SAMSUNG ELECTRONICS

Product Information

ssued Date : August 16, 2004

SAMSUNG TFT-LCD

MODEL NO. : LTA260W2-L01

Note:

Any Modification of Spec is not allowed without SEC's permission.

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Samsung Electronics Co . , LTD.

wise view™ SAMSUNG TFT-LCD

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Revision History

No	Date	Page	Before change	After change	remark
0.1	2004.08.16	4	APVA(Advanced Patterned Vertical Align) mode	PVA(Patterned Vertical Align) mode	Changed
		7	Color Chromaticity Red[Rx, Ry] = [0.643, 0.332]	Color Chromaticity Red[Rx, Ry] = [0.640, 0.330]	Changed
			Color Chromaticity Green[Gx, Gy] = [0.270, 0.587]	Color Chromaticity Green[Gx, Gy] = [0.265, 0.590]	Changed
			Color Chromaticity Blue[Bx, By] = [0.143, 0.063]	Color Chromaticity Blue[Bx, By] = [0.150, 0.060]	Changed
		11	Power Consumption (c)N-Pattern [Min, Max] = [1100, 1600]	Power Consumption (c)N-Pattern [Min, Max] = [1200, 1800]	Changed
		13	Lamp Current[Min, Typ, Max] = [4.0, 5.0, 6.0]	Lamp Current[Min, Typ, Max] = [4.2, 5.2, 6.2]	Changed
			Lamp Voltage[Typ] = [1010]	Lamp Voltage[Typ] = [1005]	Changed
		15	T-CON (LVDS + RSDS) LRX4322T0	T-CON (LVDS + RSDS) LRX4222T	Changed
		16	Part NO. : BHCR-02VS-2 (JST)	Part NO. : BDAMR-02VAS-1 (JST)	Changed
		17	OTHERWISE : LOW (GND) OR OPEN(NC)	OTHERWISE : LOW (GND)	Changed
		19	Power INPUT CONNECTOR : S14B-PH-SM3-TB (JST)	Power INPUT CONNECTOR : 20022WR-14L (Yeon-ho)	Changed
			Output Current Io,max[Min, Typ, Max] = [5.0, 5.5, 6.0]	Output Current Io,max[Min, Typ, Max] = [5.2, 5.7, 6.2]	Changed
			Output Current Io,min[Min, Typ, Max] = [4, 4.5, 5]	Output Current Io,max[Min, Typ, Max] = [4.2, 4.7, 5.2]	Changed
		22	Clock[Min, Typ, Max] = [60, 80, 85]	Clock[Min, Typ, Max] = [65, 75, 82]	Changed
			Hsync[Min, Typ, Max] = [43, 50, 53]	Hsync[Min, Typ, Max] = [44, 47, 53]	Changed
			Horizontal total[Min, Typ, Max] = [1368, 1600, 2040]	Horizontal total[Min, Typ, Max] = [1460, 1600, 2000]	Changed

General Description

*** Description**

LTA260W2-L01 is a color active matrix TFT (Thin Film Transistor) liquid crystal display (LCD) that uses amorphous silicon TFTs as a switching devices. This model is composed of a TFT LCD panel, a driver circuit and a back-light system. The resolution of a 26.0" contains 1366 x 768 pixels and can display up to 16.7 million colors with wide viewing angle of 85° or higher in all directions.

*** Features**

- High contrast ratio, high aperture structure
- PVA(Patterned Vertical Align) mode
- Wide viewing angle(±170°)
- High speed response
- WXGA(1366 x 768 pixels) resolution (16:9)
- Low Power consumption
- 8 U-type CCFL(Cold Cathode Fluorescent Lamp)
- DE only mode
- LVDS(Low-Voltage Differential Signal) interface.(1pixel/clock)

*** Applications**

Home-alone Multimedia TFT-LCD TV
Display terminals for AV application products
High Definition TV (HD TV)

*** General information**

Items	Specification	Unit	Note
Display area	575.77(H) ×323.71(V)	mm	
Driver element	a-Si TFT active matrix		
Display colors	16.7M(8bits-true)	colors	
Number of pixels	1366 x 768	pixel	16:9
Pixel arrangement	RGB Vertical Stripe		
Pixel pitch	0.4215(H) × 0.4215(W)	mm	
Display mode	Normally Black		
Surface treatment	Haze 44% , Hard-Coating (3H)		Conductive Pol.

*** Mechanical information (Panel Module Only)**

Item		Min.	Typ.	Max.	Note
Module size	Horizontal(H)	625.0	626.0	627.0	mm
	Vertical(V)	372.0	373.0	374.0	mm
	Depth(D)	50.0	51.0	52.0	mm
Weight		-	4300	-	g

1. Absolute Maximum Ratings

1.1 Absolute ratings of environment

Item	Symbol	Min.	Max.	Unit	Note
Storage temperature	T_{STG}	-20	65	℃	(1)
Operating temperature	T_{OPR}	0	50	℃	(1)
(Ambient temperature)	Tsur	0	65	℃	(2)
Shock (non - operating)	Snop	-	50	G	(3),(5)
Vibration (Non - operating)	Vnop	-	1.5	G	(4),(5)

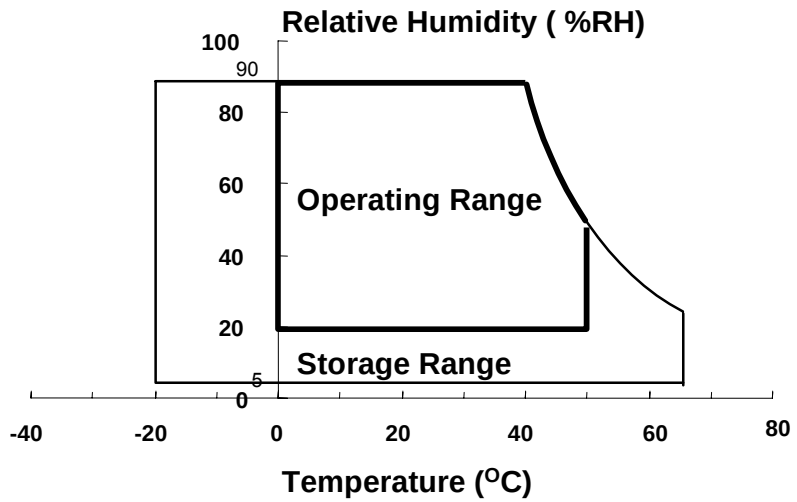
Note (1) Temperature and relative humidity range are shown in the figure below.
93.8 % RH Max. (40 °C ≥ Ta)
Maximum wet-bulb temperature at 39 °C or less. (Ta > 40 °C) No condensation.

(2) Abnormal visual problems by panel surface temperature can be occurred in specific range. But materials(ex : polarizer) are not damaged permanently in this range, Tsur.

(3) 11ms, sine wave, 1 time for ±X, ±Y, ±Z axis

(4) 10～300Hz/1.5G
(10min/cycle, 30min for X,Y,Z axis)

(5) 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	VDD	Vss-0.5	6.5	V	(1)

NOTE (1) Within Ta (25 ± 2 °C)

(2) BACK-LIGHT UNIT (Ta = 25 ± 2°C)

ITEM	SYMBOL	MIN.	MAX.	UNIT	NOTE
Power Supply Voltage/ Inverter	V_{CC}	Vss-0.5	26.4	V	(1)
Lamp Current	I_L	4.0	7.0	mArms	(2),(3)
Lamp Frequency	F_L	40	80	kHz	(2)

NOTE (1) Inverter Input power

(2) 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.

(3) Specified values are for a single lamp.

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 (1).

◆ Measuring equipment : TOPCON BM-5A , BM-7, PHOTO RESEARCH PR650

* Ta = 25 ± 2°C , V_{DD}=5.0V, fv= 60Hz, f_{DCLK}=75 MHz, I_L = 5.2mA_{rms}

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio (Center of screen)		C/R	Normal ϕ = 0 θ = 0 Viewing Angle	600	800	-		(3) BM-5A
Response Time **(DCC On)**	Rising	Tr		-	8	(16)	msec	(4),(9) BM-7
	Falling	Tf		-	6	(10)		
	G to G	Tg		-	8	(10)		
Luminance of White (Center of screen)		YL		400	500	-	cd/m2	(5) BM-5A
Color Chromaticity (CIE 1931)	Red	Rx		TYP. -0.03	0.640	TYP. +0.03		(6) PR650
		Ry			0.330			
	Green	Gx			0.265			
		Gy			0.590			
	Blue	Bx			0.150			
		By			0.060			
	White	Wx			0.272			
		Wy			0.277			
Color Temperature		k		-	12000	-		
Viewing Angle	Hor.	θ L	C/R≥10	75	85	-	Degrees	(7) BM-5A
		θ R		75	85	-		
	Ver.	ϕ H		75	85	-		
		ϕ L		75	85	-		
Brightness Uniformity (9 points)		Buni		-	-	25	%	(2),(8) BM-5A

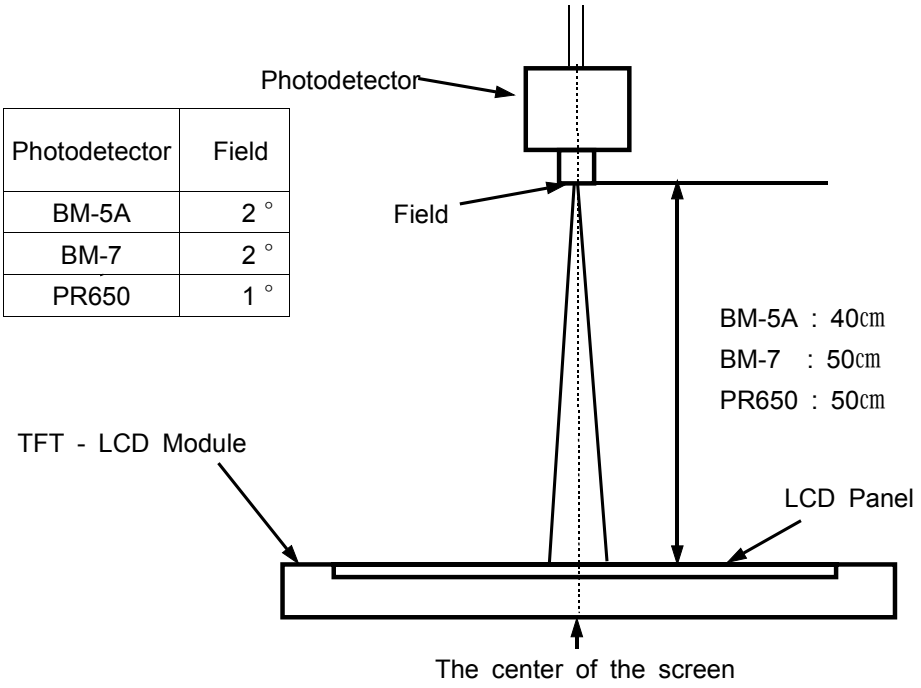
Note 1) Test Equipment Setup

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 back-light. This should be measured in the center of screen.

A single lamp current : 5.2mA

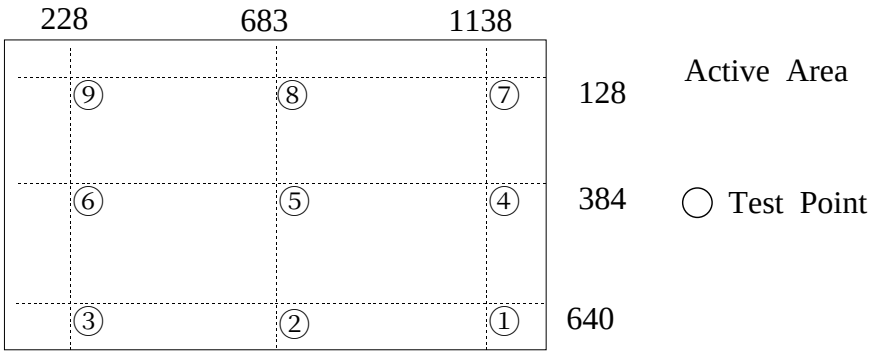
Environment condition : Ta = 25 ± 2 °C

Photodetector	Field
BM-5A	2 °
BM-7	2 °
PR650	1 °



Optical Measuring Equipment Setup

Note 2) Definition of test point



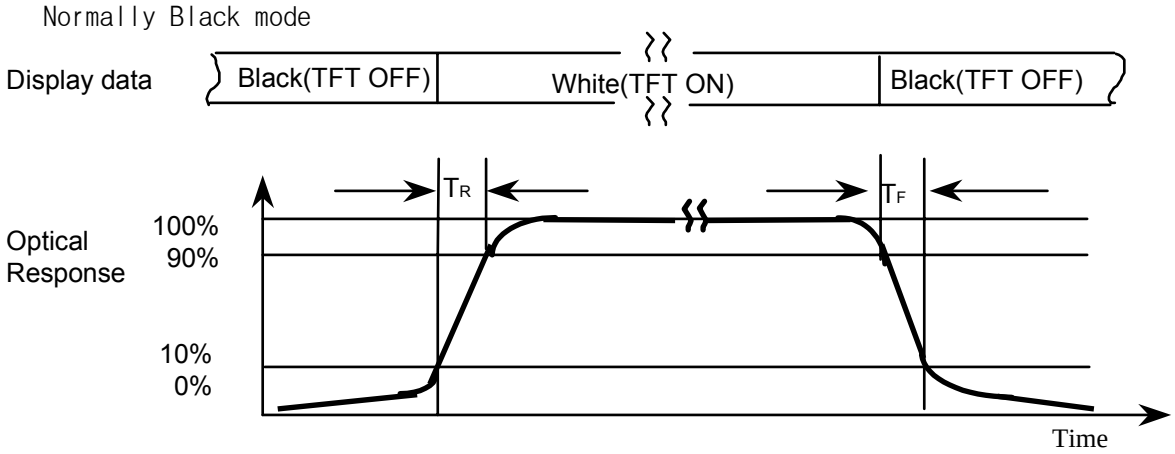
Note 3) Definition of Contrast Ratio (C/R) : Ratio of gray max (Gmax) & gray min (Gmin) at the center point(5) of the panel

$$CR = \frac{G\max}{G\min}$$

Gmax : Luminance with all pixels white

Gmin : Luminance with all pixels black

Note 4) Definition of Response time : Sum of Tr ,Tf

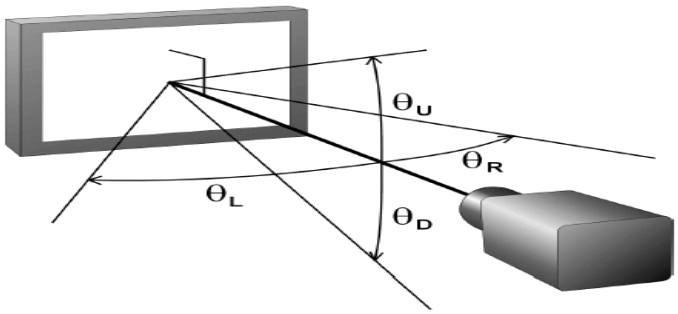


Note 5) Definition of Luminance of White : Luminance of white at center point(5).

Note 6) Definition of Color Chromaticity (CIE 1931)

Color coordinate of Red , Green , Blue & White at center point(5).

Note 7) Definition of Viewing Angle : Viewing angle range (CR≥10)



Note 8) Definition of 9 points brightness uniformity

$$Buni = 100 * \frac{(B\max - B\min)}{B\max}$$

Bmax : Maximum brightness
Bmin : Minimum brightness

Note 9) G to G Response time means Gray to Gray Response Time.

3. Electrical Characteristics

3.1 TFT LCD MODULE

Ta = 25°C

Item		Symbol	Min.	Typ.	Max.	Unit	Note
Voltage of Power Supply		V_{DD}	4.5	5.0	5.5	V	(1)
Power Consumption	(a)Black	I_{DD}	(800)	-	(1000)	mA	(2),(3), (5)
	(b)White		(900)	-	(1400)	mA	
	(c)N-Pattern		(1200)	-	(1800)	mA	
Vsync Frequency		f_V	48	60	66	Hz	
Hsync Frequency		f_H	44	47	53	kHz	
Main Frequency		f_{DCLK}	65	75	82	MHz	
Rush Current		I_{RUSH}	-	-	4	A	(4)

Note (1) Main pixel clock frequency is the value which is measured at the input of LVDS transmitter.

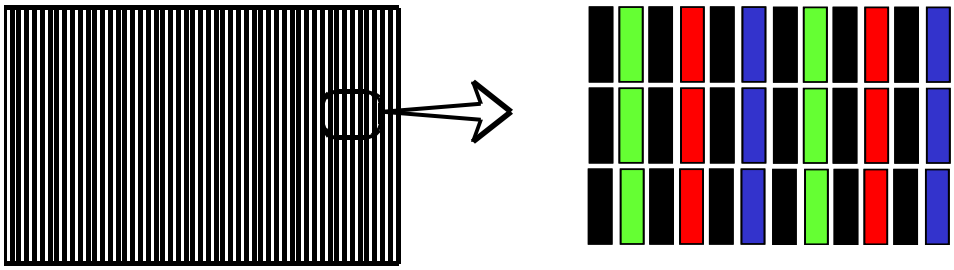
(2) f_V=60Hz, f_{DCLK} =75MHz, V_{DD} = 5.0V, DC Current.

(3) Power dissipation check pattern(LCD Module only)

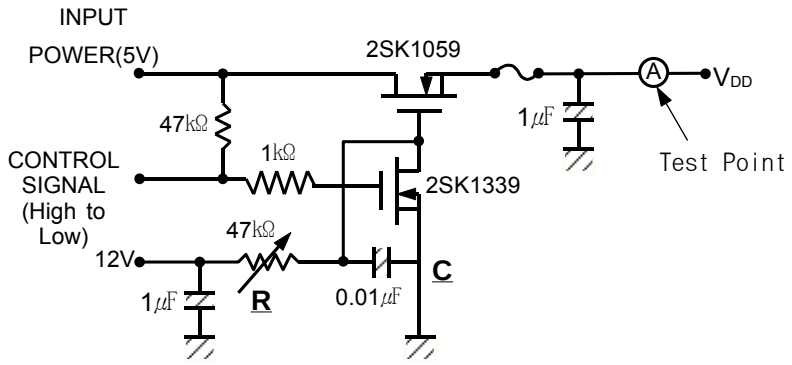
(a) Black Pattern

(b) White Pattern

(C) N-pattern



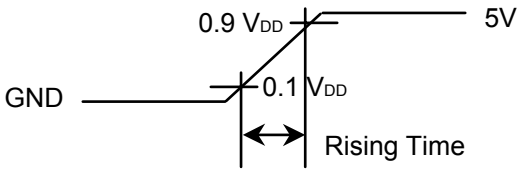
(4) Measurement Conditions (Rising time =470μs)



Note : Control Signal : High(+5V) -->Low(Ground)

All Signal lines to panel except for power 5V : Ground

The rising time of supplied voltage is controlled to 470us by R and C value.



(5) Power Consumption → Execpt for Inverter power consumption

3.2 BACK-LIGHT UNIT

The back-light system is an U-type with 8 CCFTs (Cold Cathode Fluorescent Tube).
The characteristics of U-type lamps are shown in the following tables.

Ta=25 ± 2°C

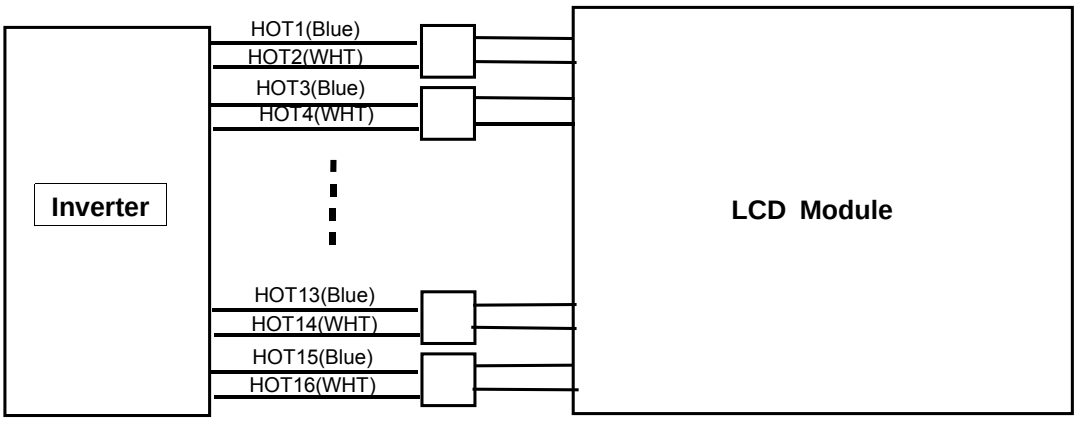
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Lamp Current	I_L	4.2	5.2	6.2	mArms	(1)
Lamp Voltage	V_L	-	1005	-	Vrms	(1)
Lamp Frequency	f_L	-	60	-	kHz	(2)
Operating Life Time	Hr	50,000	-	-	Hour	(3)
Start up Voltage	Vs	-	-	1560@0℃ 1250@25℃	Vrms	(4)

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.
Specified values are for a single 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 current meter.
Refer to the following block diagram of the back-light unit for more information.
Lamp Voltage Min : Lamp Current (6.2) mArms
Lamp Voltage Max : Lamp Current (4.2) mArms



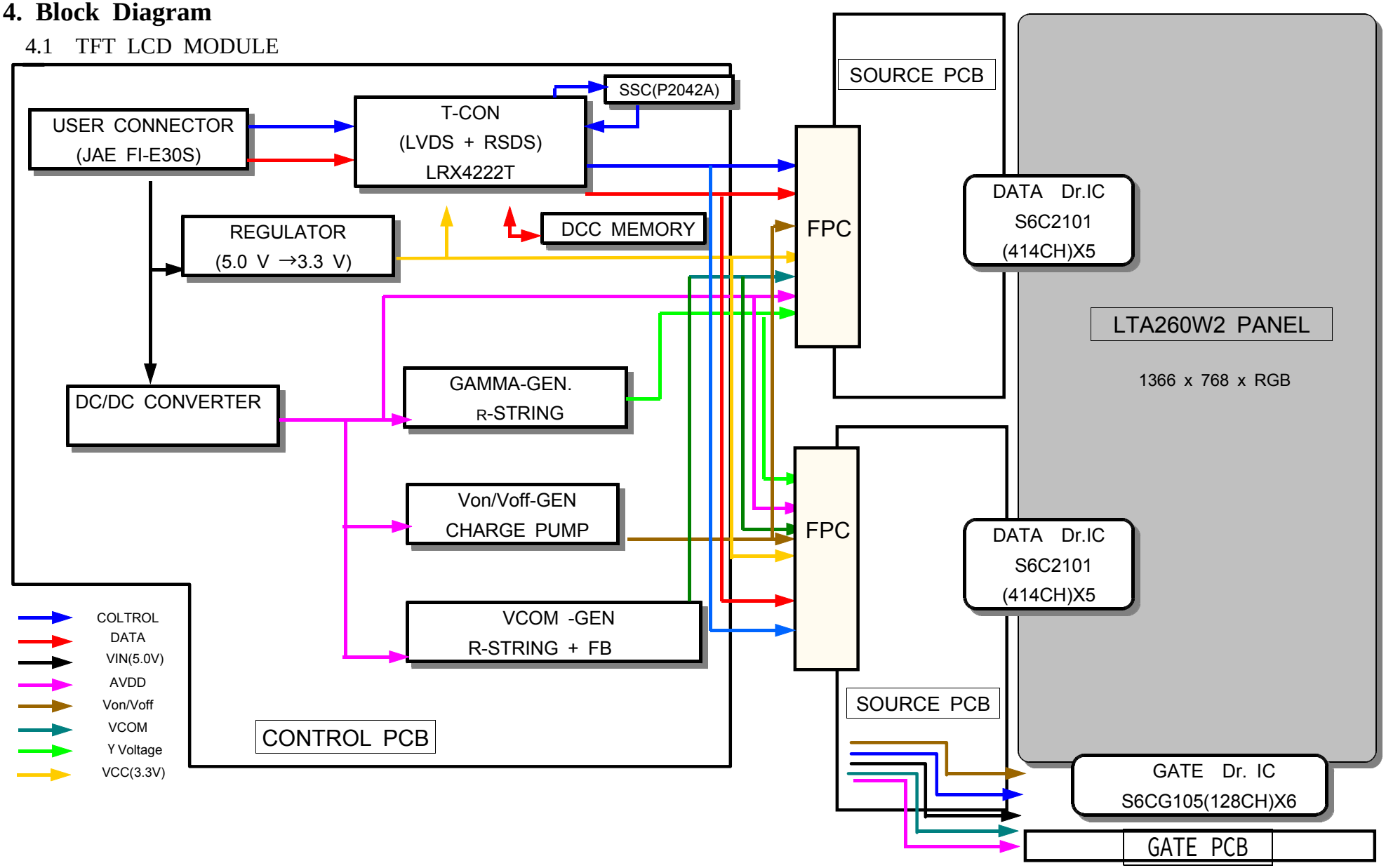
(3) Life time (Hr) of a lamp is defined as the time in which it continues to operate under

the condition of Ta = 25±2°C and IL = (6.2)mArms(max) for a lamp until the brightness becomes 50% or lower than it's original value.

(4) If an inverter has shutdown function it should keep its output for more than 1 second even if the lamp connector open. Otherwise the lamps may not to be turned on.

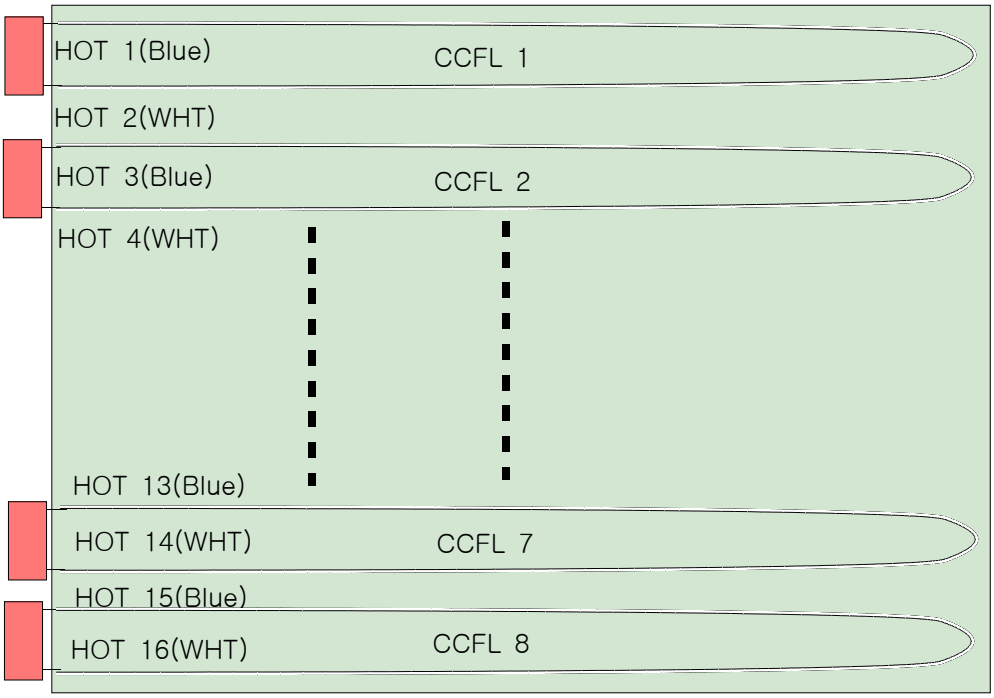
4. Block Diagram

4.1 TFT LCD MODULE



4.2 BACL-LIGHT UNIT

HOT : HIGH VOLTAGE (Part NO. : BHCR-02VS-2 (JST))



5. Input Terminal Pin Assignment

5.1. Input Signal & Power : Connector FI-E30S (JAE)

No	Signal	No	Signal
1	N.C *	16	GND
2	N.C *	17	Rx3-
3	N.C *	18	Rx3+
4	GND	19	GND
5	Rx0-	20	N.C *
6	Rx0+	21	LVDS OPTION **
7	GND	22	N.C *
8	Rx1-	23	GND
9	Rx1+	24	GND
10	GND	25	GND
11	Rx2-	26	Vdd (+5Vdc)
12	Rx2+	27	Vdd (+5Vdc)
13	GND	28	Vdd (+5Vdc)
14	RxCLK-	29	Vdd (+5Vdc)
15	RxCLK+	30	Vdd (+5Vdc)

* NOT CONNECTED : THIS PINS ARE ONLY USED FOR SEC INTERNAL OPERATIONS.
** LVDS OPTION : IF THIS PIN : HIGH (3.3 V) → NORMAL NS LVDS FORMAT
OTHERWISE : LOW (GND) OR OPEN(NC) → JEIDA LVDS FORMAT
Sequence : On = Vdd(T1) ≥ LVDS Option ≥ Interface Signal(T2)
OFF = Interface Signal(T3) ≥ LVDS Option ≥ Vdd

5.2 LVDS Interface

-LVDS Receiver : Tcon (LVDS Rx merged)

-Pixel data (single data)

	LVDS pin	JEIDA -DATA	Normal -DATA
TxOUT/RxIN0	TxIN/RxOUT0	R2	R0
	TxIN/RxOUT1	R3	R1
	TxIN/RxOUT2	R4	R2
	TxIN/RxOUT3	R5	R3
	TxIN/RxOUT4	R6	R4
	TxIN/RxOUT6	R7	R5
	TxIN/RxOUT7	G2	G0
TxOUT/RxIN1	TxIN/RxOUT8	G3	G1
	TxIN/RxOUT9	G4	G2
	TxIN/RxOUT12	G5	G3
	TxIN/RxOUT13	G6	G4
	TxIN/RxOUT14	G7	G5
	TxIN/RxOUT15	B2	B0
	TxIN/RxOUT18	B3	B1
TxOUT/RxIN2	TxIN/RxOUT19	B4	B2
	TxIN/RxOUT20	B5	B3
	TxIN/RxOUT21	B6	B4
	TxIN/RxOUT22	B7	B5
	TxIN/RxOUT24	HSYNC	HSYNC
	TxIN/RxOUT25	VSYNC	VSYNC
	TxIN/RxOUT26	DEN	DEN
TxOUT/RxIN3	TxIN/RxOUT27	R0	R6
	TxIN/RxOUT5	R1	R7
	TxIN/RxOUT10	G0	G6
	TxIN/RxOUT11	G1	G7
	TxIN/RxOUT16	B0	B6
	TxIN/RxOUT17	B1	B7
	TxIN/RxOUT23	RESERVED	RESERVED

5.3 INVERTER UNIT : Inverter input pin configuration

Power INPUT CONNECTOR : 20022WR-14L (Yeon-ho)

PIN NO.	PIN Configuration (FUNCTION)
1	AWG24 24.0 V
2	AWG24 24.0 V
3	AWG24 24.0 V
4	AWG24 24.0 V
5	AWG24 24.0 V
6	AWG24 GND
7	AWG24 GND
8	AWG24 GND
9	AWG24 GND
10	AWG24 GND
11	N.C
12	BACKLIGHT ON~OFF / ON: 2.4~5.0V, OFF: 0~0.8V
13	Analog Dimmer
14	PWM Dimmer

Control signal INPUT CONNECTOR : B4B-ZR-SM3A-TF (JST)

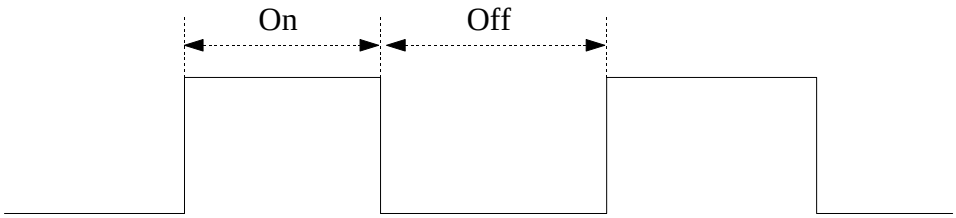
PIN NO.	1	2	3	4
Pin configuration	PWM dimmer	Analog dimmer	On/Off	GND

5.4 Inverter specification

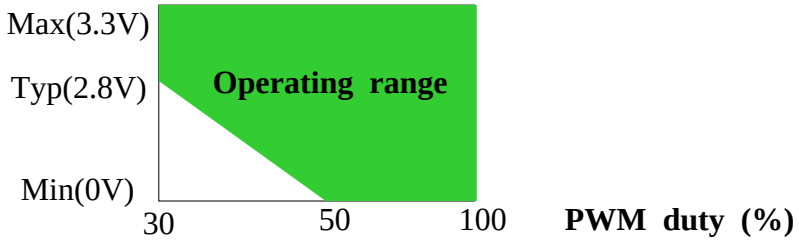
Items	Symbol	Conditions	Specifications			Unit	Note
			Min.	Typ.	Max.		
Input Voltage	Vin	-	23	24	25	V	Ta=25℃
Input Current	Pin		-	3.5	6	Adc	After 2hour Warm-up @Vin=24.0V (1)
Output Current	Io,max	Vadim=3.3V	5.0	5.5	6.0	mArms	
	Io,min	Vadim=0V	4	4.5	5		
Lamp Frequency	FL	Vin=24.0,Vadim=3.3V	60±5			kHz	
Shutdown Time	Ts-d	No Load	1	-	2	sec	
Open Lamp Voltage	Vo	No Load	1560	-	-	V	
On/Off Control	On	ON/OFF=High	2.4	-	5	V	
	Off	ON/OFF=Low	0	-	0.8	V	
PWM Frequency	Fpwm	Vin=24.0,Vadim=3.3V	120	-	240	Hz	
PWM Dimming Range	PMD	Vin=24.0,Vadim=3.3V	30	-	100	%	(2)

Note(1) Controlled by Analog or PWM dimming

Note(2) High-duty = On/(On+Off) * 100



Analog Dimming (Vadim)



- Analog dimming 0V (Minimum Lamp current)
- Analog dimming 3.3V (Maximum Lamp current)

5.5 Input Signal,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	R6	R7	G0	G1	G2	G3	G4	G5	G6	G7	B0	B1	B2	B3	B4	B5	B6	B7	
BASIC COLOR	BLACK	0	0	0	0	0	0	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	0	0	0	0	1	1	1	1	1	1	1	1	-
	GREEN	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	-
	CYAN	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
	RED	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-
	MAGENTA	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	-
	YELLOW	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	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	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	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	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	0	0	0	0	0	0	R2
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	R3~R252
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	↓	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R253
	LIGHT	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R254
	RED	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R255
GRAY SCALE OF GREEN	BLACK	0	0	0	0	0	0	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	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G1
	↑	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G2
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	G3~G252
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	↓	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	G253
	LIGHT	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	G254
	GREEN	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	G255
GRAY SCALE OF BLUE	BLACK	0	0	0	0	0	0	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	0	0	0	0	1	0	0	0	0	0	0	0	B1
	↑	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	B2
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	B3~B252
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	↓	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1	B253
	LIGHT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	B254
	BLUE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	B255

Note) Definition of Gray :

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

Input Signal : 0 = Low level voltage, 1 = High level voltage

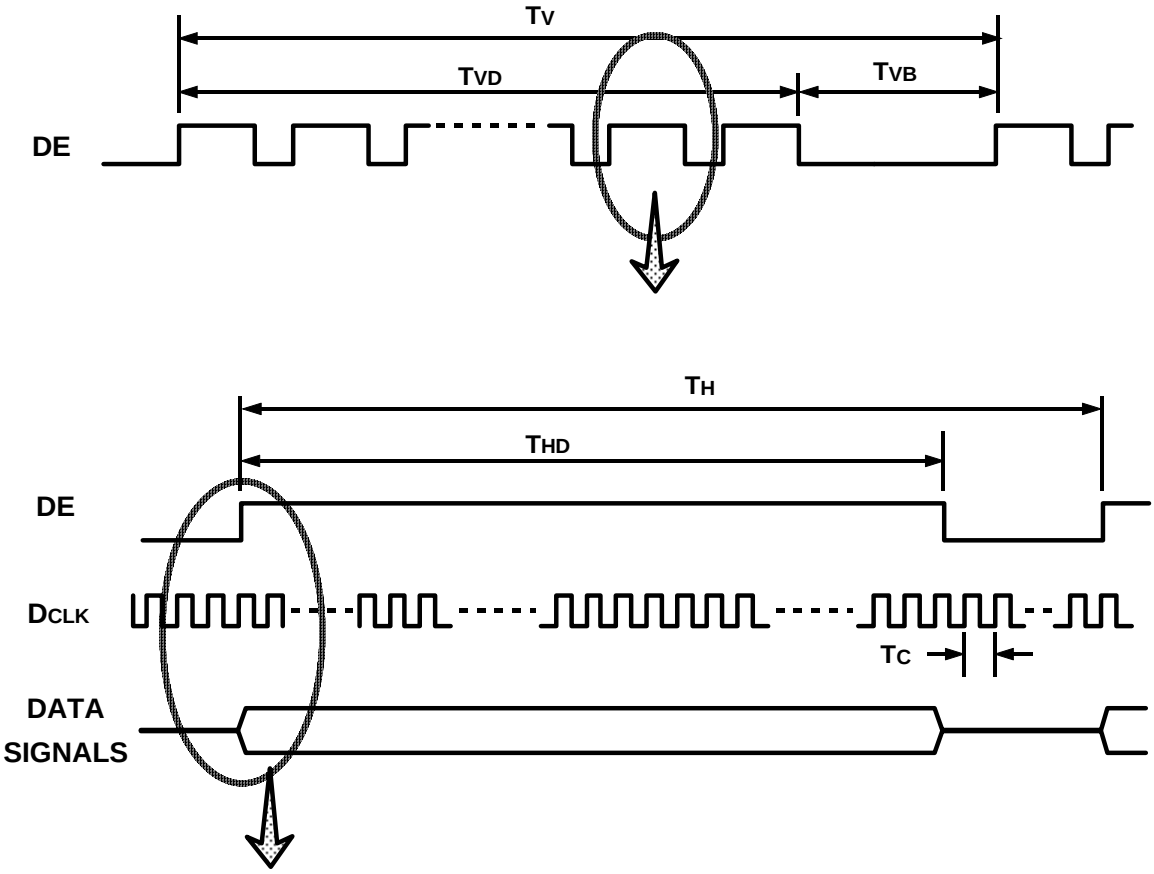
6. Interface Timing

6.1 Timing Parameters (DE only mode)

SIGNAL	ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
Clock	Frequency	1/TC	65	75	82	MHz	
Hsync		Fh	44	47	53	KHz	
Vsync		Fv	48	60	66	Hz	
Vertical Active Disply Term	Display Period	TVD	-	768	-	lines	
	Vertical Total	TVB	773	838	1200	lines	
Horizontal Active Display Term	Display Period	THD	-	1366	-	clocks	
	Horizontal Total	TH	1460	1600	2000	clocks	

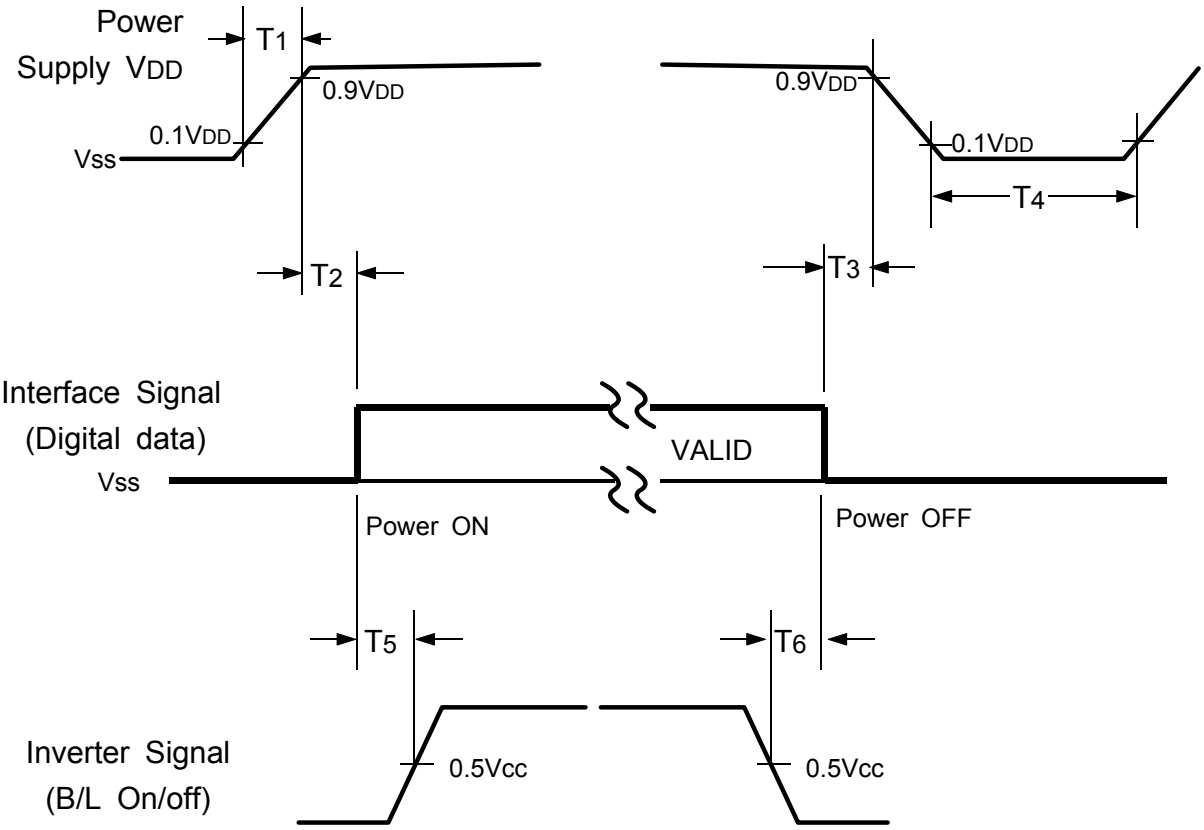
Note) This product is DE only mode. The input of Hsync & Vsync signal does not have an effect on normal operation.

6.2 Timing diagrams of interface signal (DE only mode)



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.



0<T1≤30msec
0<T2≤50msec
0<T3≤50msec
300msec≤T4
1000 msec ≤ T5(Recommand Value)
100 msec ≤ T6(Recommand Value)

NOTE.

(1)The supply voltage of the external system for the module input should be the same as the definition of VDD.

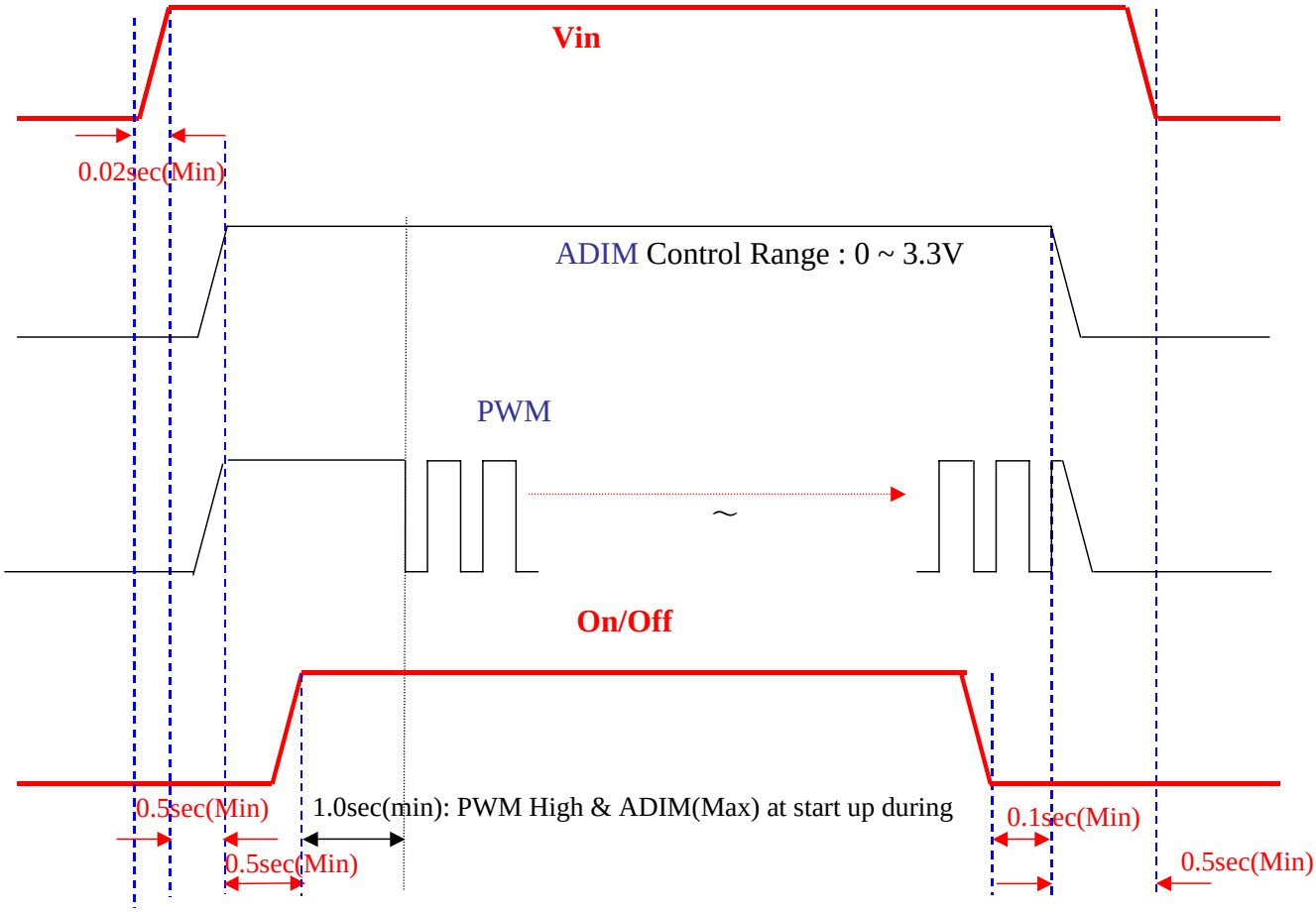
(2) Apply the lamp voltage within the LCD operation range. When the back-light turns on before the LCD operation or the LCD turns off before the back-light turns off, the display may momentarily become abnormal screen.

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

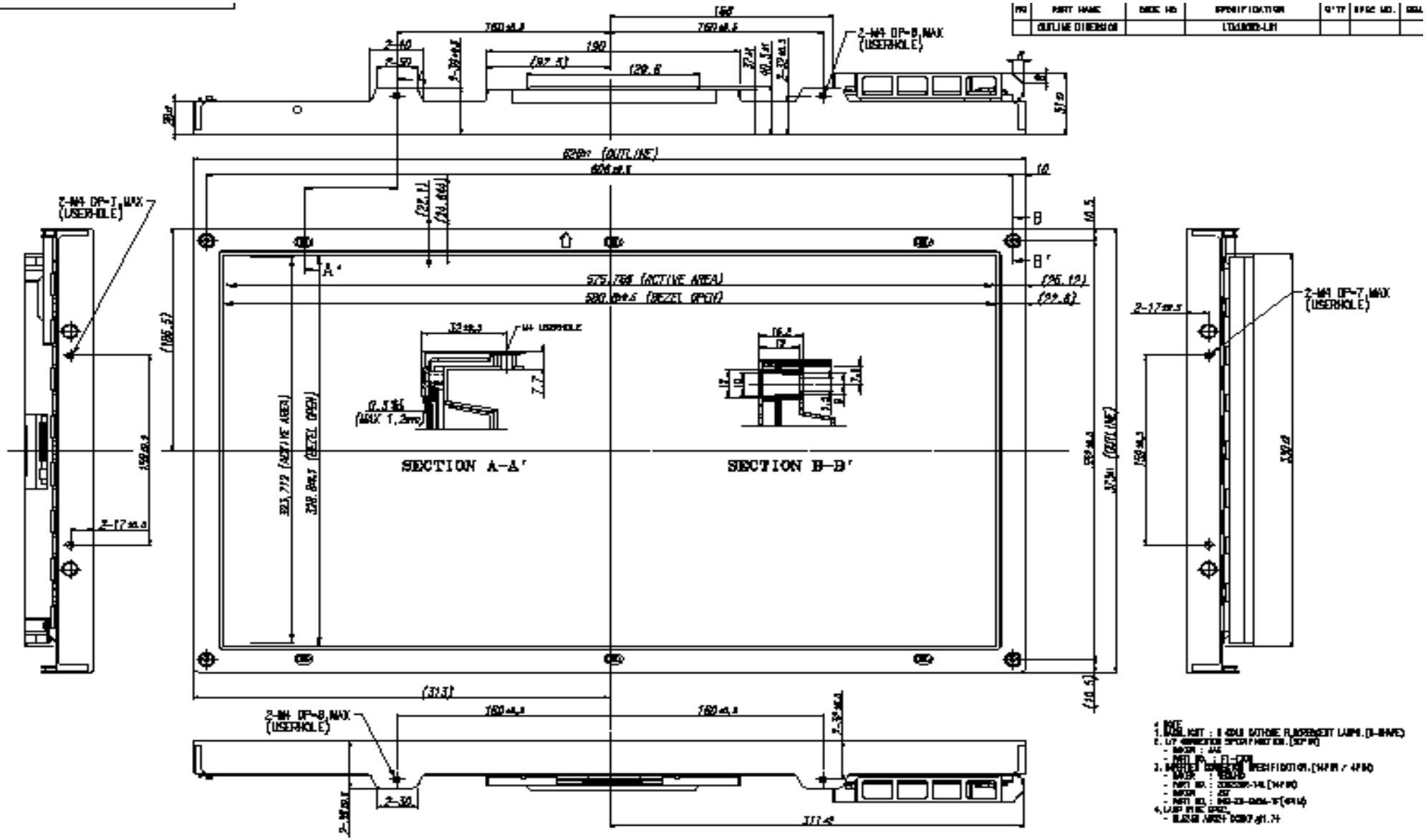
(4) T4 should be measured after the module has been fully discharged between power off and on period.

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

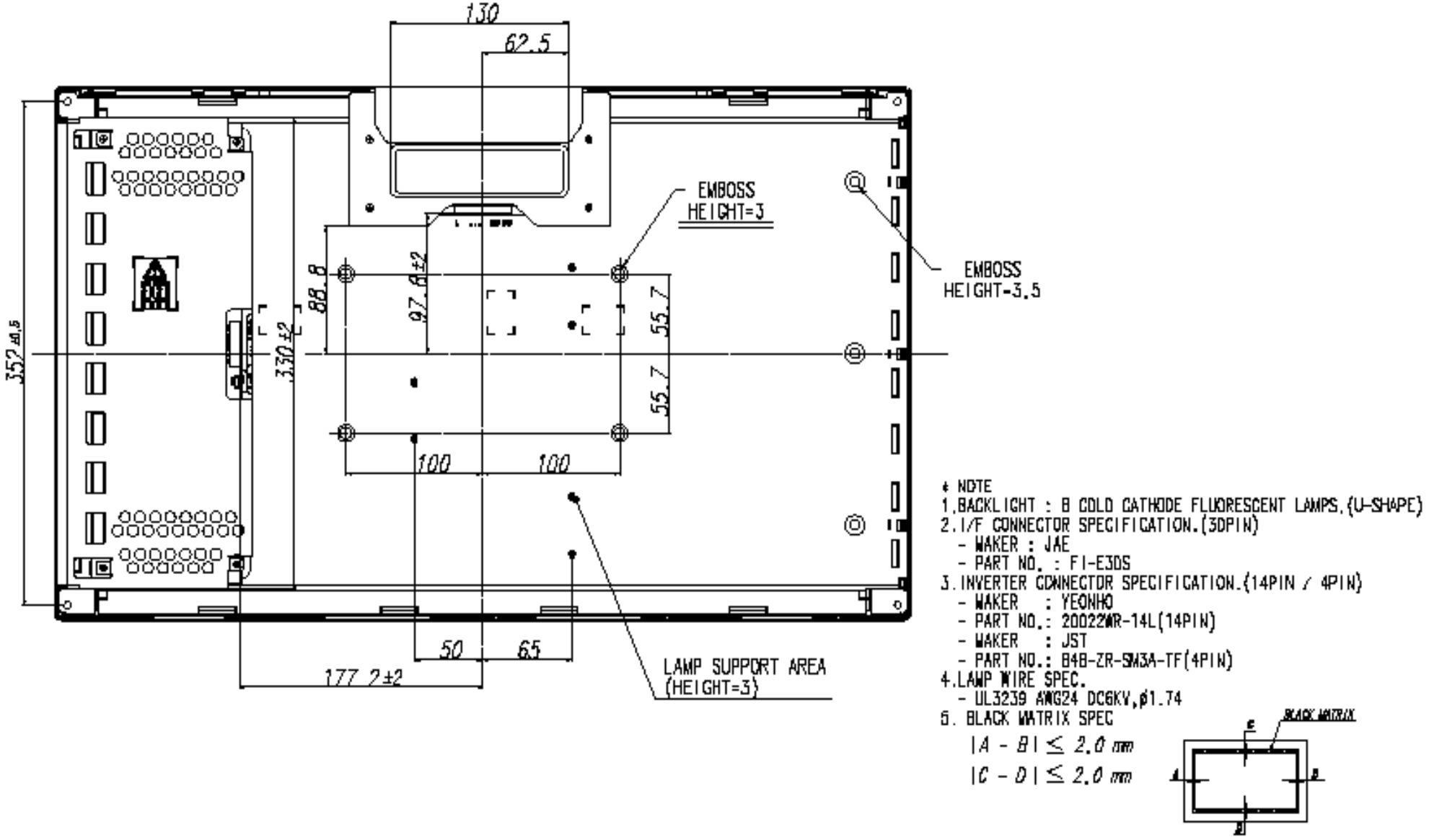
6.3.2 Inverter B/D Sequence



7. Outline Dimension(Front View)



(Rear View)

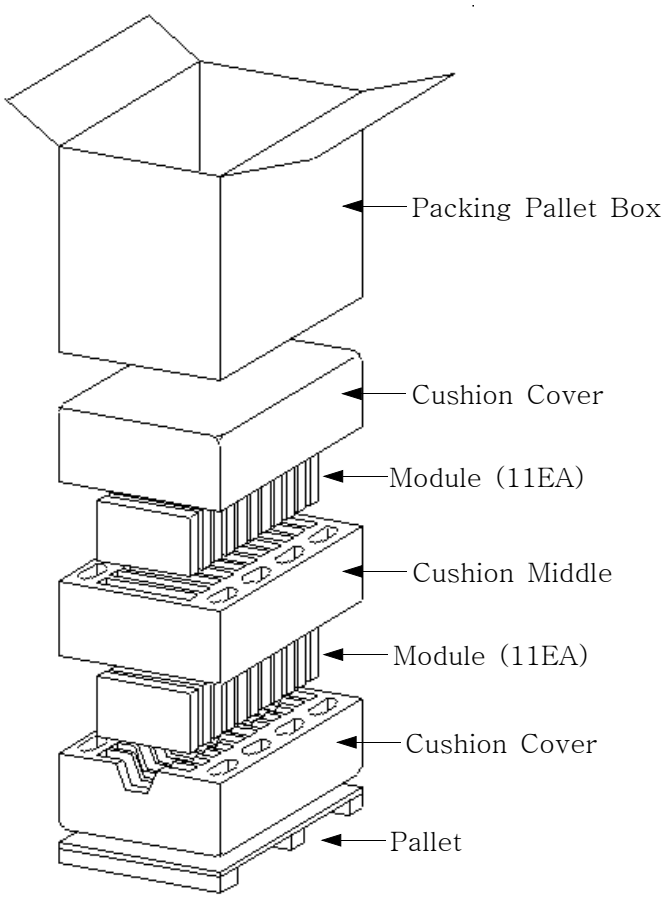


* NOTE
1. BACKLIGHT : 8 COLD CATHODE FLUORESCENT LAMPS. (U-SHAPE)
2. I/F CONNECTOR SPECIFICATION. (30PIN)
   - MAKER : JAE
   - PART NO. : FI-E30S
3. INVERTER CONNECTOR SPECIFICATION. (14PIN / 4PIN)
   - MAKER : YEONHO
   - PART NO.: 20022WR-14L(14PIN)
   - MAKER : JST
   - PART NO.: B4B-ZR-SM3A-TF(4PIN)
4. LAMP WIRE SPEC.
   - UL3239 AWG24 DC6KV, ϕ1.74
5. BLACK MATRIX SPEC

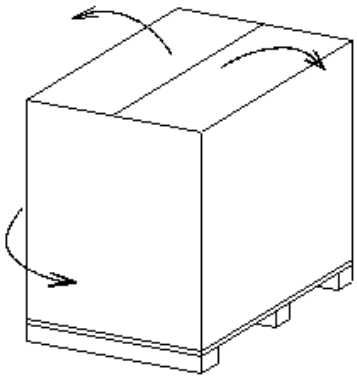
$|A - B| \leq 2.0\ mm$

$|C - D| \leq 2.0\ mm$

8. PACKING



→ Direction : Be able to open it.



ITEM	Specification	Remark
LCD Packing	22ea / Box (Packing-Pallet Box)	1. 4.3kg/LCD 2. 5.5kg/Cushion Cover(2ea) 3. 6kg/Cushion Middle(1ea) 4. 7kg/Packing-Pallet Box(1ea) 5. Cushion Material : EPS 6. Packing Pallet Box Material : DW4
Pallet	1 Box/Pallet	1. Pallet weight : 7kg 2. 119kg/Pallet , Total : 126kg/Pallet
Packing Direction	Vertical	
Pallet Size	H x V x Height	1150mm(H) x 985mm(V) x 1050mm(Height)

9. Reliability test

Item	Test condition	quantity
Temperature chracteristic	0 ~ 50℃, 20Cycle (10cycle determination)	4EA
HTOL	50℃, 1000HR (500hr determination)	8EA
LTOL	0℃, 1000HR (500hr determination)	4EA
RTOL	25℃, continue ~	4EA
HTS	70℃, 1000HR (500hr determination)	4EA
LTS	-30℃, 1000HR (500hr determination)	4EA
THB	40℃ / 95%RH, 1000HR (500hr determination)	4EA
WHTS	60℃ / 75%RH, 1000HR (500hr determination)	4EA
T/C	-20 ℃ ~ 60 ℃, 200Cycle (100cycle determination)	4EA
ESD (non-operation)	C D M : ±10 kV,150pF/330 Ω,9Point,3times/Point	3EA
ESD(operation)	contact : ±8 kV ,150pF/330Ω,100Point,1 time/Point non-contact : ±15 kV,200pF/100Ω,100Point,1 time/Point	6EA
Input Con. ESD	contact : ±2kV,150pF/330,Input Con.Pin,3 times/Pin	3EA
POWER ON/OFF	30sec (on) / 30sec(off) : 12,000 times	4EA
Vibration	10~300Hz/1.5G/10minSR, XYZ, 30min/axis	3EA
Shock	50G, 11msec, ±XYZ 1time/axis	3EA
PALLET vibration	1.146 Grms, Random, Z axis 1Hr	1PALLET(22EA)
PALLET Drop	20cm, 2Edge(Front, Back), 1Face(Bottom)	1PALLET(22EA)

HTOL/LTOL : High/Low Temperature Operating Life

THB : Temperature Humidity Bios

HTS/LTS : High/Low Temperature Storage

WHTS : Wet High Temperature Storage

10. MARKING & OTHERS

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

(1) Parts number : LTA260W2-L01-00R5

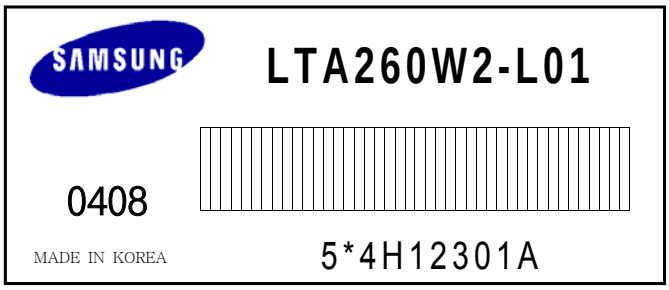
(2) Revision : One letter

(3) Control : One letter

(4) Lot number : 5 * 4 H 123 01 A
1 2 3 4 5 6 7

① 5 : Line
② * : Device
③ 4 : Year
④ H : Month
⑤ 123 : LOT NO
⑥ 01 : GLASS NO
⑦ A : CELL NO

(5) Nameplate Indication



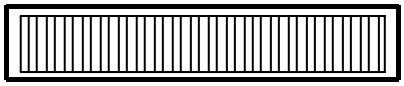
(6) Bar code marking for Customer

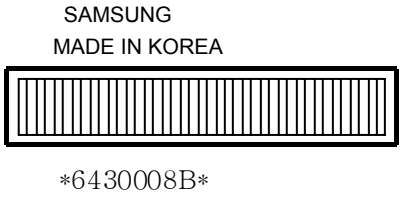
The bar code marking is attached to module backside.

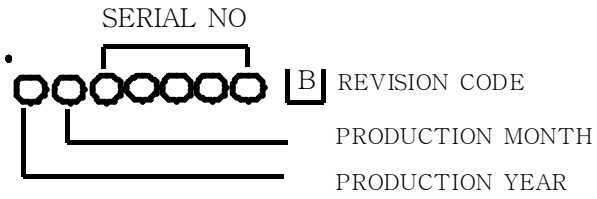
1) MODEL NAME : LTA260W2-L01-00R5
2) SAMSUNG
3) MADE IN KOREA
4) PRODUCTION NUMBER
5) USER MODEL NAME

Bar code shows

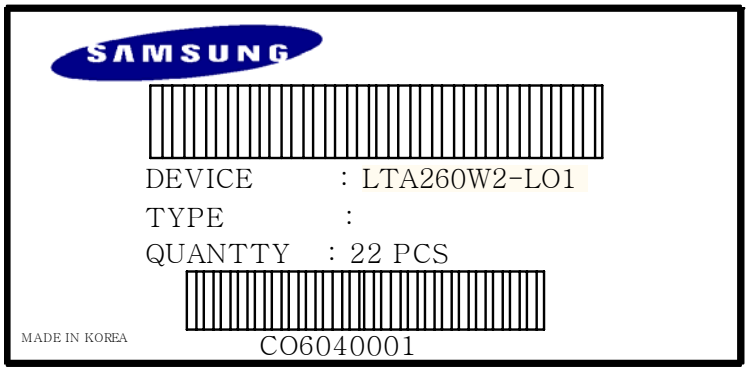
a) User model name
LTA260W2-L01-00R5







(7) Packing box attach



11. General Precautions

11.1 Handling

(a) When the module is assembled into a system, it should be attached firmly using all 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 CCFL back-light.

(c) Note that polarizers are very fragile and can 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 absorbent cotton or soft cloth.

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

(g) If the liquid crystal material leaks from the panel, it should be kept away from the eyes and mouth. In case of contact with skin or clothes, thoroughly wash it away with soap and water.

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

(i) Use finger-stalls with soft gloves to keep display clean during the incoming inspection and the assembly process.

(j) Do not disassemble the module.

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

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

(m) I/F connector pins should not be touched directly with bare hands.

11.2 Storage

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

(b) Do not store the TFT-LCD module in direct sunlight. The module shall be stored in a dark place. Prolonged exposure to sunlight or fluorescent light during the storage will damage the module.

11.3 Operation

(a) Do not connect or 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) The 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 should be at the minimum length possible to 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).

Operation Condition Guide

(a) The LCD product should to be operated under normal conditions.
Normal condition is defined as below;
- Temperature : 20±15℃
- Humidity : 65±20%
- Display pattern : continually changing pattern (Not stationary)

(b) If the product will be used in extreme conditions such as high temperature, humidity, display patterns or operation time etc.., It is strongly recommended to contact SEC for Application engineering advice. Otherwise, its reliability and function may not be guaranteed. Extreme conditions are commonly found at Airports, Transit Stations, Banks, Stock market, and Controlling systems.

11.4 Others

(a) Use Ultra-violet light filters if outdoor operation is necessary.

(b) Avoid water condensation. Moisture may penetrate sensitive electrical connections resulting in improper operation.

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

(d) If the module displays the same pattern continuously for a long period of time, it can result in the situation where the image " sticks " (remains) on the screen. We recommend that you should discuss SEC when you want the module to be operated in displaying the same pattern for a long time.

(e) The module has sensitive PCB circuitry on the back side and should be handled carefully in order prevent stress and possible failure.