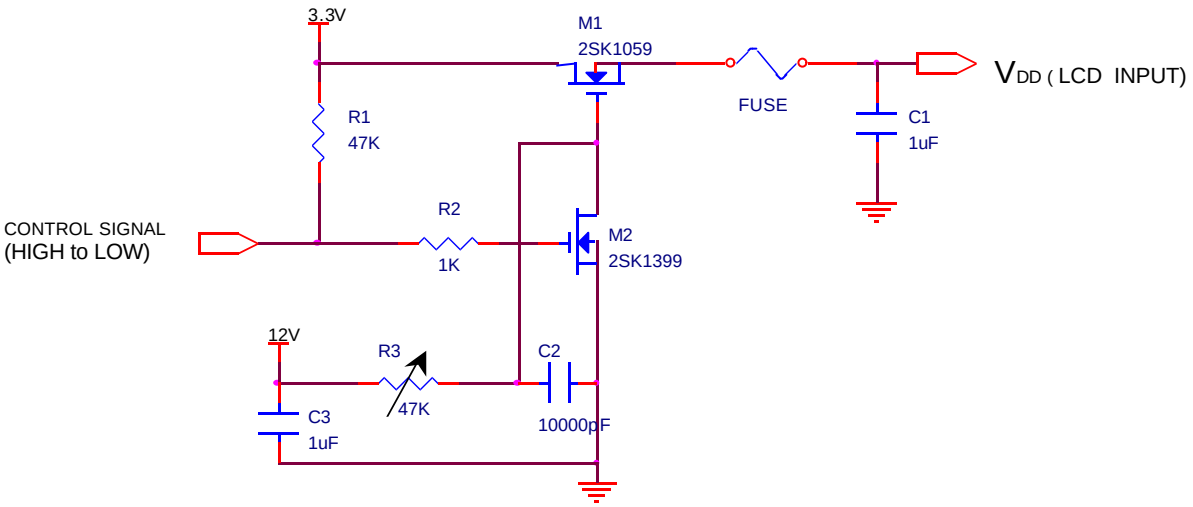
*b)Mosaic Pattern



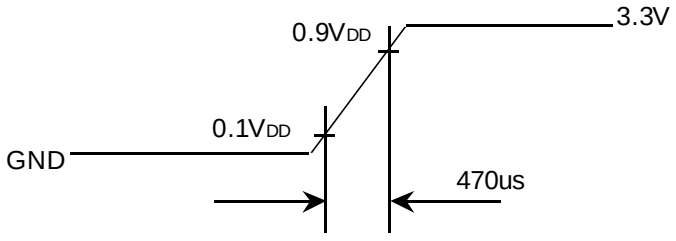
*c) Maximum Power pattern : 1dot vertical stripe



(4) Rush current measurement condition



VDD rising time is 470us



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.

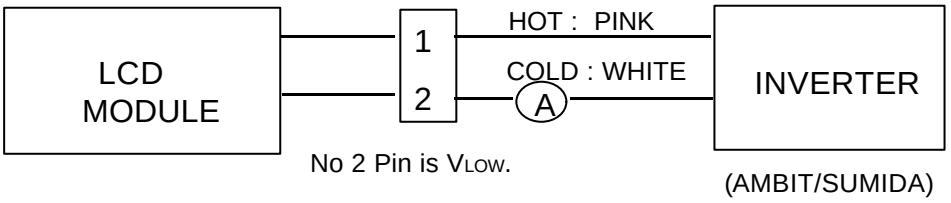
INVERTER : AMBIT/SUMIDA

Ta = 25 ± 2°C

ITEM	SYMB	MIN	TYP	MAX	UNIT	NOTE
Lamp Current	I_L	3.0	5.0	6.5	mA_{rms}	(1)
Lamp Voltage	V_L	-	660	-	V_{rms}	I_L=5.0mA
Frequency	f_L	45	-	65	KHz	(2)
Power Consumption	P_L	-	4.0	-	W	(3) I_L=6.0mA
Operating Life Time	Hr	10,000	-	-	Hour	(4)
Startup Voltage	V_S	-	-	1100	V_{rms}	25°C
		-	-	1250	V_{rms}	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.



(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 ± 2°C and I_L = 6.0 mA_{rms} 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.

3.3 INVERTER

Inverter : AMBIT, SUMIDA

Ta = 25 ± 2°C

ITEM		MIN	TYP	MAX	UNIT	NOTE
Input Voltage(Vin)		9.0	14.4	21.0	mArms	
Open Circuit Voltage		1250	1400	1700	Vrms	IL =6.0 mArms
PWM duty cycle		10 ±2 @SMB_DAT FFH	-	100 @SMB_DAT 00H	%	Vin=14.4V
Efficiency	Optical	20	33.3	-	Nit/W	After 30min turn on at the center of LCD Vin=14.4V @6.0mA(3)
	Electrical	75	80	-	%	
Operating Frequency		50±5	55±5	60±5	kHz	SMB_DAT=00H
PWM Frequency		195	210	225	Hz	Vin=14.4V
Input Voltage Ripple		-	-	0.5	Vpp	Peak to peak value
Input Power Consumption		-	4.5	-	W	(1) Iout=6.0mArms
In-rush current		-	-	1	A	
Shutdown time		1.0	-	1.4	sec	
Start-up time		-	-	0.3	sec	(2)

Note

(1) Iin=312mA, Efficiency=85%

(2) Inverter start-up time

(3) Efficiency should be calculated as below formulation.

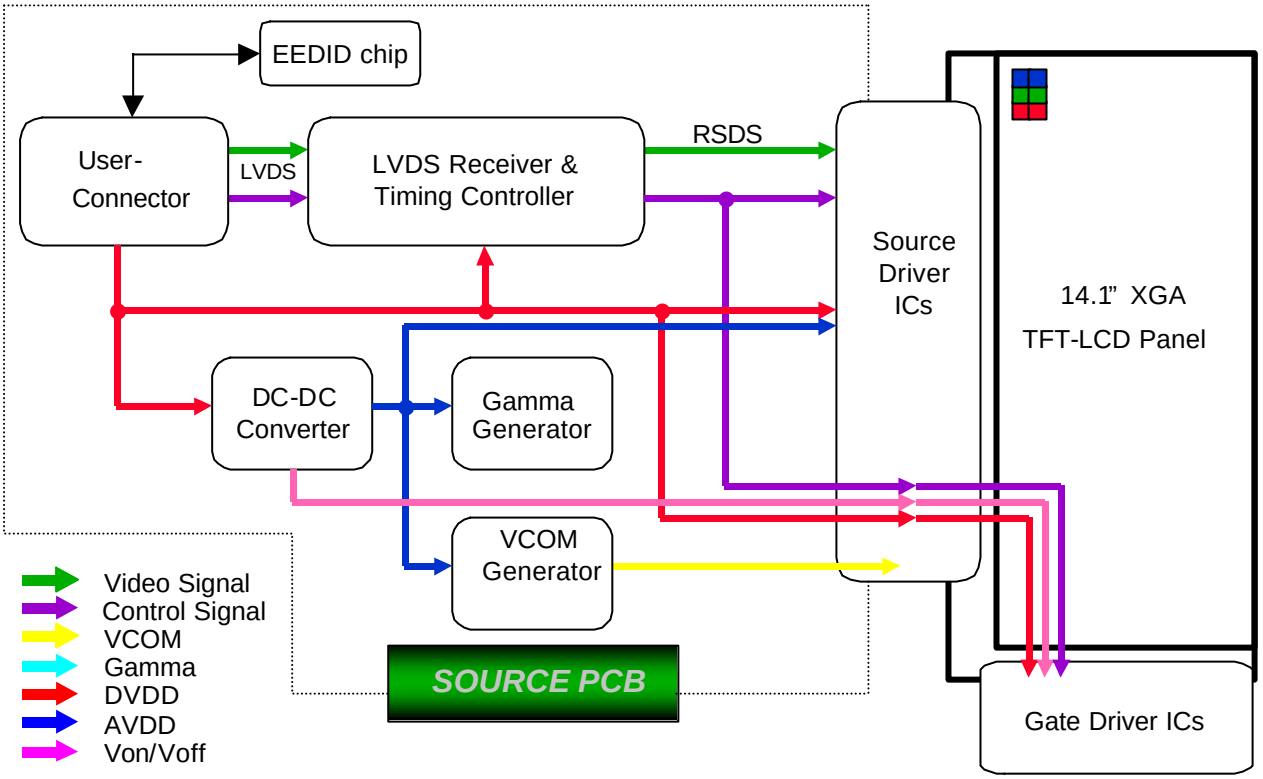
Optical efficiency = output Brightness(nits) / Input power(watt)

Electrical efficiency = output power / input power

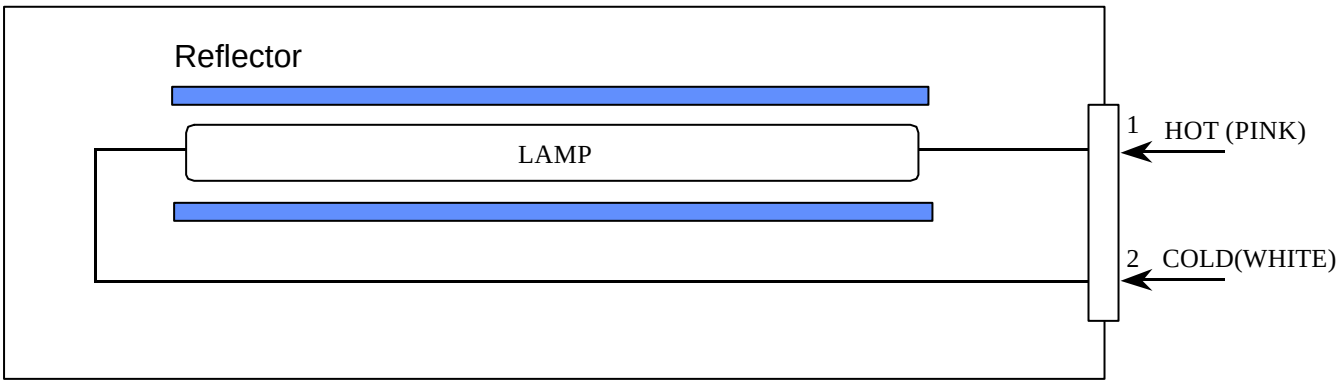
If the lamp current is under the 3.0mA, the lamp flicker may happen.

4. BLOCK DIAGRAM

4.1 TFT LCD Module



4.2 BACKLIGHT UNIT

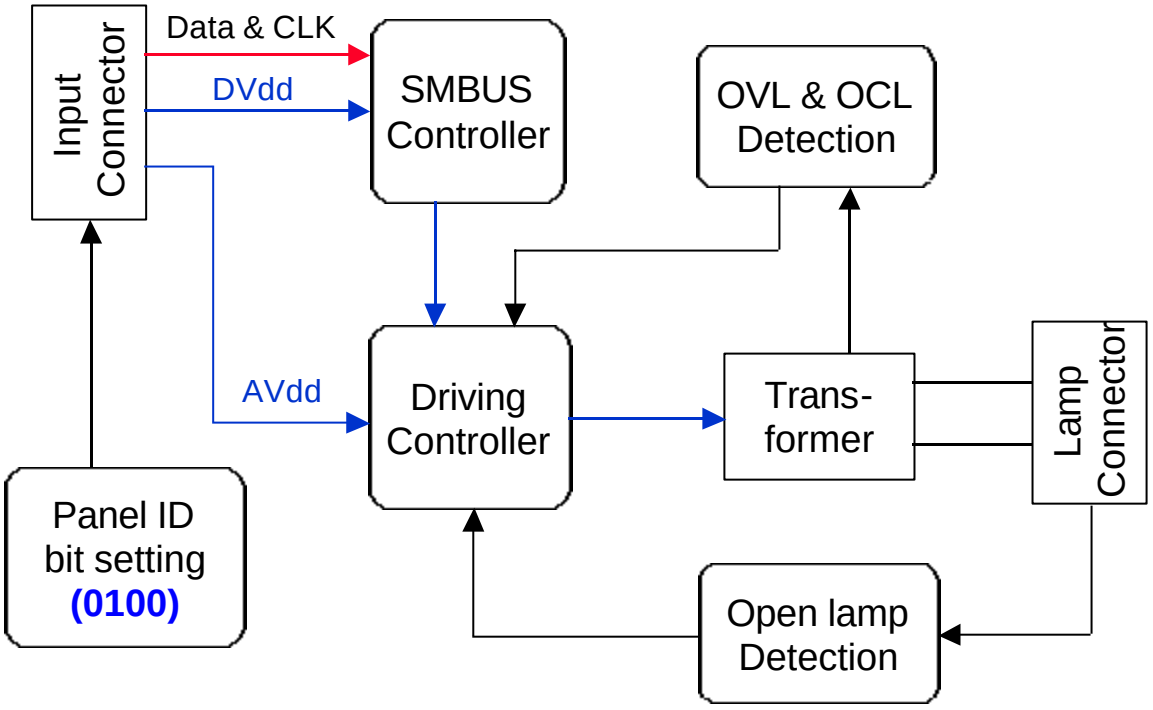


Note) The output of the inverter may change according to the material of the reflector.

4.3 INVERTER

Input Connector : JAE, WR-L16S-VF-1

Lamp Connector : JST, SM02B-BHSS-1-TB



5. INPUT TERMINAL PIN ASSIGNMENT

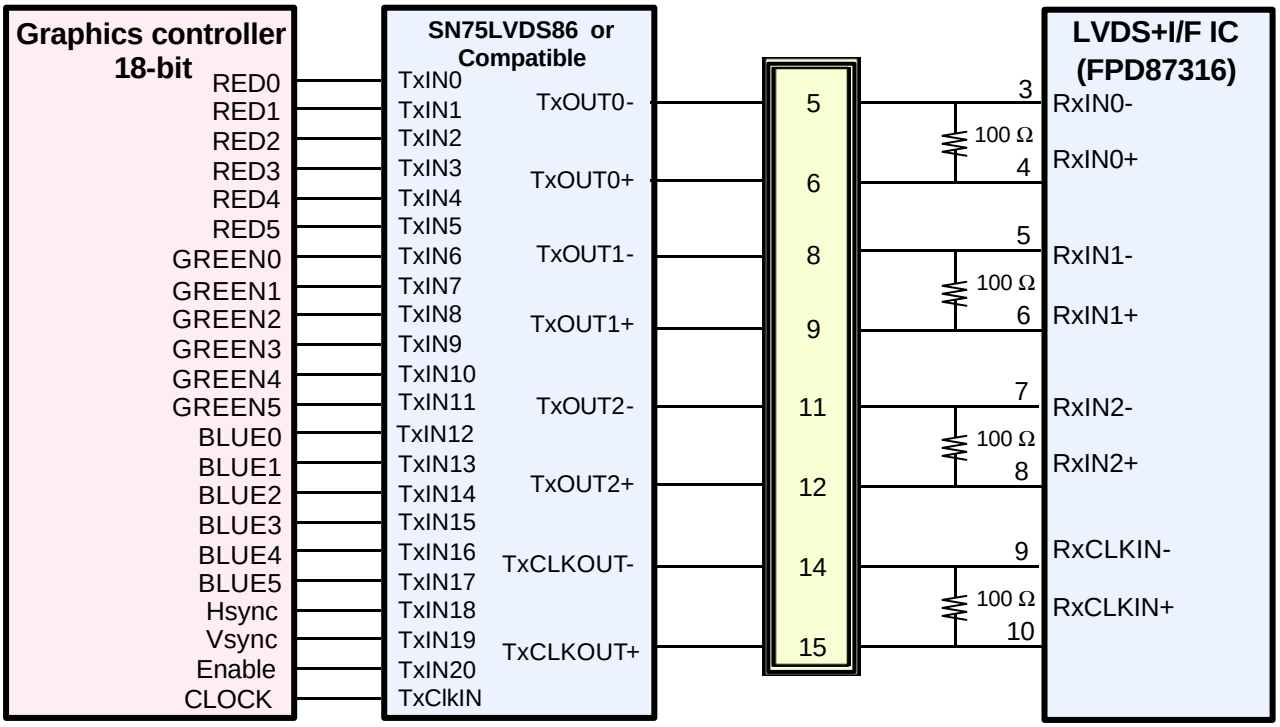
5.1. Input Display Signal & Power (LVDS, Connector : UJU, 1524B-2041R or compatible
Mating Connector : JAE, FI-SE20M-HF)

PIN NO	SYMBOL	FUNCTION	POLARITY	REMARK
1	VDD	POWER SUPPLY +3.3V		
2	VDD	POWER SUPPLY +3.3V		
3	VSS	GROUND		
4	VSS	GROUND		
5	RxIN0-	LVDS Differential Data INPUT	Negative	R0~R5 G0
6	RxIN0+	LVDS Differential Data INPUT	Positive	
7	VSS	GROUND		
8	RxIN1-	LVDS Differential Data INPUT	Negative	G1~G5 B0~B1
9	RxIN1+	LVDS Differential Data INPUT	Positive	
10	VSS	GROUND		
11	RxIN2-	LVDS Differential Data INPUT	Negative	B2~B5,DE Hsync,Vsync
12	RxIN2+	LVDS Differential Data INPUT	Positive	
13	VSS	GROUND		
14	RxCLKIN-	LVDS Differential Data INPUT	Negative	
15	RxCLKIN+	LVDS Differential Data INPUT	Positive	
16	VSS	GROUND		
17	V_{EDID}	DDC 3.3V power		
18	NC	Reserved for supplier test point		
19	Clk_{EDID}	DDC Clock		
20	$DATA_{EDID}$	DDC Data		

5.2 LVDS Interface : Transmitter SN75LVDS86 or Compatible

Pin No.	Name	RGB Signal	Pin No.	Name	RGB Signal
44	TxIN0	R0	12	TxIN11	G5
45	TxIN1	R1	13	TxIN12	B0
47	TxIN2	R2	15	TxIN13	B1
48	TxIN3	R3	16	TxIN14	B2
1	TxIN4	R4	18	TxIN15	B3
3	TxIN5	R5	19	TxIN16	B4
4	TxIN6	G0	20	TxIN17	B5
6	TxIN7	G1	22	TxIN18	Hsync
7	TxIN8	G2	23	TxIN19	Vsync
9	TxIN9	G3	25	TxIN20	DE
10	TxIN10	G4	26	TxCLK IN	Clock

LVDS INTERFACE

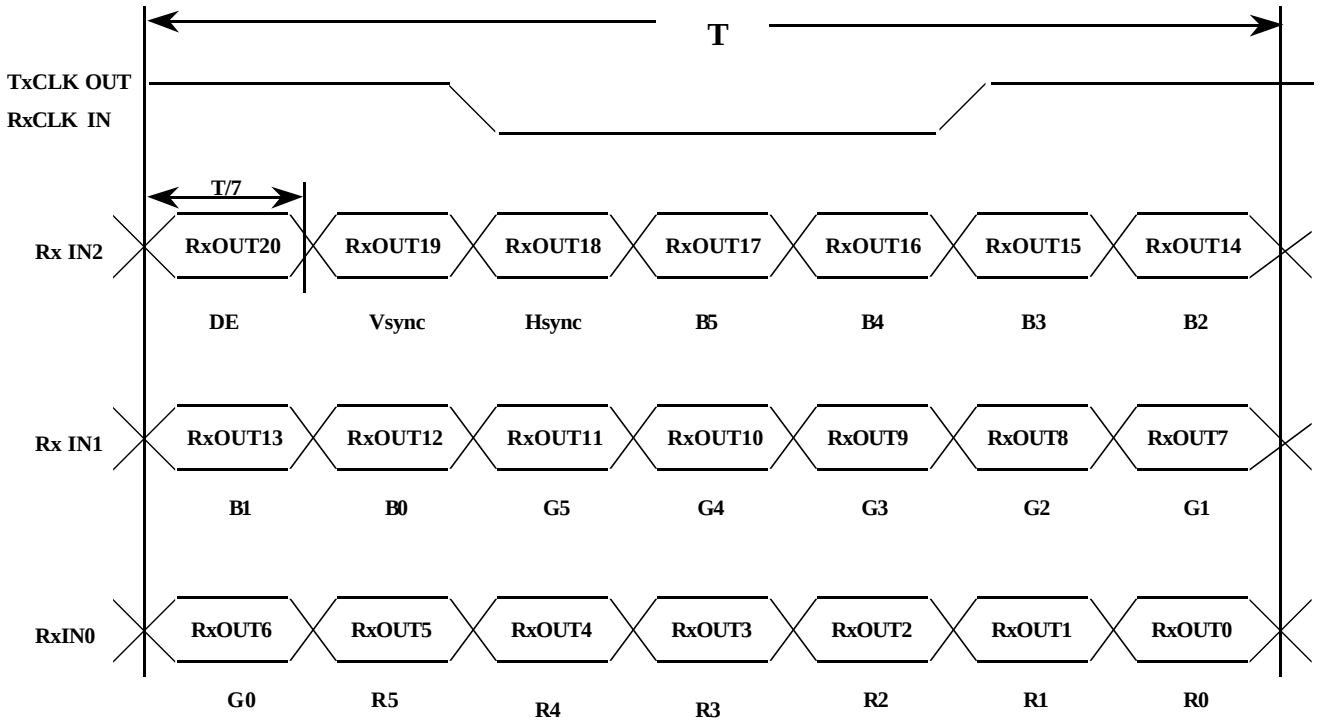


5.3 BACK LIGHT UNIT

Connector : JST BHSR - 02VS -1
Mating Connector : JST SM02B-BHSS-1

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 INVERTER signals & power

Inverter Connector : JAE, WR-L16S-VF-1

PIN NO	SYMBOL	Voltage	Comments
1	INV_SRC	9.0V to 21V	This power rail should be used as a power rail to drive the back-light DC-AC converter.
2	INV_SRC	9.0V to 21V	This power rail should be used as a power rail to drive the back-light DC-AC converter.
3	GND	0V	Ground
4	INV_SRC	9.0V to 21V	This power rail should be used as a power rail to drive the back-light DC-AC converter.
5	GND	0V	Ground
6	GND	0V	Ground
7	5VSUS	4.85 to 5.2V	This should be used as power source for the control circuitry on the inverter.
8	5VALW	5V	This should be used as power source that stores the brightness/contrast values & the circuit that interfaces with SMB_CLK & SMB_DAT.
9	SMB_DAT	-	SMBus interface for sending brightness & contrast information to the inverter/panel
10	SMB_CLK	-	SMBus interface for sending brightness & contrast information to the inverter/panel
11	FPVEE	-	Control signal input into the inverter to turn ON or OFF Lamp. (1 - ON, 0 - OFF)
12	NC	-	
13	PANEL_ID3	-	Output pin, See Note(2)
14	PANEL_ID2	-	Output pin, See Note(2)
15	PANEL_ID1	-	Output pin, See Note(2)
16	PANEL_ID0	-	Output pin, See Note(2)

Note (1) SMBus address Definition

SMBus address definition for brightness & contrast

Inverter SMBus address	A2	A1	A0
Address = 50h	0	0	0

- Recommend using Dallas Semiconductor DS1803-dual digital potentiometer (or equivalent). Use Wiper '0' for contrast control & Wiper '1' for brightness (backlight) control.

Note (2) Panel ID bit Definition

Panel type	Product ID	ID3	ID2	ID1	ID0
14.1" XGA single channel LVDS TFT-LCD	LTN141XD-L01	**0**	**1**	**0**	**0**

5.6 Input Signal,Basic Display Colors and Gray Scale of Each Colors

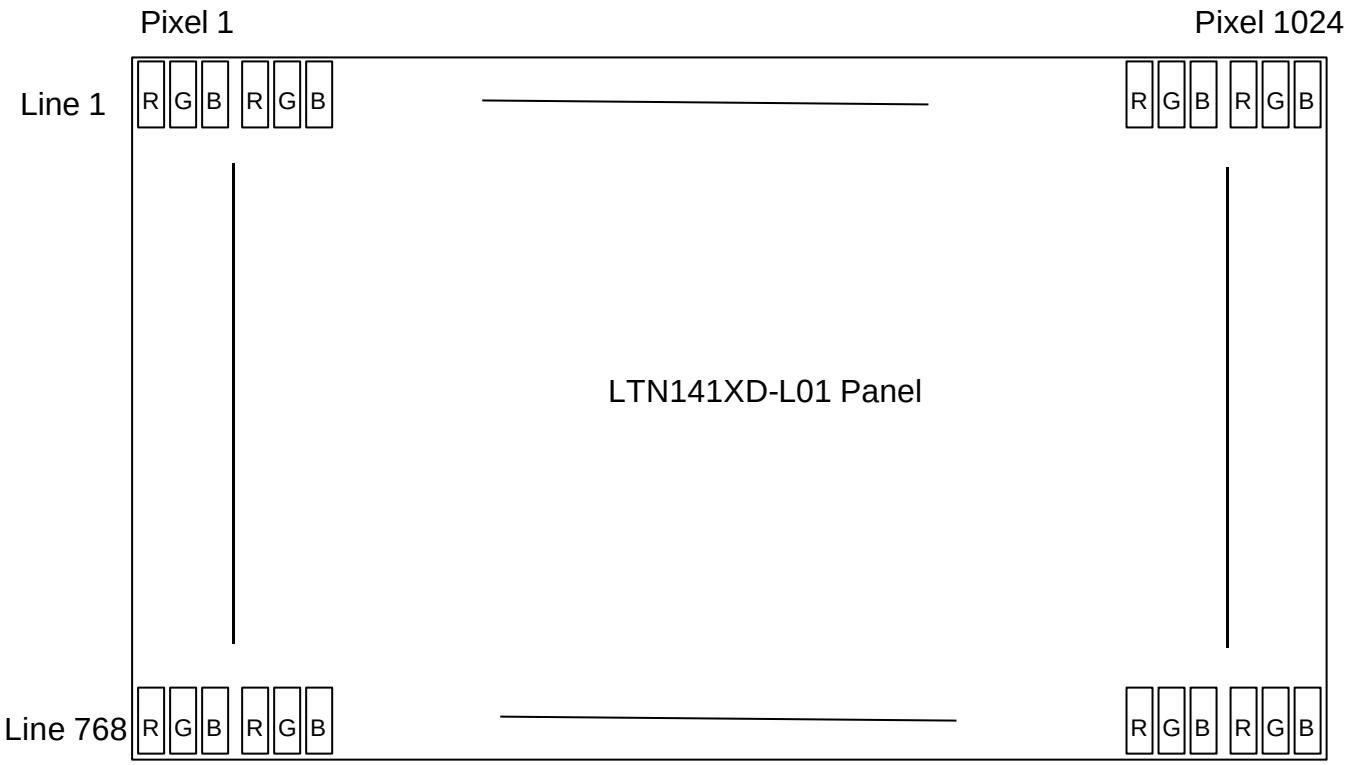
COLOR	DISPLAY	DATA SIGNAL																		GRAY SCALE LEVEL
		RED						GREEN						BLUE						
		R0	R1	R2	R3	R4	R5	G0	G1	G2	G3	G4	G5	B0	B1	B2	B3	B4	B5	
BASIC COLOR	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-
	BLUE	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	-
	GREEN	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	-
	CYAN	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

5.7 PIXEL FORMAT

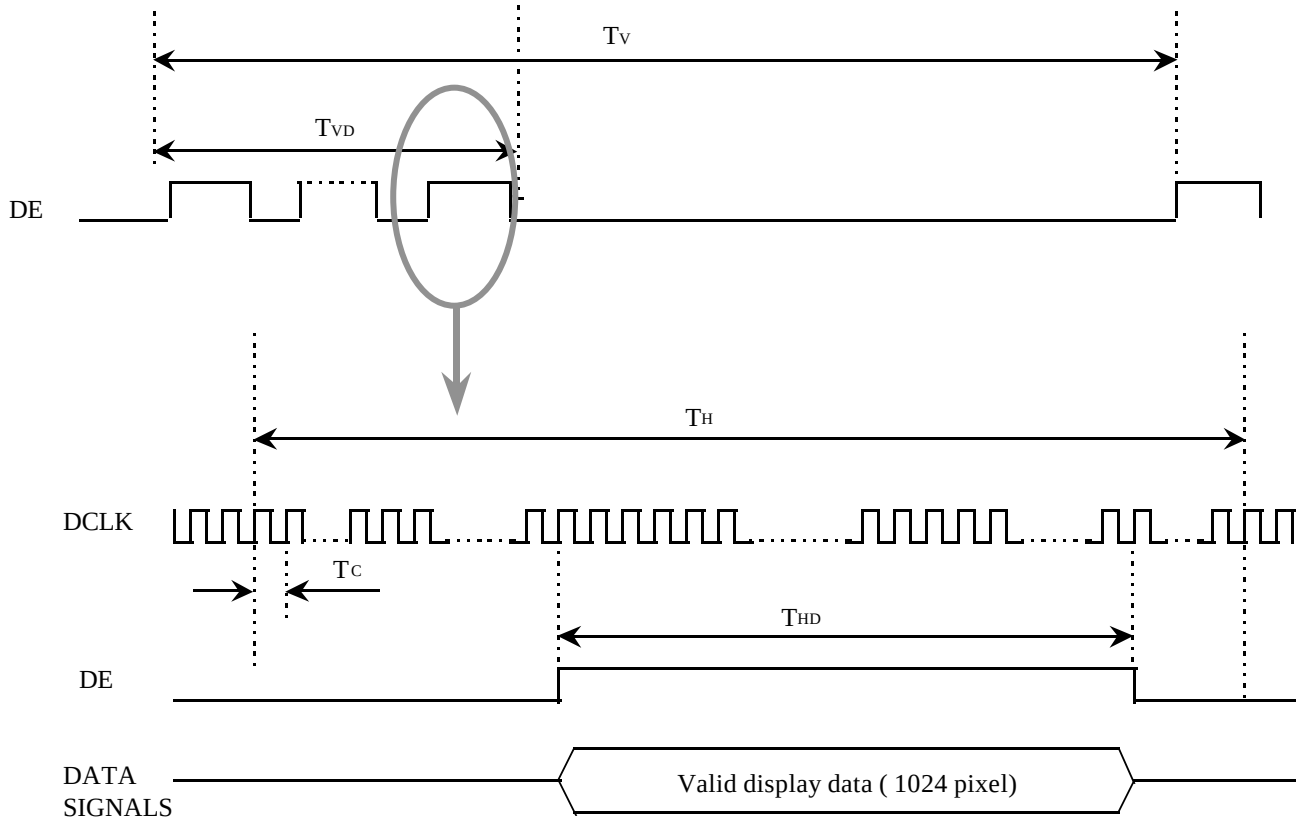


6. INTERFACE TIMING

6.1 Timing Parameters

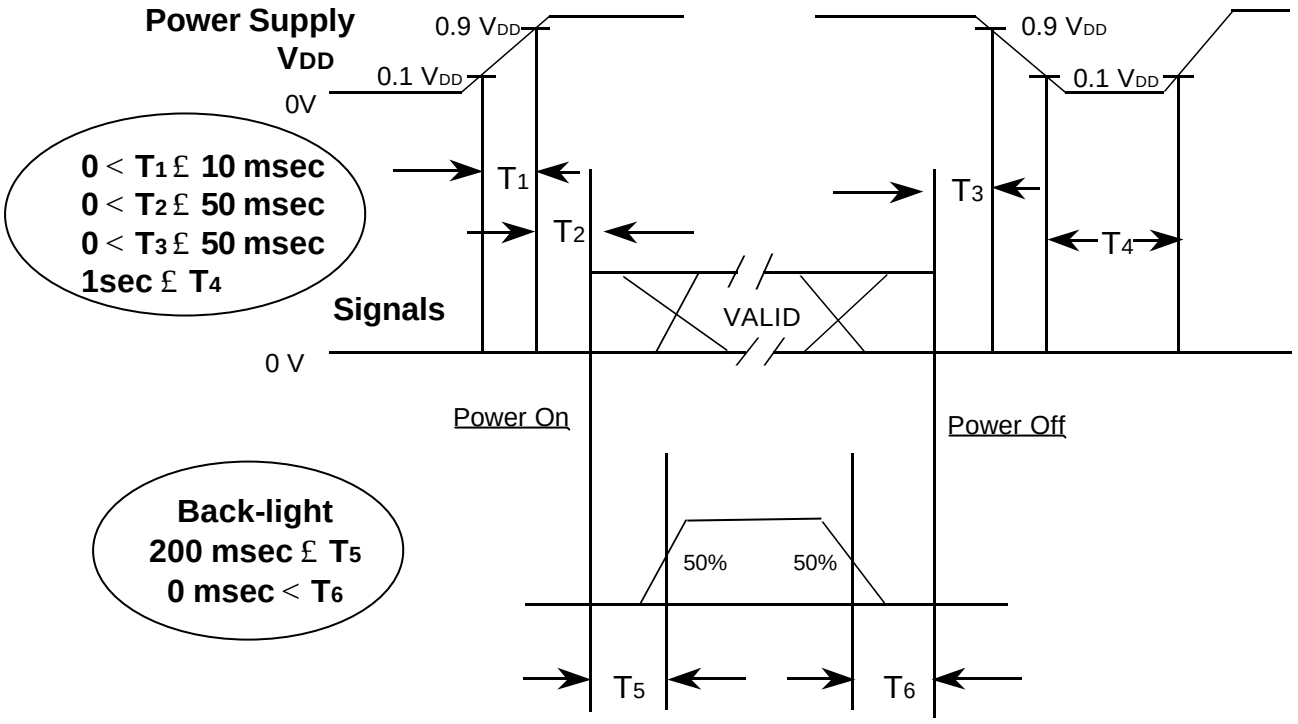
Signal	Item	Symbol	MIN	TYP	MAX	Unit	Note
Frame Frequency	Cycle	T_V		806		lines	
Vertical Active Display Term	Display Period	T_{VD}		768		lines	
One Line Scanning Time	Cycle	T_H		1344		clocks	
Horizontal Active Display Term	Display Period	T_{HD}		1024		clocks	

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 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.

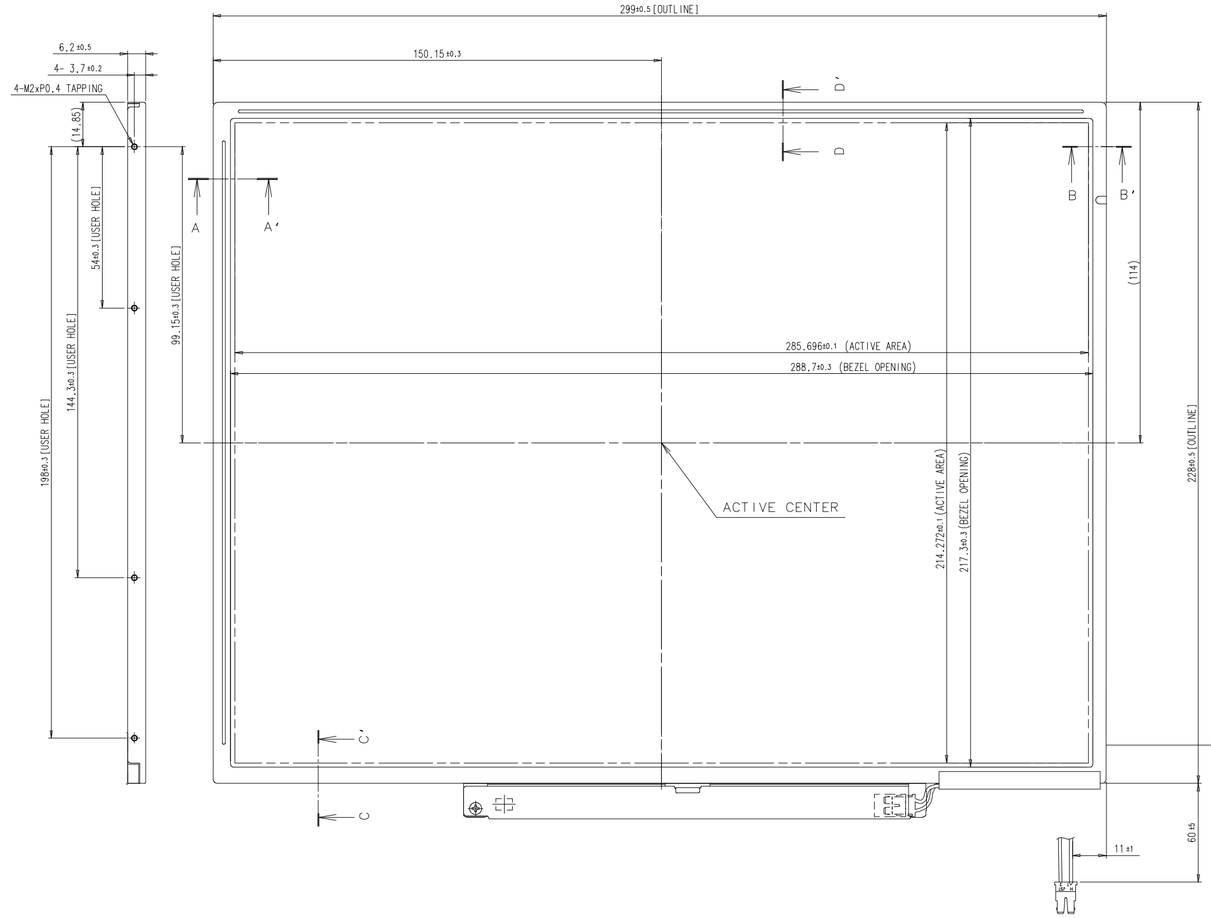
(3) In case of V_{DD} = off level, please keep the level of input signals on the low or keep a high impedance.

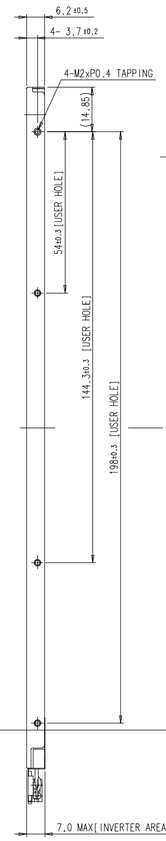
(4) T4 should be measured after the module has been fully discharged between power off and on period.

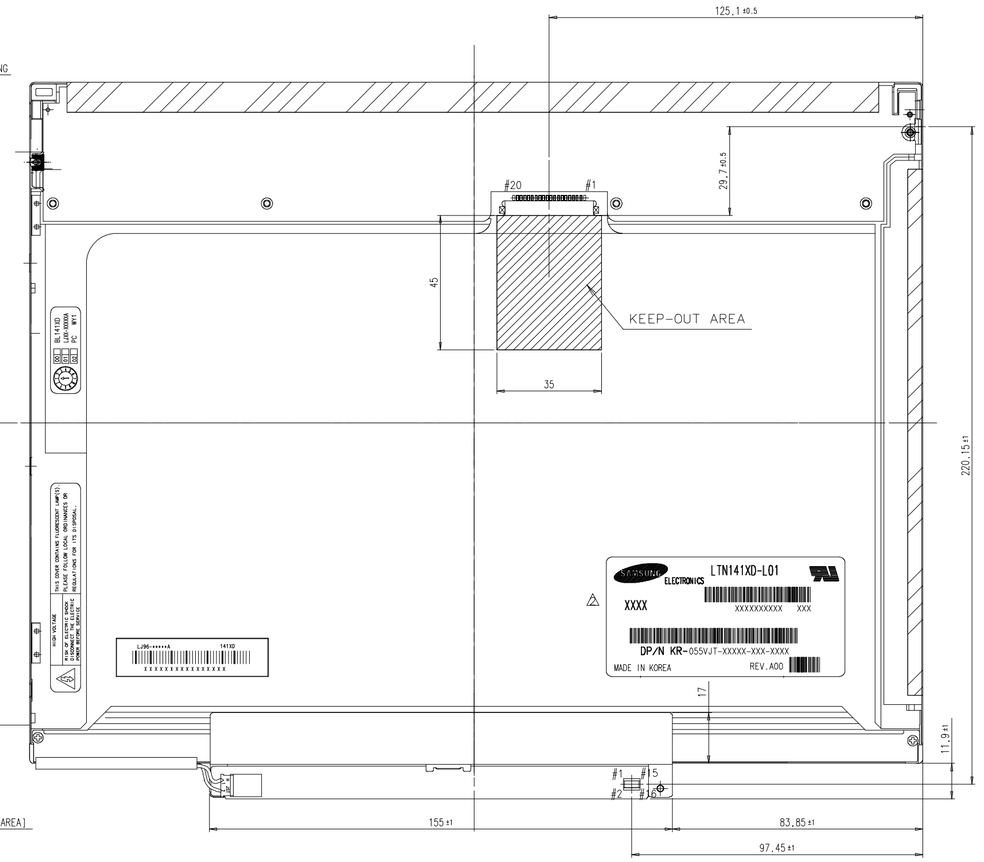
(5) Interface signal shall not be kept at high impedance when the power is on.

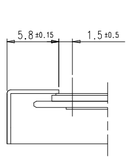
FILE NO.

NO	PART NAME	CODE NO	SPECIFICATION	Q'TY	WEIGHT		UNFOLDED DIM. OF. MATERIAL	REMARK
					FINISH	MATERIAL		

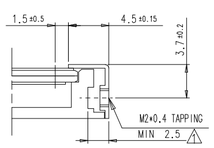




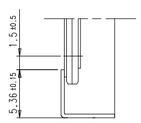




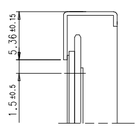
SECTION A-A'(S=3/1)



<USERHOLE PART>
SECTON B-B'(S=3/1)



SECTION C-C'(S=3/1)



SECTION D-D'(S=3/1)

* NOTE

1. SIGNAL INTERFACE CONNECTOR TO BE SPECIFIED AS BELOW.
   - MAKER : UJU
   - PART NO : 1524B-2041R
   - INPUT MATCHING CONNECTOR : JAE F1-SE20M-HF
2. CCFT CONNECTOR FOR BACKLIGHT TO BE SPECIFIED AS BELOW.
   - MAKER : JST
   - PART NO : BHSR-02VS-1
   - LAMP DIAMETER : ø2.0
3. CALIFERS MEASURING FORCE :750 ± 250 gf
4. ⚠ ALLOWED DEPTH OF USERHOLE SCREW INSERTION IS 2.5mm MAX.

REVISION

00	'00.12.14	⚠	CHANGE CUST' LABEL	Customer Request	H.S.PARK

GENERAL TOLERANCE			
STEP	LEVEL 1	LEVEL 2	LEVEL 3
0 < X ≤ 4	±0.05	±0.1	±0.2
4 < X ≤ 16	±0.08	±0.15	±0.3
16 < X ≤ 64	±0.12	±0.25	±0.5
64 < X ≤ 256	±0.25	±0.4	±0.8

REV	DATE	DESCRIPTION OF REVISION	REASON	CHG'D BY
00	00.11.30	⚠ADD NOTE OF USERHOLE SCREW INSERTION		

UNIT	mm	DRA'N BY	DES'D BY	CHK'D BY	APP'D BY
SCALE	1/1	H.S.PARK	H.S.PARK	J.H.CHUN	Y.B.CHU
TOLERANCE					
LEVEL 3		00.07.28	00.07.28	00.07.28	00.07.28

SAMSUNG ELECTRONICS

SPEC. NO

FOR CONTROL

MODEL NAME	LTN141XD
PART/SHEET NAME	OUTLINE DIMENSION
CODE NO.	
SHEET	1/1
VER.	00

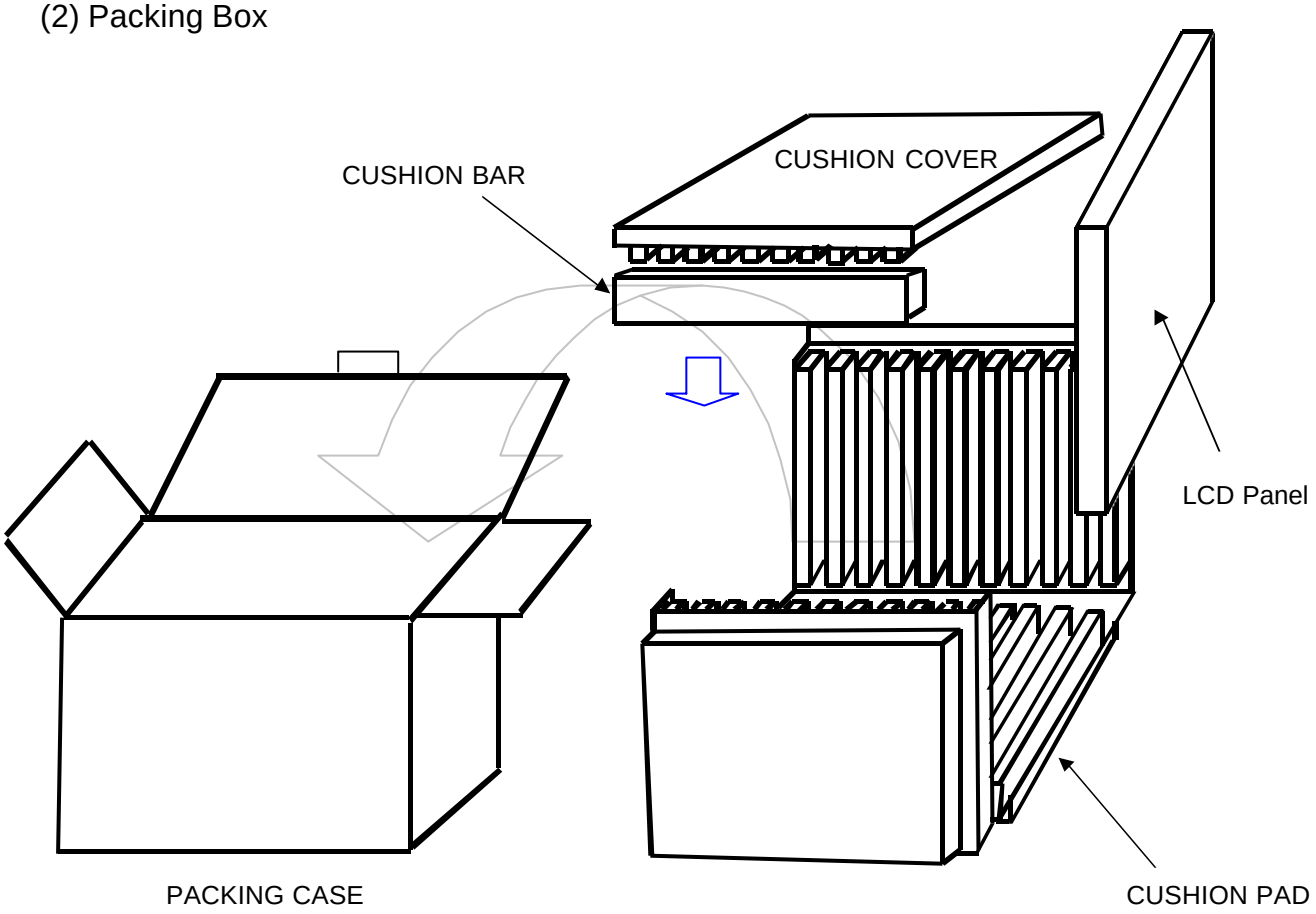
8. PACKING

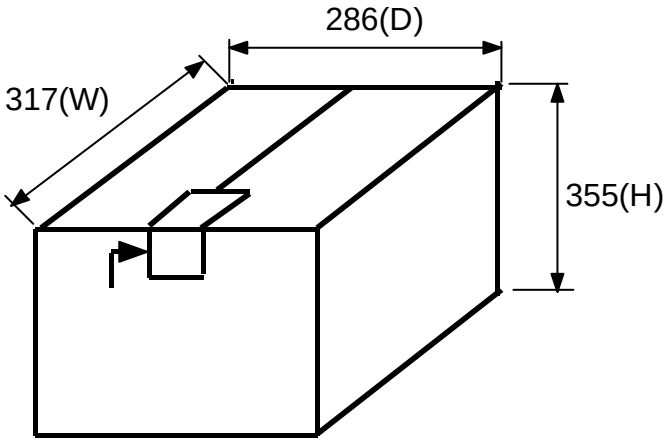
1. CARTON(Internal Package)

(1) Packing Form

Corrugated Cardboard box and Corrupad form as shock absorber

(2) Packing Box





Note 1)Total Weight : Approximately 7.5 kg

2) Acceptance number of piling : 10 sets

3) Carton size : 317(W)×286(D)×355(H)

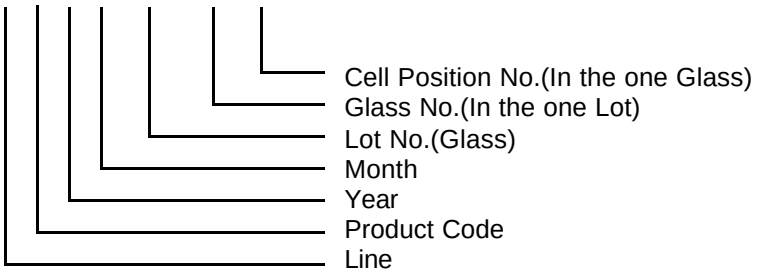
4) MAX accumulation quantity : 5 cartons

No	Part name	Quantity
1	Static electric protective sack	10
2	Packing case(Inner box) included shock absorber	1 set
3	Pictorial marking	2 pics
4	Carton	1 set

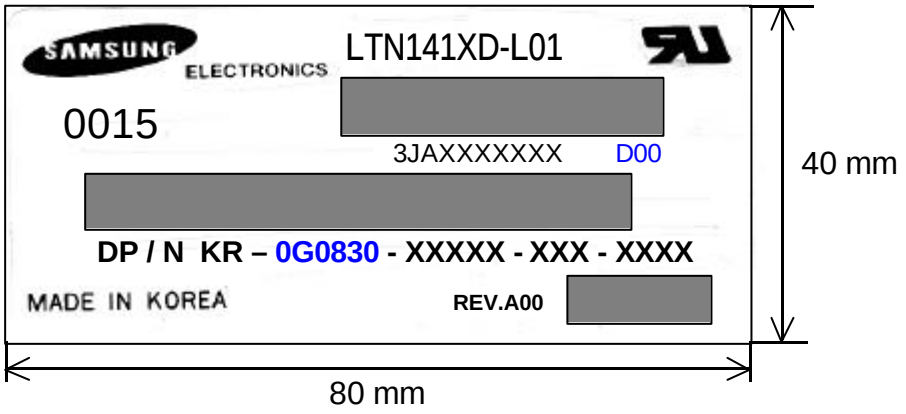
9. MARKINGS & OTHERS

A nameplate bearing followed by is affixed to a shipped product at the specified location on each product.

(1)Parts number : LTN141XD-L01
(2)Revision : One letter
(3)Control code : One letter
(4)Lot number : 3 J 0 A XXX XX XX

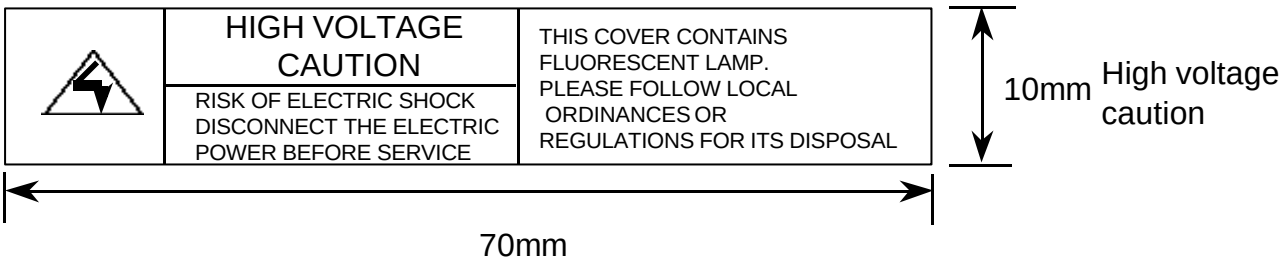


(5) Nameplate Indication (Dell PPID Label)

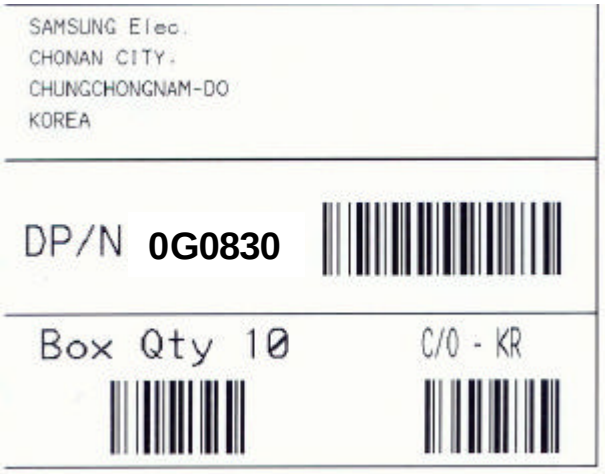


Parts name : LTN141XD - L01
Lot number : 3XXXXXXXXX
Inspected work week : 0015
DP/N : Dell Part Number (“0G0830” is for 141XD-L01)
REV.A00 : Product Revision Code

This HIGH VOLTAGE CAUTION is carved in mold frame



(6) Packing box attach (Dell PPID Label)



(7) Packing box Marking : Samsung TFT-LCD Brand Name

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.

Appendix 1. EDID

APPROVAL

Address (HEX)	FUNCTION	Value HEX	BIN	DEC	ASCII or Data	Notes
00	Header	00	00000000	0		EDID Header
01		FF	11111111	255		
02		FF	11111111	255		
03		FF	11111111	255		
04		FF	11111111	255		
05		FF	11111111	255		
06		FF	11111111	255		
07		00	00000000	0		
08	ID Manufacturer Name	4C	01001100	76	S	3 character ID
					E	
09		A3	10100011	163	C	"SEC"
0A	ID Product Code	58	01011000	88	X	"X"
0B		44	01000100	68	D	"D"
0C	32-bit serial no.	00	00000000	0		
0D		00	00000000	0		
0E		00	00000000	0		
0F		00	00000000	0		
10	Week of manufacture	00	00000000	0		
11	Year of manufacture	0C	00001100	12	2002	2002
12	EDID Structure Ver.	01	00000001	1	1	EDID Ver. 1.3
13	EDID revision #	03	00000011	3	3	EDID Rev. 0.3
14	Video input definition	80	10000000	128		
15	Max H image size	1D	00011101	29	29	29 cm(approx)
16	Max V image size	15	00010101	21	21	21 cm(approx)
17	Display Gamma	78	01111000	120	2.2	Gamma 2.2
18	Feature support	0A	00001010	10		
19	Red/green low bits	7F	1111111	127		01111111
1A	Blue/white low bits	D4	11010100	212		11010100
1B	Red x/ high bits	92	10010010	146	0.571	Red x 0.571=1001001001
1C	Red y	55	01010101	85	0.335	Red y 0.335=0101010111
1D	Green x	4E	01001110	78	0.308	Green x 0.308=0100111011
1E	Green y	88	10001000	136	0.534	Green y 0.534=1000100011
1F	Blue x	26	00100110	38	0.151	Blue x 0.151=0010011011
20	Blue y	23	00100011	35	0.138	Blue y 0.138=0010001101
21	White x	4F	01001111	79	0.310	White x 0.310=0100111101
22	White y	57	01010111	87	0.340	White y 0.340=0101011100
23	Established timing 1	00	00000000	0		
24	Established timing 2	00	00000000	0		
25	Established timing 3	00	00000000	0		

Address (HEX)	FUNCTION	Value HEX	BIN	DEC	ASCII or Data	Notes
26	Standard timing #1	01	00000001	1		not used
27		01	00000001	1		
28	Standard timing #2	01	00000001	1		not used
29		01	00000001	1		
2A	Standard timing #3	01	00000001	1		not used
2B		01	00000001	1		
2C	Standard timing #4	01	00000001	1		not used
2D		01	00000001	1		
2E	Standard timing #5	01	00000001	1		not used
2F		01	00000001	1		
30	Standard timing #6	01	00000001	1		not used
31		01	00000001	1		
32	Standard timing #7	01	00000001	1		not used
33		01	00000001	1		
34	Standard timing #8	01	00000001	1		not used
35		01	00000001	1		
36	Detailed timing/monitor descriptor #1	64	01100100	100	65	main clock=65Mhz
37		19	00011001	25		
38		00	00000000	0	1024	Hor active=1024 pixels
39		28	00101000	40	296	Hor blanking=296pixels (Thbp)
3A		41	01000001	65		4bit : 4bit
3B		00	00000000	0	768	Vertcal active=768 lines
3C		23	00100011	35	35	Vertical blanking=35lines (Tvbp)
3D		30	00110000	48		4bit : 4bit
3E		18	00011000	24	24	Hor sync. Offset=24 Pixels (T hfp)
3F		88	10001000	136	136	H sync. Width=136pixels
40		36	00110110	54	3 6	V sync. Offset=3 lines (Tvfp) V sync. Width=6 lines
41		00	00000000	0		2bit : 2bit :2bit :2bit
42		1E	00011110	30	286	H image size= 286 mm(approx)
43		D6	11010110	214	214	V image size= 214mm(approx)
44		10	00010000	16		
45		00	00000000	0		No Horizontal Border
46		00	00000000	0		No Vertical Border
47		19	00011001	25		
48	Detailed timing/monitor descriptor #2	00	00000000	0		Manufacturer Specified (Timing)
49		00	00000000	0		
4A		00	00000000	0		
4B		0F	00001111	15		
4C		00	00000000	0		
4D		00	00000000	0		Value=HSPWmin / 2
4E		00	00000000	0		Value=HSPWmax / 2
4F		00	00000000	0		Value=Thbpmin /2
50		00	00000000	0		Value=Thbpmax /2
51		00	00000000	0		Value=VSPWmin /2
52		00	00000000	0		Value=VSPWmax /2
53		00	00000000	0		Value=Tvbpmin / 2
54		00	00000000	0		Value=Tvbpmax / 2
55		18	00011000	24		Thpmin=value *2 + Hapixelclks
56		EE	11101110	238		Thpmax=value *2 + Hapixelclks
57		02	00000010	2		Tvpmin=value *2 + Valines
58		74	01110100	116		Tvpmax=value *2 + Valines
59		00	00000000	0		Module revision

Address (HEX)	FUNCTION	Value HEX	BIN	DEC	ASCII or Data	Notes
5A		00	00000000	0		
5B		00	00000000	0		
5C		00	00000000	0		ASCII Data String Tag
5D		FE	11111110	254		
5E		00	00000000	0		
5F		47	01000111	71	[G]	
60		30	00110000	48	[0]	
61	Detailed timing/monitor	38	00111000	56	[8]	
62	descriptor #3	33	00110011	51	[3]	
63		30	00110000	48	[0]	
64		32	00110010	50	[2]	
65		31	00110001	49	[1]	
66		34	00110100	52	[4]	
67		31	00110001	49	[1]	
68		58	01011000	88	[X]	
69		44	01000100	68	[D]	
6A		20	00100000	32	[ ]	
6B		20	00100000	32	[ ]	
6C		00	00000000	0		
6D		00	00000000	0		
6E		00	00000000	0		Monitor Name Tag (ASCII)
6F		FE	11111110	254		
70		00	00000000	0		
71		E8	11101000	232		
72		DA	11011010	218		
73	Detailed timing/monitor	CB	11001011	203		
74	descriptor #4	BD	10111101	189		
75		A0	10100000	160		
76		83	10000011	131		
77		49	01001001	73		
78		00	00000000	0		
79		01	00000001	1		
7A		00	00000000	0		
7B		20	00100000	32		
7C		20	00100000	32		
7D		20	00100000	32		
7E	Extension Flag	00	00000000	0		
7F	Checksum	A8	10101000	168		