Samsung Secret

Product Information

DATE : 15. Jul. 2011

SAMSUNG TFT-LCD

MODEL : **LTA460HJ14**

The Information Described in this Specification is Preliminary and can be changed without prior notice

LCD Business

Samsung Electronics Co . , LTD.

Samsung Secret

Contents

Revision History

Date	Rev. No	Page	Summary
15. Jul. 2011	000	all	First issued

General Description

Samsung Secret

Description

LTA460HJ14 is a color active matrix liquid crystal display (LCD) that uses amorphous silicon TFT (Thin Film Transistor) as switching components. This model is composed of a TFT LCD panel, a driver circuit and a back light unit.

The resolution of a 46.0" is 1920 x 1080 and this model can display up to16.7 Million colors with wide viewing angle of 89° or higher in all directions. This panel is intended to support applications to provide a excellent performance for Flat Panel Display such as Home-alone Multimedia TFT-LCD TV and High Definition TV.

Features

- RoHS compliance (Pb-free)
- High contrast ratio & aperture ratio with wide color gamut
- SPVA(Super Patterned Vertical Align) mode
- Wide viewing angle (± 178°)
- High speed response
- FHD resolution (16:9)
- Low Power consumption
- Edge Type LED (Light Emitted Diode) BLU
- DE (Data Enable) mode
- 4ch LVDS (Low Voltage Differential Signaling) interface (4 pixel/clock)

General Information

Items	Specification	Unit	Note
Module Size	1055.5(H_{TYP}) x 610.8 (V_{TYP})	mm	± 1.0mm
	31.1 (D_{TYP})		
Weight	11,800 (Max.)	g	
Pixel Pitch	0.53025(H) x 0.17675(W) * 3	mm	
Active Display Area	1018.08(H) x 572.67(V)	mm	
Surface Treatment	Haze 7%	-	Anti-Glare
Display Colors	8bit – 16.7M	Colors	
Number of Pixels	1920 x 1080	Pixel	
Pixel Arrangement	RGB vertical stripe	-	
Display Mode	Normally Black	-	
Luminance of White	400 (Typ.)	cd/m^2	

1. Absolute Maximum Ratings

If the condition exceeds maximum ratings, it can cause malfunction or unrecoverable damage to the device.

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	V_{DD}	GND-0.3	*16.5*	V	(1)
Storage temperature	T_{STG}	-20	60	℃	(2)
Operation temperature	T_{OPR}	0	50	℃	
Surface temperature	T_{SUR}	0	60	℃	-
Shock (non - operating)	S_{nop}	-	30	G	(3)
Vibration (non - operating)	V_{nop}	-	1.5	G	(4)

Note (1) Ta= 25 ± 2 ℃
(2) Temperature and relative humidity range are shown in the figure below.
a. 90 % RH Max. (Ta ≤ 39 ℃)
b. Relative Humidity is 90% or less. (Ta > 39 ℃)
c. No condensation
(3) 11ms, sine wave, one time for ± X, ± Y, ± Z axis
(4) 10-300 Hz, Sweep rate 10min, 30min for X,Y,Z axis

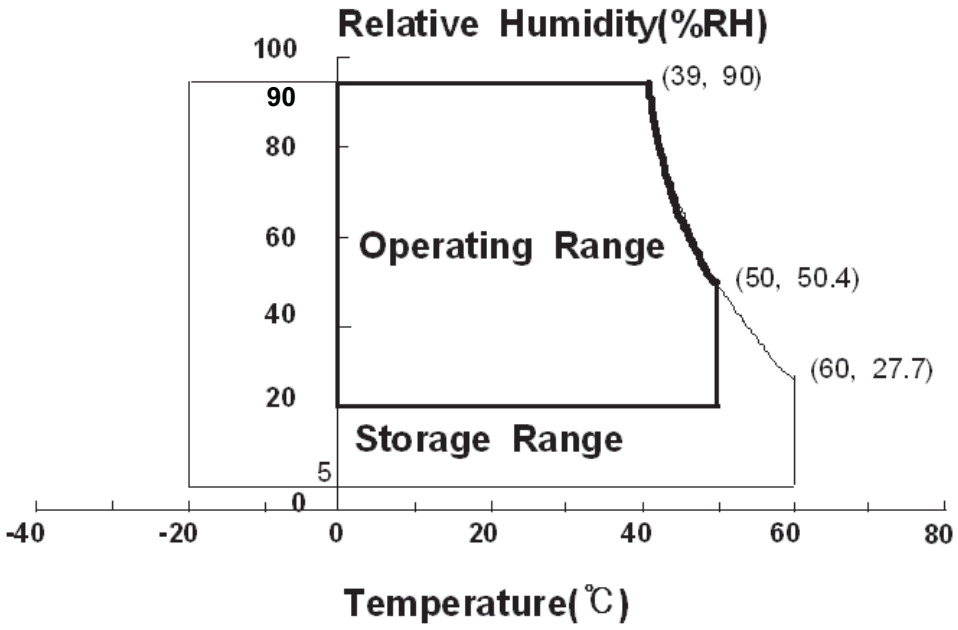


Fig. Temperature and Relative humidity range

2. Optical Characteristics

Samsung Secret

The optical characteristics should be measured in a dark room or equivalent.
Measuring equipment : TOPCON RD-80S, TOPCON SR-3, ELDIM EZ-Contrast

(Ta = 25 ± 2℃, VDD=12.0V, fv=120Hz, f_{DCLK}=297MHz, Dimming Duty = Max)

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio (Center of screen)		C/R	Normal θL,R=0 θU,D=0 Viewing Angle	3,000	4,000	-		(1) SR-3
Response Time	G-to-G	Tg		-	8	-	msec	(3) RD-80S BM-7
Luminance of White (Center of screen)		Y_L		300	400	-	cd/m²	(4) SR-3
Color Chromaticity (CIE 1931)	Red	Rx		TYP. -0.03	0.653	TYP. +0.03		(5),(6) SR-3 PR650
		Ry			0.330			
	Green	Gx			0.310			
		Gy			0.600			
	Blue	Bx			0.150			
		By			0.058			
	White	Wx			0.280			
		Wy			0.290			
Color Gamut		-		-	72	-	%	(5) SR-3
Color Temperature		CCT		-	10,000	-	K	
Viewing Angle	Hor.	θ_L	C/R≥10	75	89	-	Degree	(6) EZ-Contrast
		θ_R		75	89	-		
	Ver.	θ_U		75	89	-		
		θ_D		75	89	-		
Brightness Uniformity (9 Points)		B_{uni}		-	-	25	%	(2) SR-3

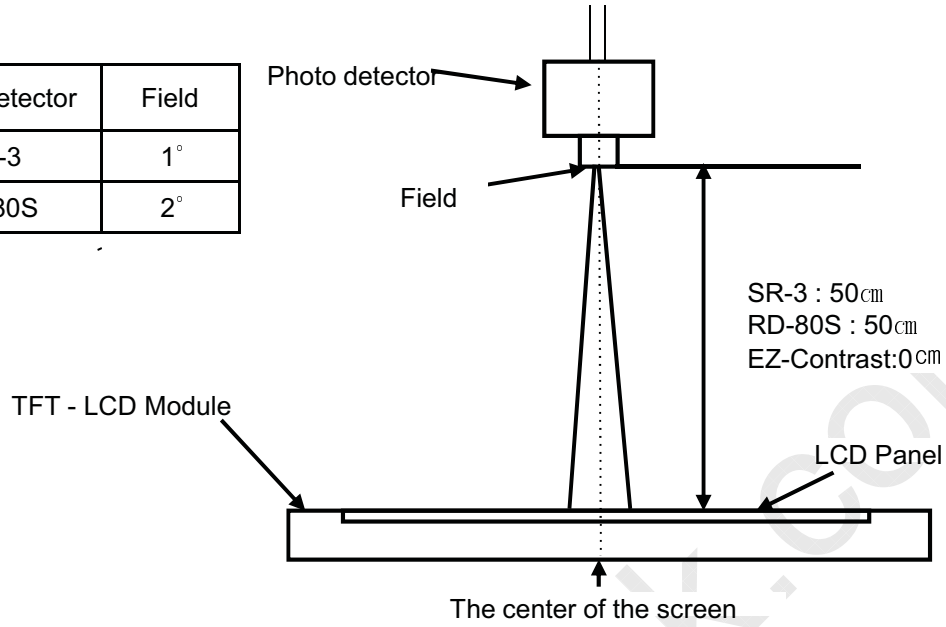
- Test Equipment Setup

The measurement should be executed in a stable, windless and dark room between 40min and 60min after lighting the back light at the given temperature for stabilization of the back light. This should be measured in the center of screen.

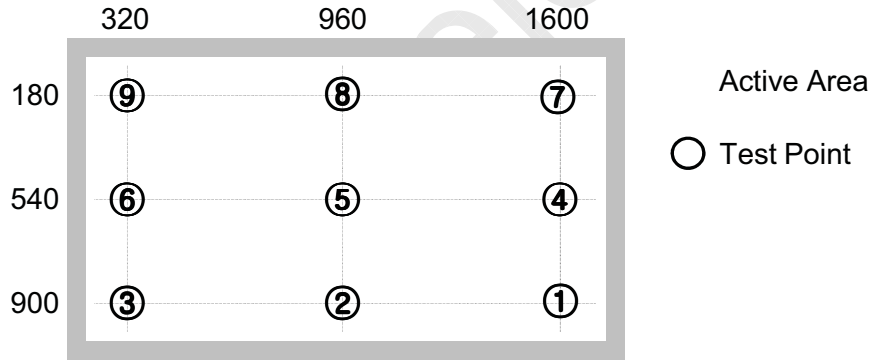
. Dimming Duty = 100%
. Environment condition : Ta = 25 ± 2 ℃

Samsung Secret

Photo detector	Field
SR-3	1°
RD-80S	2°



- Definition of test point



Note (1) Definition of Contrast Ratio (C/R)
: Ratio of gray max (Gmax) & gray min (Gmin) at the center point ⑤ of the panel

$$C/R = \frac{G\max}{G\min}$$

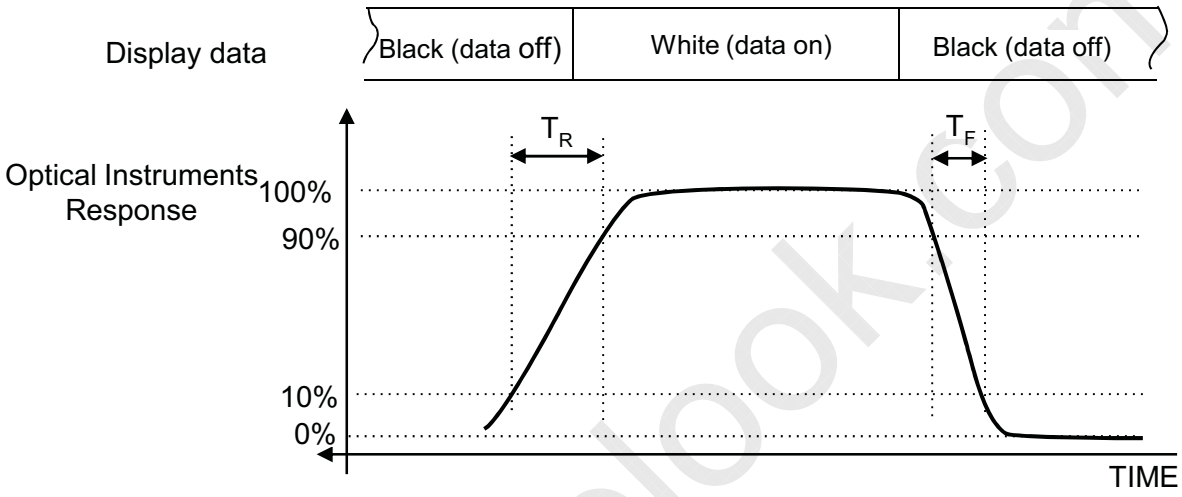
Gmax : Luminance with all pixels white
Gmin : Luminance with all pixels black

Note (2) Definition of 9 points brightness uniformity (Test pattern : Full White)

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

Bmax : Maximum brightness
Bmin : Minimum brightness

Note (3) Definition of Response time : Sum of Tr, Tf

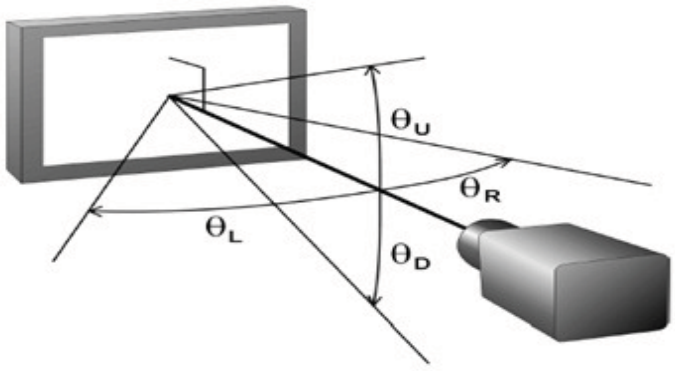


※ G- to- G : Average response time between Gray to Gray (Scale)

Note (4) Definition of Luminance of White : Luminance of white at center point ⑤

Note (5) Definition of Color Chromaticity (CIE 1931)
Color coordinate of Red, Green, Blue & White at center point ⑤

Note (6) Definition of Viewing Angle
: Viewing angle range (C/R ≥10)



3. Electrical Characteristics

3.1 TFT LCD Module

The connector for display data & timing signal should be connected.

Ta = 25℃ ± 2 ℃

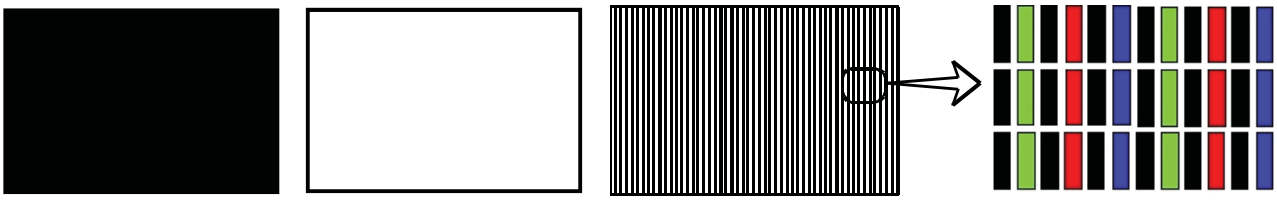
Item		Symbol	Min.	Typ.	Max.	Unit	Note
Voltage of Power Supply		V_{DD}	10.8	12.0	13.2	V	(1)
Current of Power Supply	(a) Black	I_{DD}	-	720	950	mA	(2),(3)
	(b) White		-	1280	1500	mA	
	(c) N-pattern		-	1280	1500	mA	
Vsync Frequency		f_V	100	120	125	Hz	
Hsync Frequency		f_H	120	135	140	kHz	
Main Frequency		Fdclk	260	297	310	MHz	
Rush Current		I_{RUSH}	-	5	7	A	(4)

Note (1) The ripple voltage should be controlled under 10% of V_{DD}.

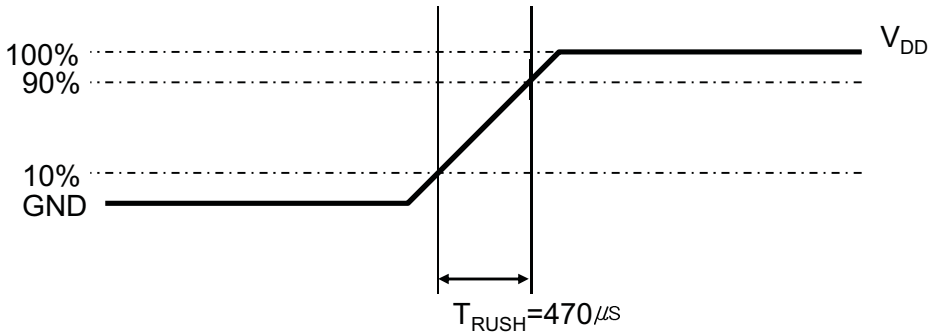
(2) fv=120Hz, f_{DCLK} =297MHz, V_{DD} = 12.0V, DC Current.

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

a) Black Pattern b) White Pattern c) N-Pattern



(4) Measurement Conditions

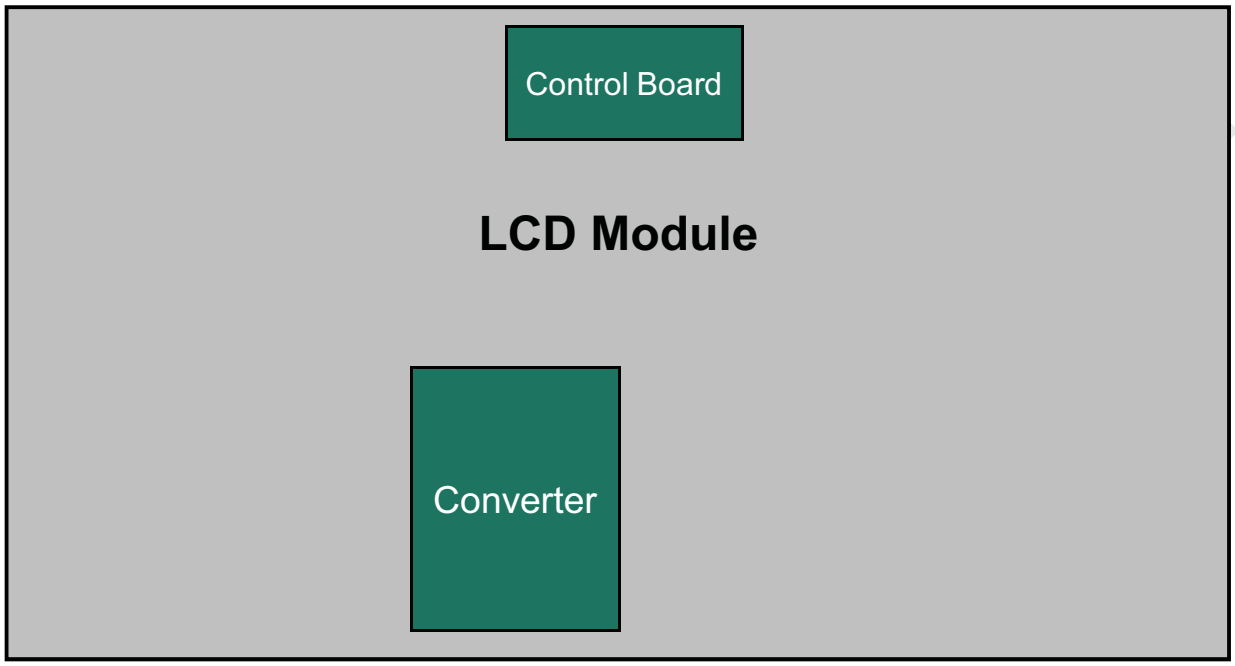


Rush Current I_{RUSH} can be measured when T_{RUSH}. is 470㎲.

3.2 Back Light Unit

The back light unit contains Edge type White LEDs (Light Emitting Diode)

Ta=25 ± 2℃



Item	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Life Time	Hr	30,000	-	-	Hour	(1)

Note (1) It is defined as the time to take until the brightness reduces to 50% of its original value.

[Operating condition : Ta = 25± 2℃, For single LED only.]

Samsung Secret

3.3 Converter Input Condition & Specification

Items	Symbol	Conditions	Specifications			Unit	Note
			Min.	Typ.	Max.		
Input Voltage	Vin	-	22	24	26	V	Ta=25± 2 ℃
Input Current	I_{RUSH}	Vin=24.0V Vdim =3.3V	-	-	3.8	A	2D Mode
			-	-	TBD	A	3D Mode
Output Current	$I_{O,MAX}$	Vin = 24.0V V dim =3.3 V	-	140	-	mArms	2D Mode
			-	TBD	-	mArms	3D Mode
Backlight On/Off	ON	Vin=24.0 V	2.4	-	5.25	V	
	OFF	Vin=24.0 V	0	-	0.8		
Dimming Range	$V_{\_DIM}$	Vin :22~26V	0	-	3.3	V	
Dimming Frequency	F_{PWM}	Vin=24.0 V	-	170	-	Hz	
External Dimming Duty Range	EX_Dim	Min	1	-	100	%	
External Dimming Frequency Range	F_{EX_PWM}	Vin=22.0~26.0 V	120	-	180	Hz	Dim Pin(#13) : Floating
External Dimming Signal Level	V_{PWM}	High (ON)	2.4	-	5.25	V	
		Low (Off)	0	-	0.8		

Note) Power Consumption is measured when 400 [cd/m] of luminance which is the typical luminance.

(1) All data is measured after 120min warm-up.

- Additional Appendix for Supply Current & Power consumption

ITEM	SYMBOL	CONDITION	SPECIFICATION			UNIT	NOTE
			MIN	TYP	MAX		
Input Current	Iovershoot, 2D	Vin=24V, dim=max	-	TBD	TBD	Adc	Maximum current after turn-on
	Isaturation,2D		-	TBD	TBD	Adc	Saturation current after 1hr aging
	Iovershoot,3D		-	TBD	TBD	Adc	Maximum current after turn-on
	Isaturation,3D		-	TBD	TBD	Adc	Saturation current after 1hr aging

4. Input Terminal Pin Assignment

Samsung Secret

4.1.1 Input Signal & Power Connector : FI-RE41S-HF (JAE/UJU)

Pin	Description		Pin	Symbol	Description
1	Vdd(12V)		21	ODD LVDS SIGNAL	Rx1[3]P
2	Vdd(12V)		22		No Connection
3	Vdd(12V)		23		No Connection
4	Vdd(12V)		24		GND
5	Vdd(12V)		25		Rx3[0]N
6	No Connection		26		Rx3[0]P
7	GND		27		Rx3[1]N
8	GND		28		Rx3[1]P
9	GND		29		Rx3[2]N
10	ODD LVDS SIGNAL	Rx1[0]N	30		Rx3[2]P
11		Rx1[0]P	31		GND
12		Rx1[1]N	32		Rx3CLK-
13		Rx1[1]P	33		Rx3CLK+
14		Rx1[2]N	34		GND
15		Rx1[2]P	35		Rx3[3]N
16		GND	36		Rx3[3]P
17		Rx1CLK-	37		No Connection
18		Rx1CLK+	38		No Connection
19		GND	39	GND	
20		Rx1[3]N	40	No Connection	
			41	No Connection	

Note) No Connection: This PINS are only used for SAMSUNG internal using.

Samsung Secret

4.1.2 Input Signal & Power

Connector : FI-RE51S-HF (JAE/UJU)

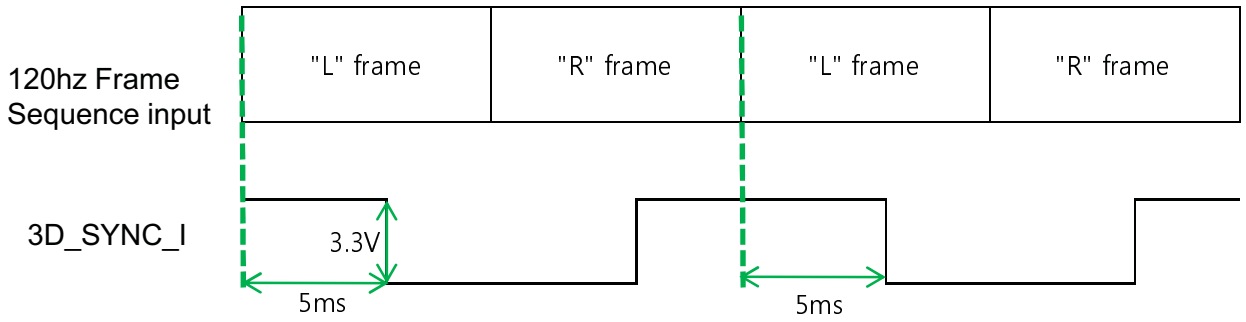
Pin	Description		Pin	Description	
1	Vdd(12V)		26	EVEN LVDS SIGNAL	Rx4[0]P
2	Vdd(12V)		27		Rx4[1]N
3	Vdd(12V)		28		Rx4[1]P
4	Vdd(12V)		29		Rx4[2]N
5	Vdd(12V)		30		Rx4[2]P
6	No Connection		31		GND
7	GND		32		Rx4CLK-
8	GND		33		Rx4CLK+
9	GND		34		GND
10	EVEN LVDS SIGNAL	Rx2[0]N	35		Rx4[3]N
11		Rx2[0]P	36		Rx4[3]P
12		Rx2[1]N	37		No Connection
13		Rx2[1]P	38		No Connection
14		Rx2[2]N	39	GND	
15		Rx2[2]P	40	No Connection	
16		GND	41	No Connection	
17		Rx2CLK-	42	3D_EM	3D_EN signal (Note 2)
18		Rx2CLK+	43	No Connection	
19		GND	44	No Connection	
20		Rx2[3]N	45	No Connection	
21		Rx2[3]P	46	No Connection	
22		No Connection	47	No Connection	
23		No Connection	48	3D_SYNC_I	Shutter glass Sync Input signal (Note 3)
24		GND	49	3D_SYNC_O	Shutter glass Sync Signal
25		Rx4[0]N	50	No Connection	
			51	No Connection	

Note (1) No Connection: These PINS are used only for SAMSUNG. (DO NOT CONNECT)
Note (2) 3D Enable signal voltage level
High : Min 2.7V, Max 3.3V Low : Min 0 V, Max 0.4V

Samsung Secret

Note3) Recommend timing for 3D_SYNC_I Signal .

- Guide Signal to Separate L frame and R frame
- Shutter glass signal & Operation timing also depend on this signal
- To operate 3D function, need this signal from Set A/D board.
  (In Order for using it in 2D mode, change the input condition into High)



Note4) Pin number starts from Left side

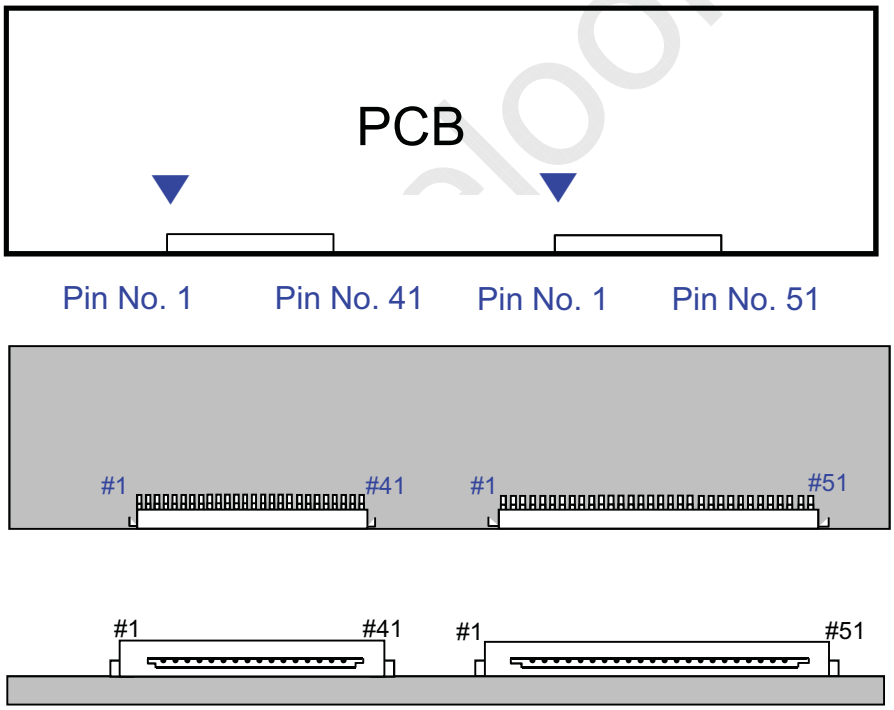


Fig. Connector diagram

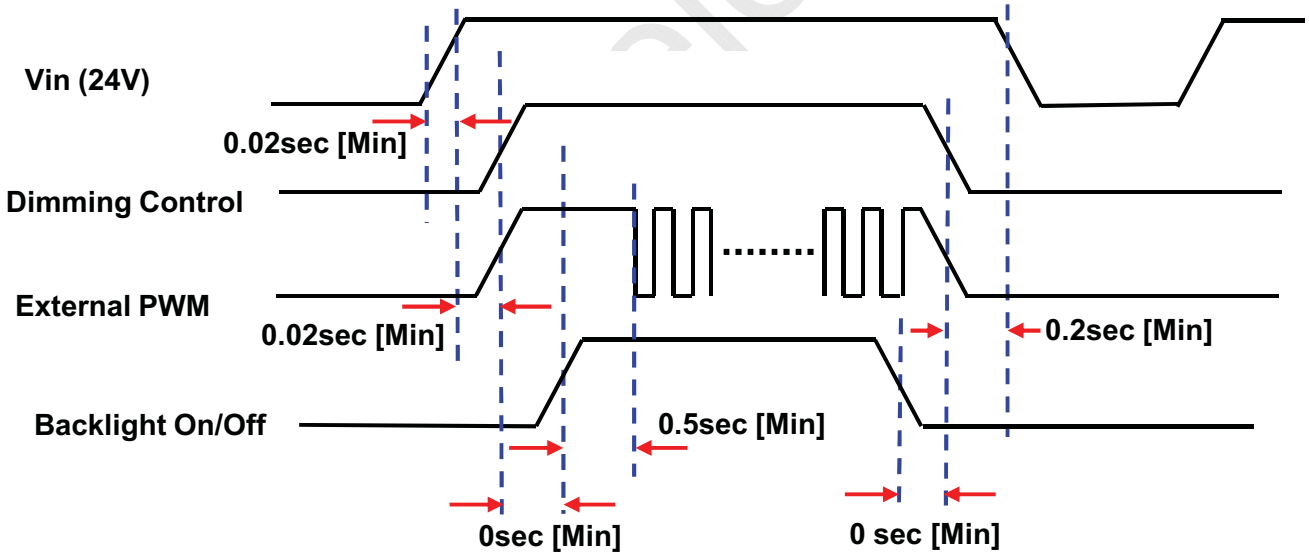
a. All GND pins should be connected together and also be connected to the LCD's metal chassis.
b. All power input pins should be connected together.
c. All NC pins should be separated from other signal or power.

4.2 Converter Input Pin Configuration

Connector : Yeon-ho, 20022WR-14B1

Pin No.	Pin Configuration(FUNCTION)
	Master
1 ~ 5	24 V
6 ~ 10	GND
11	No Connection (DO NOT CONNECT)
12	Backlight On /Off [ON:2.4 – 5.25 V, OFF: 0 - 0.8 V]
13	Dimming Control [0V:Min, 3.3V:Max]
14	No Connection (DO NOT CONNECT)

4.3. Converter Input Power Sequence



Note) SEQUENCE : ON = Vin(24V) > Dimming Control ≥ Backlight On/Off
OFF = Backlight On/Off ≥ Dimming Control > Vin(24V)

4.4 LVDS Interface

- LVDS Receiver : T-con (merged)
- Data Format (JEIDA Only)

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

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

COLOR	DISPLAY (8bit)	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~ R 252
	↓ 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	R 253
		0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R 254
	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

5. Interface Timing

5.1 Timing Parameters (DE mode)

SIGNAL	ITEM	SYMBOL	MIN.	TYP.	MAX.	Unit	NOTE
Clock	Frequency	$1/T_C$	260	297	305	MHz	-
Hsync		F_H	120	135	140	KHz	-
Vsync		F_V	100	120	125	Hz	-
Vertical Display Term	Active Display Period	T_{VD}	-	1080	-	Lines	-
	Vertical Total	T_V	1092	1125	1380	Lines	-
Horizontal Display Term	Active Display Period	T_{HD}	-	1920	-	Clocks	-
	Horizontal Total	T_H	2092	2200	2348	clocks	-

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

(1) Test Point : TTL control signal and CLK at LVDS Tx input terminal in system

(2) Internal V_{DD} = 3.3 V

(3) Spread spectrum

- Modulation rate (max) : ± 1.5 %
- Modulation Frequency : under 100 KHz

5.2 LVDS Input Data Characteristics

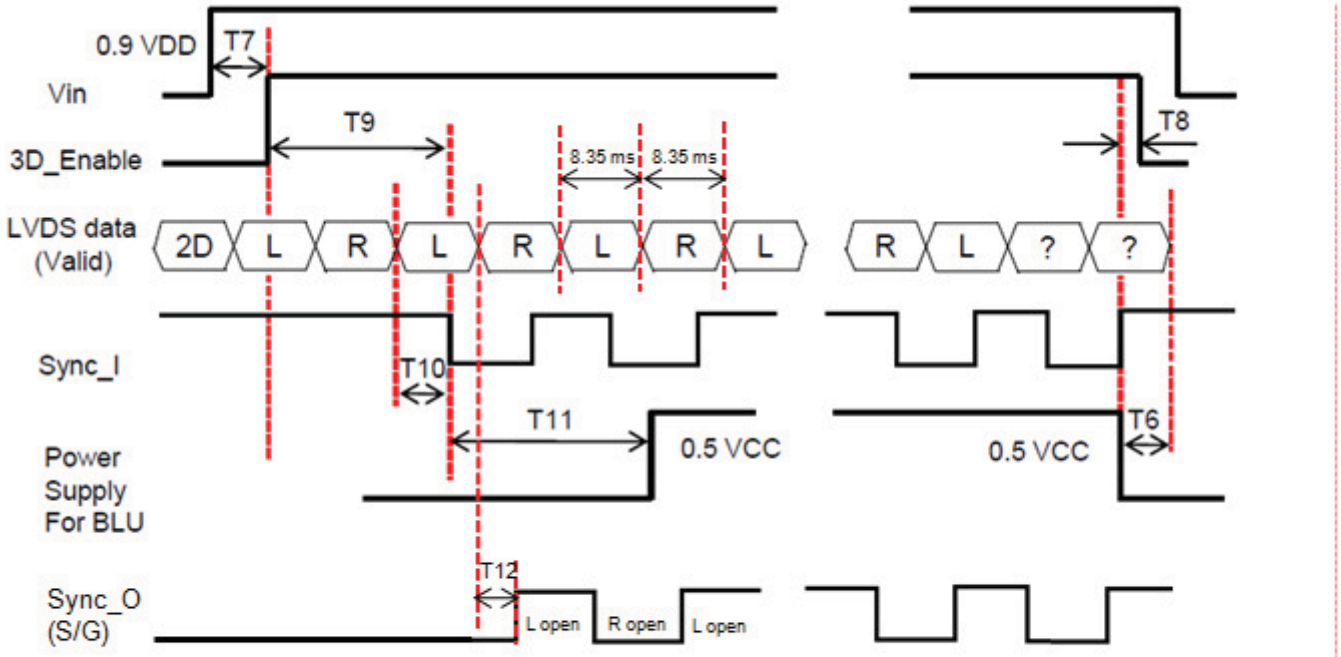
ITEM		SYMBOL	Min.	Typ.	Max.	UNIT	NOTE
Input Data Position	F_{IN}=85MHz	t_{RSRM}	-	-	400	ps	-
	F_{IN}=78MHz		-	-	450	ps	
	F_{IN}=74.25MHz		-	-	500	ps	
Input Data Position	F_{IN}=85MHz	t_{RSLM}	-400	-	-	ps	
	F_{IN}=78MHz		-450	-	-	ps	
	F_{IN}=74.25MHz		-500	-	-	ps	
Input common mode voltage		V_{CM}	0.3	-	1.8	V	-
Differential Input Voltage		$\|V_{ID}\|$	200	350	600	mV	-

Note) When the skew is measured the Spread Spectrum should be 0%

Samsung Secret

5.3 3D mode Sequence

5.3.1 3D Sequence



	spec	Measure	Result		spec	Measure	Result
T5	≥ 1000 msec			T8	> 0 msec		
T6	≥ 100 msec			T9	> 0 msec		
T7	≥ 2 sec			T10	Typ. 5 msec		
T12	Typ. 4.5msec						

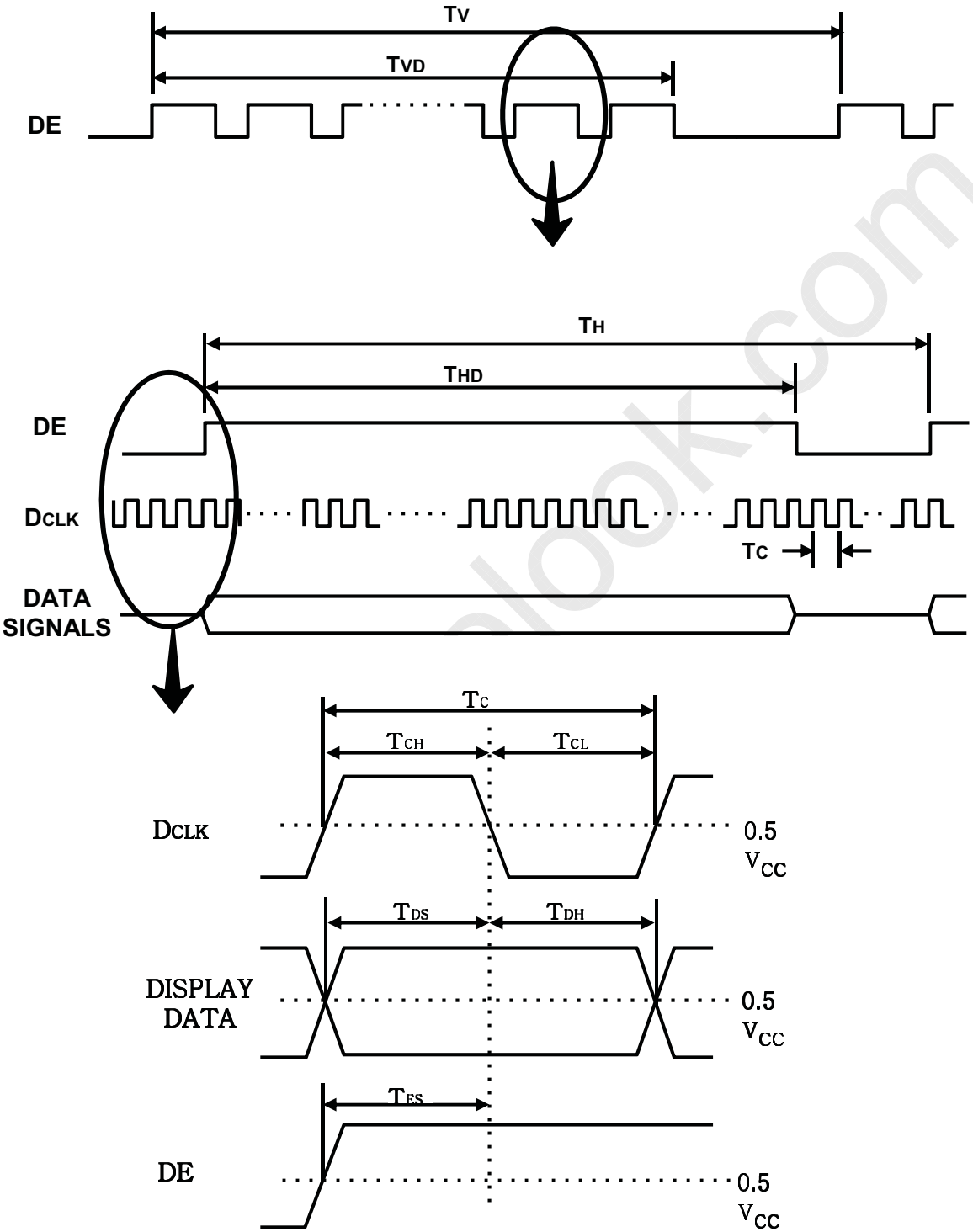
※ T10 : Sync_I is checked with Valid Active L frame

5.3.2 Level of 3D Control signal

Test Items	Test Condition		Spec	
			Min	Max
3D Enable Level	C-PBA Input Level (Change to 3D mode)	High	2.7	3.3
		Low	0.0	0.4
3D_SYNC_I	C-PBA Input Level (L/R Sync)	High	2.7	3.3
		Low	0.0	0.4
3D_SYNC_O	Shutter Glasses Sync Level	High	2.7	3.3
		Low	0.0	0.4

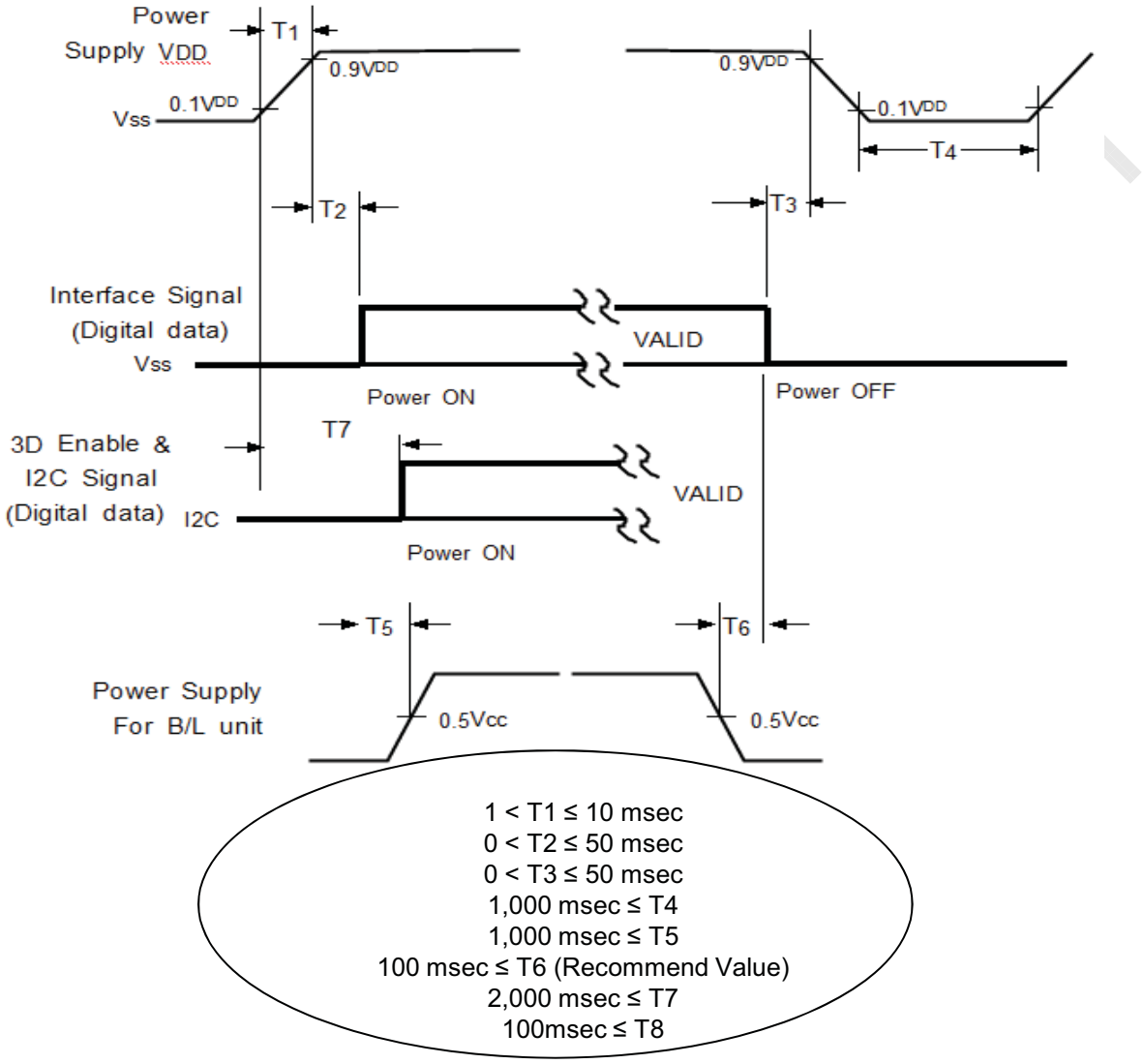
Samsung Secret

5.4 Timing diagrams of interface signal (DE mode)

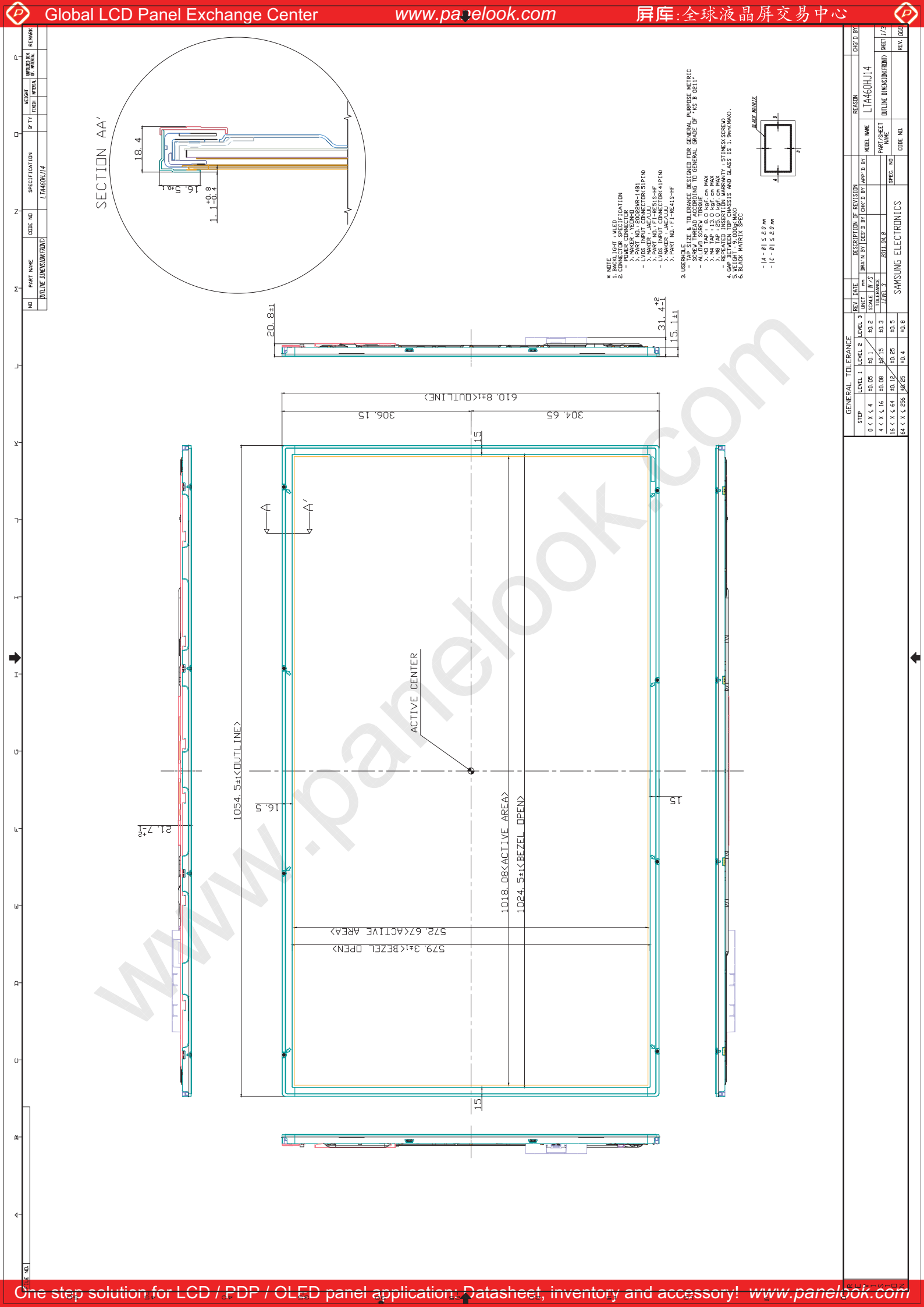


5.5 Power ON/OFF Sequence

To prevent a latch-up or DC operation of the LCD Module, the power on/off sequence should be as the diagram below.



- The supply voltage of the external system for the Module input should be the same as the definition of V_{DD}.
- Apply the LED 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 show abnormal screen.
- In case of V_{DD} = off level, please keep the level of input signals low or keep a high impedance.
- T4 should be measured after the Module has been fully discharged between power off and on period.
- Interface signal should not be kept at high impedance when the power is on.



NO	PART NAME	CODE NO	SPECIFICATION	Q'TY	WEIGHT	UNPLATED DIM BY MATERIAL	REMARK
	OUTLINE DIMENSION(FRONT)		LTA460HJ14				

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

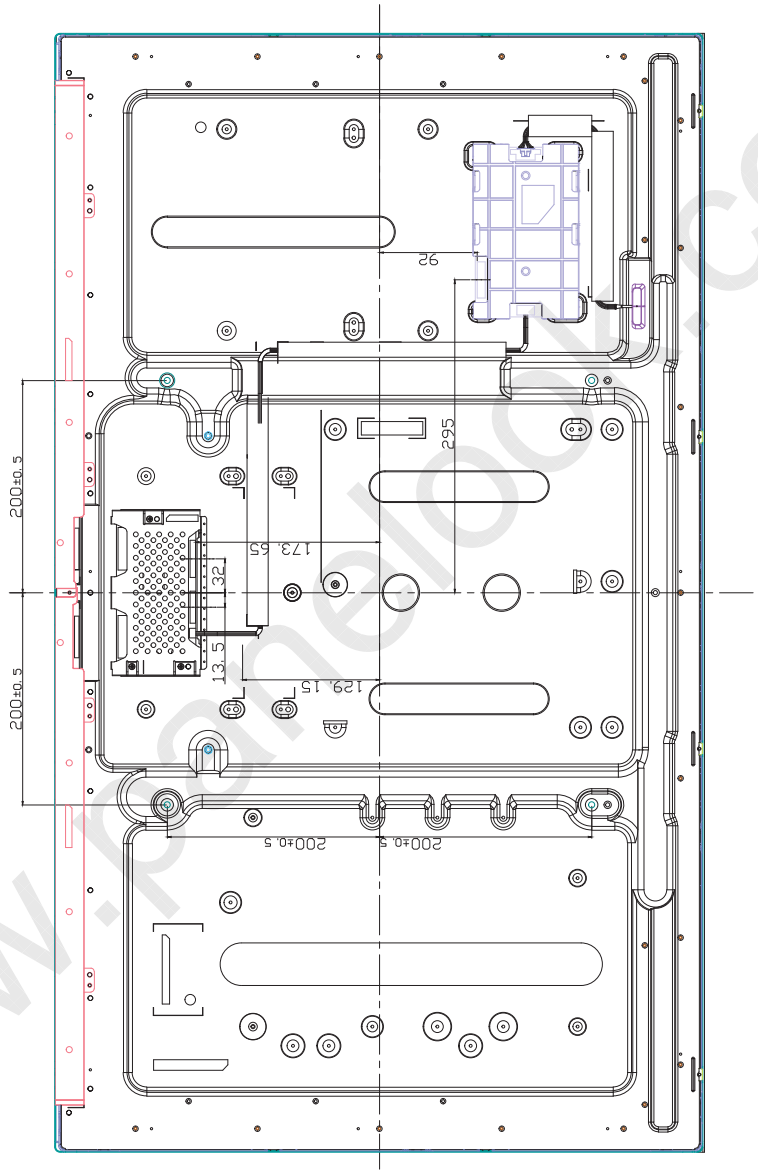
REV	DATE	DESCRIPTION OF REVISION	DRA'N BY	DES'D BY	CHK'D BY	APP'D BY

UNIT : mm
SCALE : N/S
TOLERANCE LEVEL 2
2011.04.8

SAMSUNG ELECTRONICS

REASON	CHG'D BY

MODEL NAME : LTA460HJ14
PART/SHEET NAME : OUTLINE DIMENSION(FRONT)
SHEET 1/3
SPEC. NO
CODE NO.
REV. 000



7. PACKING

8.1 CARTON (Internal Package)

(1) Packing Form

Corrugated fiberboard box and corrugated cardboard as shock absorber

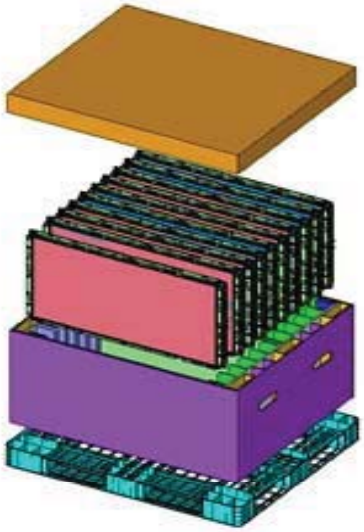
(2) Packing Method

Packing -Pallet Box

LCD Module

Packing -Pallet Box

Pallet-Plastic



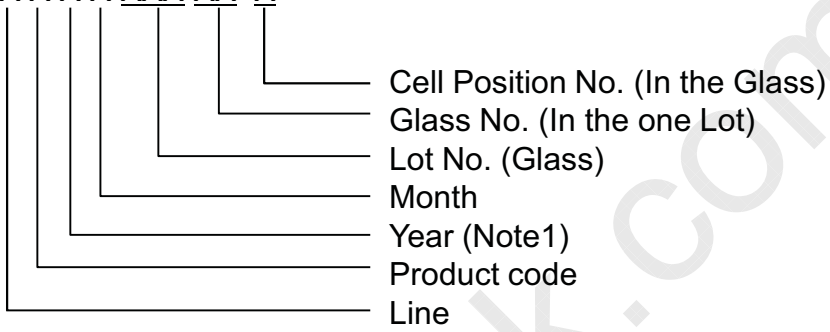
8.2 Packing Specification

Item	Specification	Remark
LCD Packing	16 ea / (Packing-Pallet Box)	1. 10.5 kg / LCD (16ea) 2. 12 Kg / Cushion-pallet (2ea) 3. 8 Kg / Packing-Pallet Box (1ea) 4. Packing Material : Paper
Pallet	1Box / Pallet	1. Pallet weight = 8.8 kg
Packing Direction	Vertical	
Total Pallet Size	H x V x height	1270mm(H) x 1150mm(V) x 844mm(height)
Total Pallet Weight	196.8kg	Pallet(8.8kg) + Module (10.5 * 16=168kg) + Cushion (up + bottom =12kg) + Pallet-BOX(8kg)

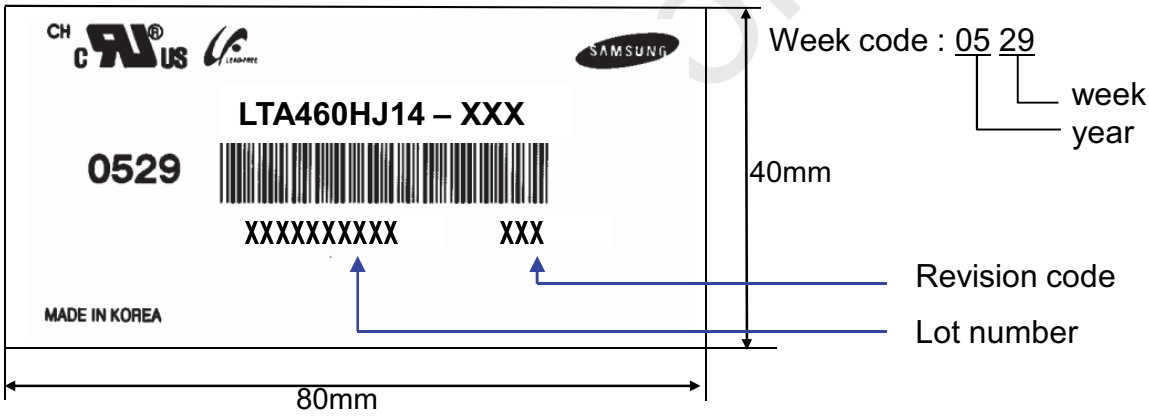
8. MARKING & OTHERS

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

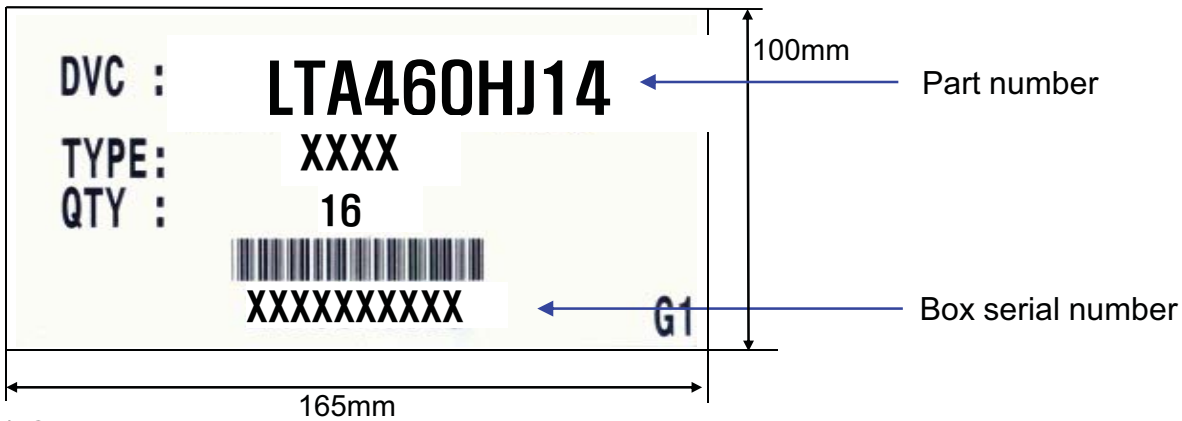
(1) Part number : LTA460HJ14 – XXX
(2) Revision: Three letters
(3) Lot number : X X X X XXX XX X



(4) Nameplate Indication



(5) Packing box attach



(6) Others

1. After service part
   LEDs cannot be replaced because of the narrow bezel structure.

9. General Precautions

9.1 Handling

(a) When the Module is assembled, it should be attached to the system firmly using all mounting holes. Be careful not to twist and bend the Module.

(b) Because the converter use high voltage, it should be disconnected from power before it is assembled or disassembled.

(c) 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 LED back light.

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

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

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

(g) 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.

(h) 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 with soap thoroughly.

(i) Protect the module from Electrostatic discharge. Otherwise the ASIC IC or Semiconductor would be damaged.

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

(k) Do not disassemble the Module.

(l) Do not disassemble shield case of converter & LVDS board.

(m) Do not connect N.C pins. (Samsung internal use only)

(n) Protection film for polarizer on the Module should be slowly peeled off just before use so that the electrostatic charge can be minimized. Must put on antistatic glove while handle a module

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

9.2 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 5 to 40℃ and relative humidity of less than 70%.

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

(c) The Module should be stored in a dark place. It is prohibited to apply sunlight or fluorescent light in storing.

(d) Storage period is recommended not to excess 1 year.

9.3 Operation

(a) Do not connect or disconnect the Module in the "Power On" condition.

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

(c) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference should 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 converter power supply should be connected directly with a minimized length. A longer cable between the back light and the converter may cause lower luminance of LED and may require higher startup voltage (Vs).

9.4 Operation Condition Guide

(a) The LCD product should be operated under normal conditions.
Normal condition is defined as below;
- Temperature : 20± 15℃
- Humidity : 55± 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.

9.5 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. (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 keeps displaying the same pattern for a long period of time, the image may be "sticked " to the screen.
To avoid image sticking, it is recommended to use a screen saver.

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

(f) Please contact SEC in advance when you display the same pattern for a long time.