SAMSUNG ELECTRONICS

Approval

TO : Dell / Compal

DATE : Apr. 25, 2007

SAMSUNG TFT-LCD

MODEL NO. : LTN141W2-L01

NOTE :

- Extension code [-1] ; LTN141W2-L01-1
- changes : M08 inverter, new PCB version for WWAN

Any Modification of Specification is not allowed without SEC's Permission.

APPROVED BY : *W. B . Youn*

PREPARED BY : **LCD Product Planning Group 1, Marketing Team**

SAMSUNG ELECTRONICS CO., LTD.

Samsung Secret

Approval

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REVISION HISTORY

Approval

Date	Rev. No.	Page	Summary
Jan 23, 2007	P00	All	. The preliminary specification of LTN141W2-L01-1 was first issued.
Apr. 25. 2007	A00	All	. The approval specification was issued.

GENERAL DESCRIPTION

DESCRIPTION

LTN141W2-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 and a backlight unit. The resolution of a 14.1" contains 1,280 x 800 pixels and can display up to 262,144 colors. 6 O'clock direction is the Optimum viewing angle.

FEATURES

- High contrast ratio and high brightness for outdoor visibility
- Attached the protective glass for surface durability
- 1280 x 800 pixels resolution
- Low power consumption
- Fast Response
- 2 CCFL
- DE(Data enable) only mode
- 3.3V LVDS Interface
- Onboard EEDID chip
- Attached Burst mode Inverter with Ambient Light Sensor

APPLICATIONS

- Notebook PC
- 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	303.36(H) x 189.6(V) (14.1” diagonal)	mm	
Driver element	a-Si TFT active matrix		
Display colors	262,144		
Number of pixel	1280 x RGB(3) x 800	pixel	16 : 10
Pixel arrangement	RGB vertical stripe		
Pixel pitch	0.2370(H) x 0.2370(V) (TYP.)	mm	
Display Mode	Normally white		
Surface treatment	Hard-Coating 7H min		Protective glass

Mechanical Information

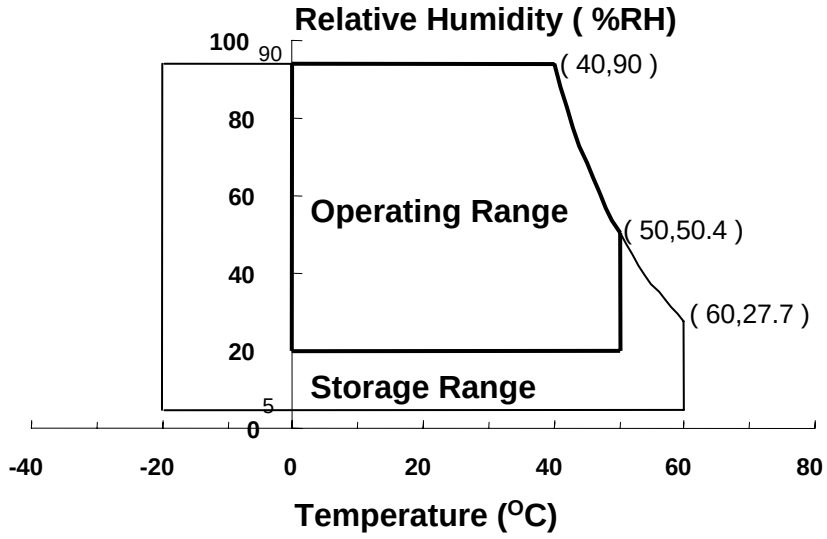
Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal (H)	319.0	319.5	320.0	mm	w/o inverter ass'y
	Vertical (V)	205.0	206.5	207.0	mm	
	Depth (D) [With the protective glass]	-	-	10.6	mm	LCD except bottom area
		-	-	12.4		LCD bottom area
Weight [With the protective glass]		-	825	870	g	w/o Inverter
		-	840	890	g	w/ Inverter assembly

1. ABSOLUTE MAXIMUM RATINGS

1.1 ENVIRONMENTAL ABSOLUTE RATINGS

Item	Symbol	Min.	Max.	Unit	Note
Storage temperate	T_{STG}	-20	60	°C	(1)
Operating temperate (Temperature of glass surface)	T_{OPR}	0	50	°C	(1)
Shock (non-operating)	Snop	-	240	G	(2),(4)
Vibration (non-operating)	Vnop	-	2.41	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) 2ms, half sine wave, one time for ±X, ±Y, ± Z.
(3) 5 - 500 Hz, random vibration, 30min for X, Y, Z.
(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

V_{DD} =3.3V, V_{SS} = GND = 0V

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	V_{DD}	VSS - 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	7.0	mArms	(1)
Lamp frequency	F_L	40	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.

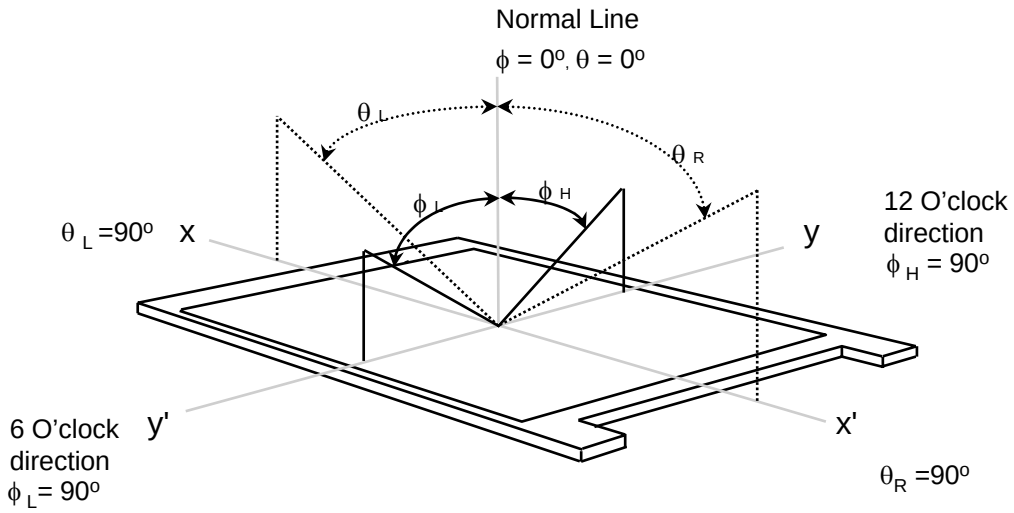
2. OPTICAL CHARACTERISTICS

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 and PR-650

* Ta = 25 ± 2 °C, V_{DD}=3.3V, fv= 60Hz, f_{DCLK} = 68.9MHz, I_L = 6.0 mArms

Item		Symbol	Condition	Min.	Typ.	Max	Unit	Note
Contrast Ratio (5 Points)		CR		TBD	500	-	-	(1), (2), (5)
Response Time at Ta (Rising + Falling)		$T_{RT\_B/W}$		-	25	35	msec	(1), (3)
Average Luminance of White (5 Points)		$Y_{L,AVE}$	Normal Viewing Angle $\phi = 0$ $\theta = 0$	500	550	-	cd/m^2	I_L=6.0mA (1), (4)
Color Chromaticity (CIE)	Red	R_X		0.592	0.612	0.632	-	(1), (5) PR-650
		R_Y		0.326	0.346	0.366		
	Green	G_X		0.303	0.323	0.343		
		G_Y		0.537	0.557	0.577		
	Blue	B_X		0.128	0.148	0.168		
		B_Y		0.087	0.107	0.127		
	White	W_X		0.293	0.313	0.333		
		W_Y		0.309	0.329	0.349		
Color Gamut				50	55	-	%	
Viewing Angle	Hor.	θ_L	CR ≥ 10	40	45	-	Degrees	(1), (5) BM-5A
		θ_H		40	45	-		
	Ver.	ϕ_H		15	20	-		
		ϕ_L		30	40	-		
	Hor.	θ_L	CR ≥ 100	20	25	-	Degrees	
		θ_H		20	25	-		
	Ver.	ϕ_H		2	7	-		
		ϕ_L		10	15	-		
13 Points White Variation		δ_L		-	-	2.2	-	(6)

Note 1) Definition of Viewing Angle : Viewing angle range(10 ≤ C/R, 100 ≤ C/R)

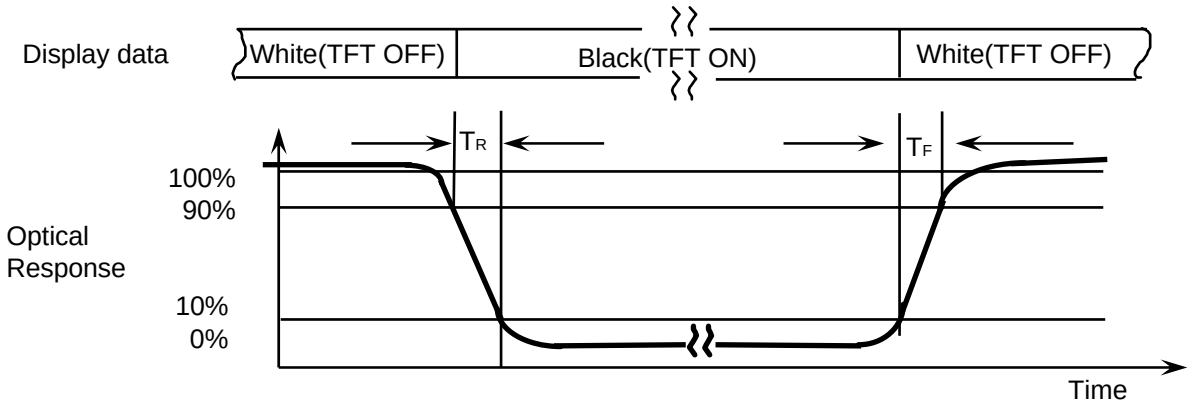


Note 2) Definition of Contrast Ratio (CR) : Ratio of gray max (Gmax) ,gray min (Gmin) at 5 points(4, 5, 7, 9, 10)

$$CR = \frac{CR(4) + CR(5) + CR(7) + CR(9) + CR(10)}{5}$$

Points : ④ , ⑤ , ⑦ , ⑨ , ⑩ at the figure of Note (6).

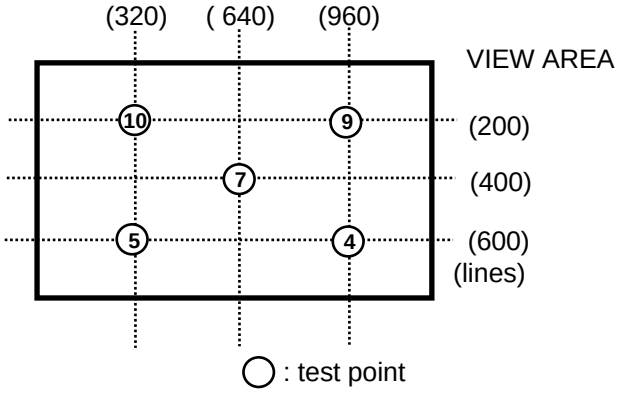
Note 3) Definition of Response time :



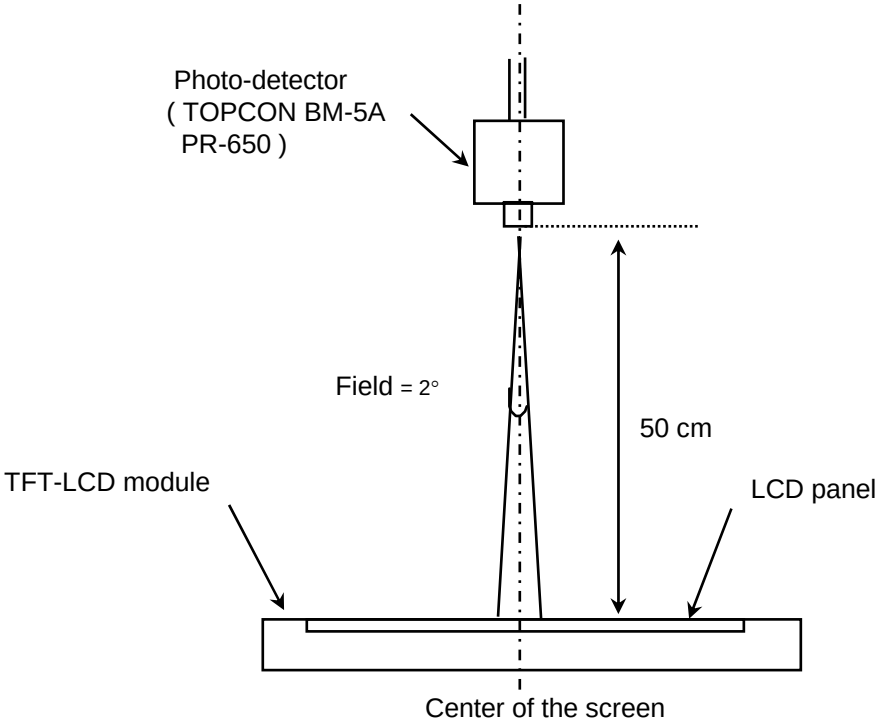
Note 4) Definition of Average Luminance of White : measure the luminance of white at 5 points.

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

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



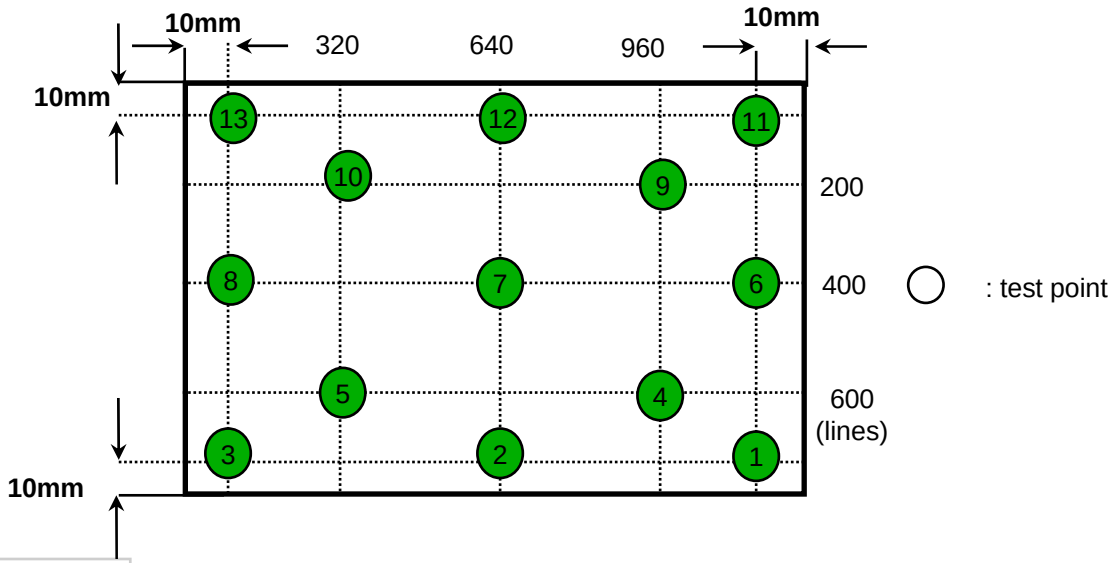
Note 5) After stabilizing and leaving the panel alone at a given temperature for 30 min , the measurement should be executed. Measurement should be executed in a stable, windless,and dark room.
30 min after lighting the backlight. This should be measured in the center of screen.
Lamp current : 6.0mA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



[Optical characteristics measurement setup]

Note 6) Definition of 13 points white variation (δ_L), CR variation(C_{VER}) [① ~ ⑬]

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



3. ELECTRICAL CHARACTERISTICS

3.1 TFT LCD MODULE

Ta= 25 ± 2°C

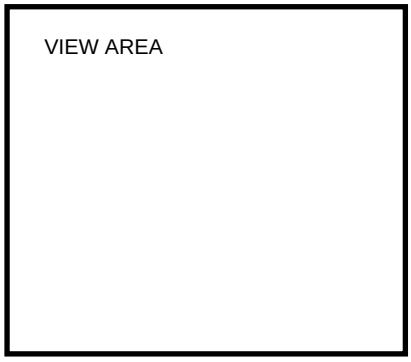
Item		Symbol	Min.	Typ.	Max.	Unit	Note
Voltage of Power Supply		V_{DD}	3.0	3.3	3.6	V	
Differential Input Voltage for LVDS Receiver Threshold	High	V_{IH}	-	-	+100	mV	V_{CM} = +1.2V
	Low	V_{IL}	-100	-	-	mV	
Vsync Frequency		fv	-	60	-	Hz	
Hsync Frequency		f_H	-	48.96	-	KHz	fv*816
Main Frequency		f_{DCLK}	-	70.5	-	MHz	fh*1408
Rush Current		I_{RUSH}	-	-	1.5	A	(4)
Current of Power Supply	White	I_{DD}	-	290	-	mA	(2),(3)*a
	Mosaic		-	300	-	mA	(2),(3)*b
	V. stripe		-	350	485	mA	(2),(3)*c

Note (1) Display data pins and timing signal pins should be connected.(GND = 0V)

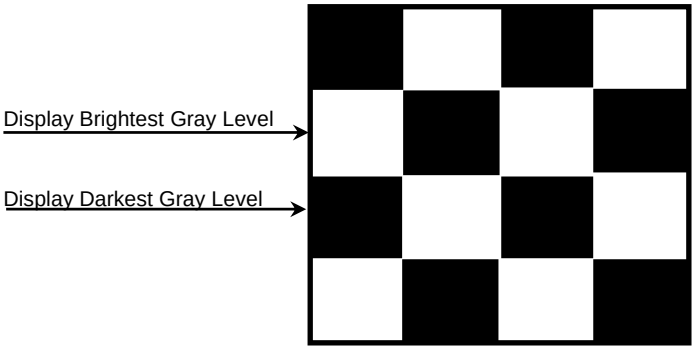
(2) f_V = 60Hz, f_{DCLK} = 68.9MHZ, V_{DD} = 3.3V , DC Current.

(3) Power dissipation pattern

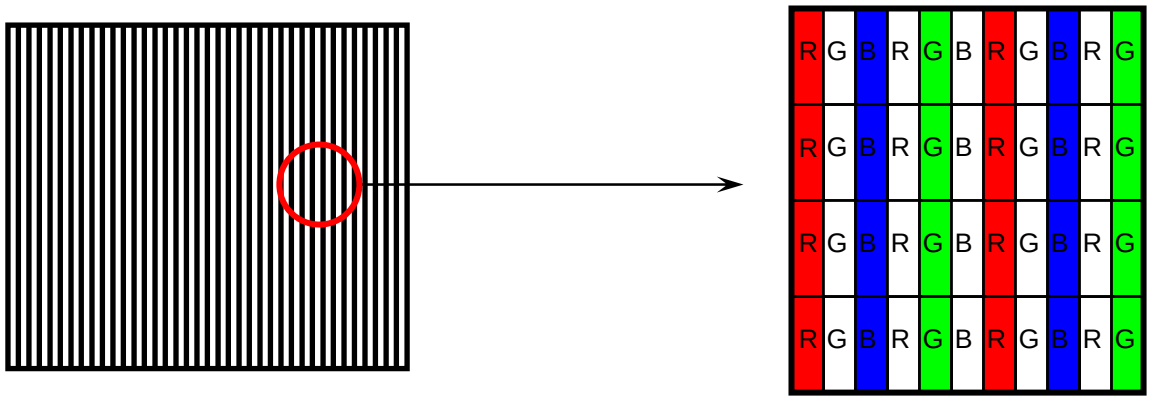
*a) White Pattern



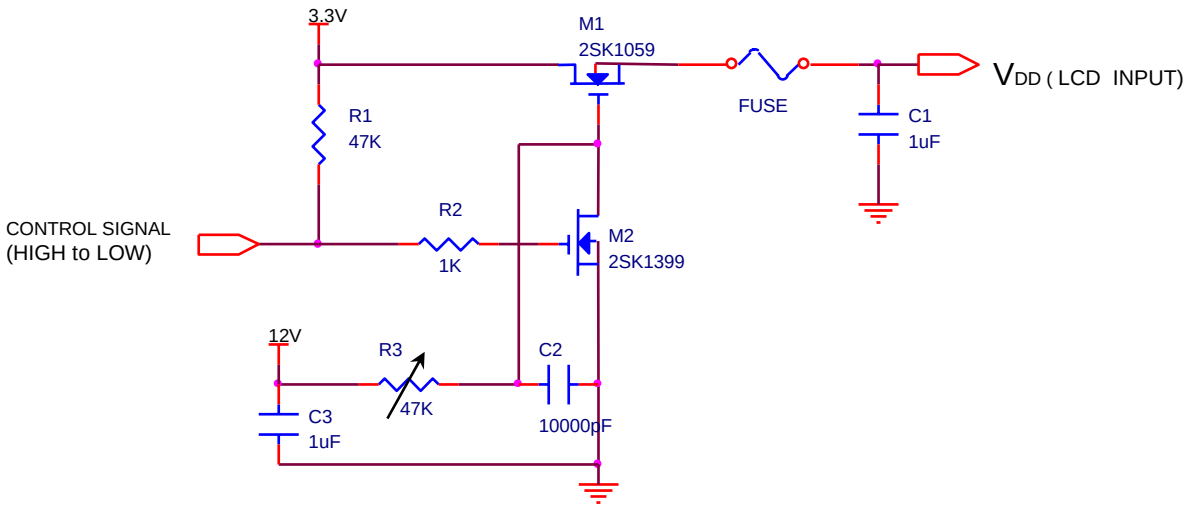
*b) Mosaic Pattern



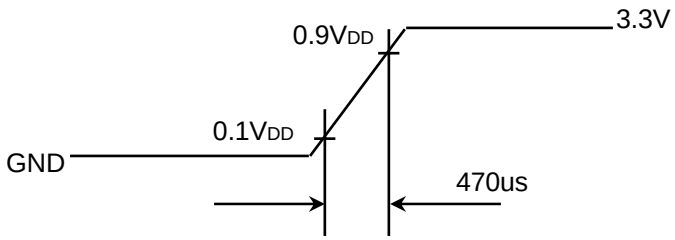
*c) 1dot Vertical stripe pattern



4) Rush current measurement condition



VDD rising time is 470us



3.2 BACK-LIGHT UNIT

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

- INVERTER : Foxconn

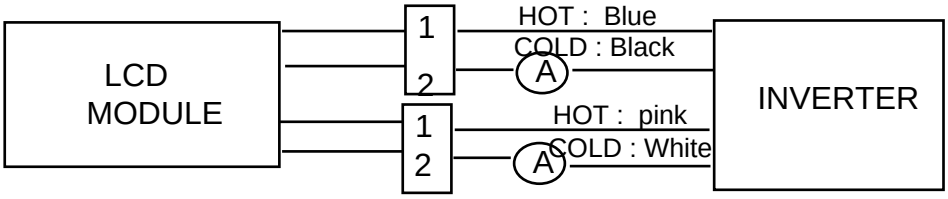
Ta= 25 ± 2 °C

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Lamp Current	I_L	3.0	6.0	6.5	mArms	(1)
Lamp Voltage	V_L	-	665	-	Vrms	I_L = 6.0mA
Frequency	f_L	50	60	65	KHz	(2)
Power Consumption [2 CCFL]	P_L	-	8.0	-	W	(3) I_L = 6.0mA
Operating Life Time	Hr	15,000	-	-	Hour	(4)
Startup Voltage	V_S	-	-	1120	Vrms	25°C, (5)
				1345	Vrms	0°C, (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 $I_L \times V_L$ 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 mArms until one of the following event occurs.
1. When the brightness becomes 50% or lower than the original.
2. When the Effective ignition length becomes 80% or lower than the 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 inverter open voltage - this voltage should be measured behind ballast capacitor- has to be larger than the lamp startup voltage. Otherwise, backlight may have blinking for a moment after being turned on, or not be turned on. If an inverter has shutdown function, it should keep its open voltage for longer than 1 second even if a lamp connector is open.

3.3 Inverter

Inverter Manufacturer : Foxconn

Ta = 25 ± 2°C

Item		Min.	Typ.	Max	Unit	Note
Input Voltage (Vin)		7.5	14.4	21.0	V	
Open Circuit Voltage		1400	-	2100	Vrms	
Lamp Current (Duty Cycle)		10 @SMB_DAT 00H	-	100 @SMB_DAT FFH I_L=6.0mArms	%	Vin=14.4V (3)
Efficiency	Optical	20	-	-	nit / W	After 30min turn on at the center of LCD Vin=14.4V @ 6.0mA
	Electrical	-	80	-	%	
Operating Frequency		45	55	65	kHz	SMB_DAT=FFH
Input Power Consumption		-	-	TBD	W	Vin=14.4V Iout = 6.0mArms
PWM Frequency		200	210	220	Hz	
Shutdown time		0.6	1.0	1.4	sec	
Start-up time		-	-	0.1	sec	(1)

Note)

(1) Inverter start-up time

(2) Efficiency should be calculated as below formulation.

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

Electrical efficiency = output power / input power

(3) Below items are not guaranteed, if this product is used at 10nit setting.

1. Luminance deviation

. Luminance deviation 20% can not be guaranteed under 20% duty ratio.

2. Luminance reduction at low temperature

. Luminance can be reduced at lower temperature.

3. Partial turn-on of lamp / No turn-on / Non-uniformity

. Visual characteristic problems can happen due to the abnormal turn-on of lamp.

. Lamp can not be turned on under 20% duty ratio.

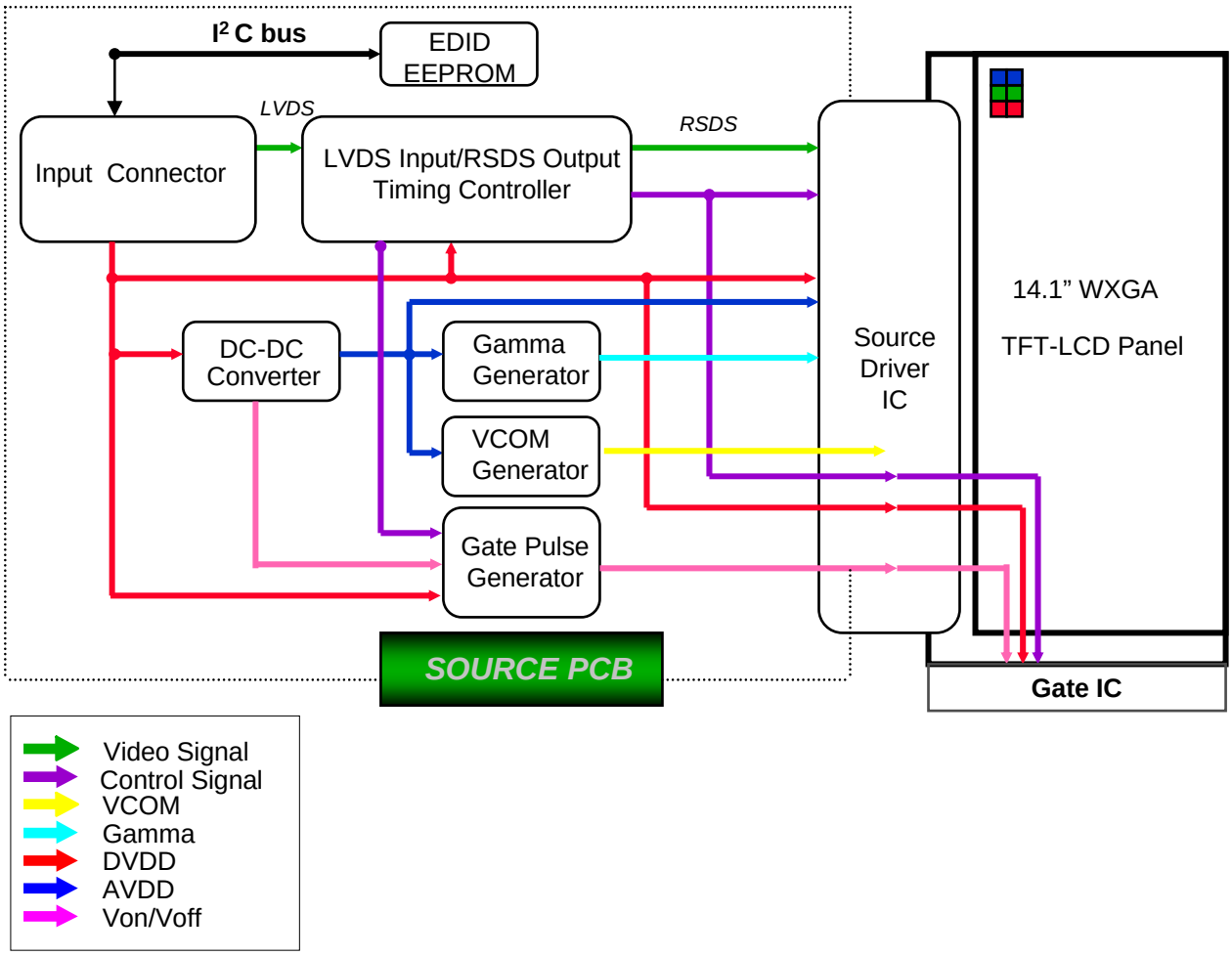
. Non-uniformity can occur due to the mercury distribution under 20% duty ratio.

4. Lamp life time reduction

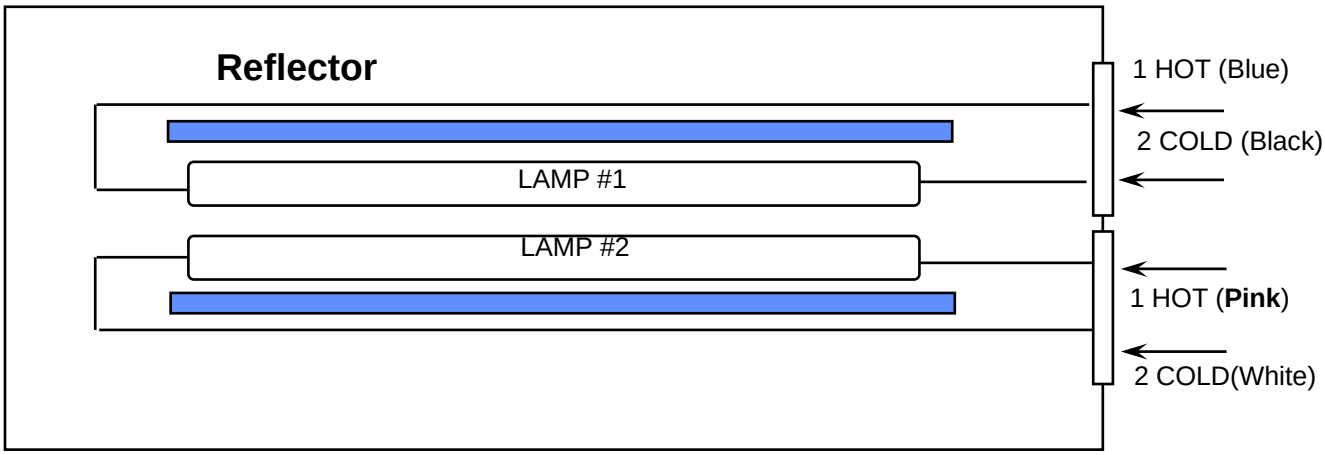
. Lamp life time can be shortened under the usage of low temperature or lower duty ratio for a long time.

4. BLOCK DIAGRAM

4.1 TFT LCD Module



4.2 BACKLIGHT UNIT

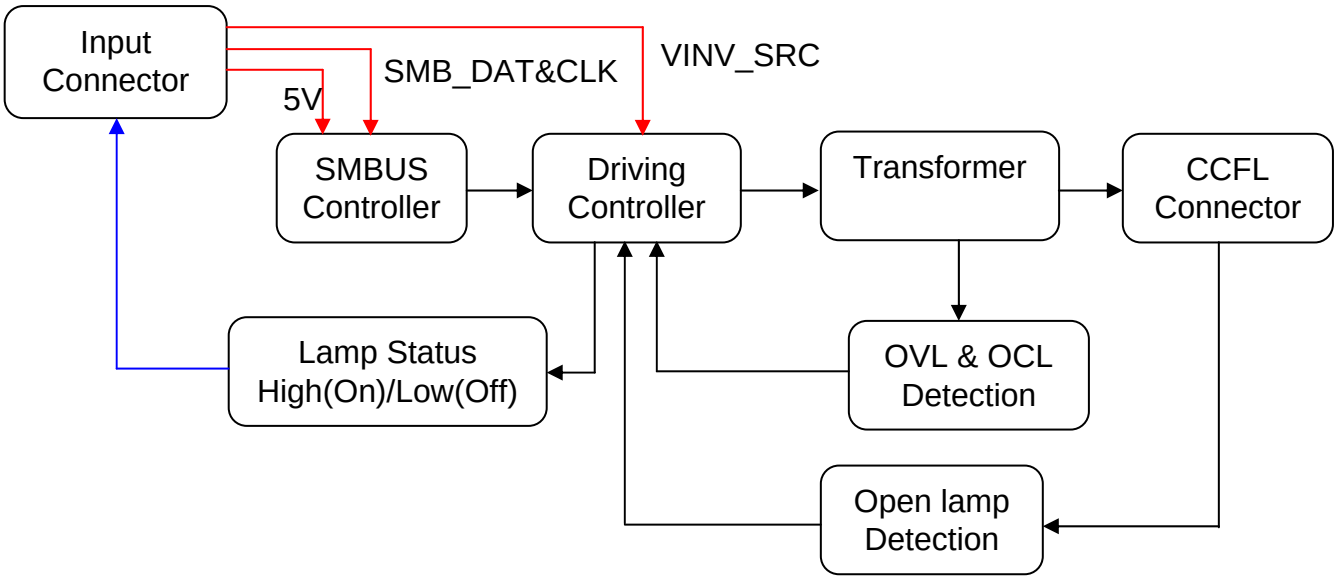


Note) The output of the inverter may change according to the material of the reflector.

4.3 Inverter UNIT

Input Connector : Honda, LVC-D20SFYG

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



5. INPUT TERMINAL PIN ASSIGNMENT

5.1. Input Signal & Power (LVDS, Connector : JAE FI-XB30SRLZ-HF11 or compatible)
Mating Connector : JAE FI-X30M or compatible)

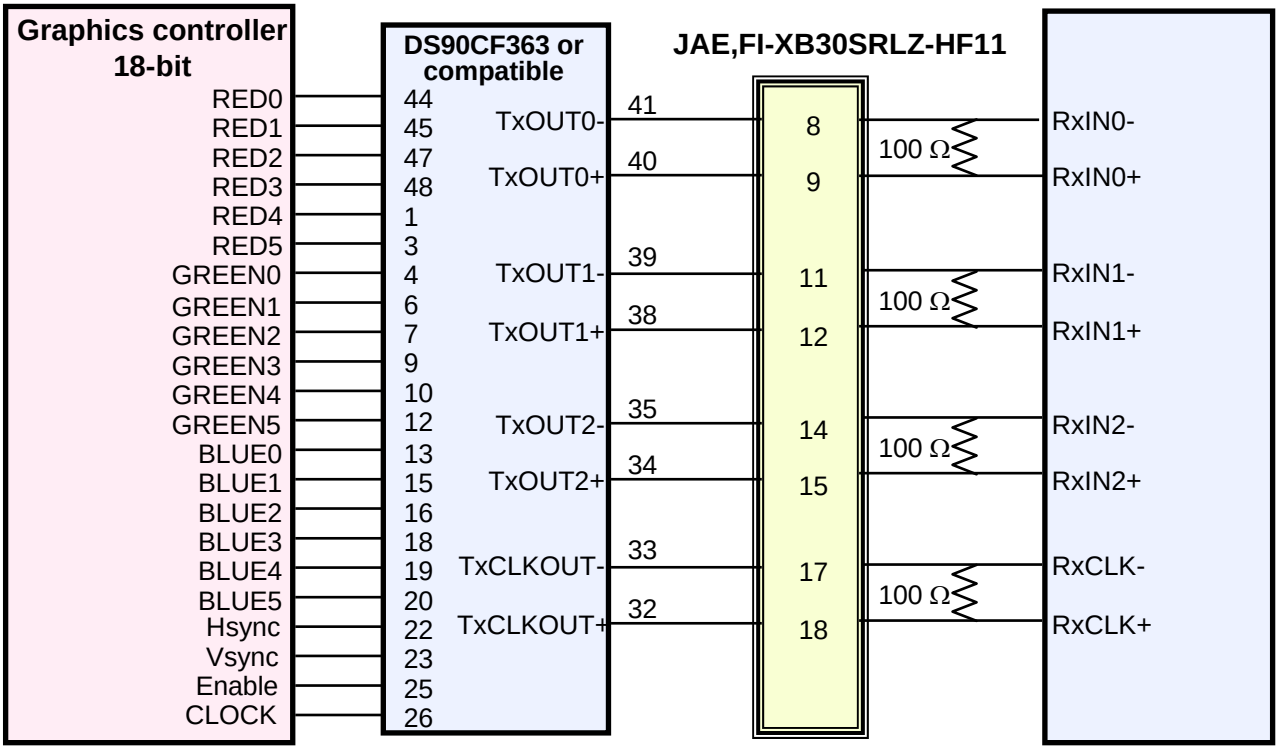
No.	Symbol	Function	Polarity	Remarks
1	VSS	Ground		
2	VDD	POWER SUPPLY +3.3V		
3	VDD	POWER SUPPLY +3.3V		
4	VEEDID	DDC 3.3V Power		
5	BIST	Panel BIST enable		
6	CLKEDID	DDC Clock		
7	DATAEDID	DDC data		
8	RxIN0-	LVDS Differential Data INPUT (R0-R5,G0)	Negative	
9	RxIN0+	LVDS Differential Data INPUT (R0-R5,G0)	Positive	
10	GND	Ground		
11	RxIN1-	LVDS Differential Data INPUT (G1-G5,B0-B1)	Negative	
12	RxIN1+	LVDS Differential Data INPUT (G1-G5,B0-B1)	Positive	
13	GND	Ground		
14	RxIN2-	LVDS Differential Data INPUT (B2-B5,Sync,DE)	Negative	
15	RxIN2+	LVDS Differential Data INPUT (B2-B5,Sync,DE)	Positive	
16	Vss	Ground		
17	ClkIN-	LVDS Differential Clock INPUT	Negative	
18	ClkIN+	LVDS Differential Clock INPUT	Positive	
19	Vss	Ground		
20	NC	No connect		
21	NC	No connect		
22	NC	No connect		
23	NC	No connect		
24	NC	No connect		
25	NC	No connect		
26	NC	No connect		
27	NC	No connect		
28	NC	No connect		
29	NC	No connect		
30	NC	No connect		

5.2 LVDS Interface : Transmitter DS90CF363 or Compatible

LVDS

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



Note : The LCD Module uses a 100ohm resistor between positive and negative lines of each receiver input.

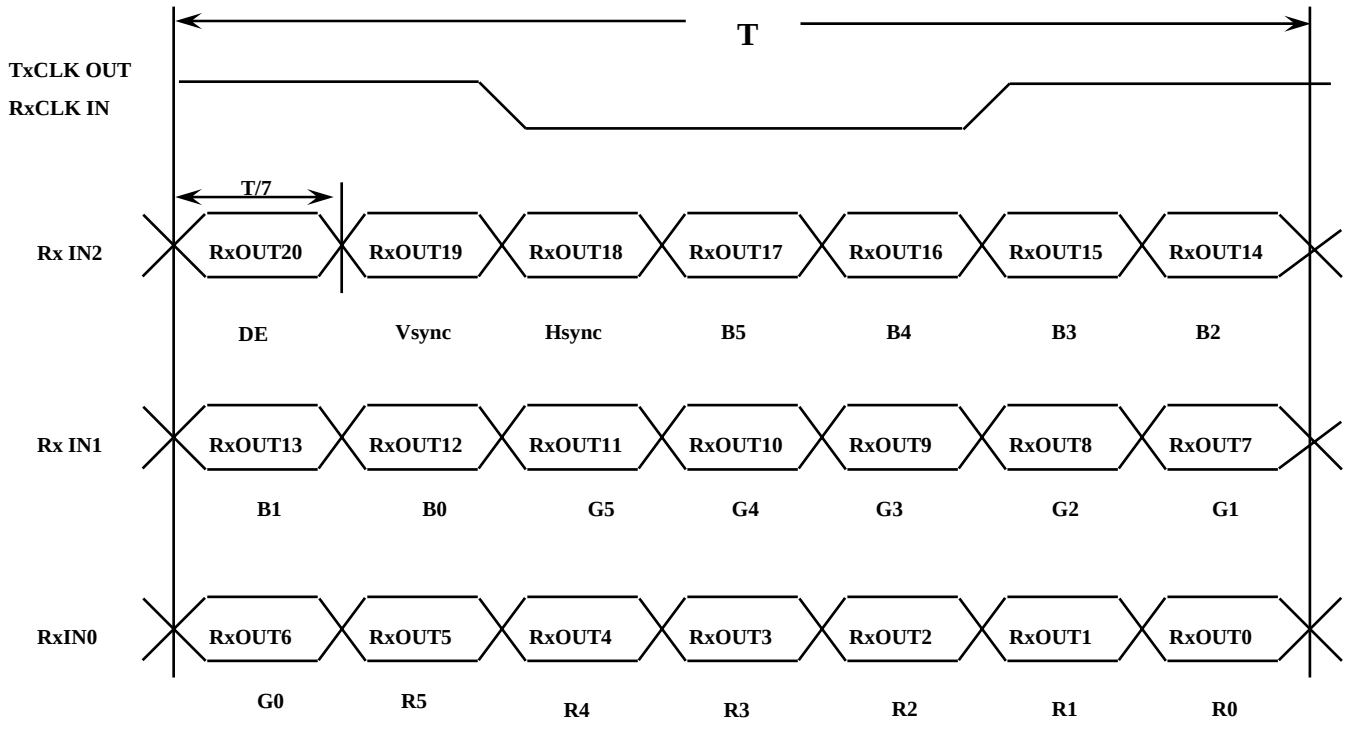
5.3 BACK LIGHT UNIT

Connector : JST BHSR - 02VS -1 * 2pcs
Mating Connector : SM02B-BHSS-1(JST) * 2pcs

Pin No.	Symbol	Color	Function
1	HOT	Blue / Pink	High Voltage
2	COLD	Black/ White	Low Voltage

5.4 Timing Diagrams of LVDS For Transmission

LVDS Receiver : Integrated T-CON

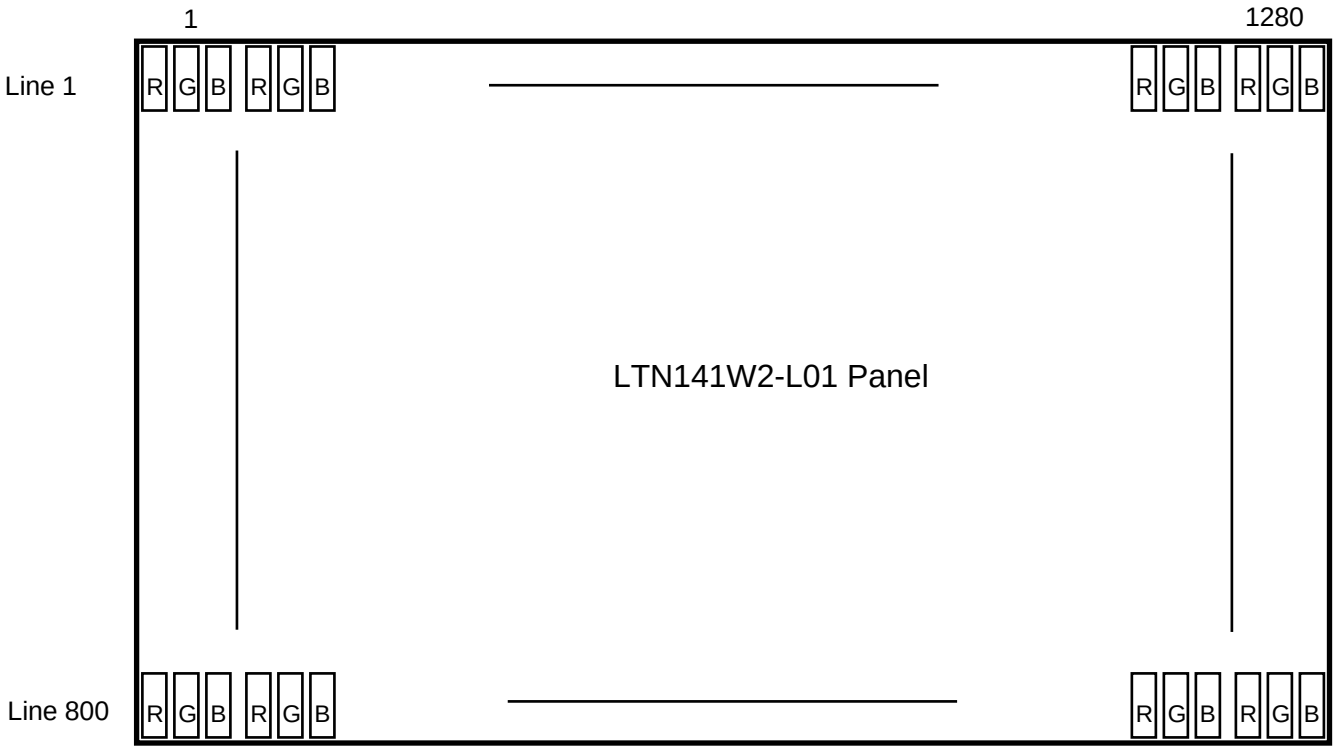


5.5 Input Signals, Basic Display Colors and Gray Scale of Each Color

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	45	B5	
Basic Colors	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
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	↓	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	R61
	Light	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
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	↓	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0	0	G61
	Light	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
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	↓	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	B61
	Light	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)
Note 2)Input signal: 0 =Low level voltage, 1=High level voltage

5.6 Pixel Format in the display



5.7 Inverter signals & power

Inverter Connector : Honda, LVC-D20SFYG

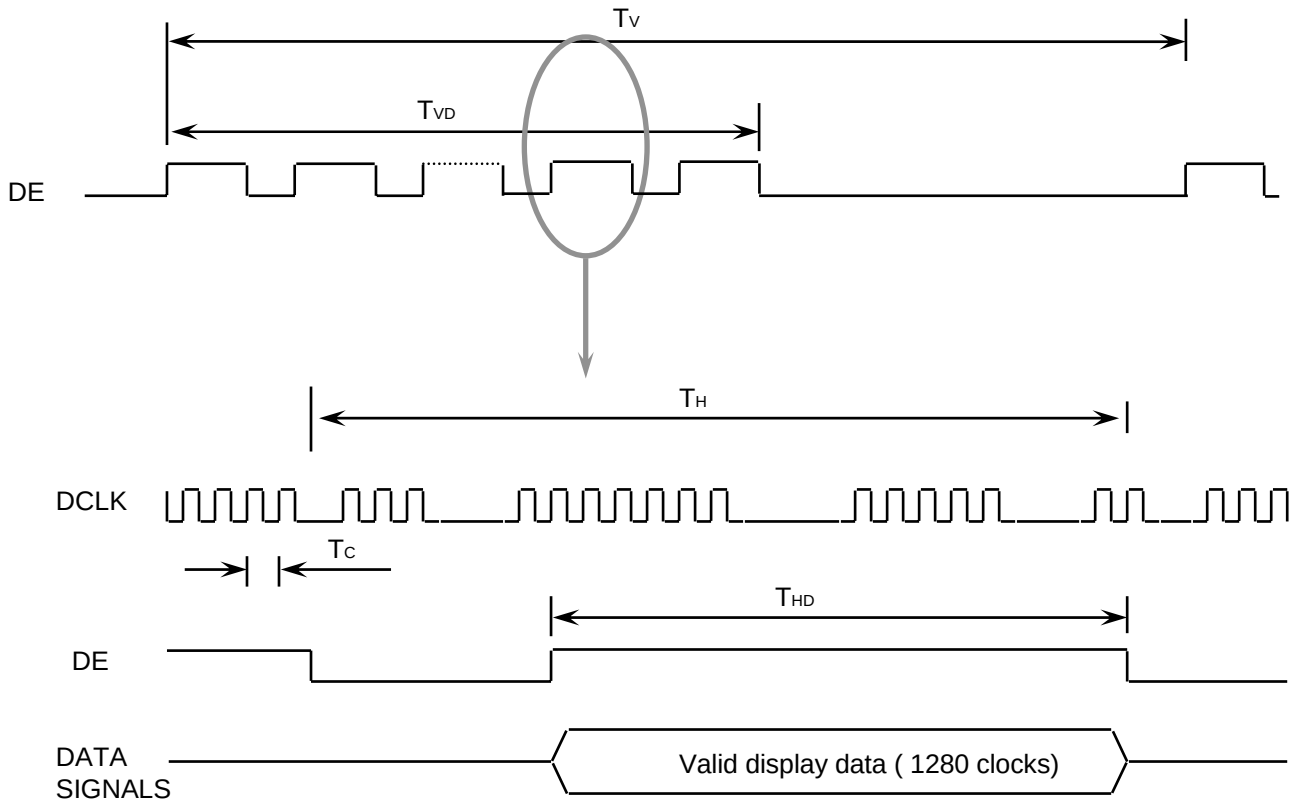
Pin No.	Symbol	Voltage	Comments
1	INV_SRC	7.5V to 21V	This power rail should be used as a power rail to drive the back-light DC-AC converter.
2	INV_SRC	7.5V to 21V	This power rail should be used as a power rail to drive the back-light DC-AC converter.
3	INV_SRC	7.5V to 21V	This power rail should be used as a power rail to drive the back-light DC-AC converter.
4	INV_SRC	7.5V 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	NC	-	No Connection
7	5VALW	5V	This should be used as power source that stores the brightness/contrast values & the circuit that interfaces with SMB_CLK & SMB_DAT.
8	GND	0V	Ground
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	GND	0V	Ground
12	INV_PWM	-	System side PWM input signal for brightness control
13	GND	0V	Ground
14	NC	-	No Connection
15	NC	-	No Connection
16	NC	-	No Connection
17	NC	-	No Connection
18	NC	-	No Connection
19	NC	-	No Connection
20	NC	-	No Connection

6. INTERFACE TIMING

6.1 Timing Parameters

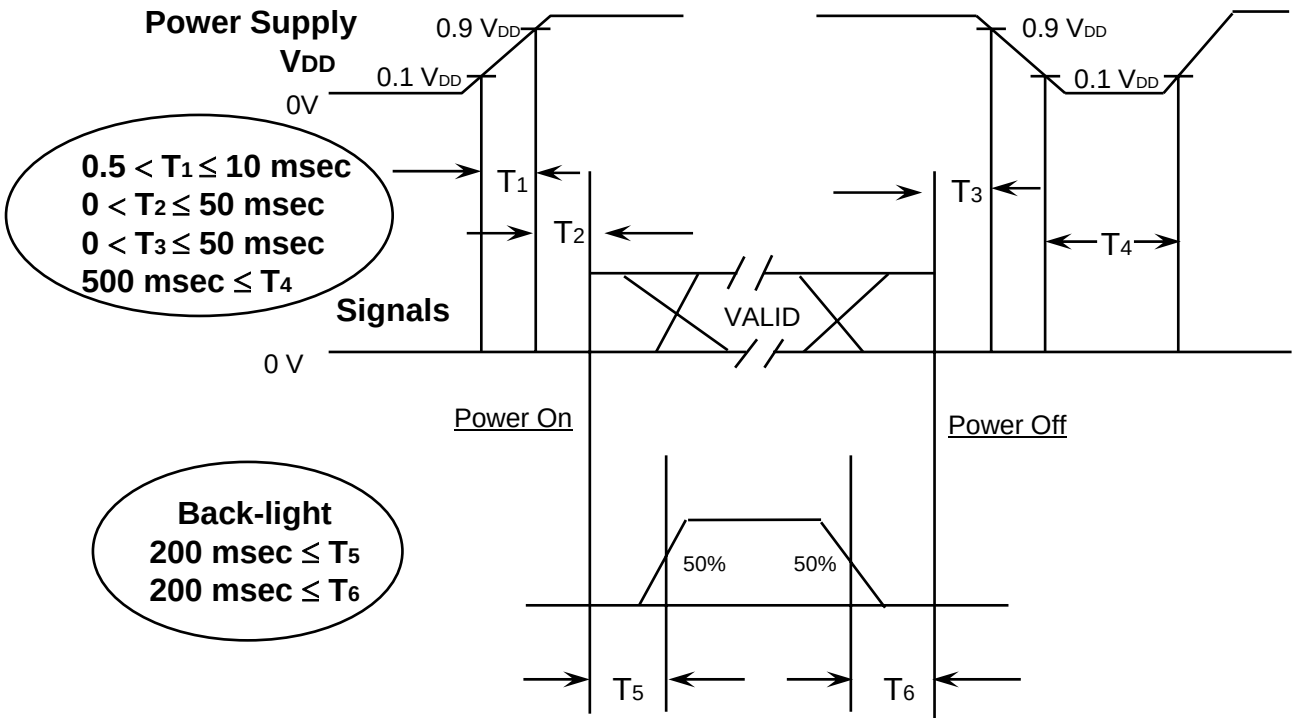
Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
Frame Frequency	Cycle	T_V	806	816	833	Lines	
Vertical Active Display Term	Display Period	T_{VD}	-	800	-	Lines	
One Line Scanning Time	Cycle	T_H	1320	1408	1500	Clocks	
Horizontal Active Display Term	Display Period	T_{HD}	-	1280	-	Clocks	

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 should be as the diagram 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 back-light turns on before the LCD operation or the LCD turns off before the back-light 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.

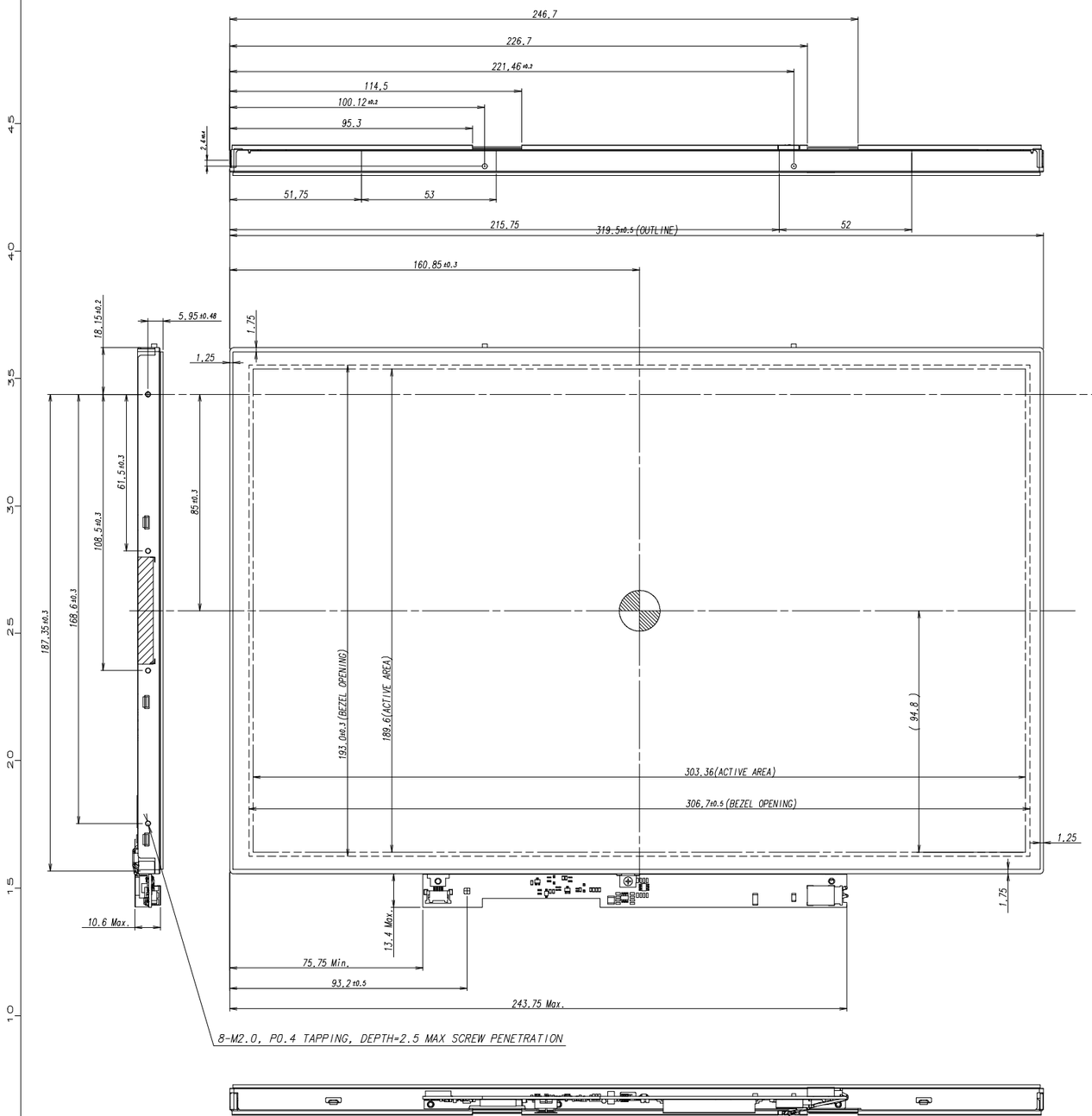
(5) Interface signal shall not be kept at high impedance when the power is on.

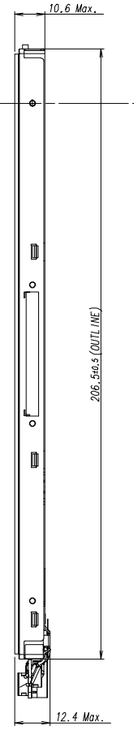
7. Mechanical Outline Dimension

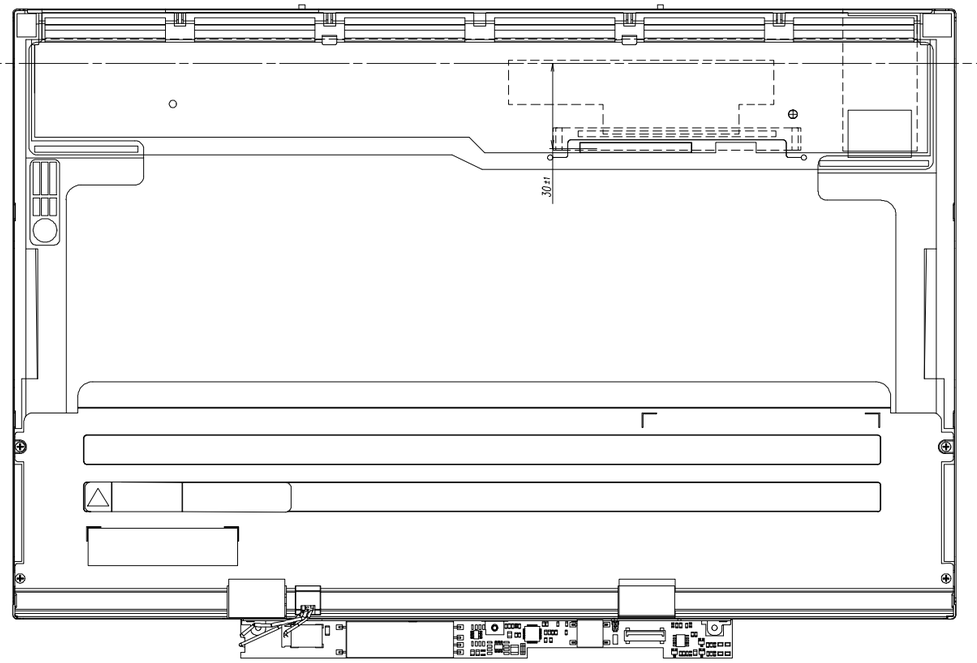
Approval

It will be attached with PDF file

NO	PART NAME	CODE NO	SPECIFICATION	Q'TY	WEIGHT		UNFOLDED DIM. OF. MATERIAL	REMARK
					FINISH	MATERIAL		
1	LTN141W2-L01-1			1EA				







* NOTE

1. INPUT SIGNAL INTERFACE CONNECTOR TO BE SPECIFIED AS BELOW.
   - PART NO./MAKER : FI-XB30SL-HF11/JAE (or compatible)
2. INPUT MATING SIGNAL INTERFACE CONNECTOR TO BE SPECIFIED AS BELOW.
   - PART NO./MAKER : FI-X30M/JAE (or compatible)
3. CCFT CONNECTOR FOR BACKLIGHT TO BE SPECIFIED AS BELOW.
   - PART NO./MAKER : LVC-D20SFYG/HONDA (or compatible)
4. CALIFERS MEASURING FORCE :530 ± 150 gf
5. USER HOLE TORQUE SPEC : 3.0Kgfcm MAX (5 TIMES)
6. WEIGHT SPEC : 890g MAX

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

UNIT	mm	DRA'N BY	DES'D BY	CHK'D BY	APP'D BY
SCALE	1/1	Y.K.KIM		Y.J.LEE	D.C.YANG
TOLERANCE	LEVEL2	05.07.04		05.07.04	05.07.04
SAMSUNG ELECTRONICS				SPEC. NO	DDS03828-000

MODEL NAME	LTN141W2-L01		
PART/SHEET NAME	Outline-Dimension	SHEET	1/1
CODE NO.		VER.	000

REVISION

8. PACKING

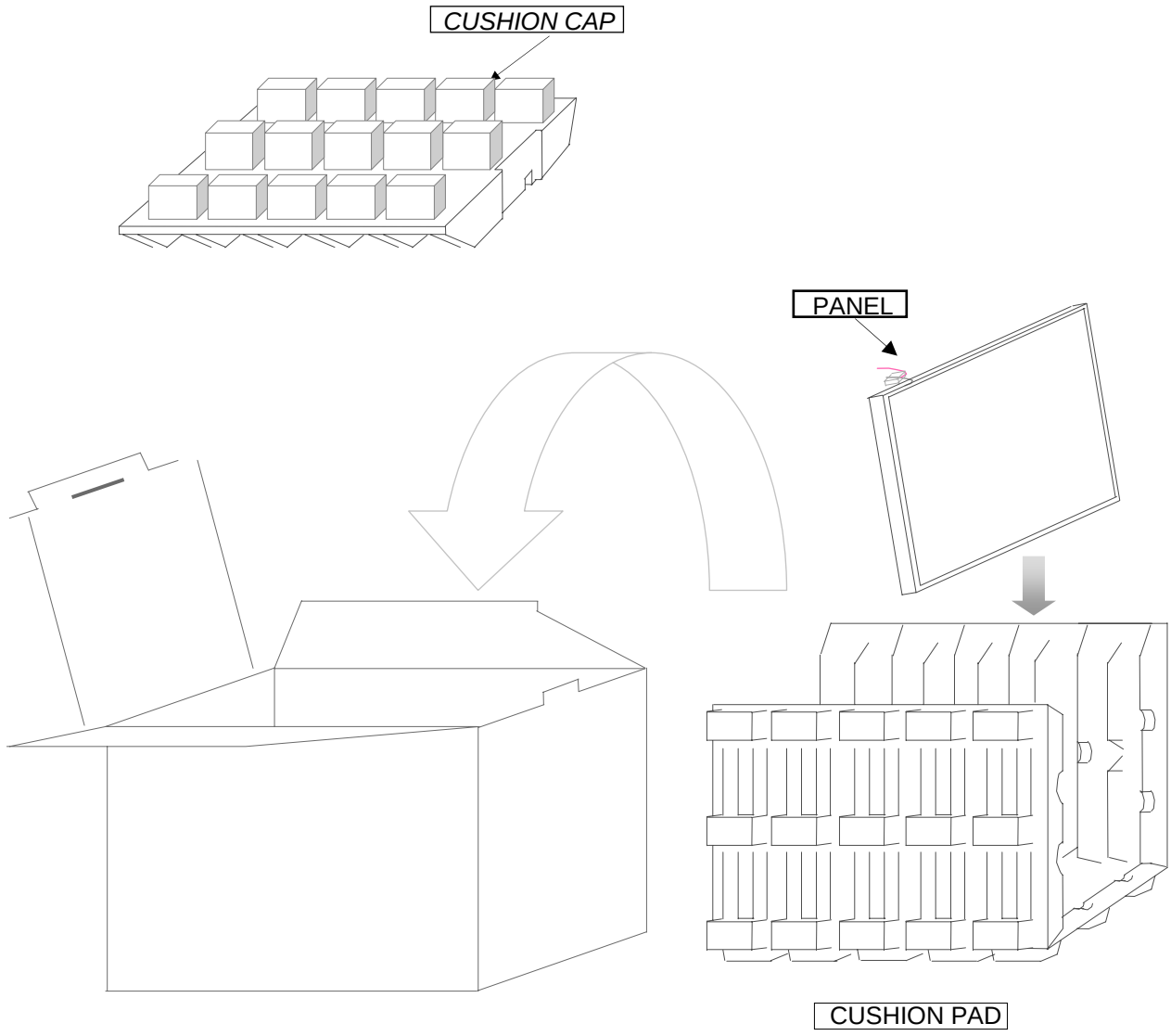
Approval

1. CARTON(Internal Package)

(1) Packing Form

Corrugated Cardboard box and Corrupad form as shock absorber

(2) Packing Method



Note 1) Total Weight : Approximately 5.5 kg

2) Acceptance number of piling : 5 sets

3) Carton size : 408(W) * 325(D) * 294(H)

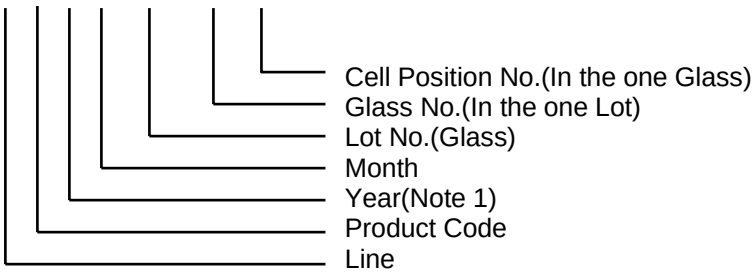
Samsung Secret

No	Part name	Quantity
1	Static electric protective sack	5
2	Packing case (Inner box) included shock absorber	1 set
3	Pictorial marking	2 pcs
4	Carton	1 set

9. MARKINGS & OTHERS

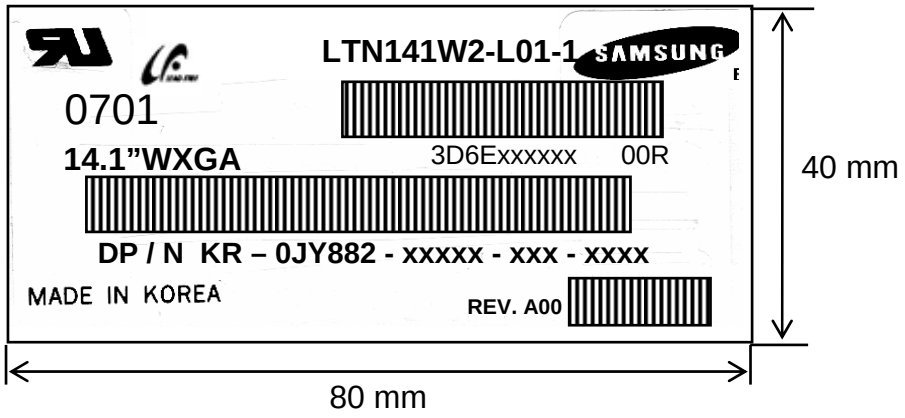
A nameplate bearing followed by is affixed to a shipped product at the specified location on each product.

(1) Parts number : LTN141W2-L01-1
(2) Revision : Three letters
(3) Lot number : 3 D 6 E XXX XX X



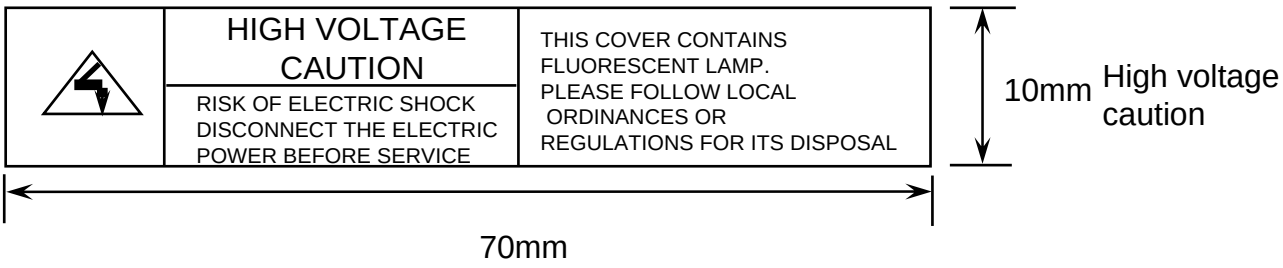
NOTE 1). This code indicating year is omitted in the products of KIHENG site.

(4) Nameplate Indication (below is only for reference.)

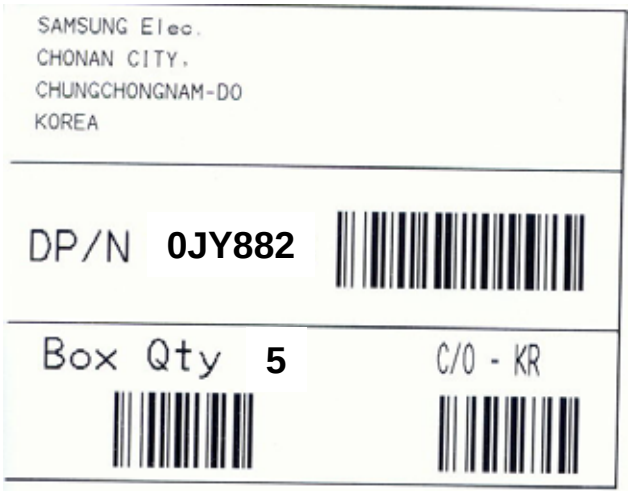


Parts name : LTN141W2-L01-1
Lot number : 3D6Exxxxxx
Inspected work week : 0701
DP/N : Dell Part Number ("JY882" is for 141W2-L01-1)
REV.xxx : Product Revision Code

This HIGH VOLTAGE CAUTION is carved in mold frame



(6) Packing box attach



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

10. GENERAL PRECAUTIONS

Approval

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).

(e) The standard limited warranty is only applicable when the module is used for general notebook applications. If used for purposes other than as specified, SEC is not to be held reliable for the defective operations. It is strongly recommended to contact SEC to find out fitness for a particular purpose.

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.

	Byte (hex)	Field Name and Comments	Value (hex)	Value (binary)
Header	0	Header	00	00000000
	1	Header	FF	11111111
	2	Header	FF	11111111
	3	Header	FF	11111111
	4	Header	FF	11111111
	5	Header	FF	11111111
	6	Header	FF	11111111
	7	Header	00	00000000
Vendor / Product EDID Version	8	EISA manufacture code = 3 Character ID	4C	01001100
	9	EISA manufacture code (Compressed ASCII)	A3	10100011
	0A	Panel Supplier Reserved – Product Code	57	01010111
	0B	Panel Supplier Reserved – Product Code	32	00110010
	0C	LCD module Serial No - Preferred but Optional ("0" if not used)	00	00000000
	0D	LCD module Serial No - Preferred but Optional ("0" if not used)	00	00000000
	0E	LCD module Serial No - Preferred but Optional ("0" if not used)	00	00000000
	0F	LCD module Serial No - Preferred but Optional ("0" if not used)	00	00000000
	10	Week of manufacture	00	00000000
	11	Year of manufacture	11	00010001
	12	EDID structure version # = 1	01	00000001
	13	EDID revision # = 3	03	00000011
Display Parameters	14	Video I/P definition = Digital I/P (80h)	80	10000000
	15	Max H image size = (Rounded to cm)	1E	00011110
	16	Max V image size = (Rounded to cm)	13	00010011
	17	Display gamma = (gamma ×100)-100 = Example: (2.2×100) – 100 = 120	78	01111000
	18	Feature support (no DPMS, Active off, RGB, timing BLK 1)	0A	00001010
Panel Color Coordinates	19	Red/Green Low bit (RxRy/GxGy)	87	10000111
	1A	Blue/White Low bit (BxBy/WxWy)	F5	11110101
	1B	Red X Rx = 0.xxx	94	10010100
	1C	Red Y Ry = 0.xxx	57	01010111
	1D	Green X Gx = 0.xxx	4F	01001111
	1E	Green Y Gy = 0.xxx	8C	10001100
	1F	Blue X Bx = 0.xxx	27	00100111
	20	Blue Y By = 0.xxx	27	00100111
	21	White X Wx = 0.xxx	50	01010000
	22	White Y Wy = 0.xxx	54	01010100
Established Timings	23	Established timings 1 (00h if not used)	00	00000000
	24	Established timings 2 (00h if not used)	00	00000000
	25	Manufacturer's timings (00h if not used)	00	00000000

Standard Timing ID	26	Standard timing ID1 (01h if not used)	01	00000001
	27	Standard timing ID1 (01h if not used)	01	00000001
	28	Standard timing ID2 (01h if not used)	01	00000001
	29	Standard timing ID2 (01h if not used)	01	00000001
	2A	Standard timing ID3 (01h if not used)	01	00000001
	2B	Standard timing ID3 (01h if not used)	01	00000001
	2C	Standard timing ID4 (01h if not used)	01	00000001
	2D	Standard timing ID4 (01h if not used)	01	00000001
	2E	Standard timing ID5 (01h if not used)	01	00000001
	2F	Standard timing ID5 (01h if not used)	01	00000001
	30	Standard timing ID6 (01h if not used)	01	00000001
	31	Standard timing ID6 (01h if not used)	01	00000001
	32	Standard timing ID7 (01h if not used)	01	00000001
	33	Standard timing ID7 (01h if not used)	01	00000001
	34	Standard timing ID8 (01h if not used)	01	00000001
	35	Standard timing ID8 (01h if not used)	01	00000001
Timing Descripter #1	36	Pixel Clock/10,000 (LSB)	8A	10001010
	37	Pixel Clock/10,000 (MSB)	1B	00011011
	38	Horizontal Active = xxxx pixels (lower 8 bits)	00	00000000
	39	Horizontal Blanking (Thbp) = xxxx pixels (lower 8 bits)	A0	10100000
	3A	Horizontal Active/Horizontal blanking (Thbp) (upper4:4 bits)	50	01010000
	3B	Vertical Active = xxxx lines	20	00100000
	3C	Vertical Blanking (Tvbp) = xxxx lines (DE Blanking typ. for DE only panels)	10	00010000
	3D	Vertical Active : Vertical Blanking (Tvbp) (upper4:4 bits)	30	00110000
	3E	Horizontal Sync, Offset (Thfp) = xxxx pixels	0C	00001100
	3F	Horizontal Sync, Pulse Width = xxxx pixels	40	01000000
	40	Vertical Sync, Offset (Tvfp) = xx lines Sync Width = xx lines	33	00110011
	41	Horizontal Vertical Sync Offset/Width upper 2 bits	00	00000000
	42	Horizontal Image Size =xxx mm	2F	00101111
	43	Vertical image Size = xxx mm	BE	10111110
	44	Horizontal Image Size / Vertical image size	10	00010000
	45	Horizontal Border = 0 (Zero for Notebook LCD)	00	00000000
	46	Vertical Border = 0 (Zero for Notebook LCD)	00	00000000
	47	Non-interlaced, Normal, no stereo, Separate sync, H/V pol Negatives, **DE only note: LSB is set to "1" if panel is DE-timing only. H/V can be ignored.**	19	00011001
Timing Descripter #2	48	Manufacturer Specified (Timing)	00	00000000
	49		00	00000000
	4A		00	00000000
	4B		0F	00001111
	4C		00	00000000
	4D	**Value**=HSPWmin / 2	00	00000000
	4E	**Value**=HSPWmax / 2	00	00000000
	4F	**Value**=Thbpmin /2	00	00000000
	50	**Value**=Thbpmax /2	00	00000000
	51	**Value**=VSPWmin /2	00	00000000
	52	**Value**=VSPWmax /2	00	00000000
	53	**Value**=Tvbpmin / 2	00	00000000
	54	**Value**=Tvbpmax / 2	00	00000000
	55	Thpmin=**value***2 + Hapixelclks	23	00100011
	56	Thpmax=**value***2 + Hapixelclks	87	10000111
	57	Tvpmin=**value***2 + Valines	02	00000010
	58	Tvpmax=**value***2 + Valines	64	01100100
	59	Module "A" Revision = Example: 00, 01, 02, 03, etc.	00	00000000

Timing Descripter #3 Dell specific information	5A	Flag	00	00000000
	5B	Flag	00	00000000
	5C	Flag	00	00000000
	5D	Dummy Descriptor	FE	11111110
	5E	Flag	00	00000000
	5F	Dell P/N 1st Character	4A	01001010
	60	Dell P/N 2nd Character	59	01011001
	61	Dell P/N 3rd Character	38	00111000
	62	Dell P/N 4th Character	38	00111000
	63	Dell P/N 5th Character	32	00110010
	64	LCD Supplier EEDID Revision #	01	00000001
	65	Manufacturer P/N	31	00110001
	66	Manufacturer P/N	34	00110100
	67	Manufacturer P/N	31	00110001
	68	Manufacturer P/N	57	01010111
	69	Manufacturer P/N	32	00110010
	6A	Manufacturer P/N	0A	00001010
	6B	Manufacturer P/N (If <13 char, then terminate with ASCII code 0Ah, set remaining char = 20h)	20	00100000
Timing Descripter #4	6C	Flag	00	00000000
	6D	Flag	00	00000000
	6E	Flag	00	00000000
	6F	Data Type Tag:	FE	11111110
	70	Flag	00	00000000
	71	SMBUS Value = XX nits	22	00100010
	72	SMBUS Value = XX nits	2F	00101111
	73	SMBUS Value = XX nits	44	01000100
	74	SMBUS Value = XX nits	62	01100010
	75	SMBUS Value = XX nits	88	10001000
	76	SMBUS Value = XXX nits	B3	10110011
	77	SMBUS Value = XXX nits	D0	11010000
	78	SMBUS Value = max nits (Typically = 00h, XXX nits)	FF	11111111
	79	Number of LVDS receiver chips = '01' or '02'	01	00000001
	7A	BIST Enable: Yes = '01' No = '00'	01	00000001
	7B	(If <13 char, then terminate with ASCII code 0Ah, set remaining char = 20h)	0A	00001010
	7C	(If <13 char, then terminate with ASCII code 0Ah, set remaining char = 20h)	20	00100000
	7D	(If <13 char, then terminate with ASCII code 0Ah, set remaining char = 20h)	20	00100000
Checksum	7E	Extension flag (# of optional 128 EDID extension blocks to follow, Typ = 0)	00	00000000
	7F	Checksum (The 1-byte sum of all 128 bytes in this EDID block shall = 0)	81	10000001