SAMSUNG TFT-LCD

MODEL: LSY400HM02-A

The Information described in this specification is for the first draft and can be changed without prior notice

Samsung Display Co., LTD

General Description

Description

This model uses a liquid crystal display (LCD) of amorphous silicon TFT as switching components. This model is composed of a TFT LCD panel, a driver circuit, and an ass'y KIT of source PBA. This 40.0" model has a resolution of a 1920 x 1080 and can display up to 16.7 million colors with the wide viewing angle of 89° or a higher degree in all directions. This panel is designed to support applications by providing a excellent performance function of the flat panel display such as home-alone multimedia TFT-LCD TV and a high definition TV.

General Information

Features

- RoHS compliance (Pb-free)
- High contrast ratio & aperture ratio with the wide color gamut
- SPVA(Super patterned vertical align) mode
- Wide viewing angle (±178°)
- High speed response
- FHD resolution (16:9)
- Low power consumption
- DE (Data enable) mode
- The interface (2pixel/clock) of 2ch LVDS (Low voltage differential signaling)

Items	Specification	Unit	Note
Active Display Area	885.6 (H) × 498.15 (V)	㎜	ACTIVE
Switching Components	a-Si TFT Active matrix		
Glass Size	TFT : 906.4(H) x 518(V) CF : 906.4(H) x 515.3(V)	mm	
Panel Size	906.4(H) x 518(V)	mm	
	1.80(D)	mm	
Weight	1800	g	± 10%
Display Colors	16.7M (8bit FRC) (True display)	color	
Number of Pixels	1,920 × 1,080	pixel	16 : 9
Pixel Arrangement	RGB Holizontal Stripe		
Display Mode	Normally Black		
Surface Treatment	6G n-Tac		
Haze	2.3%		
Hardness	2H		

1. Absolute Maximum Ratings

If the figures on measuring instruments exceed maximum ratings, it can cause the malfunction or the unrecoverable damage on the device.

Item	Symbol	Min.	Max.	Unit	Note
Power supply voltage	V_{DD}	11	13	V	(1)
Temperature for storage (Temperature of glass surface)	T_{STG}	-20	65	℃	(2),(4)
Operating temperature	T_{OPR}	0	50	℃	(2),(5)
Humidity for storage	H_{STG}	5	90	%RH	(2),(4)
Operating humidity	H_{STG}	20	90	%RG	(2),(5)
Endurance on static electricity			150	V	(3)

Note (1) The power supply voltage at Ta= 25 ± 2 °C

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

a. 90 % RH Max. (Ta ≤ 39 °C)

b. The relative humidity is 90% or less. (Ta > 39 °C)

c. No condensation

(3) Keep the static electricity under 150V in Polarizer attaching process.

(4) Operating condition with source PCB

(5) Storage temperature condition including glass

(6) Condition without packing. (Unpacking condition)

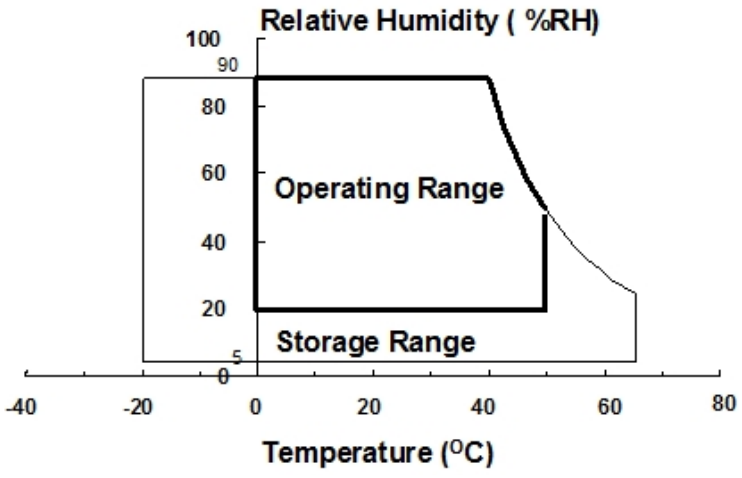


Fig. Range for temperature and relative humidity

2. Optical characteristics

The optical characteristics should be measured in the dark room or the space surrounded by the similar setting.

Measuring equipment : TOPCON RD-80S, TOPCON SR-3 ,ELDIM EZ-Contrast

(Ta = 25 ± 2°C, VDD=12.0V, fv=60Hz, f_{DCLK}=148.5MHz, Light source: LTY400HM10 BLU(LJ96-05972A))

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio (Center of screen)		C/R*	Normal qL,R=0 qU,D=0 Viewing Angle	3000	5000	-		(1) SR-3
Response time	G-to-G [AVE]	Tg		-	8	18		(3) RD-80S
Luminance of White (Center of screen)		Y_L		370	450	-	cd/m^2	(4) SR-3
Transmittance (At the center of screen)		T		4.3	4.8%	%	D65 Standard	(10)
Color Chromaticity (CIE 1931)	Red	Rx		TYP. -0.03	0.645	TYP. +0.03		(5),(6),(11) SR-3
		Ry			0.330			
	Green	Gx			0.305			
		Gy			0.640			
	Blue	Bx			0.150			
		By			0.046			
	White	Wx			0.280			
		Wy			0.295			
Color Gamut		-		-	72	-	%	(5) SR-3
Color Temperature		-		-	10000	-	K	(5) SR-3
2Point Gamma		γ	7G ~ 57G (Full = 64G)	1.7	2.2	2.7		(9)
Viewing Angle	Hor.	q_L	C/R≥10	79	89	-	Degree	(6) SR-3
		q_R		79	89	-		
	Ver.	q_U		79	89	-		
		q_D		79	89	-		
Brightness Uniformity (9 Points)		B_{uni}		-	-	20 (SDC Standard)	%	(2) SR-3
						30 (LTY400HM10 BLU)	%	

Notice

(a) Setup for test equipment

The measurement should be executed in a stable, windless, and dark room for 40min and 60min after operating the panel at the given temperature for LTY400HM10`s BLU. (LJ96-05972A)

This measurement should be measured at the center of screen.

The environment condition: Ta = 25 ± 2 °C

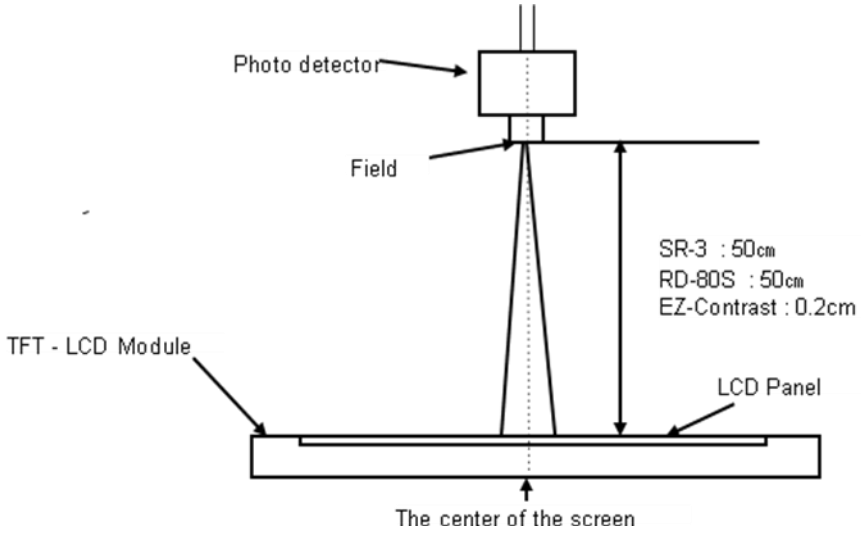
(b) LTY400HM10-A BLU is consist of one DBEF, one prism, one diffuser and LED light source.

(c) D65 Standard Light Source.

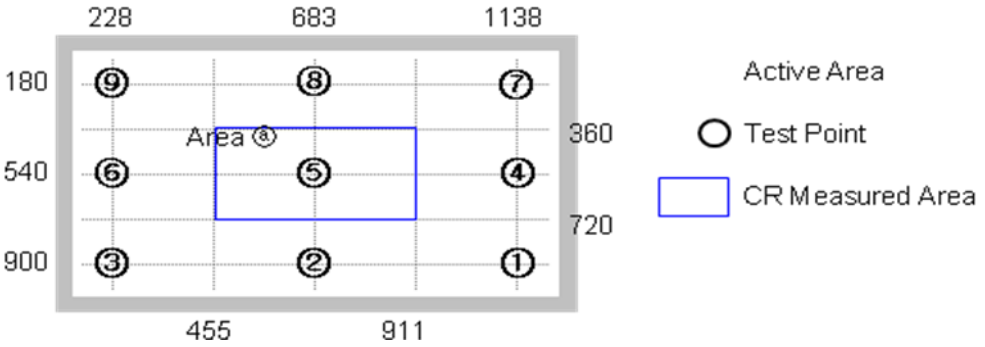
The coordinate of color is Wx 0.313, Wy 0.329.

The luminance of this product is 7217.3cd/m^2.

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



- Definition of the test point



Note (1) Definition of contrast ratio (C/R)

: The ratio of gray max (Gmax) & gray min (Gmin) at the center point ⑤ of the panel
The measurement goes in LTY400HM10 BLU

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

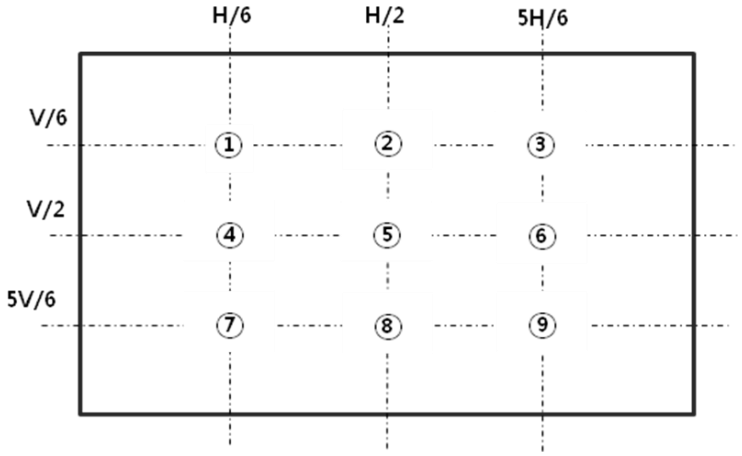
Gmax : The luminance with all white pixels
Gmin : The luminance with all black pixels

Note (2) Definition of the brightness uniformity of 9 points (Test pattern : The full white)

: The measurement shall be executed with the LTY400HM10 BLU

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

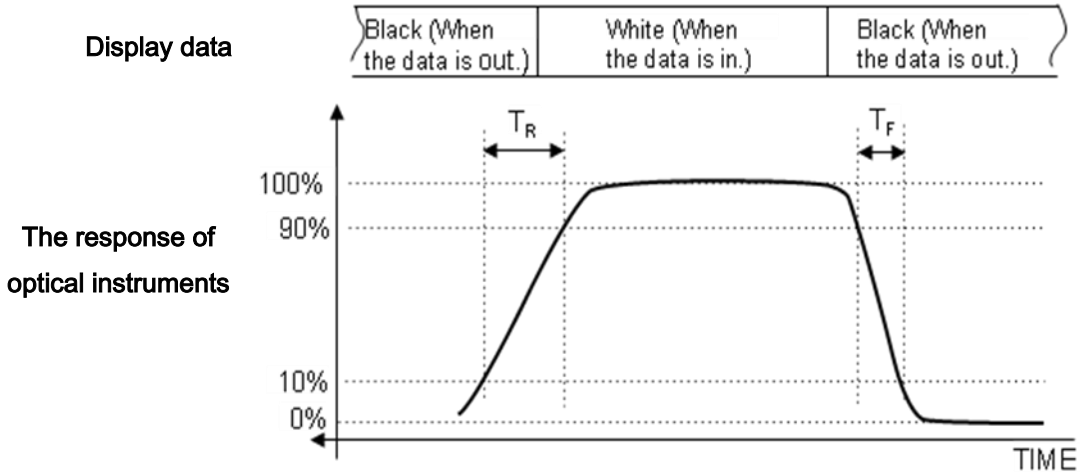
Bmax : The maximum brightness
Bmin : The minimum brightness



H : Horizontal Length of Active Area

V : Vertical height of Active Area

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



※ G-to-G: Average response time between the whole gray scale to the whole gray scale.
The response time is the value that was measured after it was operated in LTY400HM10 BLU for one hour (at room temperature)

- SONY tunes up response time based on 2012 model standard.

Note (4) The definition of luminance of white: The luminance of white at the center point ⑤

: The measurement shall be executed with the LTY400HM10 BLU

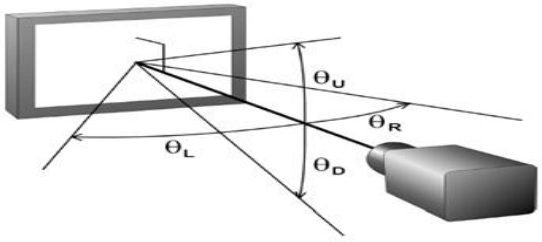
Note (5) The definition of chromaticity (CIE 1931)

The color coordinate of red, green, blue and white at the center point ⑤

: The measurement shall be executed with the LTY400HM10 BLU

Note (6) Definition of viewing angle: The range of viewing angle (C/R ≥10)

: The measurement shall be executed with the LTY400HM10 BLU



Note (7) The definition of crosstalk; (Cross modulation) (DSHA)

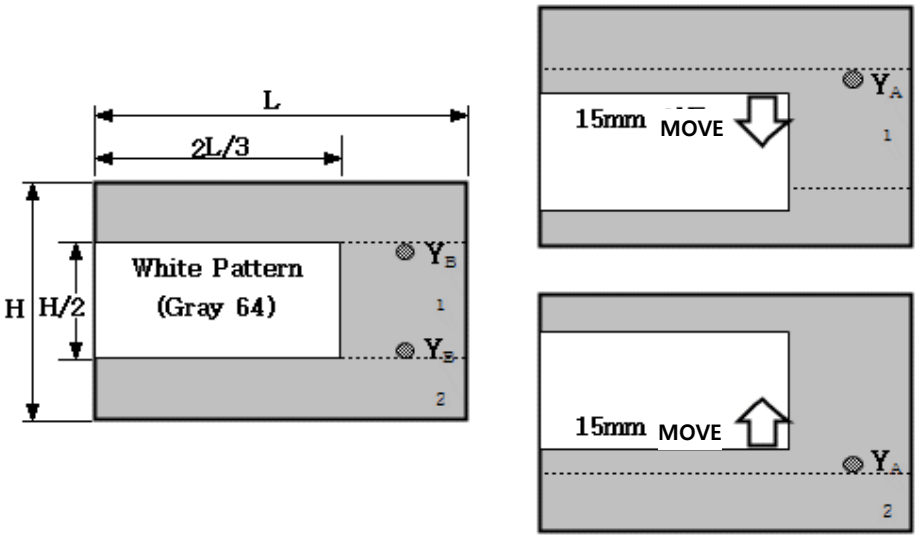
: The phenomenon, which the level of contrast ratio is declined by the interference of signals in pixels.

$$Crosstalk\ Modulation\ \ Ratio(D_{SHA}) = \frac{|Y_{normal} - Y_{abnormal}|}{Y_{normal}} \times 100(\%)$$

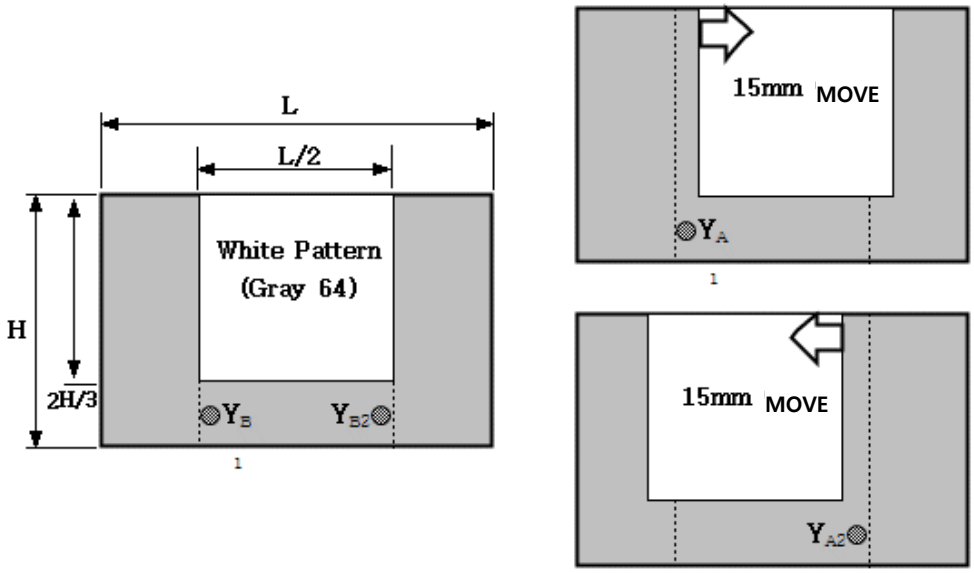
* Measure the size of background pattern at the interval of 4 grays with excluding the size of white rectangle within the range from gray 1 to gray 64.
* Measure the horizontal crosstalk and vertical crosstalk both.
* The maximum value among measured values can be defined as a crosstalk.

Reference: The color of rectangle for Gmin is black when the color of screen is white.
The color of rectangle for Gmax is white when the color of screen is black.

* Pattern to measure the crosstalk and points to be measured



< Horizontal Crosstalk >



< Vertical Crosstalk >

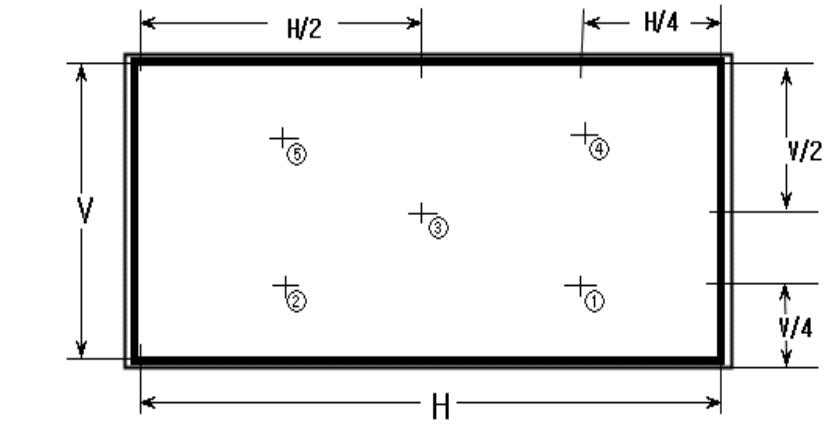
Note (8) The definition of terminology, flicker

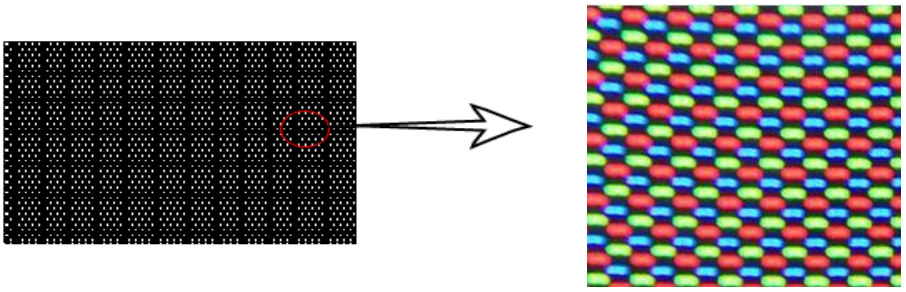
: The phenomenon, which the pixels on the screen of LCD panel blink.

1) Calculate the value of crosstalk with observing the standard for measuring the flicker.

2) The points to be measured

-The pattern to measure the flicker





< 32g white 1 dot Inversion >

Note (9) Definition of 2point Gamma

$$Gamma = \log(X_{lum}/100)/\log(Y/100)$$

$$X_{lum} = (Z - B_{\min})/(B_{\max} - B_{\min}) \times 100$$

Y: Measurement Level / Z: Measurement Brightness

B_{max}: Maximum Brightness / B_{min}: Minimum Brightness

Note (10) Definition of transmissivity

The measurement shall be executed with the D65 standard light source.

Note (11) Definition of simulation with BLU Spectrum

Simulated Color Chromaticity

$$\text{Color x} = \frac{Xsim}{Xsim + Ysim + Zsim} \quad , \text{Color y} = \frac{Ysim}{Xsim + Ysim + Zsim}$$

Xsim = Simulated Spectrum X CIE Color Matching Function x
Ysim = Simulated Spectrum X CIE Color Matching Function y
Zsim = Simulated Spectrum X CIE Color Matching Function z

Simulated Spectrum = Panel Transmittance Spectrum X Standard BLU Spectrum (Appendix2)

3. Electrical characteristics

3.1 TFT LCD Module

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

Ta = 25°C ± 2 °C

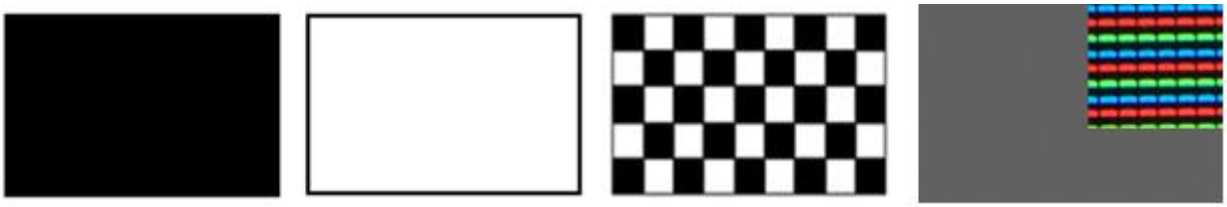
Item		Symbol	Min.	Typ.	Max.	Unit	Note
Voltage of Power Supply		V_{DD}	11	12	13	V	(1)
Current of Power Supply	(a) Black	I_{DD}	-	660	720	mA	(2),(3)
	(b) White		-	730	800		
	(c) Mosaic		-	700	760		
	(4) Max Pattern		-	890	980		
Vsync Frequency		f_V	47	60	62	Hz	
Hsync Frequency		f_H	50	67.5	73	kHz	
Main Frequency		f_{DCLK}	130	148.5	155	MHz	
Rush Current		I_{RUSH}	-	-	3	A	(4)

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

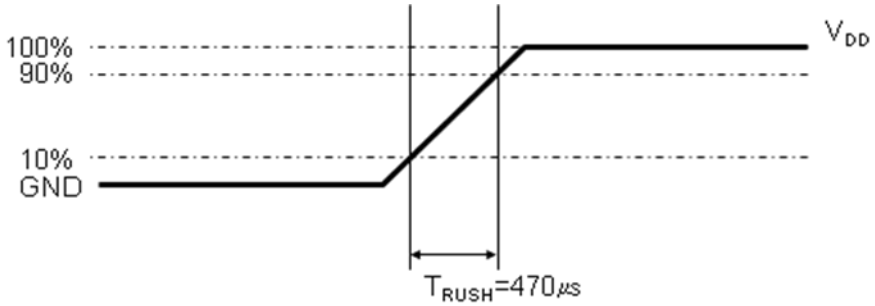
(2) fV=60Hz, fDCLK =148.5MHz, V_{DD} = 12.0V, DC Current.

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

a) Black pattern b) White pattern c) Mosaic d) Max Pattern

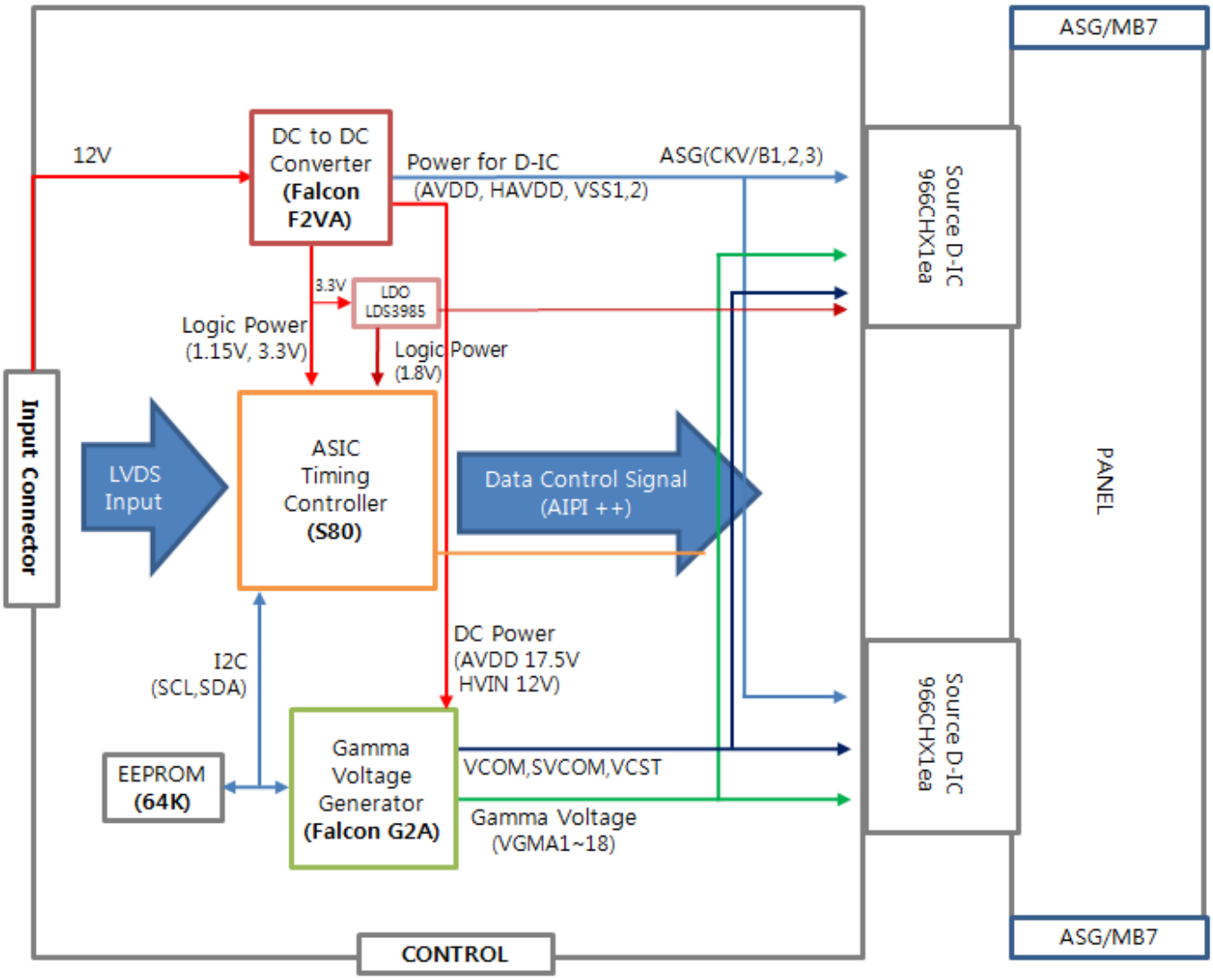


(4) Conditions for measurement



The rush current, I_{RUSH} can be measured during T_{RUSH} is 470us

4. Block diagram



5. The Pin assignment in the input terminal

5.1. Input signal & power

Connector:104103-5117(Molex)

No	Signal		No	Signal	
1	VIN	Vdd	26	RX1_AP_I	Even LVDS Signal +
2	VIN	Vdd	27	RX1_BN_I	Even LVDS Signal -
3	VIN	Vdd	28	RX1_BP_I	Even LVDS Signal +
4	VIN	Vdd	29	RX1_CN_I	Even LVDS Signal -
5	VIN	Vdd	30	RX1_CP_I	Even LVDS Signal +
6	N.C.	No Connection	31	GND	Ground
7	GND	Ground	32	RX1_CLKN_I	Even LVDS Signal -
8	GND	Ground	33	RX1_CLKP_I	Even LVDS Signal +
9	GND	Ground	34	GND	Ground
10	RX0_AN_I	Odd LVDS Signal -	35	RX1_DN_I	Even LVDS Signal -
11	RX0_AP_I	Odd LVDS Signal +	36	RX1_DP_I	Even LVDS Signal +
12	RX0_BN_I	Odd LVDS Signal -	37	RX1_EN_I	Even LVDS Signal -
13	RX0_BP_I	Odd LVDS Signal +	38	RX1_EP_I	Even LVDS Signal +
14	RX0_CN_I	Odd LVDS Signal -	39	GND	Ground
15	RX0_CP_I	Odd LVDS Signal +	40	SCL_I	I2C SCL
16	GND	Ground	41	SDA_I	I2C SDA
17	RX0_CLKN_I	Odd LVDS Signal -	42	N.C.	TV SET use only
18	RX0_CLKP_I	Odd LVDS Signal +	43	BUS_SW	BUS Release
19	GND	Ground	44	N.C.	TV SET use only
20	RX0_DN_I	Odd LVDS Signal -	45	N.C.	TV SET use only
21	RX0_DP_I	Odd LVDS Signal +	46	LUT SEL0	TV SET use only
22	RX0_EN_I	Odd LVDS Signal -	47	LUT SEL1	TV SET use only
23	RX0_EP_I	Odd LVDS Signal +	48	LUT SEL2	TV SET use only
24	GND	Ground	49	N.C.	TV SET use only
25	RX1_AN_I	Even LVDS Signal -	50	N.C.	TV SET use only
			51	LVDS Option	TV SET use only

Note (1) No connection: These PINS are used only for the product of SAMSUNG.
(DO NOT CONNECT the input device to these pins.)

Note (2) Pin number which starts from the left side.

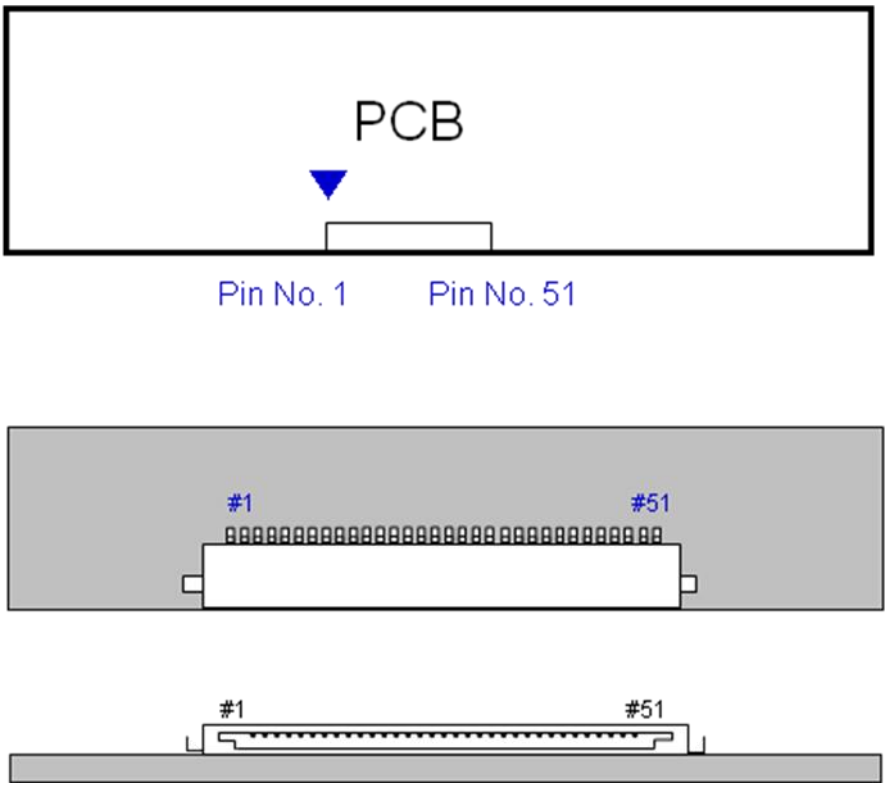


Fig . The diagram of connector

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 pins should be separated from other signal or power.

Note(3) LVDS OPTION : IF THIS PIN : LOW (GND V)/ NC → JEIDA LVDS FORMAT
OTHERWISE : HIGH (3.3V) → NORMAL NS LVDS FORMAT

Note(4) 46th Pin Aging Enable PIN / IF this Pin HIGH(3.3V)
→ BIST MODE (Rolling Pattern is operated by Only 3.3V input)

Notice : iWPN,SCL_I and SDA_I shouldn`t be communicated with I2C device whose output level is 5V

5.2 LVDS Interface

- LVDS receiver : T-con (merged)
- Data format : (JEIDA Only)

	LVDS pin	Odd Data	Even Data
TxOUT/RxIN0	TxIN/RxOUT0	R0	R0
	TxIN/RxOUT1	R1	R1
	TxIN/RxOUT2	R2	R2
	TxIN/RxOUT3	R3	R3
	TxIN/RxOUT4	R4	R4
	TxIN/RxOUT6	R5	R5
	TxIN/RxOUT7	G0	G0
TxOUT/RxIN1	TxIN/RxOUT8	G1	G1
	TxIN/RxOUT9	G2	G2
	TxIN/RxOUT12	G3	G3
	TxIN/RxOUT13	G4	G4
	TxIN/RxOUT14	G5	G5
	TxIN/RxOUT15	B0	B0
	TxIN/RxOUT18	B1	B1
TxOUT/RxIN2	TxIN/RxOUT19	B2	B2
	TxIN/RxOUT20	B3	B3
	TxIN/RxOUT21	B4	B4
	TxIN/RxOUT22	B5	B5
	TxIN/RxOUT24	HSYNC	HSYNC
	TxIN/RxOUT25	VSYNC	VSYNC
	TxIN/RxOUT26	DEN	DEN
TxOUT/RxIN3	TxIN/RxOUT28	R6	R6
	TxIN/RxOUT29	R7	R7
	TxIN/RxOUT30	G6	G6
	TxIN/RxOUT31	G7	G7
	TxIN/RxOUT32	B6	B6
	TxIN/RxOUT33	B7	B7
	TxIN/RxOUT34	Reserved	Reserved
TxOUT/RxIN4	TxIN/RxOUT35	R8	R8
	TxIN/RxOUT36	R9	R9
	TxIN/RxOUT37	G8	G8
	TxIN/RxOUT38	G9	G9
	TxIN/RxOUT39	B8	B8
	TxIN/RxOUT40	B9	B9
	TxIN/RxOUT41	Reserved	Reserved

5.3 Input signals, basic display colors and the 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) The 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 The parameters of timing (Only DE mode)

SIGNAL	ITEM	SMBOL	MIN.	TYP.	MAX.	Unit	NOTE
Clock	Frequency	$1/T_C$	130	148.5	155	MHz	-
Hsync		F_H	50	67.5	73	KHz	-
Vsync		F_V	47	60	63	Hz	-
Term for the vertical display	Active display period	T_{VD}	-	1080	-	Lines	-
	Total vertical	T_V	1100	1125	1480	Lines	-
Term for the horizontal display	Active display period	T_{HD}	-	1920	-	Clocks	-
	Total Horizontal	T_H	2145	2200	2350	clocks	-

Note) These products don't have to receive the signal of Hsync & Vsync from the input device.

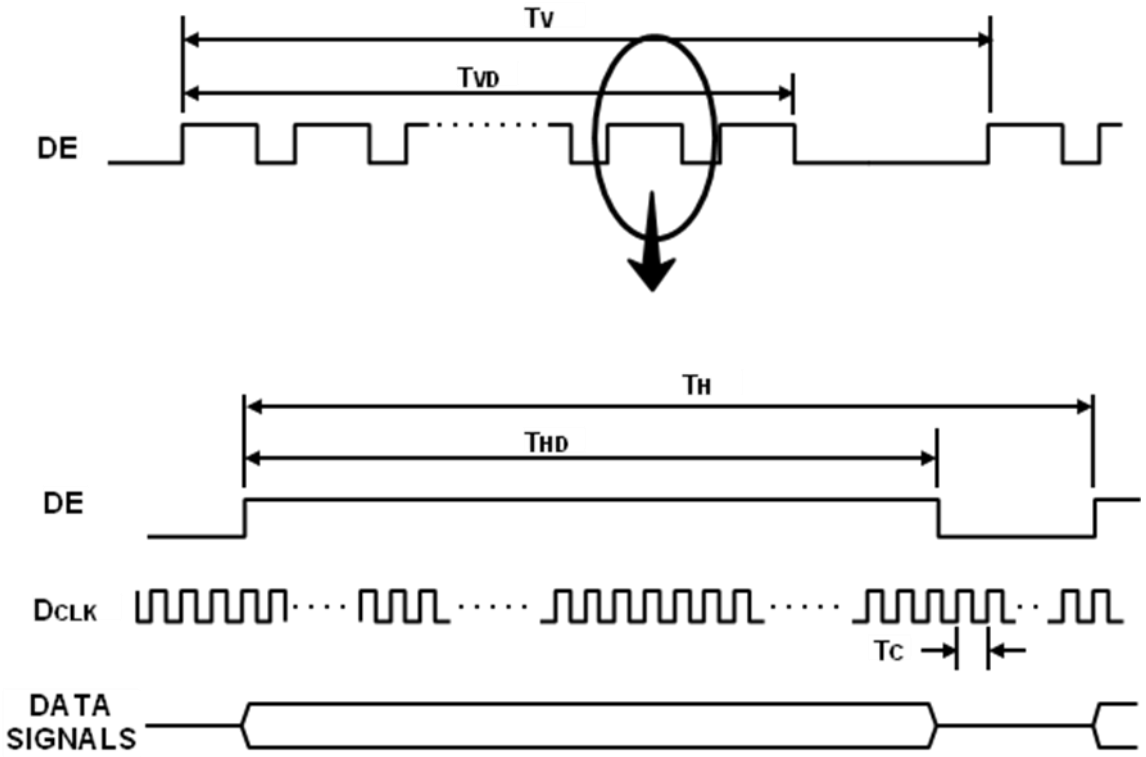
(1) Key points when testing: TTL controls the signal and the CLK at the input terminal of LVDS Tx of the system.

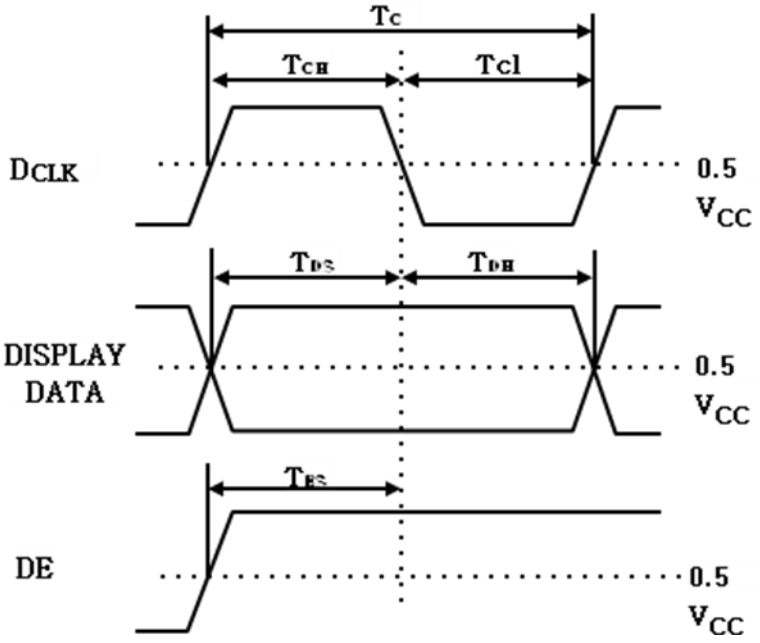
(2) Internal VDD = 3.3V

(3) Spread spectrum

- The limit of spread spectrum's range of SET in which the LCD module is assembled should be within ± 3 %.

6.2 Timing diagrams of interface signal (Only DE mode)



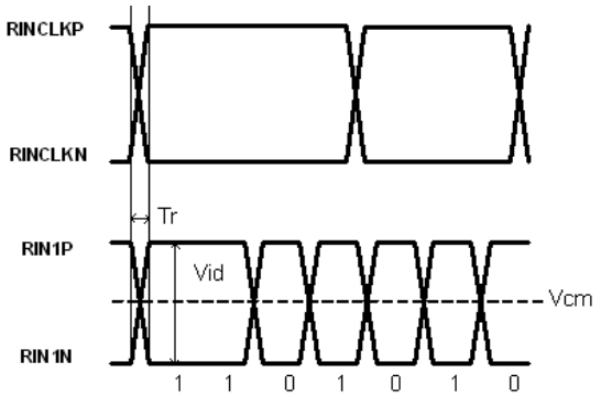


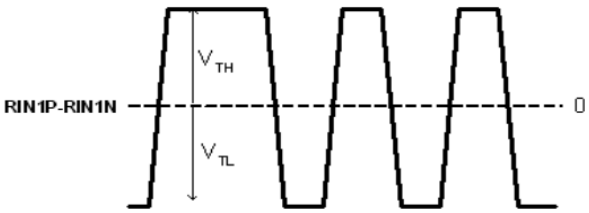
6.3 Characteristics of Input data of LVDS

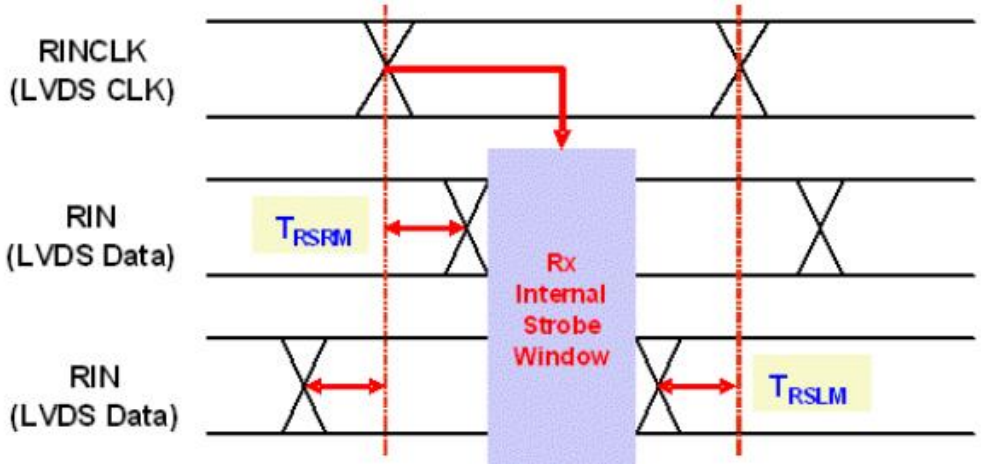
ITEM		SYMBOL	Min.	Typ.	Max.	UNIT	NOTE
Differential input high threshold voltage		VTH	-	-	+100	mV	V_{CM}= 1.2V
Differential input low threshold voltage		VTL	-100	-	-	mV	
Input common mode voltage		V_{CM}	0.2	1.2	2.0	V	-
Differential Input Voltage		$\|V_{ID}\|$	100	-	600	mV	$\|V_{ID}\|$=100mV
Input data position	F_{IN}=80MHz	t_{RSRM}	-	-	450	ps	
		t_{RSLM}	-450	-		ps	

Notice The spread spectrum should be 0% when the skew is measured.

Position of a measurement is T-CON LVDS input pin

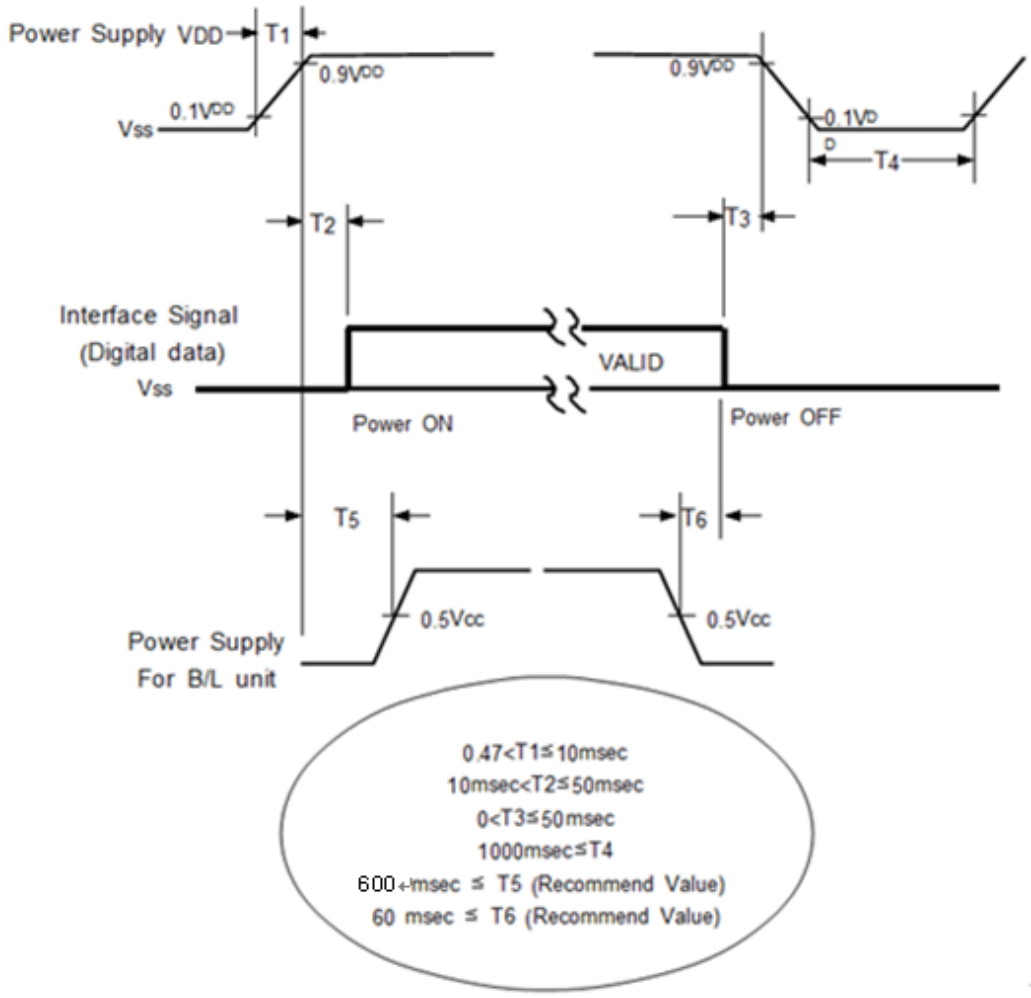






6.4 The sequence of power on and off

To prevent a latch-up phenomena or the DC operation of the LCD Module, the power on/off sequence should be accorded with the settings described in 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 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.
- 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.
- While the V_{DD} is off level, please keep the level of input signals low or keep a high impedance condition.
- The figure of T4 should be measured after the module has been fully discharged between the periods when the power is on and off.

6.5 INPUT SPREAD SPECTRUM SPECIFICATION

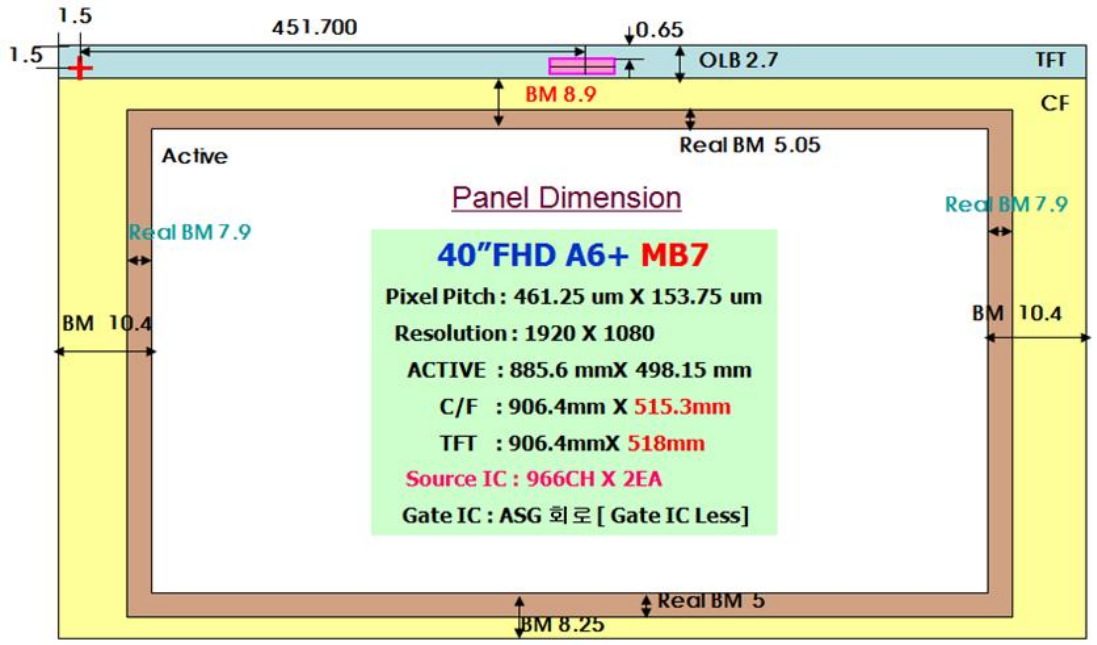
	Modulation Ratio (Max)	Modulation Frequency (Min.)	Modulation Frequency (Max.)
Input Signal	±1.5%	30KHz	150KHz

*SET Vender Should Check Waterfall before apply Spread Spectrum which occurs based on Modulation Frequency.

7. Outline dimension

7.1 The adhesive size of POL

The next figure shows the size of POL on the drawing sheet attached to the panel for BLU design.



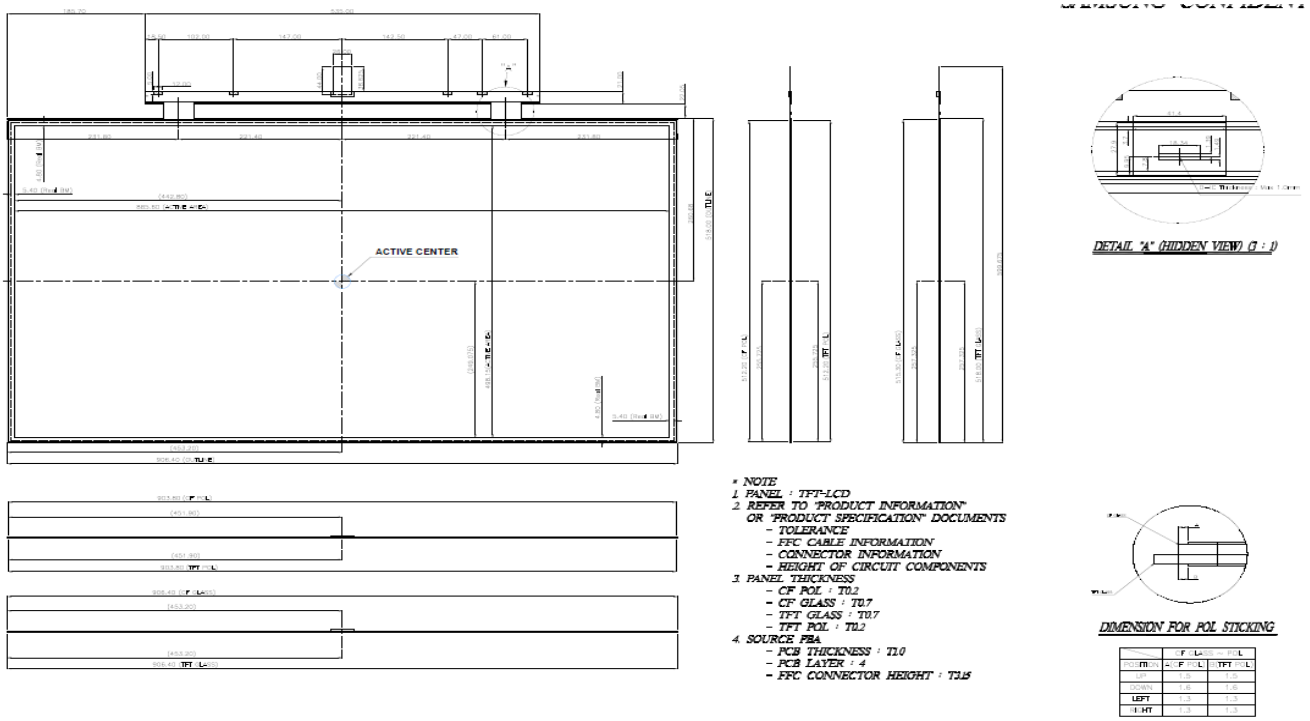
<Figure.>

The POL size of CF : 903.8 X 512.2 LEFT%RIGHTE ± 0.6mm, UP&DOWN± 0.5mm

The POL size of TFT: 903.8 X 512.2 LEFT%RIGHTE ± 0.6mm, UP&DOWN± 0.5mm

The total adhesion allowance of POL is LEFT%RIGHTE ± 1.3mm, UP&DOWN± 1.2mm

7.2 The drawing sheet for the size of the OLB bonding



8. Reliability test

8.1 Panel

Item	Test Condition	Quantity	Note
HTOL	60 ℃ (Panel change 500hr / circuit change 250hr)	8	
LTOL	-5 ℃ (Panel change 500hr / circuit change 250hr)	4	
THB	50 ℃ / 90 %RH(Panel change 500hr / circuit change 250hr)	10	
ASG Low temperature	Max. frequency 25℃~-40℃	Each Cell	ASG Product Only
ASG High Temperature	Min. frequency 60℃ operation 96hr	Each Cell	ASG Product Only
Image sticking	25 ℃ / Mosaic pattern(9*10) 12hrs Rolling pattern 12hrs / 3cycles	8	
Decompression	-40~50℃, 0m(0ft) ~ 13,700m(45,000ft), 72.5Hr	4	
HTS	70 ℃, Storage	4	
LTS	-25 ℃, Storage	4	
Transportation condition	drop(20cm) → temperature/humidity(-30~60℃ / 40℃ 90%RH) → pressure → vibration(5~200Hz 1.05Grms, 2hr) → drop(20cm)	1pallet	
WHTS	60 ℃ / 75 %RH, Storage 500hr	4	
Noise	Electromagnetic noise: Overall 23dB 이하	2	
Complex stress	-20℃~60℃, 0~90%RH, 2cycle	4	
ESD	S-IC Input ±7KV, Output ±4KV	4	
EOS (optional)	Item: Vin Input step — Test condition: Surge combination (High impedance) ↓ Pass Condition: 5kV under. Item: Signal Input step — Test condition: Surge combination (High impedance) ↓ Pass Condition: 120V under.	2	

[Criteria on evaluation]

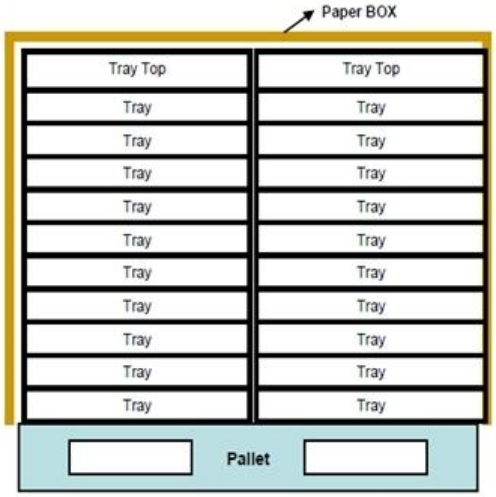
There should be no change of the product, which may affect to the practical display functions, when the display quality test is executed under the normal operation setting.

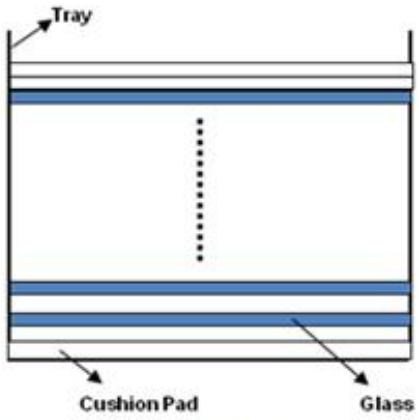
* HTOL/ LTOL : The operating cycle on the high and low temperature
* THB : Temperature humidity slant
* HTS/LTS : The storage at the high and low temperature
* WHTS : The storage in the high temperature with the high humidity

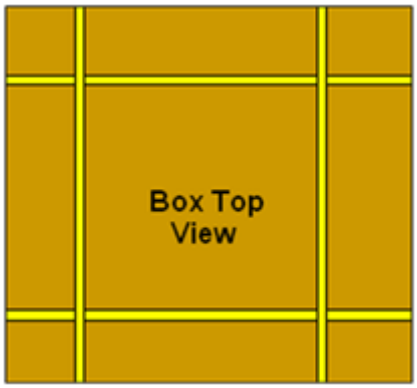
Appendix4

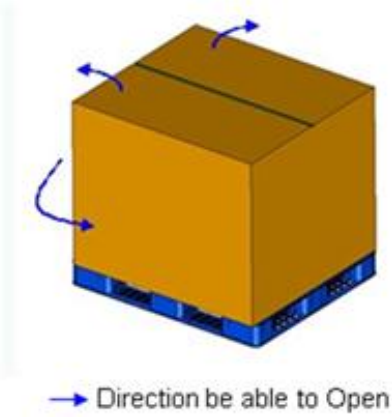
Packing Information

1. Panel Kit Packing









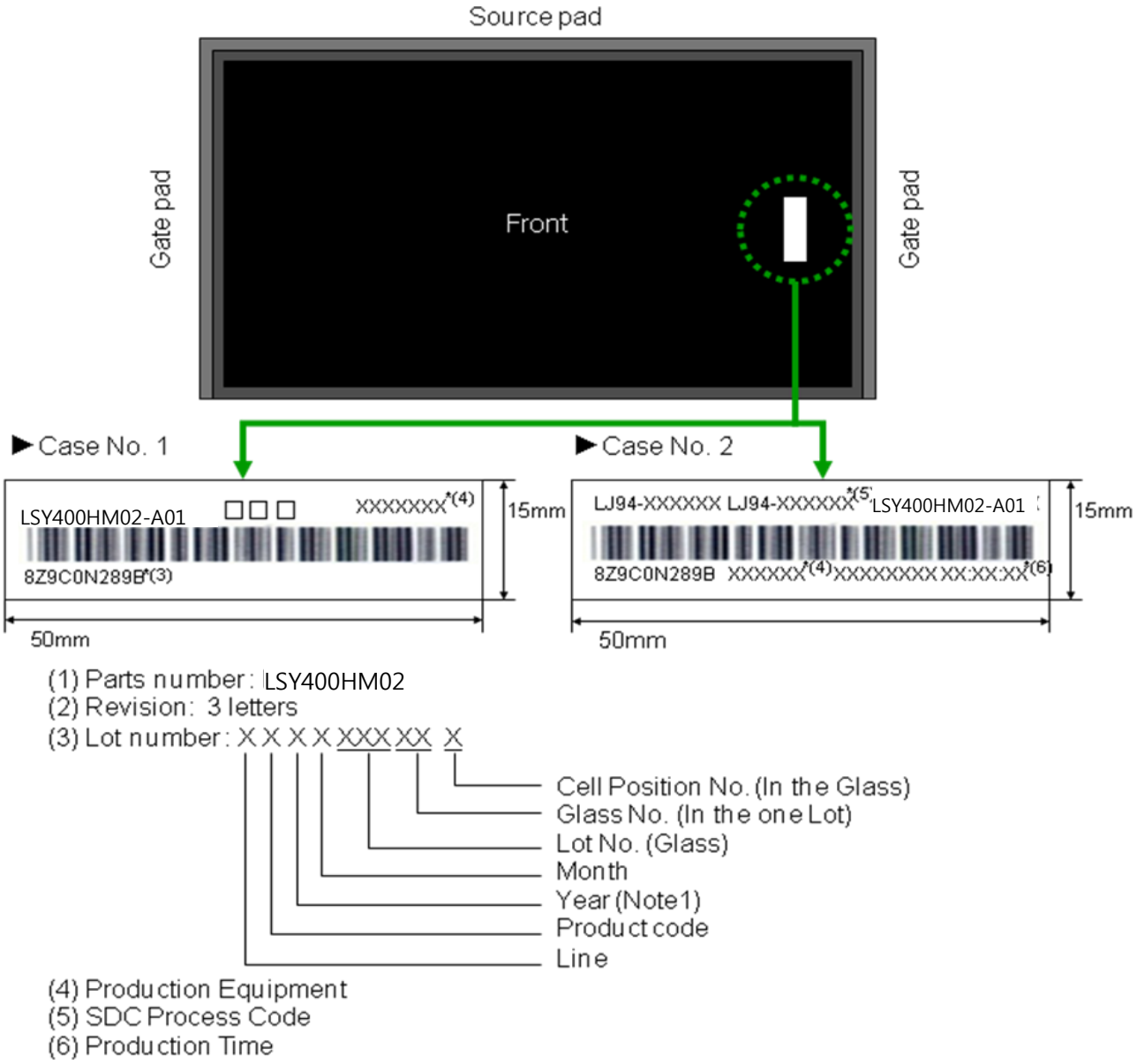
Item	Dimension	Weight	Q'ty / PLT	Total Weight
	W x L x H (mm)	g	pcs	Kg
Packing Tray	1110*730*112	1650	20	329.5
Pallet	1150*1475*125	21000	1	
Panel	-	1850	140	
Tray Top	1110*730*40	891	2	
Cushion Pad	908*608.5*3.5	53.2	160	
Silica gel		40	80	
Paper Box	1124*1474*1045	3000	1	
Stack Layer	MAX	2	Pallet	
Total Size	1475*1150*1192			

NOTE) The Cushion PAD is worked out for antistatic device.

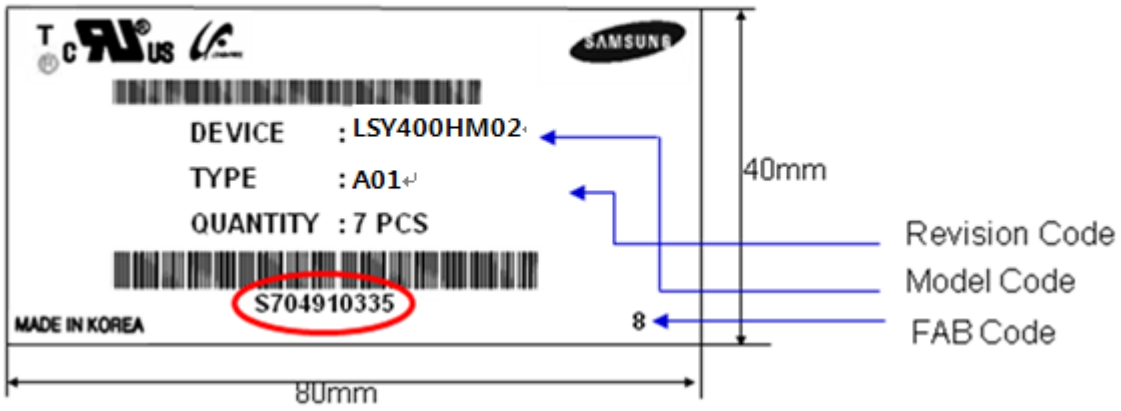
2. Panel Kit Marking & Others

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

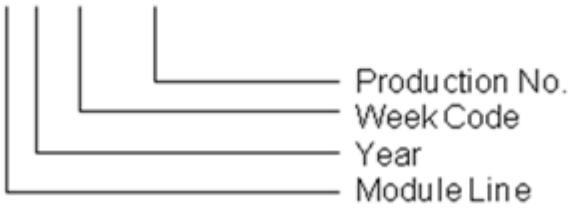
(1) Cell Label



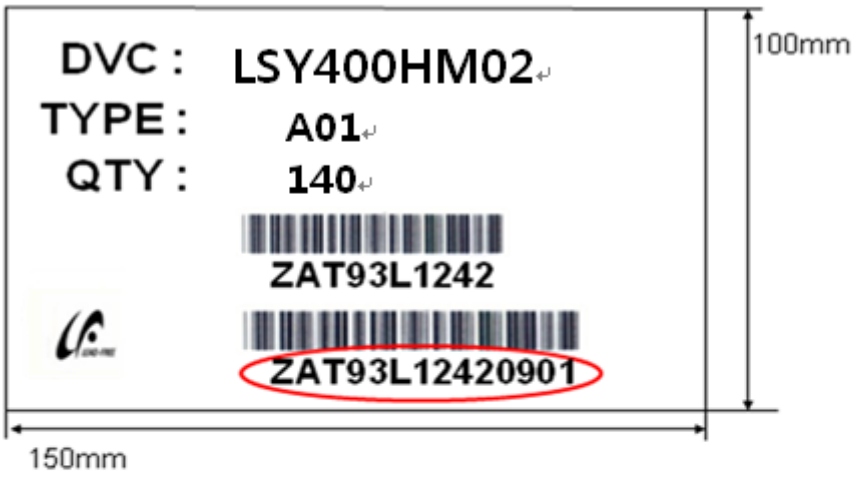
(2) Tray Label



※ Lot number : S X X XX XXXXX



(3) Box Label



BOX Serial : X X X X X X XXXX XX XX