Product Information

Customer : Gen **ISSUED DATE : Apr. 28, 2009**

SAMSUNG TFT-LCD

MODEL : **LTA550HF03**

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

NOTE :

LCD Business

Samsung Electronics Co . , LTD.

Contents

General Description

Description

LTA550HF03 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 55.0" is 1920 x 1080 and this model can display up to1.06 Billion 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 & aperture ratio
- SPVA (Super Patterned Vertical Align) mode
- Wide viewing angle (±178°)
- High speed response (120Hz)
- FHD resolution (16:9)
- Low Power consumption
- White LED Backlight
- DE (Data Enable) mode
- LVDS (Low Voltage Differential Signaling) interface

General Information

Items	Specification	Unit	Note
Module Size	1267.6(H_{TYP}) x 744.4(V_{TYP})	mm	±1.0mm
	29.6(D_{TYP})		±1.0mm
Weight	17,000 (Max.)	g	
Pixel Pitch	0.630(H) x 0.630(W)	mm	
Active Display Area	1209.6(H) X 680.4(V)	mm	
Surface Treatment	Antiglare, Hard-coating(3H)	-	
Display Colors	10bit (FRC) – 1.06Billion	Colors	
Number of Pixels	1920 x 1080	Pixel	
Pixel Arrangement	RGB vertical stripe	-	
Display Mode	Normally Black	-	
Luminance of White	(450) Typ.	cd/m^2	

1. Absolute Maximum Ratings

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

1.1 Back Light Unit Absolute Maximum Ratings

Item		Symbol	Min.	Max.	Unit	Note
Power Supply Voltage		V_{DD}	GND-0.3	*13*	V	(1)
Storage temperature		T_{STG}	-20	60	℃	(2)
Glass surface temperature (Operation)	Center	T_{OPR}	0	50	℃	(2)
Shock (non - operating)		S_{nop}	-	30	G	(3)
Vibration (non - operating)		V_{nop}	-	1.5	G	(4)

1.2 LED Unit Absolute Maximum Ratings

Item	Symbol	Max.	Unit	Note
Operating Temperature Range	T_{op}	*-20~+70*	℃	-
Storage Temperature Range	T_{STG}	*-30~+70*	℃	-
Junction Temperature	T_j	110	℃	-
Forward Current	I_f	0.18	A	Continuous operation @String (2string /1Bar)
	I_{fp}	0.24	A	Duty 35% operation @String (2string /1Bar)
Forward Voltage	V_f	215.2	V	Continuous operation @String (31 LEDs / 1String)
	V_{fp}	220	V	Impulsive operation @String (31 LEDs / 1String)
Thermal Resistance, Junction to PCB	$R_{th,JS}$	<65K/W	K/W	-

Note (1) Ta= 25 ± 2 °C

(2) Temperature and relative humidity range are shown in the figure below.

a. 90 % RH Max. (Ta ≤ 39 °C)

b. Relative Humidity is 90% or less. (Ta > 39 °C)

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

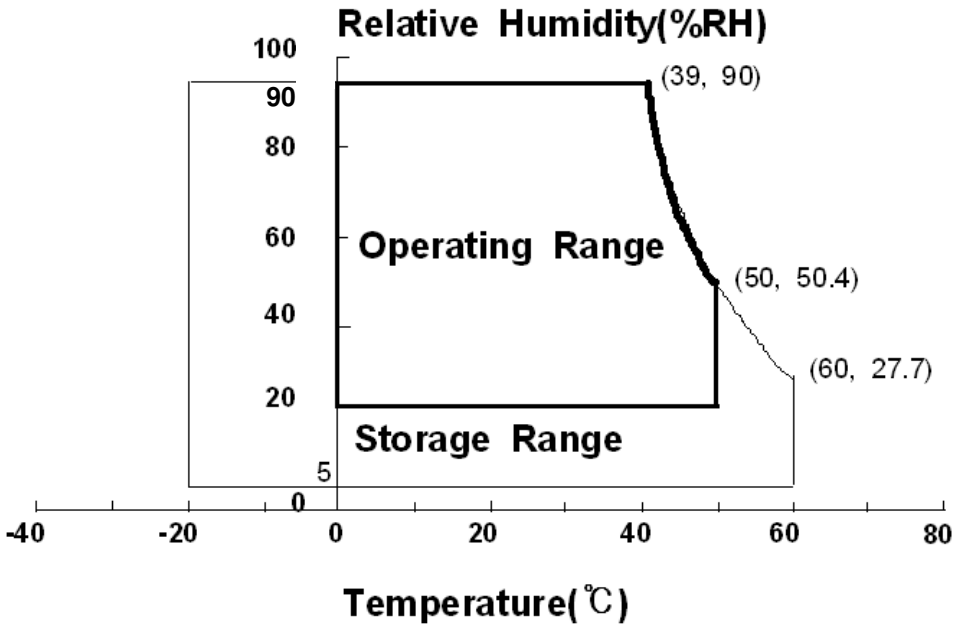


Fig. Temperature and Relative humidity range

2. Optical Characteristics

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°C, VDD=12.0V, fv=120Hz, f_{DCLK}=297MHz, LED current =110mA)

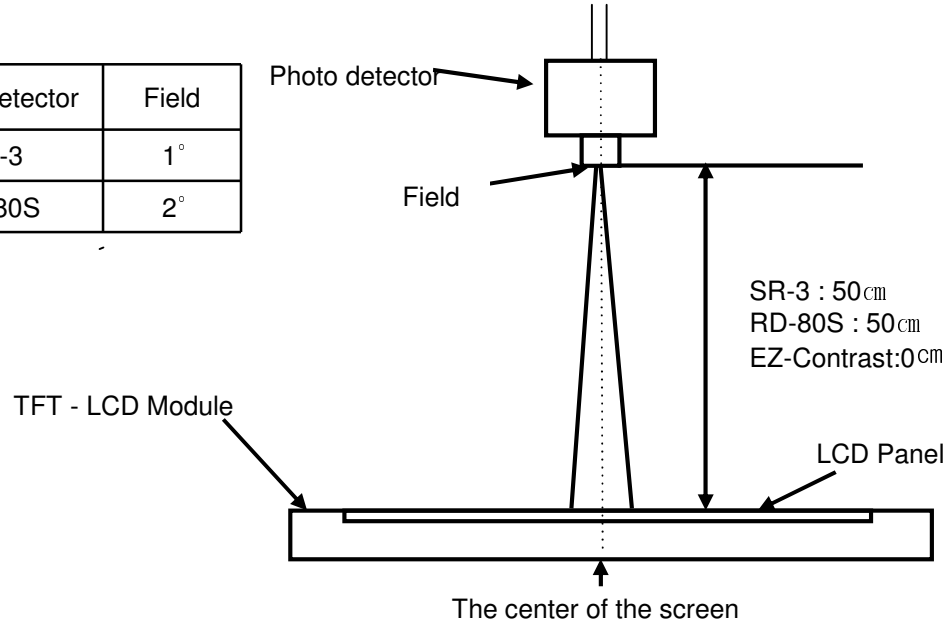
Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio (Center of screen)		C/R	Normal θ**L,R**=0 θ**U,D**=0 Viewing Angle	(4,000)	5,000	-	-	(1) SR-3
Response Time	G-to-G	Tg		-	6	(10)	msec	(3) RD-80S
Luminance of White (Center of screen)		Y_L		(400)	450	-	cd/m^2	(4) SR-3
Color Chromaticity (CIE 1931)	Red	Rx		TYP. -0.03	(0.650)	TYP. +0.03		(5),(6) SR-3
		Ry			(0.330)			
	Green	Gx			(0.285)			
		Gy			(0.635)			
	Blue	Bx			(0.150)			
		By			(0.057)			
	White	Wx			0.280			
		Wy			0.290			
Color Gamut		-		-	80	-	%	(5) SR-3
Color Temperature		-		-	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

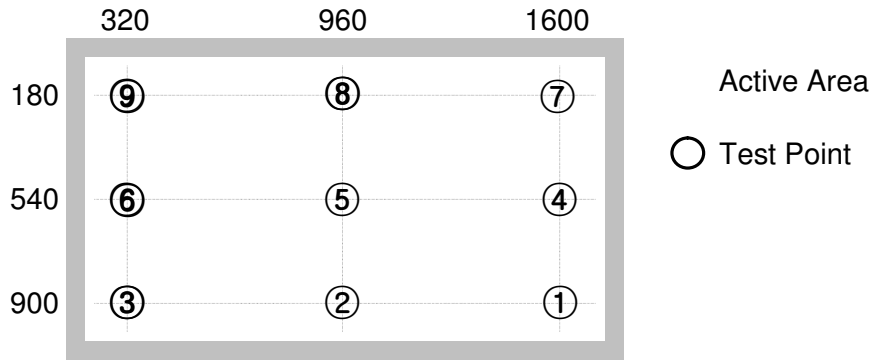
The measurement should be executed in a stable, windless and dark room between 40min and 60min after lighting the back light at the given temperature for stabilization of the back light. This should be measured in the center of screen.

. LED current = 110mA (for 1EA LED bar)
. Environment condition : Ta = 25 ± 2 °C

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

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

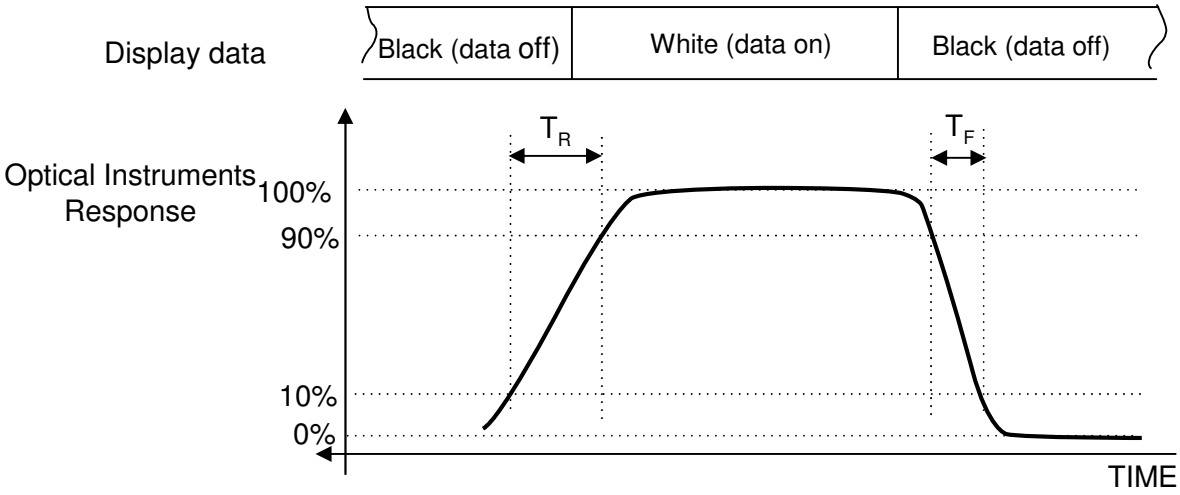
Gmax : Luminance with all pixels white
Gmin : Luminance with all pixels black

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

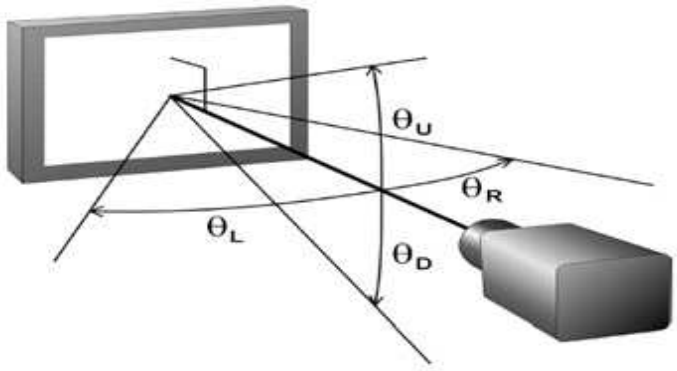


※ G-to-G : Average response time between Gray to Gray (Scale)

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°C ± 2 °C

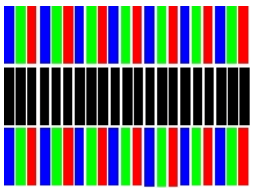
Item		Symbol	Min.	Typ.	Max.	Unit	Note
Voltage of Power Supply		V_{DD}	10.8	12.0	13.2	V	(1)
Current of Power Supply	(a) Black	I_{DD}	-	1800	(2000)	mA	(2),(3)
	(b) White		-	1800	(2000)	mA	
	(c) H-STRIPE		-	3200	(3500)	mA	
Vsync Frequency		f_V	(90)	120	(125)	Hz	
Hsync Frequency		f_H	(100)	135	(140)	kHz	
Main Frequency		Fdclk	(240)	297	(310)	MHz	
Rush Current		I_{RUSH}	-	-	(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)

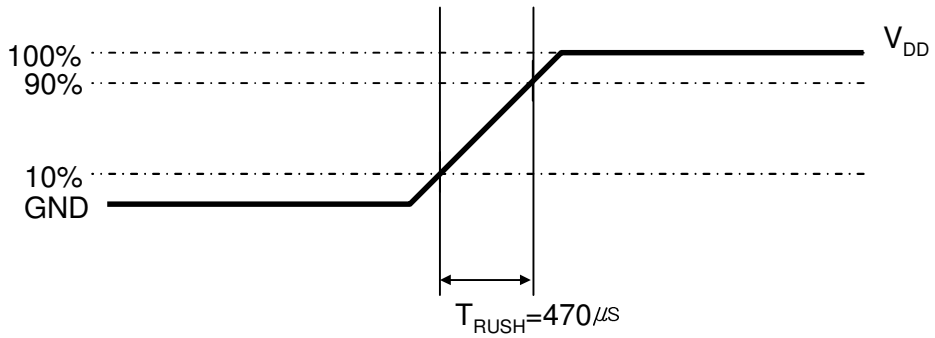
a) Black Pattern

b) White Pattern

c) H-stripe



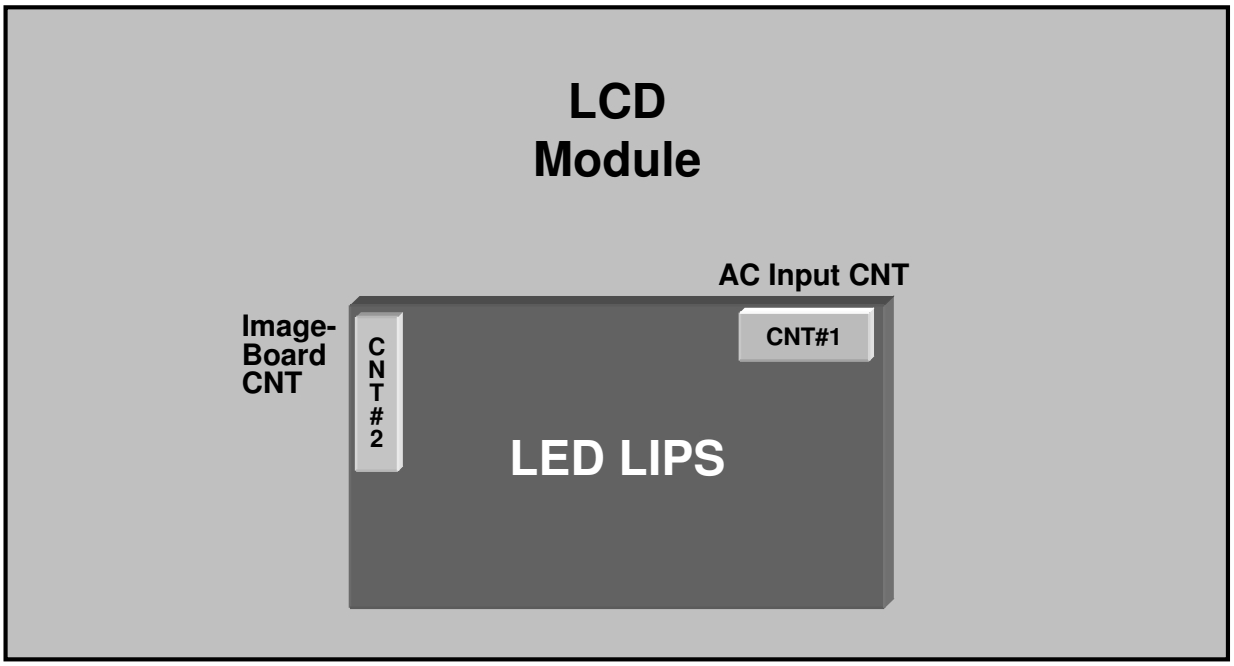
(4) Measurement Conditions



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

3.2 Back Light Unit
The back light unit contains 372ea WLEDs (White Light Emitting Diode)

Ta=25 ± 2°C



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℃]

3.3 LED LIPS Condition & Specification

Items (1)		Symbol	Conditions	Specifications			Unit	Note
				Min.	Typ.	Max.		
Input	Voltage	Vin	-	90	-	264	Vac	Ta=25±2 °C
	Current	Iin	Vin=90V	-	-	4.5	Arms	
Output	+12V	-	Vin=100~240Vac	11.4	12.0	12.6	V	Ta=25±2 °C
	Current	Iout	Int_Dim=3.3V	(104.5)	110	(115.5)	mArms	(2)
			Int_Dim=0V	15	20	25	%	(3)
	STB5.3V	-	Vin=100~240Vac	5.0	5.3	5.5	V	Ta=25±2 °C
Dim Frequency		F_{PWM}	Vin=90~264V	140	150	160	Hz	-
PS On/Off		ON	Floating	-	-	-	V	-
		OFF	Low(GND)	0	-	0.3		
BL On/Off		ON	Floating	-	-	-	V	-
		OFF	Low(GND)	0	-	0.8		
Dimming Control		Int_Dim	Max Lum	3.3	-	-	V	-
			Min. Lum	-	-	0		

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

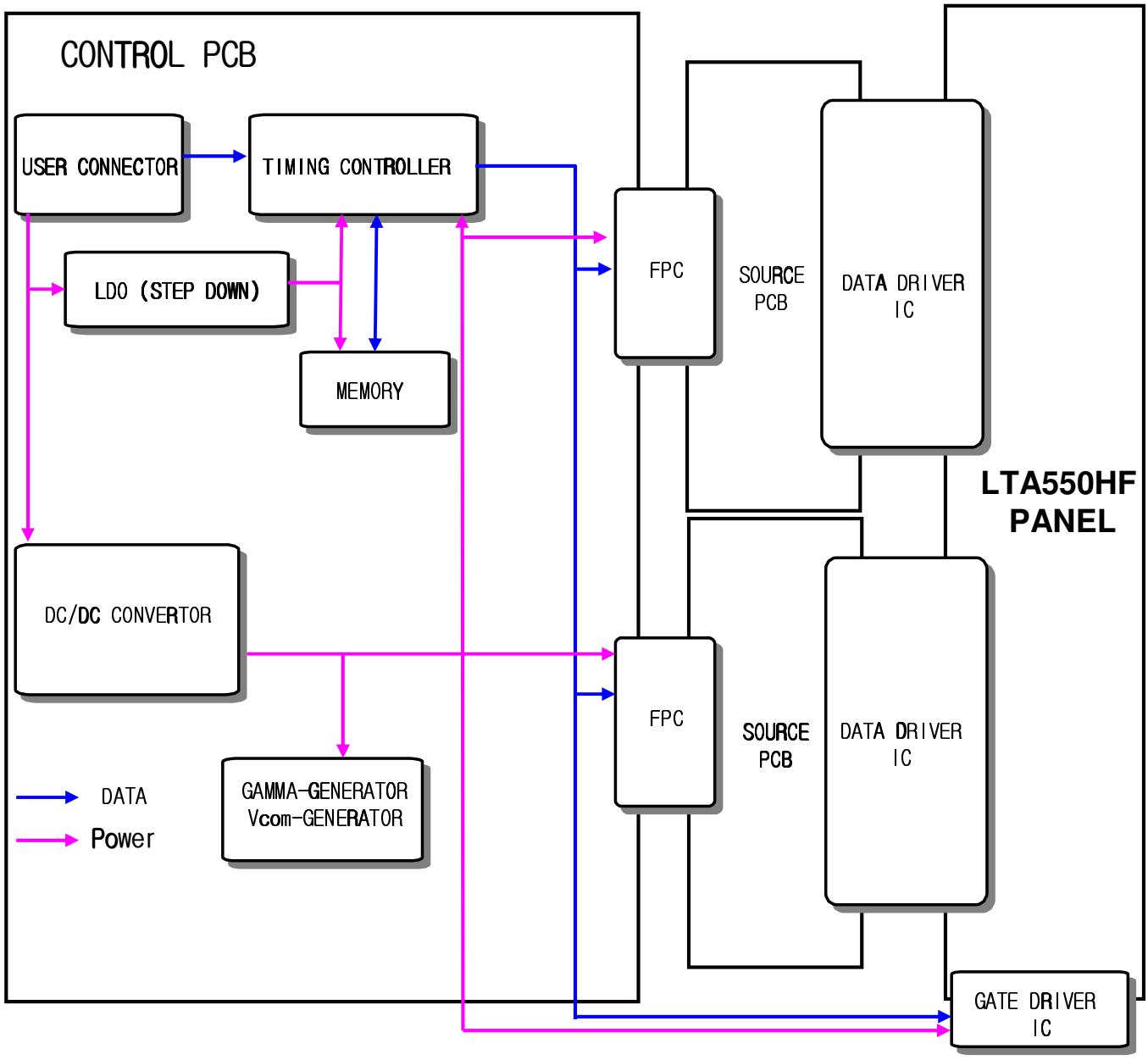
Note (2) Test Equipment

-.AC current Probe : P6022 (Tektronix)

-.Oscilloscope : TDS5054 (Bandwidth 20MHz)

Note (3) PWM Duty(%) = (T_on / T_total) * 100

4. Block Diagram



5. Input Terminal Pin Assignment

5.1. Input Signal & Power

Connector : FI-RE41S-HF (JAE)

Pin	Symbol	Description	Pin	Symbol	Description
1	12V	DC power supply	26	Rx3[0]P	3rd, 7th LVDS Signal +
2	12V	DC power supply	27	Rx3[1]N	3rd, 7th LVDS Signal -
3	12V	DC power supply	28	Rx3[1]P	3rd, 7th LVDS Signal +
4	12V	DC power supply	29	Rx3[2]N	3rd, 7th LVDS Signal -
5	12V	DC power supply	30	Rx3[2]P	3rd, 7th LVDS Signal +
6	NC	NOTE	31	GND	Ground
7	GND	Ground	32	Rx3CLK-	3rd, 7th LVDS Clock -
8	GND	Ground	33	Rx3CLK+	3rd, 7th LVDS Clock +
9	GND	Ground	34	GND	Ground
10	Rx1[0]N	1st, 5th LVDS Signal -	35	Rx3[3]N	3rd, 7th LVDS Signal -
11	Rx1[0]P	1st, 5th LVDS Signal +	36	Rx3[3]P	3rd, 7th LVDS Signal +
12	Rx1[1]N	1st, 5th LVDS Signal -	37	Rx3[4]N	3rd, 7th LVDS Signal -
13	Rx1[1]P	1st, 5th LVDS Signal +	38	Rx3[4]P	3rd, 7th LVDS Signal +
14	Rx1[2]N	1st, 5th LVDS Signal -	39	GND	Ground
15	Rx1[2]P	1st, 5th LVDS Signal +	40	NC	NOTE
16	GND	Ground	41	NC	
17	Rx1CLK-	1st, 5th LVDS Clock -			
18	Rx1CLK+	1st, 5th LVDS Clock +			
19	GND	Ground			
20	Rx1[3]N	1st, 5th LVDS Signal -			
21	Rx1[3]P	1st, 5th LVDS Signal +			
22	Rx1[4]N	1st, 5th LVDS Signal -			
23	Rx1[4]P	1st, 5th LVDS Signal +			
24	GND	Ground			
25	Rx3[0]N	3rd, 7th LVDS Signal -			

NOTE

NC(No Connection) : These PINS are used only for SAMSUNG . (DO NOT CONNECT)

5. Input Terminal Pin Assignment

5.1. Input Signal & Power

Connector : FI-RE51S-HF (JAE)

Pin	Symbol	Description	Pin	Symbol	Description
1	12V	DC power supply	26	Rx4[0]P	4th, 8th LVDS Signal +
2	12V	DC power supply	27	Rx4[1]N	4th, 8th LVDS Signal -
3	12V	DC power supply	28	Rx4[1]P	4th, 8th LVDS Signal +
4	12V	DC power supply	29	Rx4[2]N	4th, 8th LVDS Signal -
5	12V	DC power supply	30	Rx4[2]P	4th, 8th LVDS Signal +
6	**NC**	**NOTE1**	31	GND	Ground
7	GND	Ground	32	Rx4CLK-	4th, 8th LVDS Clock -
8	GND	Ground	33	Rx4CLK+	4th, 8th LVDS Clock +
9	GND	Ground	34	GND	Ground
10	Rx2[0]N	2nd, 6th LVDS Signal -	35	Rx4[3]N	4th, 8th LVDS Signal -
11	Rx2[0]P	2nd, 6th LVDS Signal +	36	Rx4[3]P	4th, 8th LVDS Signal +
12	Rx2[1]N	2nd, 6th LVDS Signal -	37	Rx4[4]N	4th, 8th LVDS Signal -
13	Rx2[1]P	2nd, 6th LVDS Signal +	38	Rx4[4]P	4th, 8th LVDS Signal +
14	Rx2[2]N	2nd, 6th LVDS Signal -	39	GND	Ground
15	Rx2[2]P	2nd, 6th LVDS Signal +	40	**NC**	**NOTE1**
16	GND	Ground	41	**NC**	
17	Rx2CLK-	2nd, 6th LVDS Clock -	42	**NC**	
18	Rx2CLK+	2nd, 6th LVDS Clock +	43	**NC**	
19	GND	Ground	44	**NC**	
20	Rx2[3]N	2nd, 6th LVDS Signal -	45	LVDS_SEL	NOTE2
21	Rx2[3]P	2nd, 6th LVDS Signal +	46	**NC**	**NOTE1**
22	Rx2[4]N	2nd, 6th LVDS Signal -	47	**NC**	
23	Rx2[4]P	2nd, 6th LVDS Signal +	48	**NC**	
24	GND	Ground	49	**NC**	
25	Rx4[0]N	4th, 8th LVDS Signal -	50	**NC**	
			51	**NC**	

Note1) No Connection: These PINS are used only for SAMSUNG. (DO NOT CONNECT)

Note2) LVDS OPTION : If this PIN is HIGH (3.3 V) → Normal LVDS format

LOW (GND) → JEIDA LVDS format

SEQUENCE : On = V_{DD}(T1) ≥ LVDS Option ≥ Interface Signal(T2)

OFF = Interface Signal(T3) ≥ LVDS Option ≥ V_{DD}

Note(1) Pin number starts from Left side

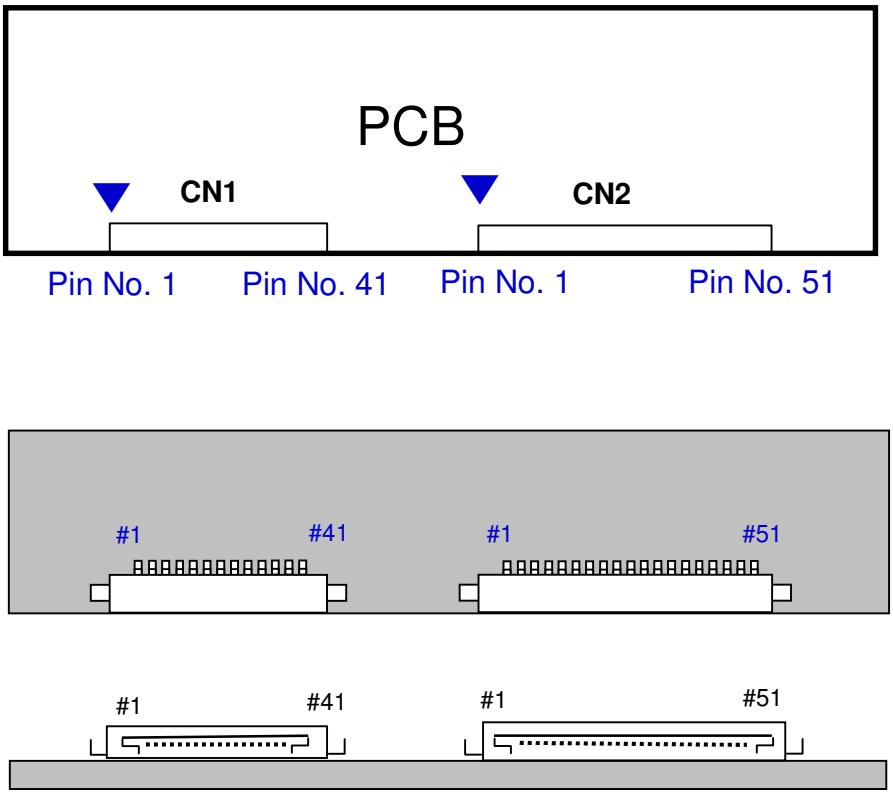


Fig. Connector diagram

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

5.2 LED LIPD AC Input Pin Configuration

Connector #1 : YAW396-03AV, 2pin (YEONHO)

Pin No.	Pin Configuration (FUNCTION)
1	AC-NEUTRAL
2	AC-LIVE (100V ~ 240V)

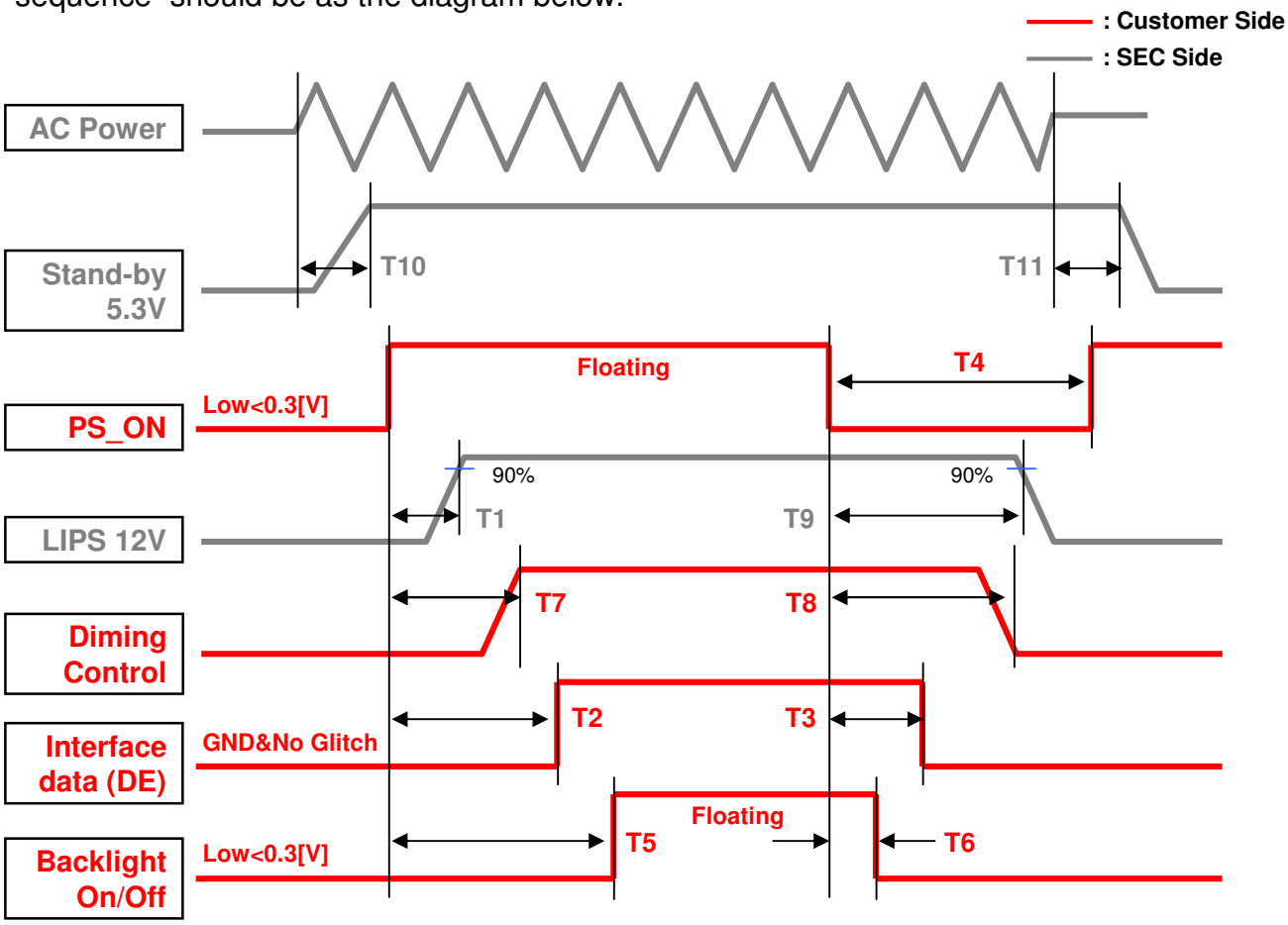
5.3 LED LIPS Input & Output Pin Configuration

Connector #2 : SMAW200-12C, 12pin (YEONHO)

Pin No.	Pin Configuration	FUNCTION
1	+12V	OUTPUT
2	+12V	OUTPUT
3	GND	
4	+12V	OUTPUT
5	GND	
6	GND	
7	STB 5.3V	OUTPUT
8	**No Connection (DO NOT CONNECT)**	
9	GND	
10	PS_ON [ON : Floating, OFF : Low(GND)]	INPUT
11	Dimming Control [0V:Min, 3.3V:Max]	INPUT
12	BL_ON [ON : Floating, OFF : Low(GND)]	INPUT

5.4 LED LIPS 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.



Item	Specifications [ms]	Item	Specifications [ms]
T1	0<T1≤250	T7	250≤T7≤ 300
T2	300<T2≤350	T8	0<T8≤20
T3	0<T3≤15	T9	55 < T9
T4	1500<T4	T10	0 < T10 ≤ 350
T5	1000≤T5	T11	500 < T11
T6	T6 = 0		

- 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 show abnormal screen.
- 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.

5.5 LVDS Interface

- LVDS Receiver : Tcon (merged)
- Data Format (JEIDA)

	LVDS pin	JEIDA -DATA
TxOUT/RxIN0	TxIN/RxOUT0	R4
	TxIN/RxOUT1	R5
	TxIN/RxOUT2	R6
	TxIN/RxOUT3	R7
	TxIN/RxOUT4	R8
	TxIN/RxOUT6	R9
	TxIN/RxOUT7	G4
TxOUT/RxIN1	TxIN/RxOUT8	G5
	TxIN/RxOUT9	G6
	TxIN/RxOUT12	G7
	TxIN/RxOUT13	G8
	TxIN/RxOUT14	G9
	TxIN/RxOUT15	B4
	TxIN/RxOUT18	B5
TxOUT/RxIN2	TxIN/RxOUT19	B6
	TxIN/RxOUT20	B7
	TxIN/RxOUT21	B8
	TxIN/RxOUT22	B9
	TxIN/RxOUT24	HSYNC
	TxIN/RxOUT25	VSYNC
	TxIN/RxOUT26	DEN
TxOUT/RxIN3	TxIN/RxOUT27	R2
	TxIN/RxOUT5	R3
	TxIN/RxOUT10	G2
	TxIN/RxOUT11	G3
	TxIN/RxOUT16	B2
	TxIN/RxOUT17	B3
	TxIN/RxOUT23	RESERVED
TxOUT/RxIN4	TxIN/RxOUT28	R0
	TxIN/RxOUT29	R1
	TxIN/RxOUT30	G0
	TxIN/RxOUT31	G1
	TxIN/RxOUT32	B0
	TxIN/RxOUT33	B1
	TxIN/RxOUT34	RESERVED

5.6 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~ 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

6. Interface Timing

6.1 Timing Parameters (DE only mode)

SIGNAL	ITEM	SYMBOL	MIN.	TYP.	MAX.	Unit	NOTE
Clock	Frequency	$1/T_C$	(240)	297	(310)	MHz	-
Hsync		F_H	(100)	135	(140)	KHz	-
Vsync		F_V	(90)	120	(125)	Hz	-
Vertical Display Term	Active Display Period	T_{VD}	-	1080	-	Lines	-
	Vertical Total	T_V	(1090)	1125	(1380)	Lines	-
Horizontal Display Term	Active Display Period	T_{HD}	-	1920	-	Clocks	-
	Horizontal Total	T_H	(2090)	2200	(2350)	clocks	-

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

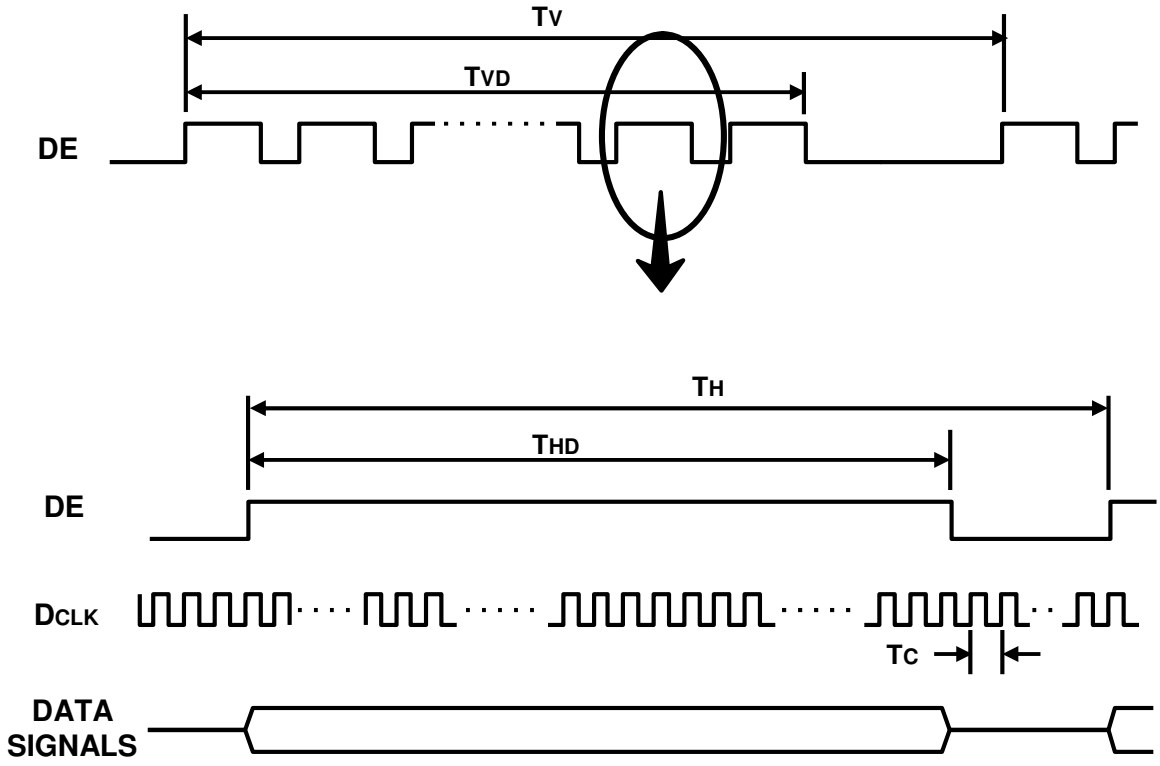
(1) Test Point : TTL control signal and CLK at LVDS Tx input terminal in system

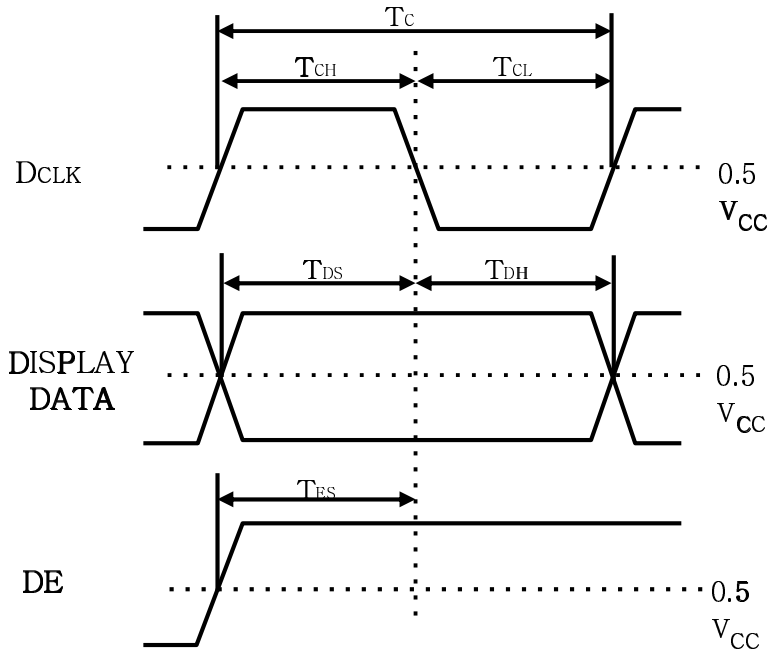
(2) Internal V_{DD} = 3.3V

(3) Spread spectrum

- Modulation rate (max) : $\pm$ 1.5 %
- Modulation Frequency : under 100KHz

6.2 Timing diagrams of interface signal (DE only mode)





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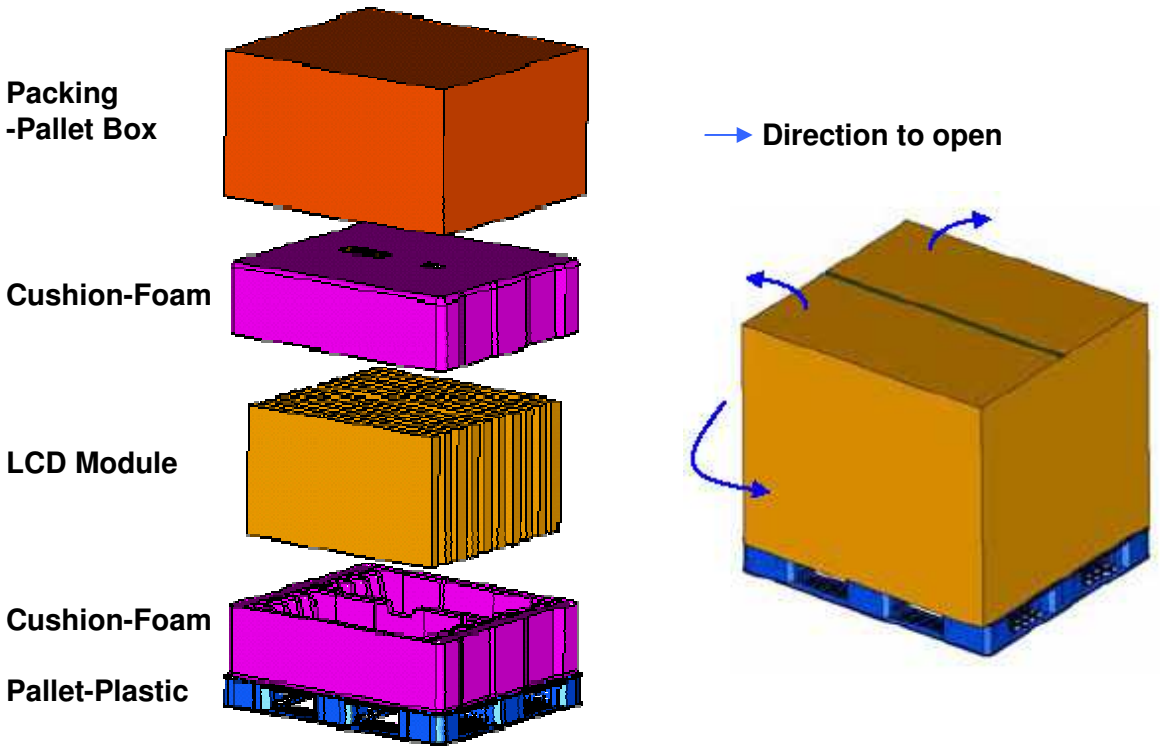
8. PACKING

8.1 CARTON (Internal Package)

(1) Packing Form

Corrugated fiberboard box and corrugated cardboard as shock absorber

(2) Packing Method



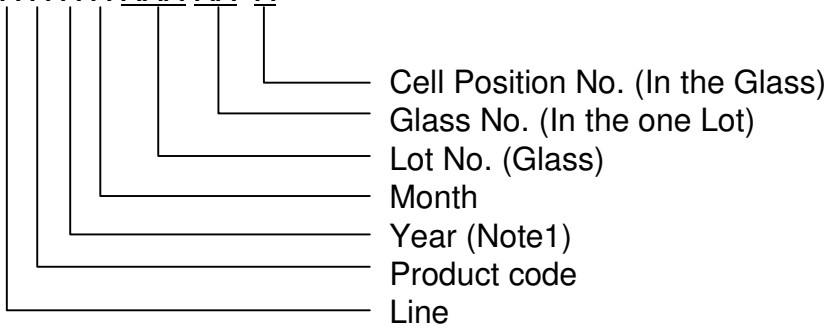
8.2 Packing Specification

Item	Specification	Remark
LCD Packing	13ea / (Packing-Pallet Box)	1. 221 Kg / LCD (16ea) 2. 13.4 Kg / Cushion-pallet (2ea) 3. 10.5 Kg / Packing-Pallet Box (1ea) 4. Cushion-pallet Material : EPS 5. Packing-Pallet Box Material : DW4
Pallet	1Box / Pallet	1. Pallet weight = 10 kg
Packing Direction	Vertical	
Total Pallet Size	H x V x height	1475mm(H) x 1150mm(V) x 995mm(height)
Total Pallet Weight	255 kg	Pallet(10kg) + Module(221kg) + Cushion(up+bottom=13.4kg) + Pallet-BOX(11kg)

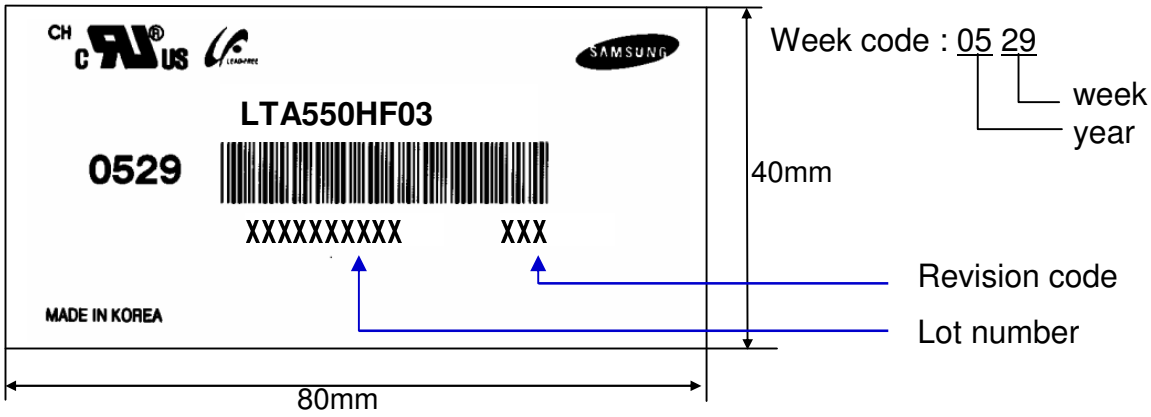
9. MARKING & OTHERS

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

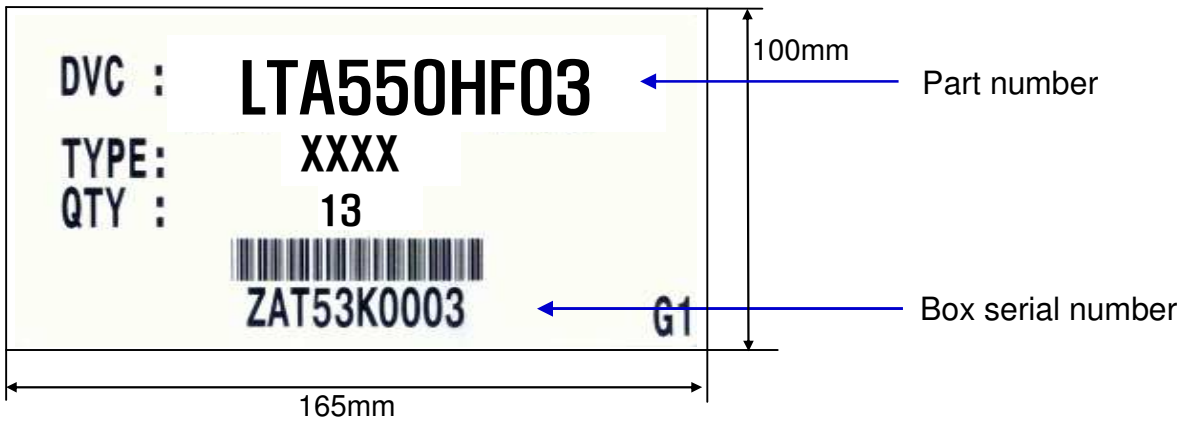
(1) Part number : LTA550HF03
(2) Revision: Three letters
(3) Lot number : X X X X XXX XX X



(4) Nameplate Indication



(5) Packing box attach



10. General Precautions

10.1 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 inverter 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 inverter & 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.

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 35℃ 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.

10.3 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 inverter power supply should be connected directly with a minimized length. A longer cable between the back light and the inverter may cause lower luminance of LED and may require higher startup voltage(Vs).

10.4 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.

10.5 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.