SAMSUNG ELECTRONICS

Product Information

Issued Date : Jan. 26, 2005

SAMSUNG TFT-LCD

MODEL NO. : LTA460H2-L02

Note :_____

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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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General Description

*** Description**

LTA460H2-L02 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 46.0" contains 1920 x 1080 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
- WUXGA(1920 x 1080 pixels) resolution (16:9)
- Low Power consumption
- Direct Type 24 CCFT(Cold Cathode Fluorescent Tube)
- DE only mode
- 2Channels LVDS(Low-Voltage Differential Signal) interface.(2 pixels/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	1018.08(H) x 572.67(V)	mm	
Driver element	a-Si TFT active matrix		
Display colors	16.7M(true)	colors	
Number of pixels	1920 x 1080	pixel	16:9
Pixel arrangement	RGB Vertical Stripe		
Pixel pitch	0.17675(H) × 0.53025(W)	mm	
Display mode	Normally Black		
Surface treatment	Haze 44% , Hard-Coating (3H)		Anti-Glare

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

Item		Min.	Typ.	Max.	Note
Module size	Horizontal(H)	1082.0	1083.0	1084.0	mm
	Vertical(V)	626.0	627.0	628.0	mm
	Depth(D)	55.5	56.5	57.5	mm
Weight		12,000	13,500	15,000	g

1. Absolute Maximum Ratings

1.1 Absolute ratings of environment

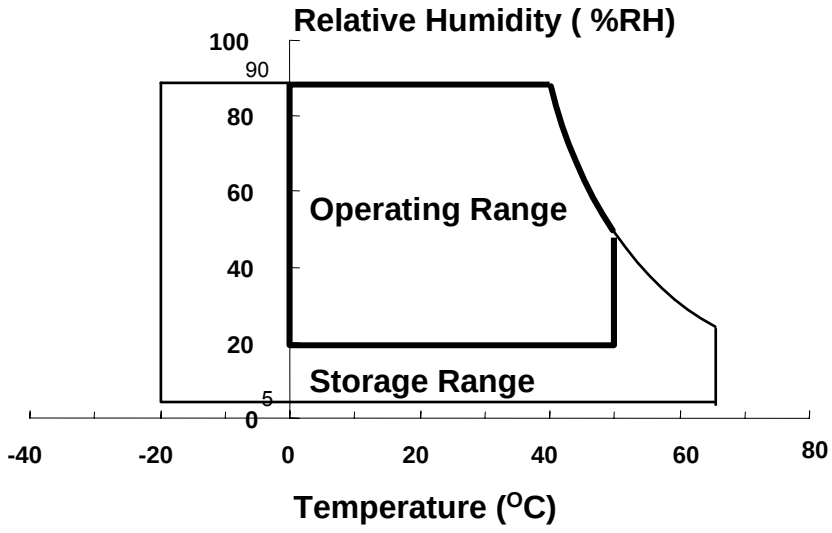
Item	Symbol		Min.	Max.	Unit	Note
Storage temperature	T_{STG}		-20	65	℃	(1)
Operating temperature (Ambient temperature)	T_{OPR}		0	50	℃	(1)
Shock (non - operating)	Snop	x,y axis	-	50	G	(2),(4)
		z axis	-	35	G	
Vibration (Non - operating)	Vnop		-	1.5	G	(3),(4)

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

(3) 10-300 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.



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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	5.5	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	4.0	7.0	mArms	(1),(2)
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) Specified values are for a single lamp.

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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
EZ-Contrast (Eldim)

* Ta = 25 ± 2°C , V_{DD}=5V, fv= 60Hz, f_{DCLK}=74.25 MHz, I_L = 6.0 mA_{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	Rising	Tr		-	6	10	msec	(4) BM-7
	Falling	Tf		-	4	6		
Luminance of White (Center of screen)		Y_L		400	450	-	cd/m2	(5) BM-5A
Color Chromaticity (CIE 1931)	Red	Rx		TYP. -0.03	0.648	TYP. +0.03		(6) PR650
		Ry			0.333			
	Green	Gx			0.271			
		Gy			0.592			
	Blue	Bx			0.141			
		By			0.066			
	White	Wx			0.280			
		Wy			0.290			
Lamp Temperature				-	10,000	-	K	
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

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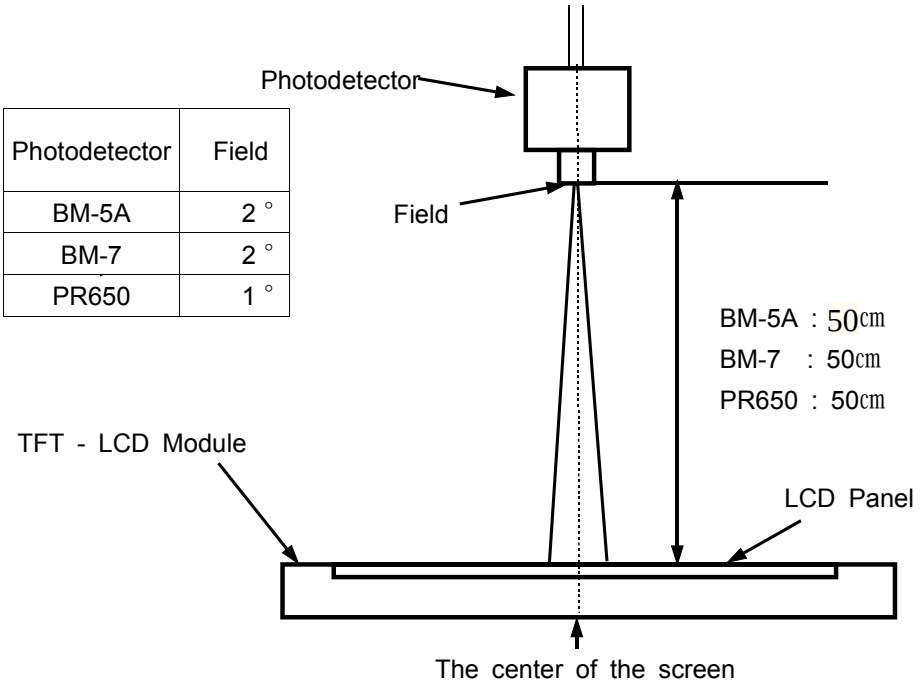
Note 1) Test Equipment Setup

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 : 6.0 mA

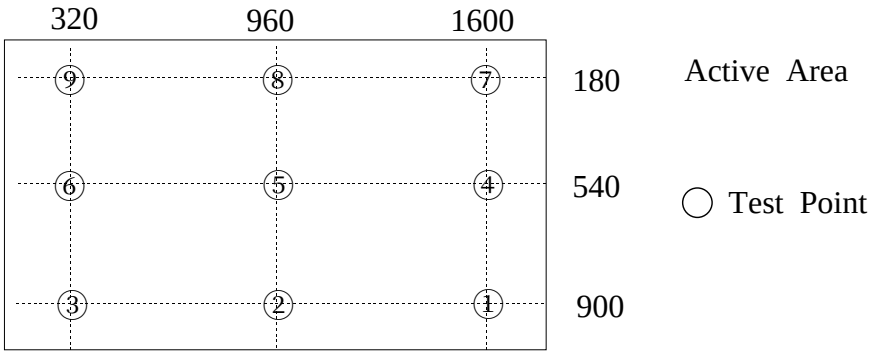
Environment condition : Ta = 25 ± 2 °C

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



Optical Measuring Equipment Setup

Note 2) **Definition of test point**



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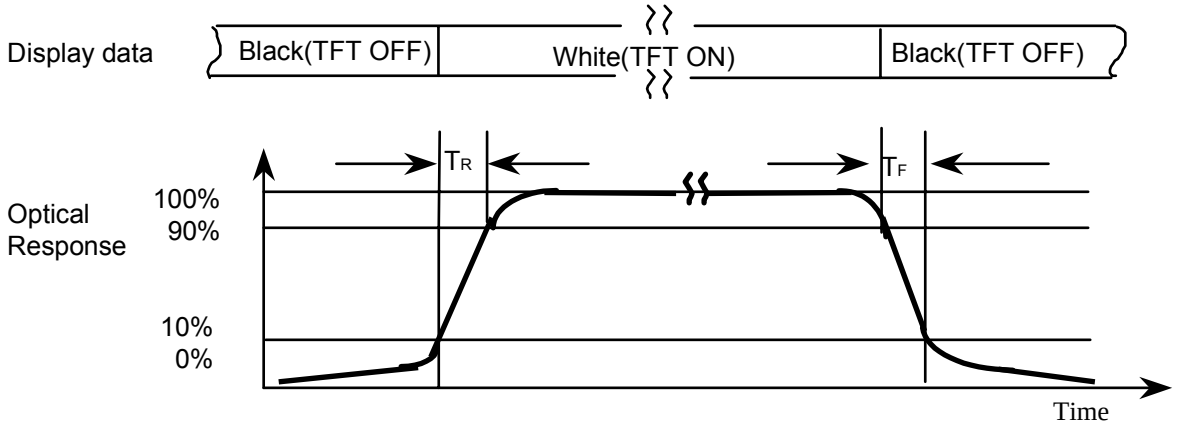
Note 3) Definition of Contrast Ratio (C/R) : Ratio of gray max (Gmax) & gray min (Gmin) at the center point(5) of the panel

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

Gmax : Luminance with all pixels white

Gmin : Luminance with all pixels black

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

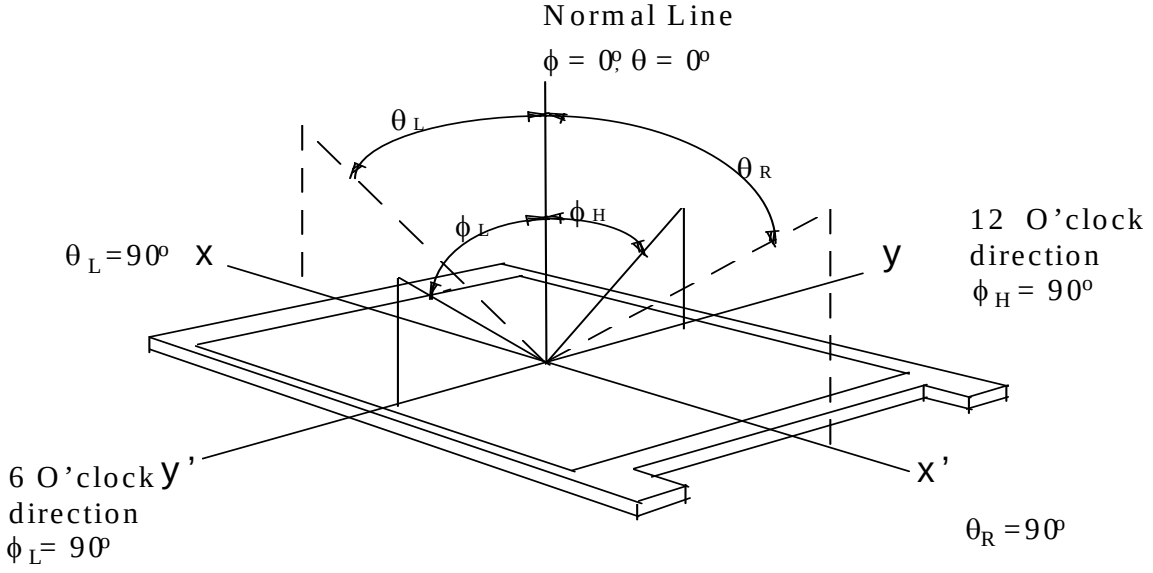


Note 5) Definition of Luminance of White : Luminance of white at center point(5).

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)



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Note 8) Definition of 5 points brightness uniformity

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

Bmax : Maximum brightness

Bmin : Minimum brightness

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3. Electrical Characteristics

3.1 TFT LCD MODULE

Ta = 25°C

Item		Symbol	Min.	Typ.	Max.	Unit	Note
Voltage of Power Supply			4.5	5.0	5.5	V	(1)
Current of Power Supply	(a)Black	I_{DD}	-	2000	-	mA	(2),(3) (Without Inverter)
	(b)Mosaic		-	2200	-	mA	
	(d)N-Pattern		-	3500	4000	mA	
Vsync Frequency		f_V	-	60	-	Hz	
Hsync Frequency		f_H	65.5	67.5	69.5	kHz	
Main Frequency		f_{DCLK}	131	74.25	166.8	MHz	
Rush Current		I_{RUSH}	-	4.5	6	A	(4)

Note (1) Voltage of Power Supply is the value which is measured at the input connector of panel.

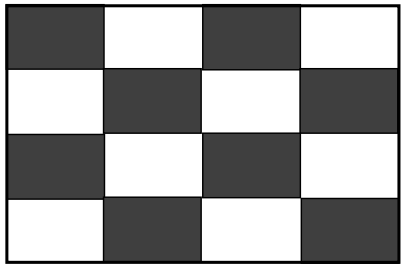
(2) f_V=60Hz, f_{DCLK} =74.25MHz, V_{DD} = 5.0V, DC Current.

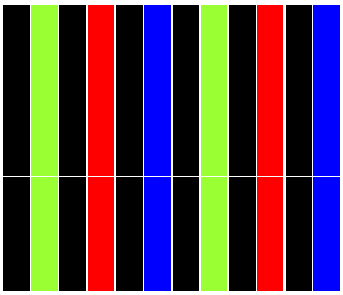
(3) Power dissipation check pattern(LCD Module only)

(a) Black Pattern

(b) Mosaic Pattern

(c)





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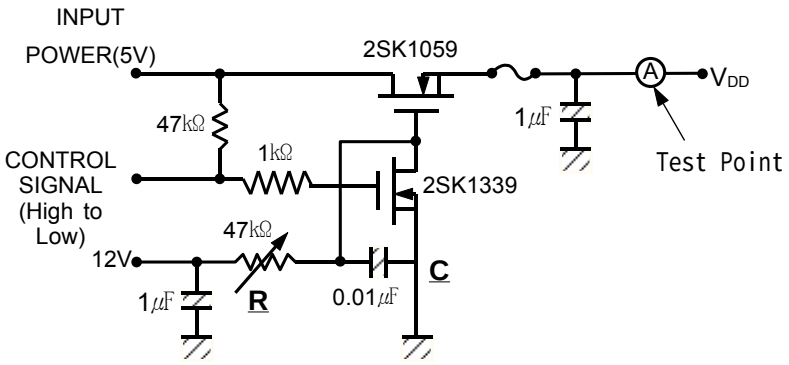
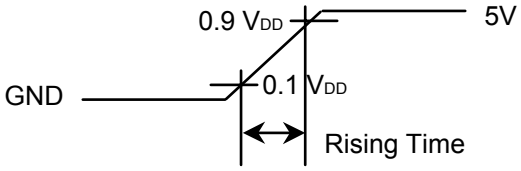
(4) Measurement Conditions (Rising time =470μs)



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.



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3.2 BACK-LIGHT UNIT

The back-light system is an direct - lighting type with 24 CCFTs (Cold Cathode Fluorescent Tube) The characteristics of 24 direct lamps are shown in the following tables.

Ta=25 ± 2°C

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Lamp Current	I_L	(5.0)	(6.0)	(7.0)	mArms	(1)
Lamp Voltage	V_L	(1480)	(1540)	(1600)	Vrms	(1)
Lamp Frequency	f_L	(40)	-	(80)	kHz	(2)
Operating Life Time	Hr	50,000	-	-	Hour	(3)
Start up Voltage	Vs	-	-	0℃:2500 25℃:1990	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 block diagram of the back-light unit in the next page for more information.
Lamp Voltage Min : Lamp Current 7.0 mArms
Lamp Voltage Max : Lamp Current 5.0 mArms

(2) Lamp frequency may produce interference with horizontal synchronous frequency and this may cause line flow on the display. Therefore lamp frequency shall be detached from the horizontal synchronous frequency and its harmonics as far as possible in order to avoid interference.

(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 = 5.5mArms 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.

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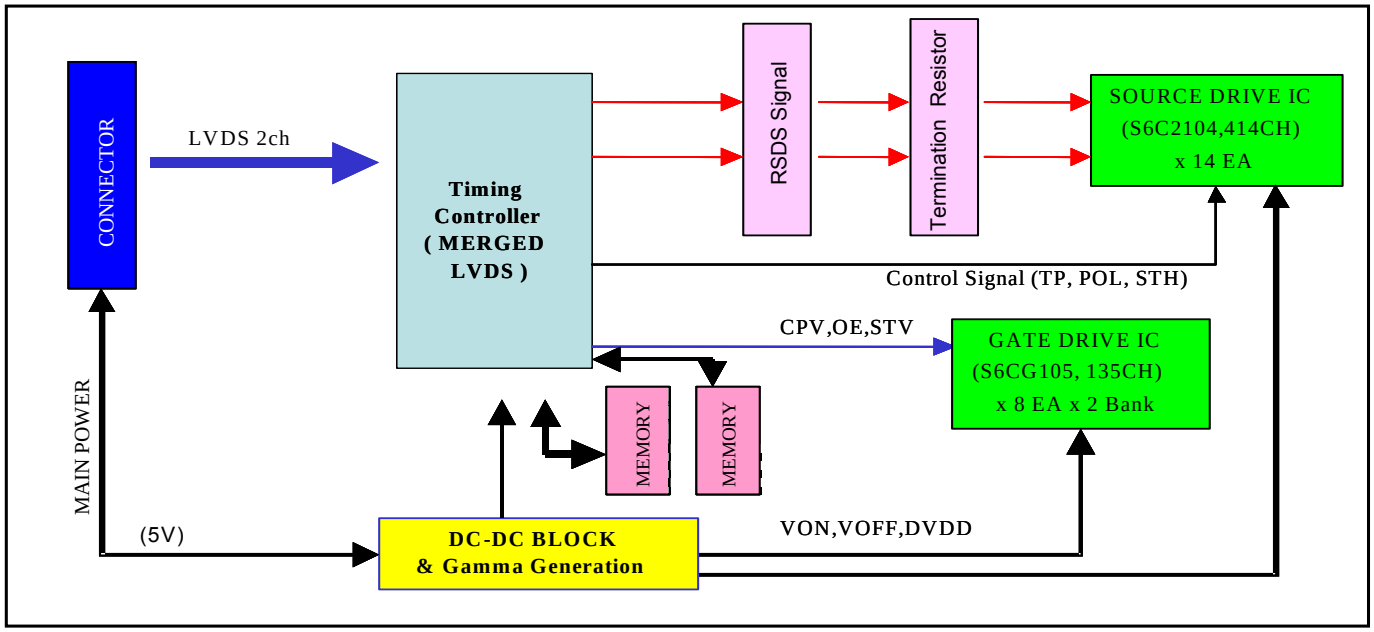
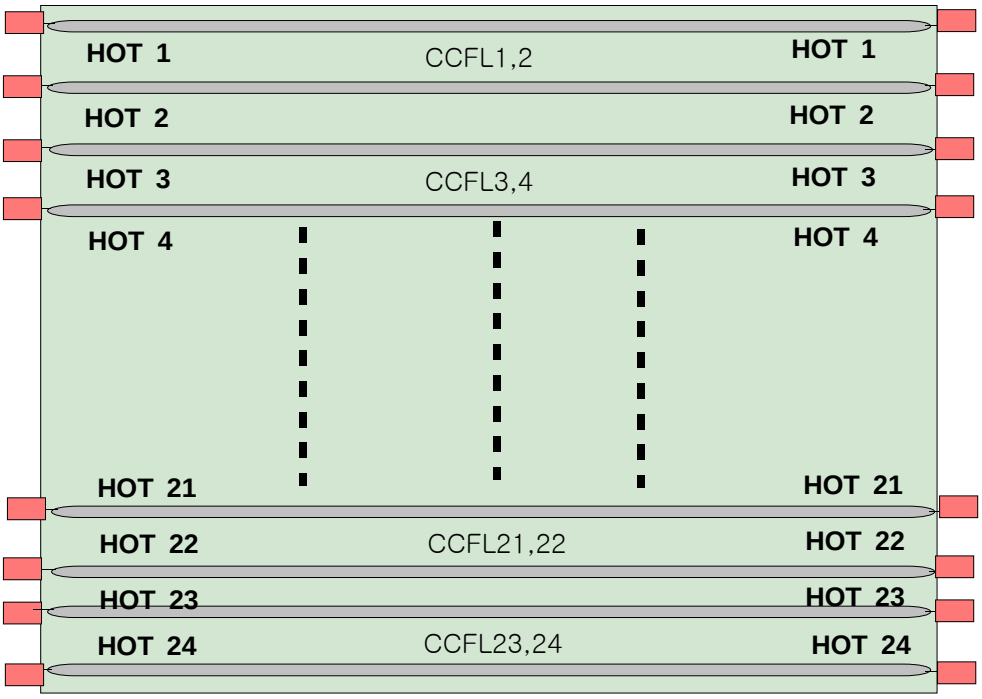
4. Block Diagram

4.1 TFT LCD MODULE



4.2 BACK-LIGHT UNIT

HOT 사양 : HIGH VOLTAGE



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5. Input Terminal Pin Assignment

5.1. Input Signal & Power : Connector 30P, FI-E30S

No	Signal	No	Signal
1	RxInO0-	16	RxInE2+
2	RxInO0+	17	RxInECLK-
3	RxInO1-	18	RxInECLK+
4	RxInO1+	19	RxInE3-
5	RxInO2-	20	RxInE3+
6	RxInO2+	21	GND
7	RxInOCLK-	22	GND
8	RxInOCLK+	23	GND
9	RxInO3-	24	GND
10	RxInO3+	25	GND
11	RxInE0-	26	V_{DD}(=+5[V])
12	RxInE0+	27	V_{DD}(=+5[V])
13	RxInE1-	28	V_{DD}(=+5[V])
14	RxInE1+	29	V_{DD}(=+5[V])
15	RxInE2-	30	V_{DD}(=+5[V])

5.2. Inverter Control Connector

Connector : JST S14B-PH-SM3

No	Signal
1	D 24V
2	D 24V
3	D 24V
4	D 24V
5	D 24V
6	GND
7	GND
8	GND
9	GND
10	GND
11	N.C
12	Inverter Enable (On : 5V, Off : 0V)
13	ADIM [Max : 3.3V, Min : 0V]
14	PDIM [Max : 100%, Min : 30%]

Note) Pin 14(PDIM) will be N.C(not connected) afterwards.

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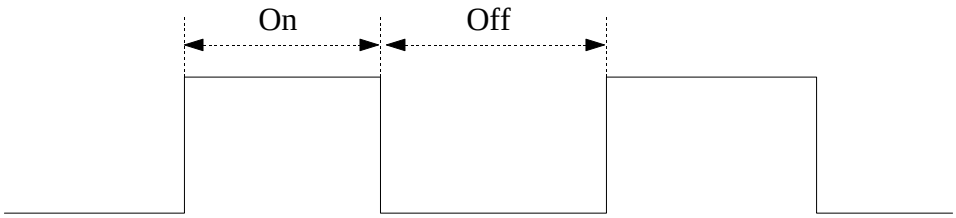
5.3 Inverter Specification

Items	Symbol	Conditions	Specifications			Unit	비고
			Min.	Typ.	Max.		
Input Power	Vin	-	23	24	25	V	Ta=25℃
Input Current	Iin	Vin=24V, Adim=3.3V		(TBD)		Adc	
Output Current (Single Lamp)	Io,max	Adim=3.3V	(6.5)	(7.0)	(7.5)	mArms	After 2hour Warm-up, Note (1)
	Io.min	Adim=0V	(4.5)	(5.0)	(5.5)		
Frequency	F_L	Vin=24V,Adim=3.3V	(55)	(60)	(65)	kHz	
Open Lamp Shutdown Time	Ts-d	No Load	1.0	1.5	2.0	sec	
Open Lamp Voltage	Vo	Vin=24V,ADIM=3.3V Each Transformer Output	(1400)			V	
On/Off control	On	ON/OFF=High	2.4	-	5.25	V	
	Off	ON/OFF=Low	0	-	0.8	V	
PWM signal	Vpwm	ON(high)	2.4		5.25	V	
	Vpwm	OFF(low)	0		0.8	V	
PWM duty	PD	Vin=24V,Adim=3.3V	30		100	%	Note (2)
		Vin=24V,Adim=0V	50		100		
Analog Dimmer	Max Lum	-	-	3.3	-	V	Note (3)
	Min. Lum	-	-	0	-		

Note(1) Controlled by Analog or PWM dimming

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



Note(3) - Controlled by Analog dimming only
- Analog dimming 0[V] (Minimum Lamp current)
- Analog dimming 3.3[V] (Maximum Lamp current)

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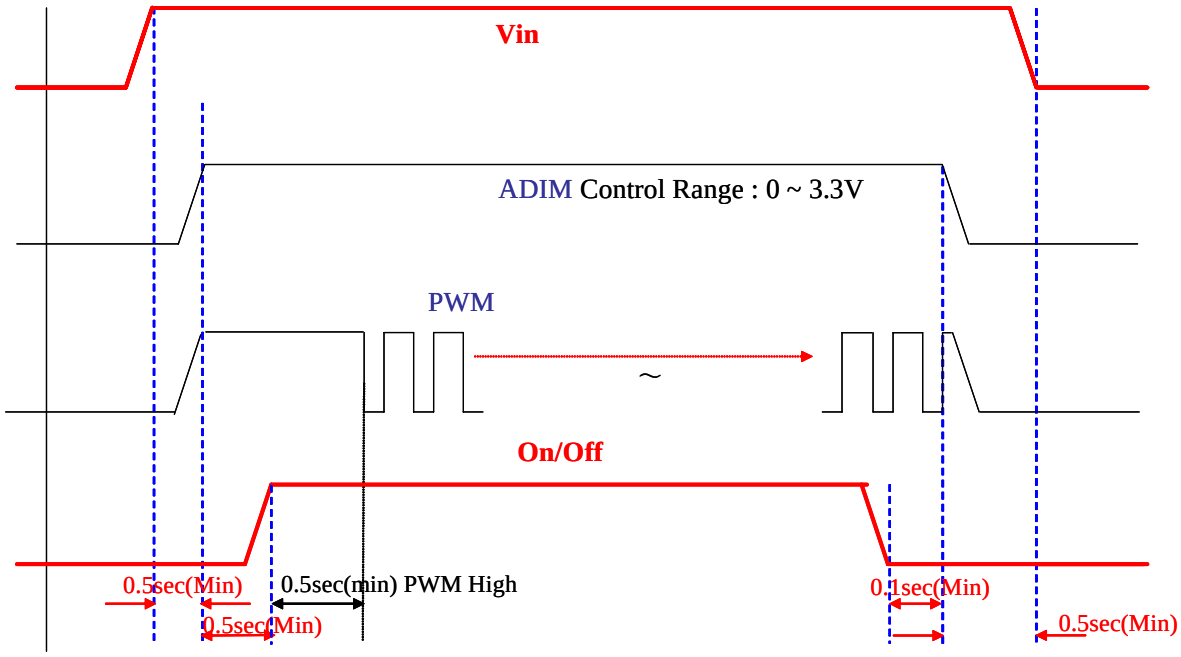
5.3.2 Inverter Input Power Sequence



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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
	↓ LIGHT	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
		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
	↓ LIGHT	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
		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
	↓ LIGHT	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
		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

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5.4 LVDS Interface

-LVDS Receiver : Tcon (LVDS Rx merged)

-Pixel data (Dual data)

LVDS Transmitter (ex : ***DS90C385***) Signal Interface					
Device Input Pin	Device Input Signal		Output Signal	To LTA460H1 Interface	
Symbol	Symbol	Function		Terminal	Symbol
TXIN0	R0	Red Pixel Data (LSB)	TXOUT0- TXOUT0+	No. 1,11 No. 2,12	RX0- RX0+
TXIN1	R1	Red Pixel Data			
TXIN2	R2	Red Pixel Data			
TXIN3	R3	Red Pixel Data			
TXIN4	R4	Red Pixel Data			
TXIN5	R7	Red Pixel Data (MSB)	TXOUT3- TXOUT3+	No. 9,19 No. 10,20	RX3- RX3+
TXIN6	R5	Red Pixel Data	TXOUT0- TXOUT0+	No. 1,11 No. 2,12	RX0- RX0+
TXIN7	G0	Green Pixel Data (LSB)			
TXIN8	G1	Green Pixel Data	TXOUT1- TXOUT1+	No. 3, 13 No. 4, 14	RX1- RX1+
TXIN9	G2	Green Pixel Data			
TXIN10	G6	Green Pixel Data	TXOUT3- TXOUT3+	No. 9,19 No. 10,20	RX3- RX3+
TXIN11	G7	Green Pixel Data (MSB)			
TXIN12	G3	Green Pixel Data	TXOUT1- TXOUT1+	No. 3, 13 No. 4, 14	RX1- RX1+
TXIN13	G4	Green Pixel Data			
TXIN14	G5	Green Pixel Data			
TXIN15	B0	Blue Pixel Data (LSB)			
TXIN16	B6	Blue Pixel Data	TXOUT3- TXOUT3+	No. 9,19 No. 10,20	RX3- RX3+
TXIN17	B7	Blue Pixel Data (MSB)			
TXIN18	B1	Blue Pixel Data	TXOUT1- TXOUT1+	No. 3, 13 No. 4, 14	RX1- RX1+
TXIN19	B2	Blue Pixel Data	TXOUT2- TXOUT2+	No. 5, 15 No. 6, 16	RX2- RX2+
TXIN20	B3	Blue Pixel Data			
TXIN21	B4	Blue Pixel Data			
TXIN22	B5	Blue Pixel Data			
TXIN24	Hsync	Horizontal Sync (Don't care)			
TXIN25	Vsync	Vertical Sync (Don't care)			
TXIN26	DE	Data Enable (Mandatory)			
TXIN27	R6	Red Pixel Data	TXOUT3- TXOUT3+	No. 9,19 No. 10,20	RX3- RX3+

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6. Interface Timing

6.1 Timing Parameters (DE only mode)

SIGNAL	ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
Clock	Frequency	1/TC	65.5	74.25	83.4	MHz	2pixels/clock
	Hgh Time	TCH	4	-	-	nsec	
	Low Time	TCL	4	-	-	nsec	
Data	Setup Time	TDS	4	-	-	nsec	
	Hold Time	TDH	4	-	-	nsec	
Data Enable	Setup Time	TES	4	-	-	nsec	
Frame Frequency	Cycle	Tv	-	16.7	-	msec	
Vertical Active Display Term	Display Period	TVD	-	1080	-	lines	
	Vertical Total	TVB	1092	1125	1158	lines	
Horizontal Active Display Term	Display Period	THD	-	1920	-	clocks	
	Horizontal Total	TH	2000	2200	2400	clocks	

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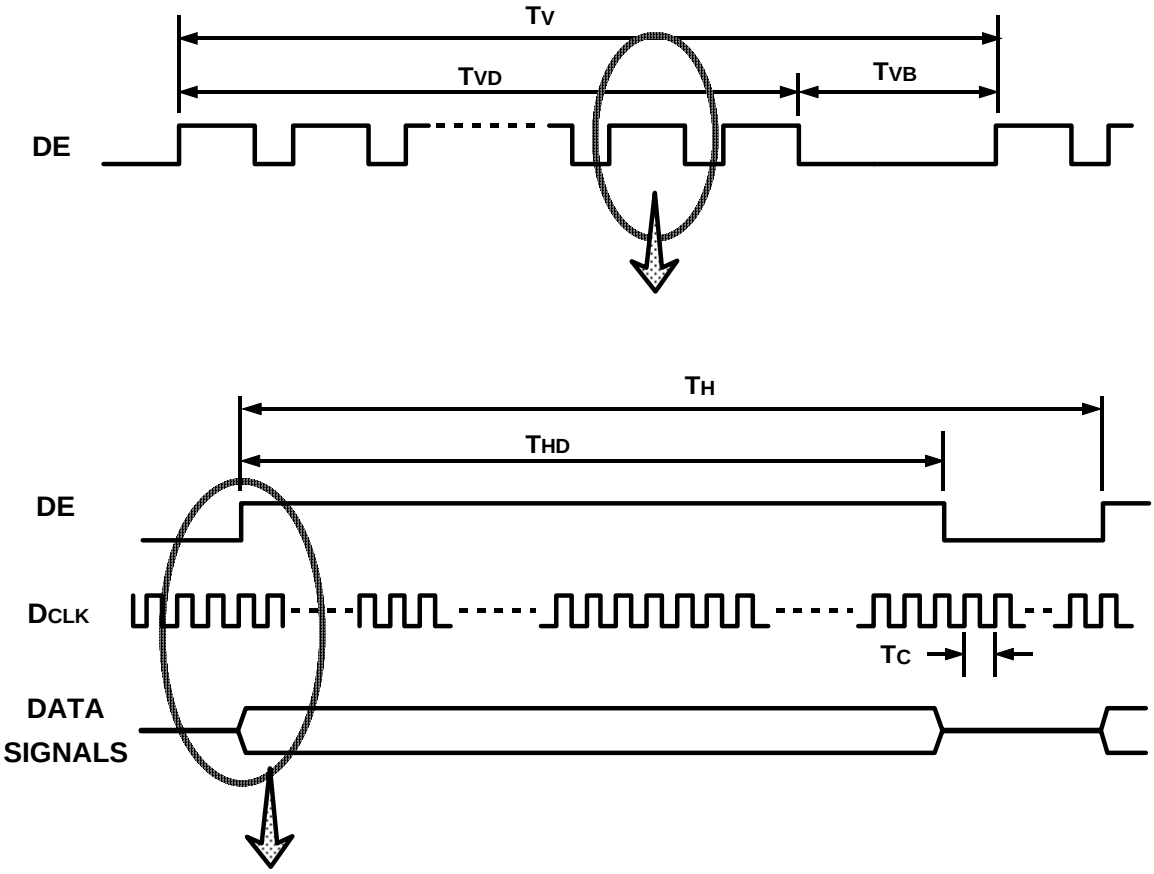
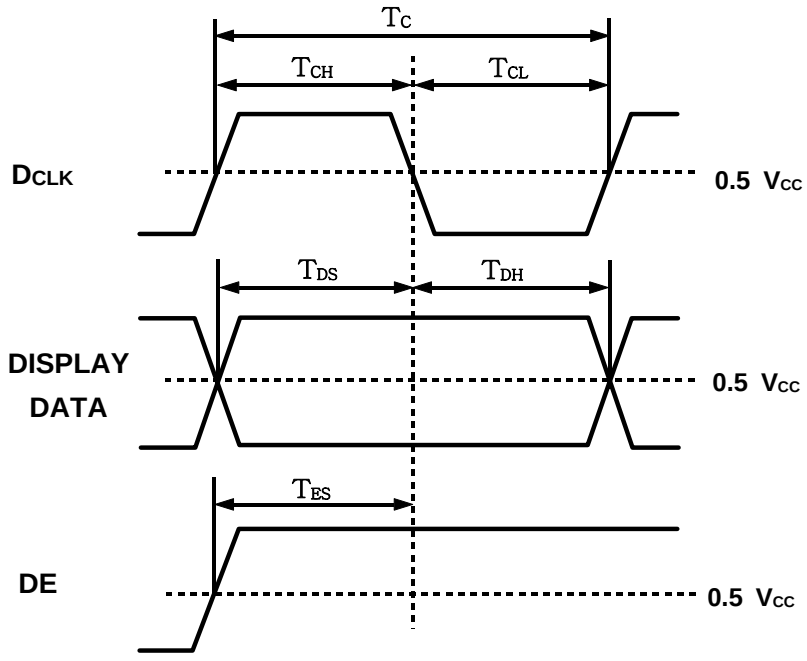
6.2 Timing diagrams of interface signal (DE only mode)





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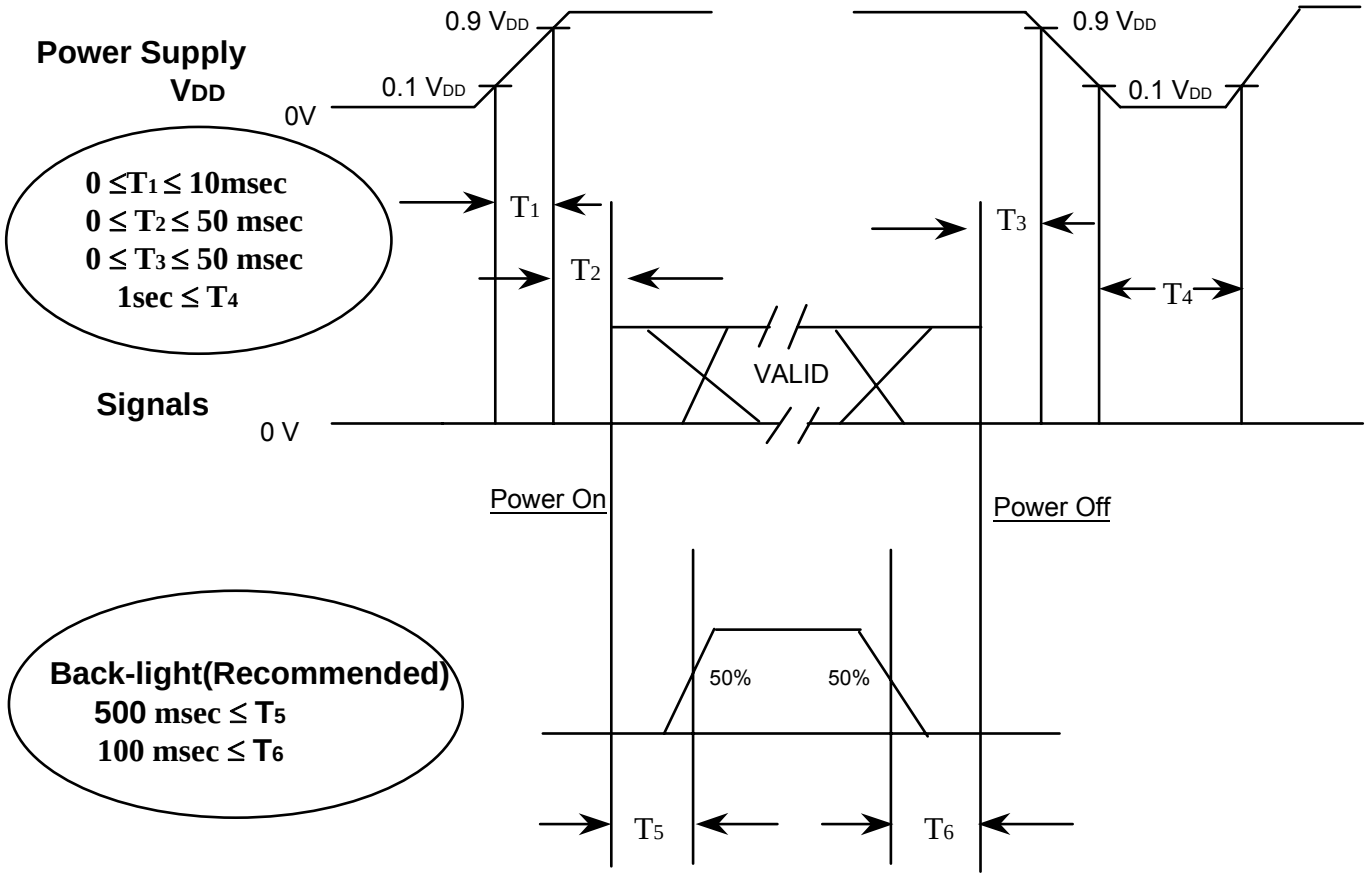
6.3 Power ON/OFF Sequence

: 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

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.

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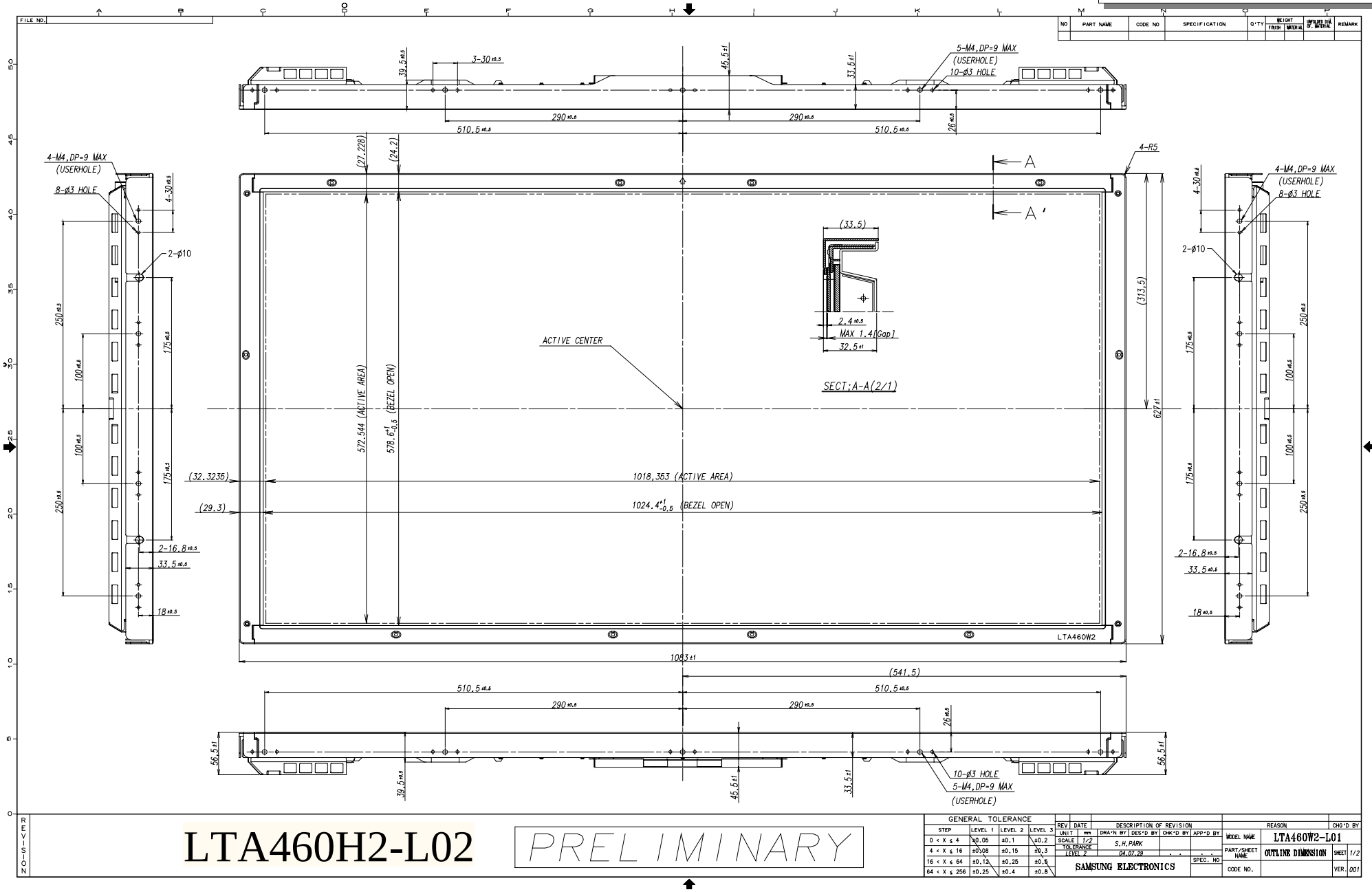
7. **Outline Dimension** - Front side



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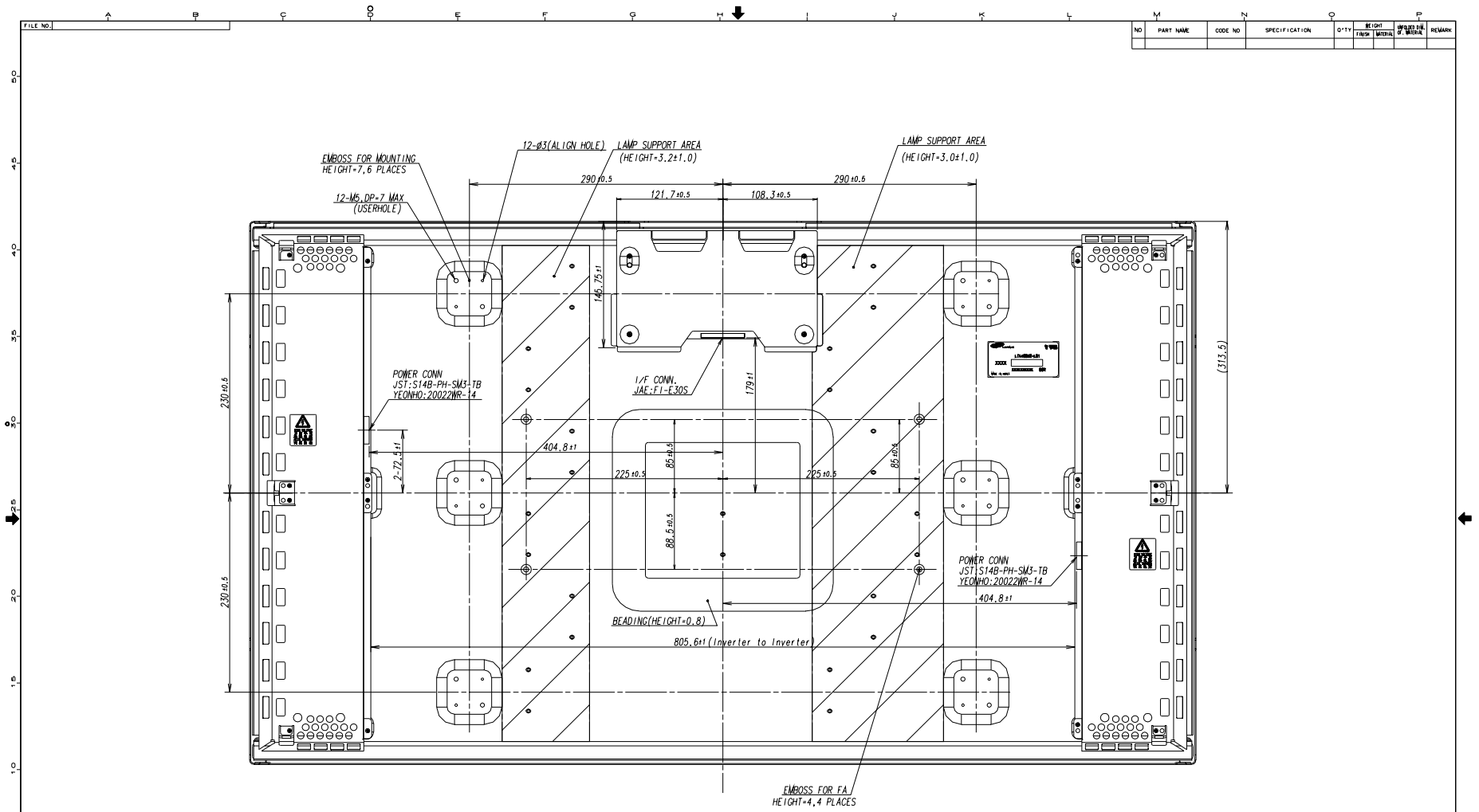

LTA460H2-L02 PRELIMINARY

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 | SCALE: 1/2 | TOLERANCE: LEVEL 2 | DRA'N BY: S.H.PARK | DES'D BY | CHK'D BY | APP'D BY | 04.07.29

SAMSUNG ELECTRONICS

MODEL NAME	LTA460W2-L01
PART/SHEET NAME	OUTLINE DIMENSION
SHEET	2/2
CODE NO.	VER. 001

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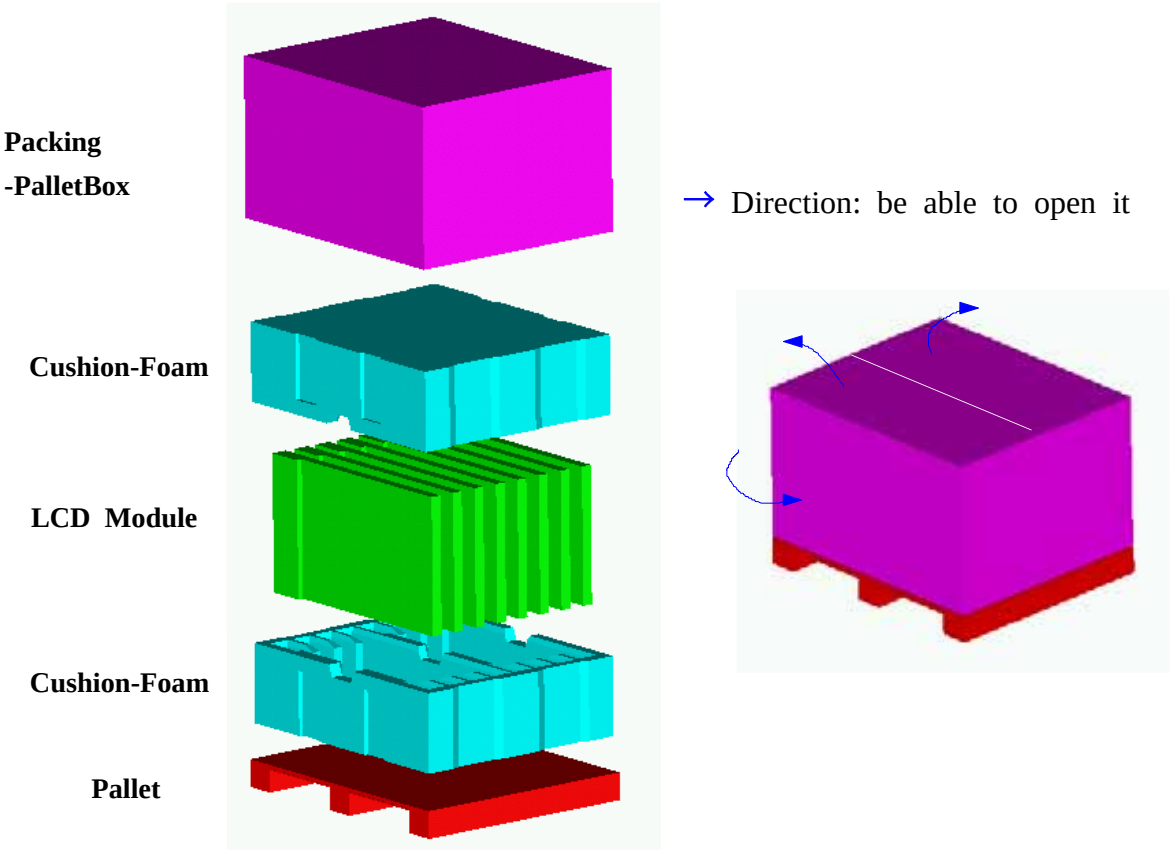
8. Packing

8.1. CARTON(Internal Package)

(1) Packing Form

Corrugated fiberboard box and corrugated cardboard as shock absorber

(2) Packing Method



8.2. Packing Specification

ITEM	Specification	Remark
LCD Packing	10ea / (Packing-Pallet Box)	1. 140 Kg / LCD (10ea) 2. 10 Kg / Cushion-Foam (2ea) 3. 8 Kg / Packing-Pallet Box (1ea) 3. Cushion-Foam Material : EPS 4. Packing-Pallet Box Material : DW4
Pallet	1Box / Pallet	1. Pallet weight = 8.8kg 2. 8.8 Kg / Pallet
Packing Direction	Vertical	
Total Pallet size	H x V x height	1270mm(H) x 1150mm(V) x 844mm(height)
Total Pallet weight	167kg	Pallet(8.8kg) + Module(14*10=140) + Cushion(up+botton=10kg) + PALLET-BOX(8kg)

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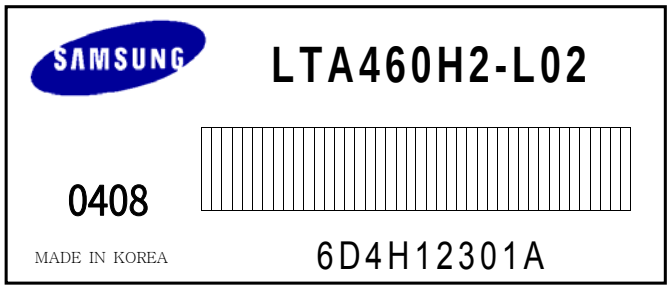
9. Marking & Others

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

(1) Parts number : LTA460H2-L02-XXXX
(2) Revision : One letter
(3) Control : One letter
(4) Lot number : 6 D 4 H 123 01 A
1 2 3 4 5 6 7

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

(5) Nameplate Indication



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(6) Bar code marking for Customer

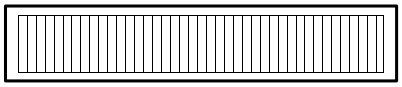
The bar code marking is attached to module backside.

1) MODEL NAME : LTA460H2-L02-XXXX
2) SAMSUNG
3) MADE IN KOREA
4) PRODUCTION NUMBER
5) USER MODEL NAME

Bar code shows a) user model name, b) production number

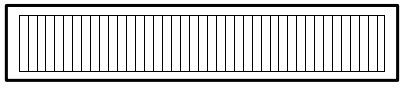
a) User model name

LTA460H2-L02-XXXX

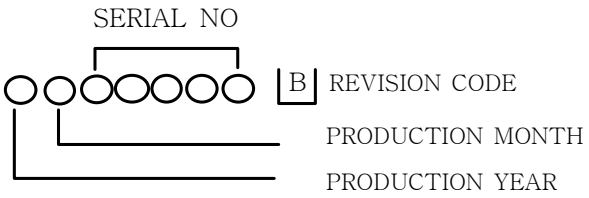


b) Production Number

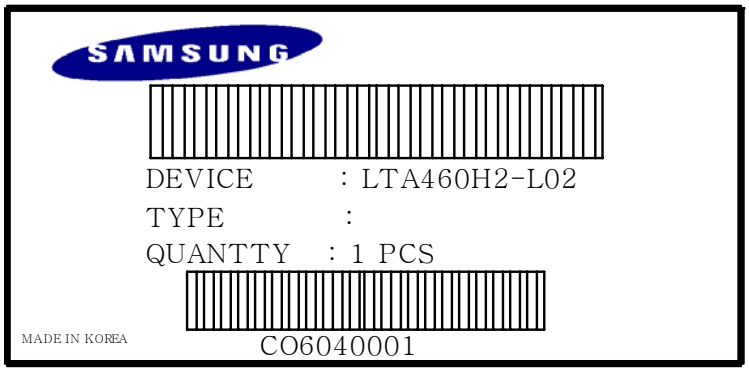
SAMSUNG
MADE IN KOREA



6430008B



(7) Packing box attach



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10. General Precautions

10.1 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(Isopropyl 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 CMOS Gate Array IC.

(i) Use finger-stalls 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 module.

(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.

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10.2 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 35C 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.

10.3 Operation

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

(b) Power supply should always be turned on/off by the 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).

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

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