Approval Spec

SAMSUNG
ELECTRONICS

Customer : Wistron   **DATE : 9. Dec. 2011**

SAMSUNG TFT-LCD

MODEL : LTA400HM19

Any Modification of Specification is not allowed without SEC's Permission.

NOTE :

Customer's Approval		APPROVAED BY	DATE 9. Dec. 2011
SIGNATURE	DATE	PREPARED BY	DATE 9. Dec. 2011

LCD Business

Samsung Electronics Co . , LTD.

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Revision History

Date	Rev. No	Page	Summary
9. Dec. 2011	000	All	First issued

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General Description

Description

LTA400HM19 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 40.0" is 1920 x 1080 and this model can display up to 16.7 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
- PVA (Patterned Vertical Align) mode
- Wide viewing angle (±178°)
- High speed response
- FHD resolution (16:9)
- 10 CCFLs B/L Unit(Cold Cathode Fluorescent Lamp)
- DE (Data Enable) mode
- mLVDS (mini Low Voltage Differential Signaling) interface (1pixel/clock)

General Information

Items	Specification	Unit	Note
Module Size	952 (H) X 551 (V)	mm	±1.0mm
	61.2 (D max)		
Weight	9000(Max)	g	
Pixel Pitch	0.46125 (H) × 0.46125 (V)	mm	
Active Display Area	885.6 (H) X 498.15 (V)	mm	
Surface Treatment	Anti-Glare (Haze 2.3%)		
Display Colors	8 bit – 16.7 M	colors	
Number of Pixels	1920 X 1080	pixel	
Pixel Arrangement	RGB Horizontal 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}	11	13	V	(1)
Storage temperature	T_{STG}	-20	65	℃	(2)
Operating temperature	T_{OPR}	0	50	℃	
Surface temperature	T_{SUR}	0	65	℃	(3)
Shock (non - operating)	X,Y,Z	-	50	G	(4)
Vibration (non - operating)	V_{NOP}	-	1.5	G	(5)

Note (1) Ta= 25 ± 2 °C
(2) Temperature and relative humidity range are shown in the figure below.
 a. 93.8 % RH Max. (Ta ≤ 40 °C)
 b. Relative Humidity is 93.8% or less. (Ta > 40 °C)
 c. No condensation
(3) Although abnormal visual problems can be occurred in T_{SUR} range, the polarizer
 is not damaged in this range.
(4) 11ms, sine wave, one time for ±X, ±Y, ±Z axis
(5) 10-300 Hz, Sweep rate 10min, 30min for X,Y,Z axis

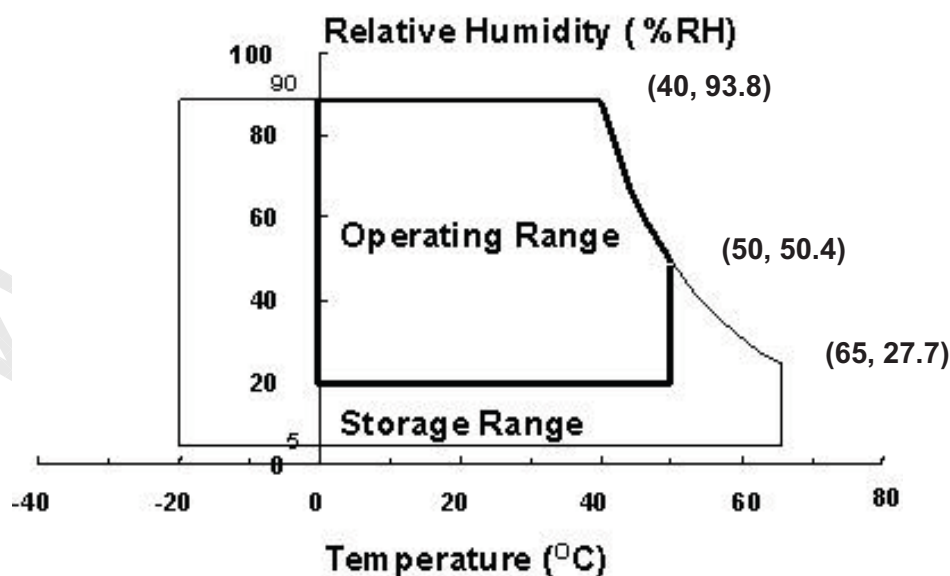**Fig. Temperature and Relative humidity range**

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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°C, VDD=12V, fv= 60Hz, f_{DCLK} = 148.5MHz, Lamp Current = 14mA)

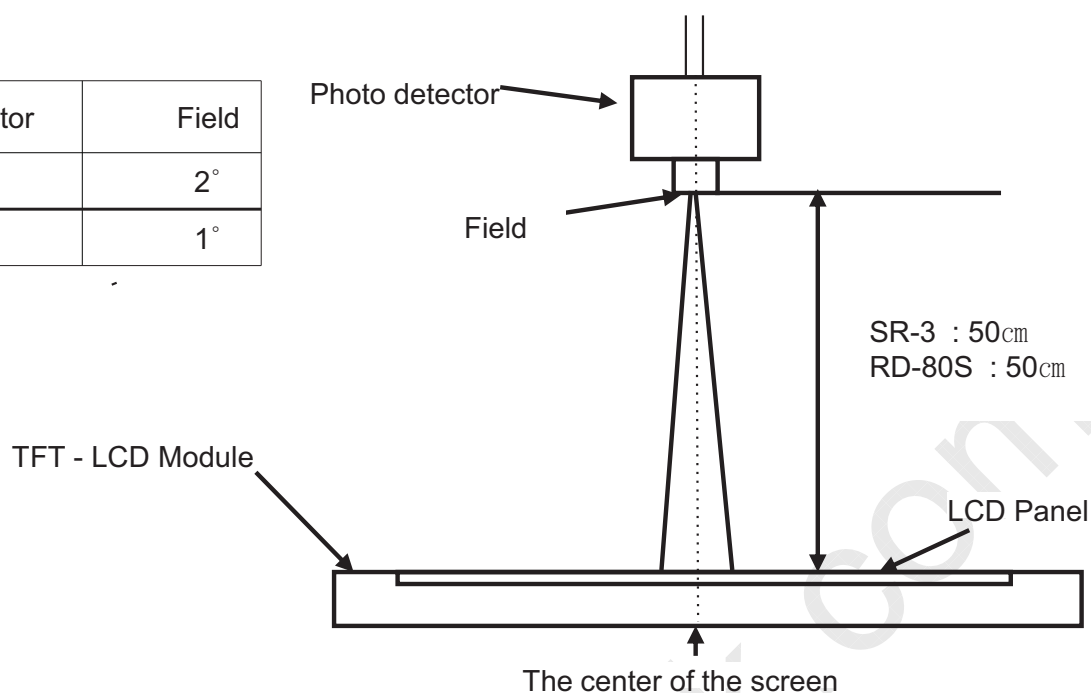| Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio (Center of screen)		C/R		2000	4000	-		(1) SR-3
Response Time (Using Wistron SOC Board)	G-to-G	Tg		-	8	-	msec	(3) RD-80S
Luminance of White (Center of screen)		Y_L	Normal qL,R =0 qU,D =0 Viewing Angle	350	400	-	cd/m^2	(4) SR-3
Color Chromaticity (CIE 1931)	Red	Rx		TYP. -0.03	0.639	TYP. +0.03		(5),(6) SR-3
		Ry			0.329			
	Green	Gx			0.296			
		Gy			0.602			
	Blue	Bx			0.146			
		By			0.061			
	White	Wx			0.280			
		Wy			0.285			
Color Gamut		-		69	72	-	%	(5) SR-3
Color Temperature		-		-	10000	-	K	
Viewing Angle	Hor.	q_L	C/R≥10	79	89	-	Degree	(6) EZ-Contrast
		q_R		79	89	-		
	Ver.	q_U		79	89	-		
		q_D		79	89	-		
White Brightness Uniformity (9 Points)		B_{uni}		-	-	25	%	(2) SR-3
Gamma		-		1.7	2.2	2.7		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.
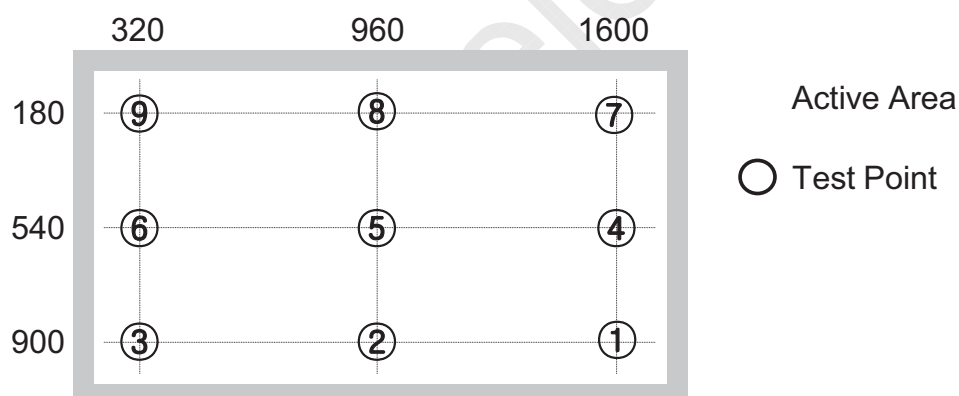Environment condition : Ta = 25 ± 2 °C

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Samsung Secret

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

Photo detector

Field

SR-3 : 50㎝
RD-80S : 50㎝

TFT - LCD Module

LCD Panel

The center of the screen

- Definition of test point

	320	960	1600
180	⑨	⑧	⑦
540	⑥	⑤	④
900	③	②	①

Active Area

◯ 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

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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

| Display data | Black (data off) | White (data on) | Black (data off) |

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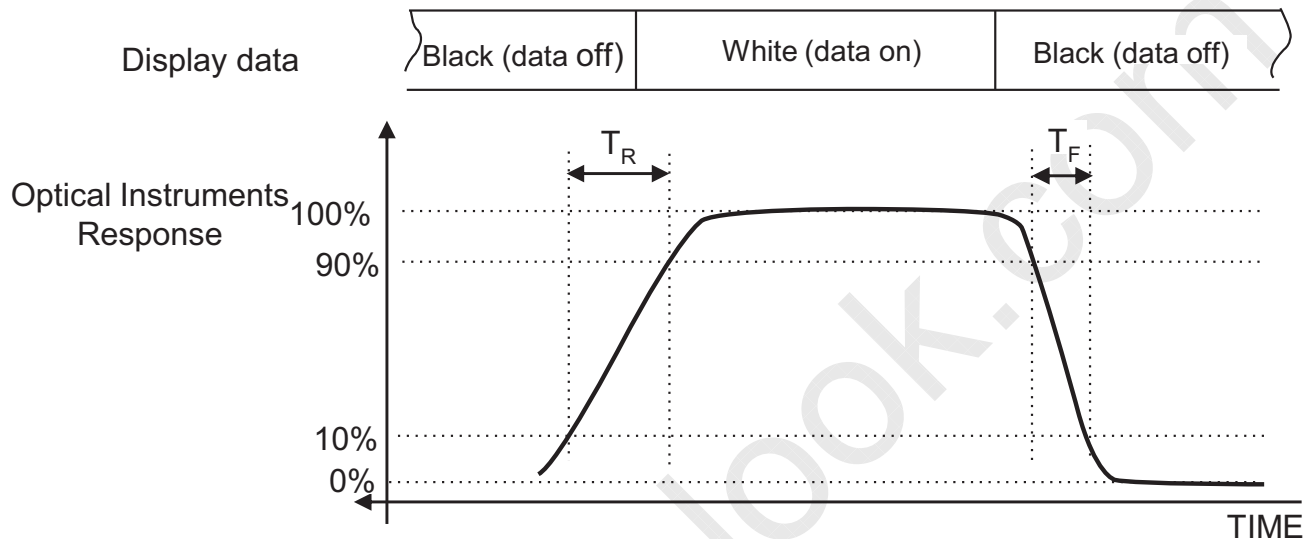
Note (4) Definition of Luminance of White : Luminance of white at center point ⑤

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)

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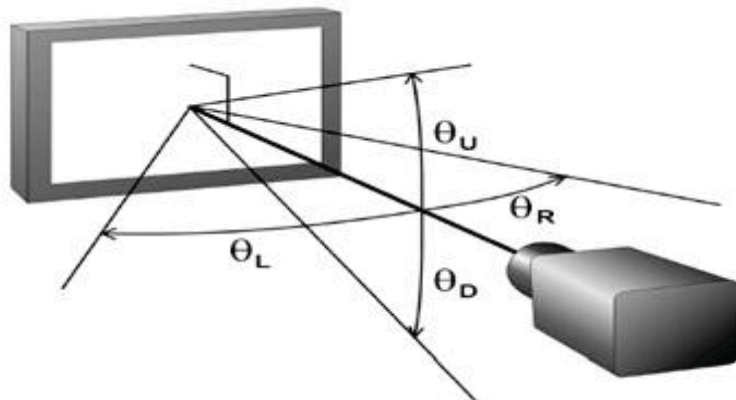
3. Electrical Characteristics

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}	11.0	12.0	13.0	V	(1)
Current of Power Supply	(a) Black	I_{DD}	-	550	900	mA	(2),(3)
	(b) White		-	550	900	mA	
	(c) Mosaic		-	600	900	mA	
	(d) Sub H-Stripe		-	650	750	mA	
Vsync Frequency		f_V	47	60	63	Hz	
Hsync Frequency		f_H	50	67.5	73	kHz	
Main Frequency		f_{DCLK}	130	148.5	155	MHz	
Rush Current		I_{RUSH}	-	-	5	A	(4)

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

(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)Sub H-Stripe
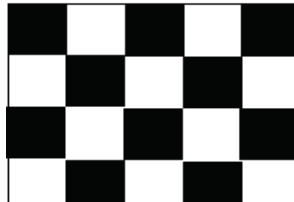
(4) Measurement Conditions

100%
90%

V_{DD}

10%
GND

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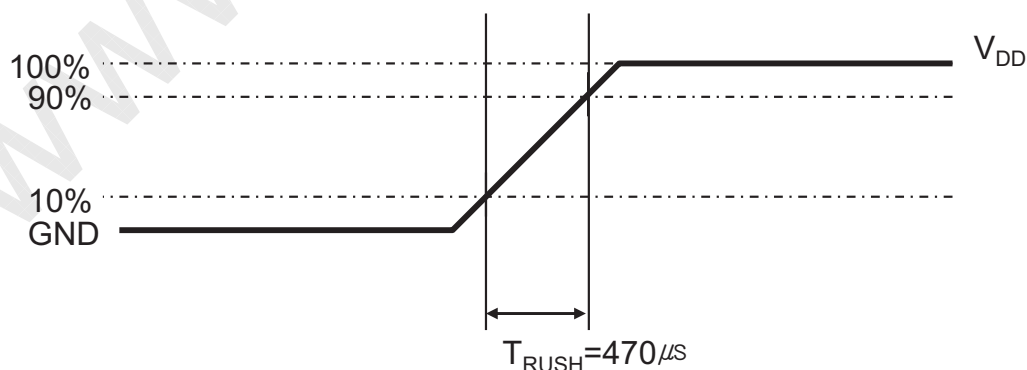
Rush Current I_{RUSH} can be measured when T_{RUSH}. is 470μs.

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3.2 Back Light Unit

The back light unit contains 10 direct-lighting type CCFLs (Cold Cathode Fluorescent Lamp). The characteristics of lamps are shown in the following tables.

Ta=25 ± 2°C
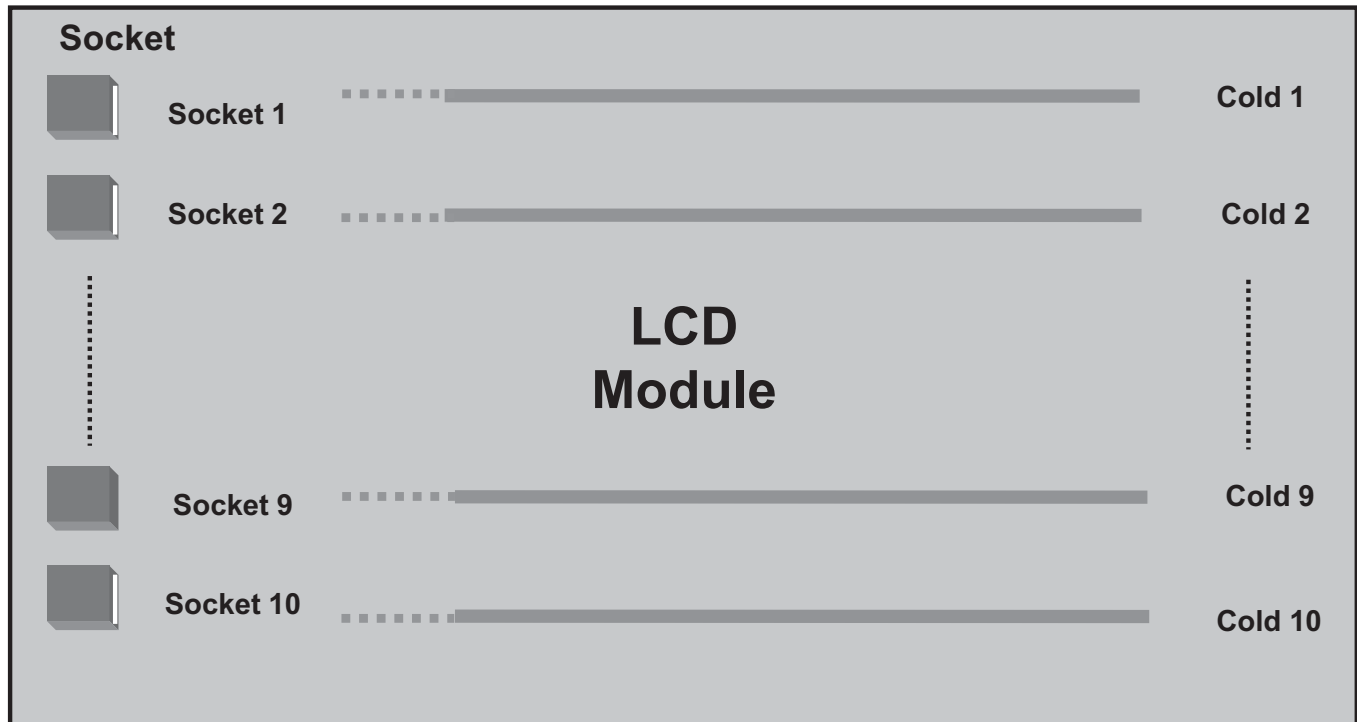
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Lamp Current	I_L	6.0	14.0	15.0	mArms	(2)
Starting Up Voltage	Es	-	-	0°C: 1500	Vrms	(3)
				25°C:1370		
Frequency	fr	30	62.5	80	kHz	
Operating Life Time	Hr	50,000	-	-	Hour	(1)

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°C, I_L = 14.0mA , For single lamp only.]

(2) In condition of Inverter hot

(3) The voltage over the starting up voltage should be input the lamp less than a second.

  If not, the lamp could not be turn on.

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4. Input Terminal Pin Assignment

4.1. Input Signal & Power   Connector : PF050-O68B-C20-S(UJU)

No	Signal	Description	No	Signal	Description
1	GND	Ground	35	LVCLKN_A	mLVDS Clock +
2	GND	Ground	36	LVCLKP_A	mLVDS Clock -
3	N.C	No Connection	37	GND	Ground
4	VIN	DC power supply	38	LV3N_A	mLVDS Signal +
5	VIN	DC power supply	39	LV3P_A	mLVDS Signal -
6	VIN	DC power supply	40	GND	Ground
7	VIN	DC power supply	41	LV2N_A	mLVDS Signal +
8	VIN	DC power supply	42	LV2P_A	mLVDS Signal -
9	VIN	DC power supply	43	GND	Ground
10	N.C	No Connection	44	LV1N_A	mLVDS Signal +
11	SDA_ROM	I2C SDA(ROM)	45	LV1P_A	mLVDS Signal -
12	SCL_ROM	I2C SCL(ROM)	46	GND	Ground
13	WPN	Inverted WP	47	LV6N_B	mLVDS Signal +
14	WP	I2C WP	48	LV6P_B	mLVDS Signal -
15	N.C	I2C SDA	49	GND	Ground
16	N.C	I2C SCL	50	LV5N_B	mLVDS Signal +
17	N.C	No Connection	51	LV5P_B	mLVDS Signal -
18	CPV1	Gate Signal #1	52	GND	Ground
19	CPV2	Gate Signal #1	53	LV4N_B	mLVDS Signal +
20	CPV3	Gate Signal #1	54	LV4P_B	mLVDS Signal -
21	N.C	No Connection	55	GND	Ground
22	STV	Vsync Start	56	LVCLKN_B	mLVDS Clock +
23	TP		57	LVCLKP_B	mLVDS Clock -
24	POL		58	GND	Ground
25	GND	Ground	59	LV3N_B	mLVDS Signal +
26	LV6N_A	mLVDS Signal +	60	LV3P_B	mLVDS Signal -
27	LV6P_A	mLVDS Signal -	61	GND	Ground
28	GND	Ground	62	LV2N_B	mLVDS Signal +
29	LV5N_A	mLVDS Signal +	63	LV2P_B	mLVDS Signal -
30	LV5P_A	mLVDS Signal -	64	GND	Ground
31	GND	Ground	65	LV1N_B	mLVDS Signal +
32	LV4N_A	mLVDS Signal +	66	LV1P_B	mLVDS Signal -
33	LV4P_A	mLVDS Signal -	67	GND	Ground
34	GND	Ground	68	GND	Ground

Note(1) No Connection: This PINS are only used ONLY for SAMSUNG.

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Note(3) Pin number starts from Left side

S-PCB

▼

Pin No. 1   Pin No. 68

#1   #68
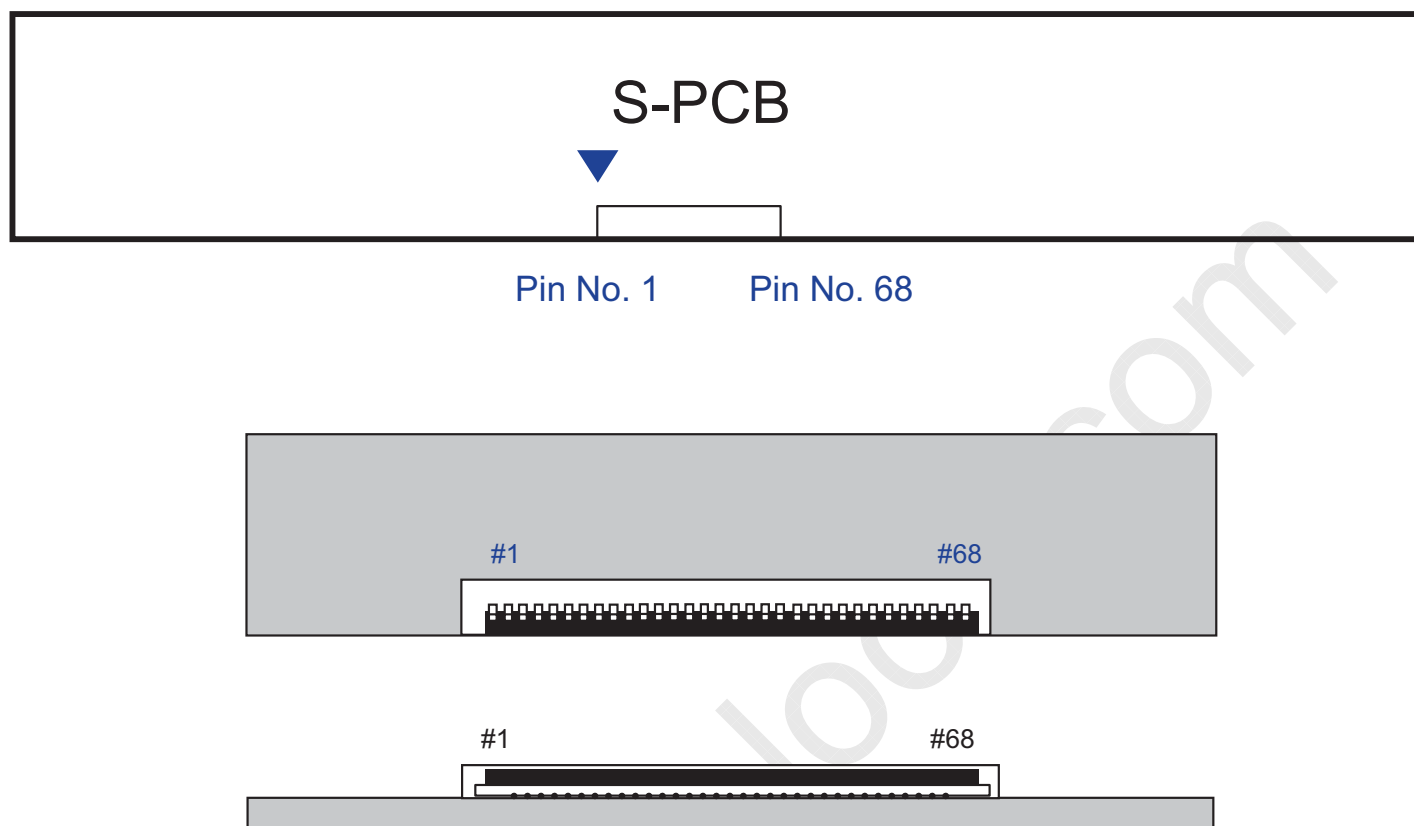
#1   #68

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.

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

COLOR	DISPLAY (8bit)	RED								GREEN								BLUE								GRAY SCALE LEVEL
		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. Interface Timing

5.1 Timing Parameters （DE mode）

SIGNAL	ITEM	SYMBOL	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	-
Vertical Display Term	Active Display Period	T_{VD}	-	1080	-	Lines	-
	Vertical Total	T_V	1100	1125	1480	Lines	-
Horizontal Display Term	Active Display Period	T_{HD}	-	1920	-	Clocks	-
	Horizontal Total	T_H	2154	2200	2300	clocks	-

Note) This product is DE mode. But the Hsync & Vsync signal must be inputted

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

     (2) Internal VDD = 3.3V

     (3) Spread spectrum

       - Modulation rate (max) : $\pm$ 2.5 %

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5.2 mini-LVDS Input Data Characteristics

ITEM	SYMBOL	MIN.	TYP.	MAX.	Unit	NOTE
VID(Single ended voltage)	VID	0.2		0.6	V	-
Vcm	VI	0.3+(VID/2)		(VDD-1.2) -VID/2	V	-
Clock pulse width	PWCLK	4	-	-	ns	-
Clock pulse high period	PWCLK(H)	1.52	-	-	ns	-
Clock pulse low Period	PWCLK(L)	1.52	-	-	ns	-
CLK-Data Setup/Hold time	tSETUP1/ tHOLD1	0.69 / 0.69	-	-	ns	-
Reset High Period	PWRST	3	-	-	clk	-
CLK1 high pulse width	tPWCLK1	0.2	-	-	us	
Pol Setup/Hold Time	tPOL-CLK1 / tCLK1-POL	5/6	-	-	ns	
CLK1 to RST input time	tCLK1-RST	200	-	-	ns	
Reset low to CLK 1 Rising time	tRST-CLK1	0	-	-	ns	

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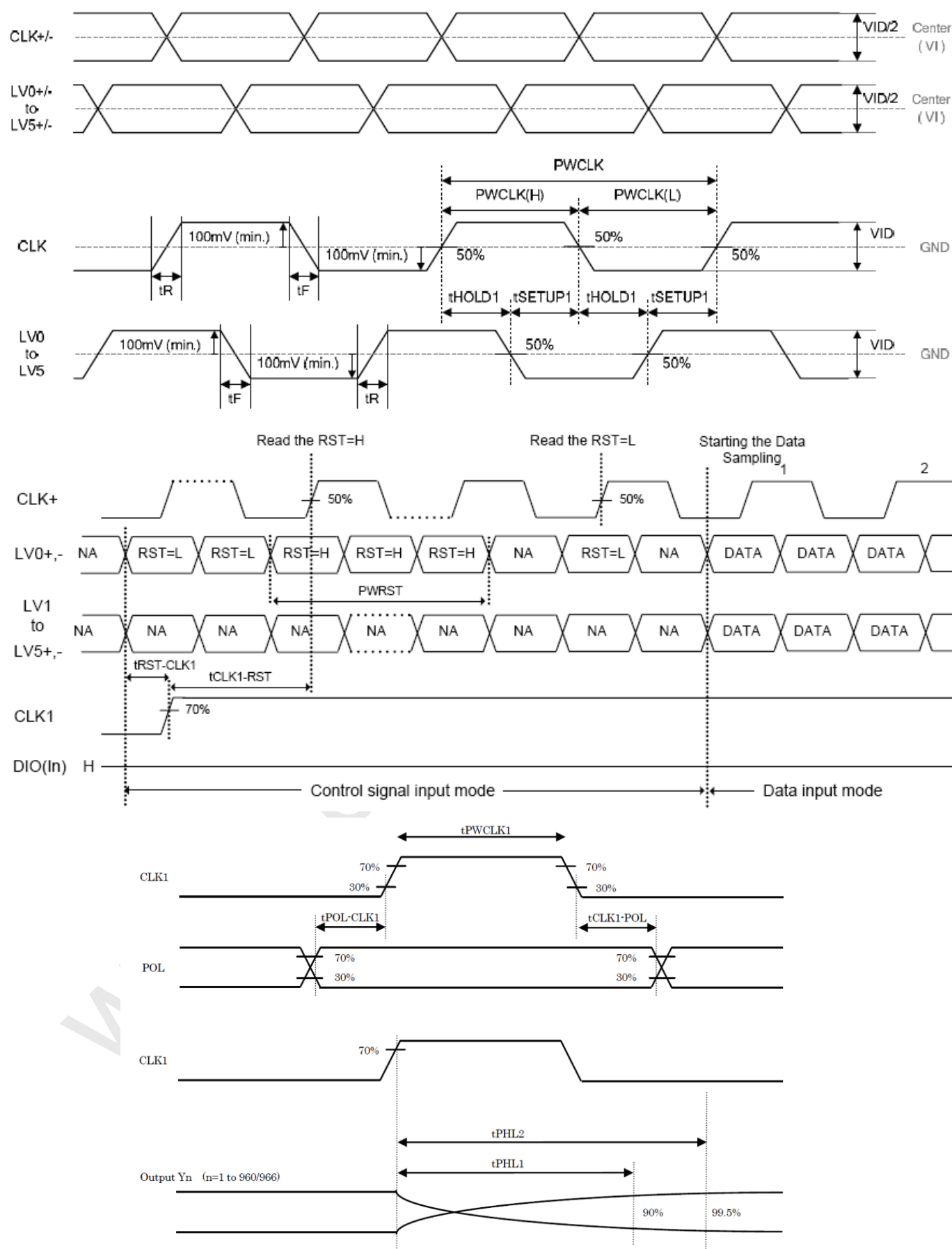
5.3 I2C Signal In/Out Sequence

T1 ≤ 100msec (Recommend)
300msec ≤ T2 ≤ 600msec
(Recommend)
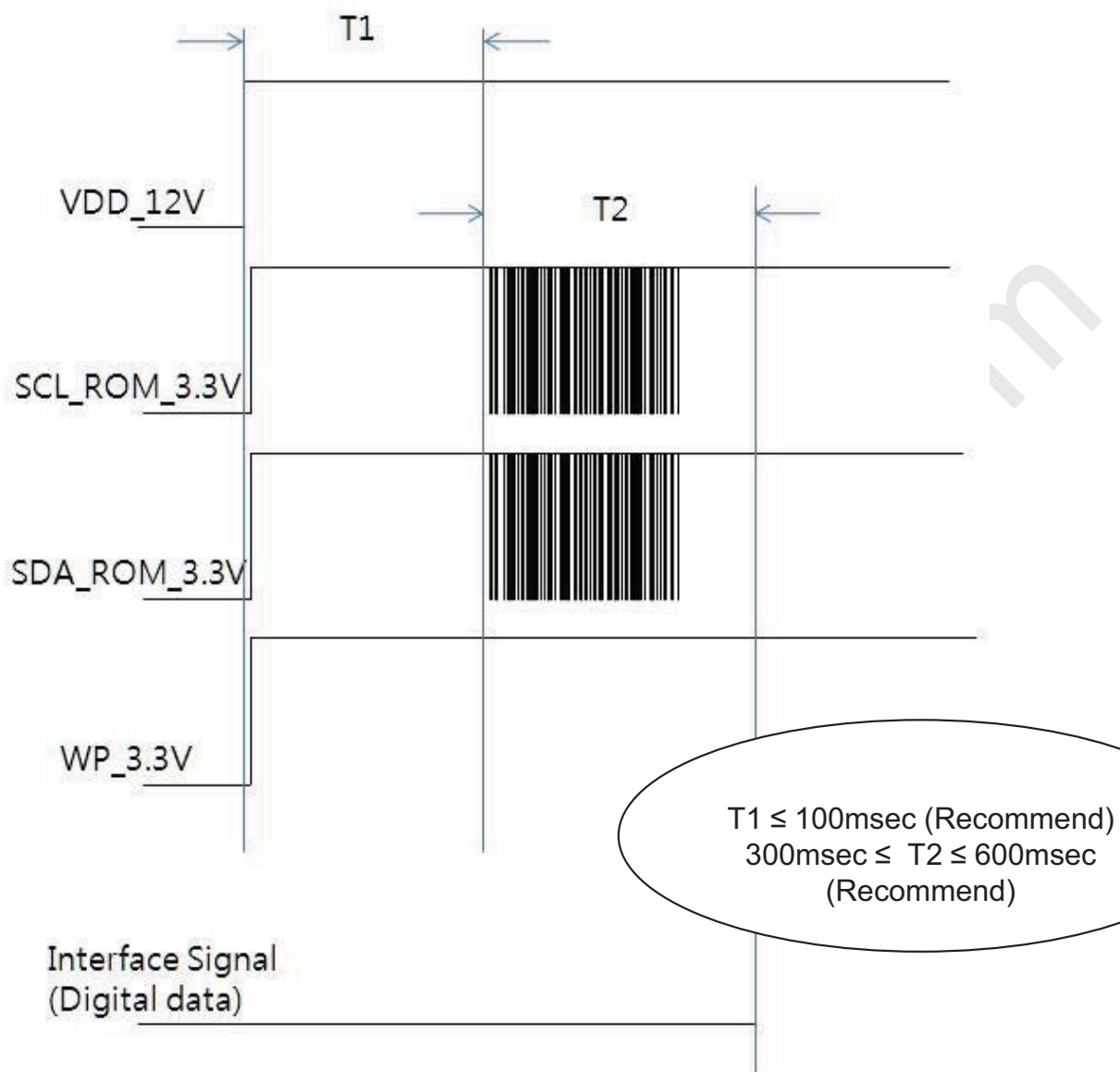
Note (1) SCL_ROM, SDA_ROM, WP(=WPN) signal is 3.3V I2C digital signal to operate
power IC of module.
(2) Panel On time is delayed as T1 timing is longer, this can be different according to
AD board of set.

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5.4 Timing diagrams of interface signal (DE mode)

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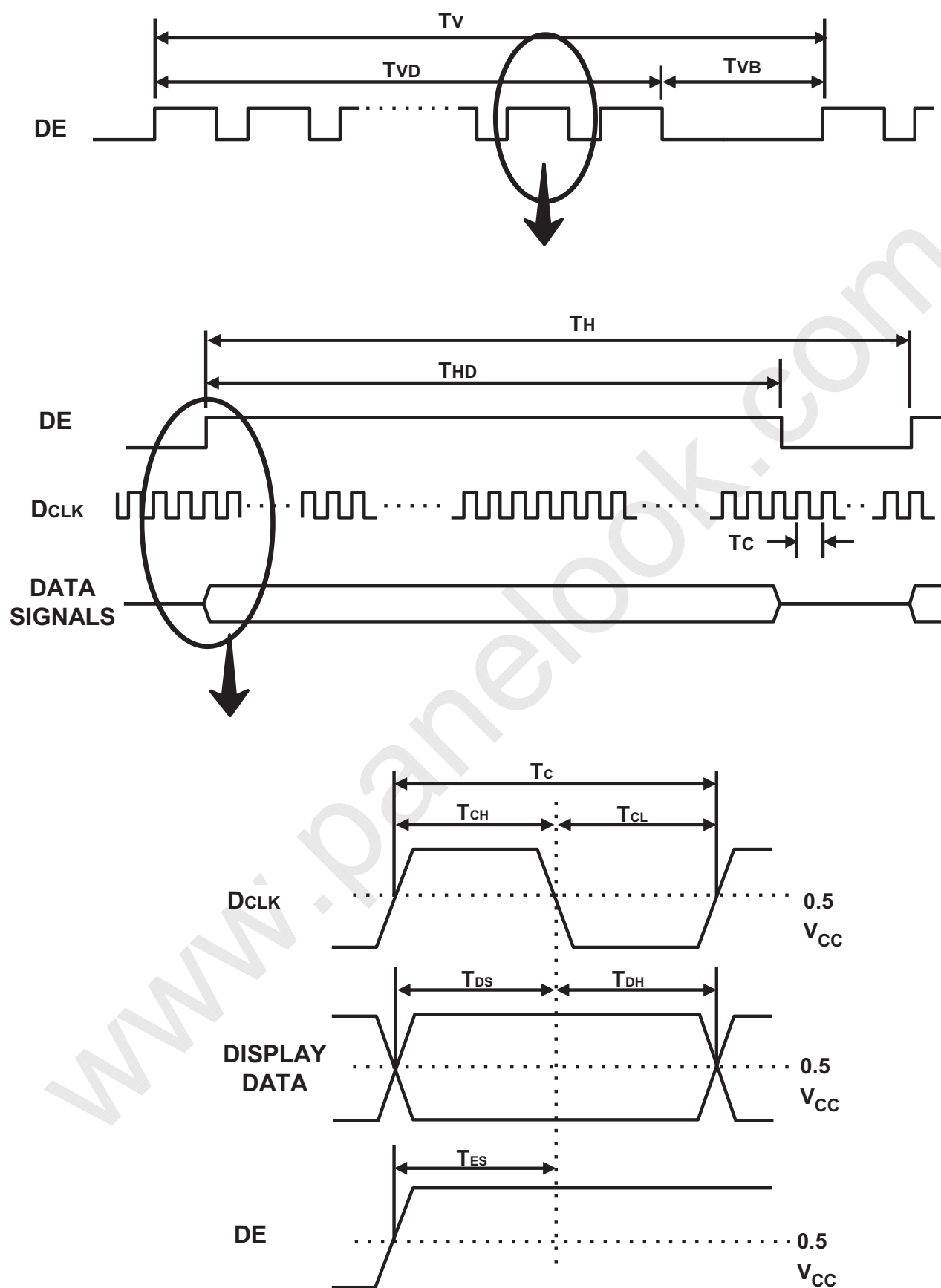
5.5 Power ON/OFF Sequence

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

0.47msec<T1≤30msec
0msec<T2≤1800msec
(Recommend Value)
0<T3≤50msec
(Recommend Value)
1000msec≤T4

700msec≤T5
(Recommend Value)
100msec≤T6
(Recommend Value)
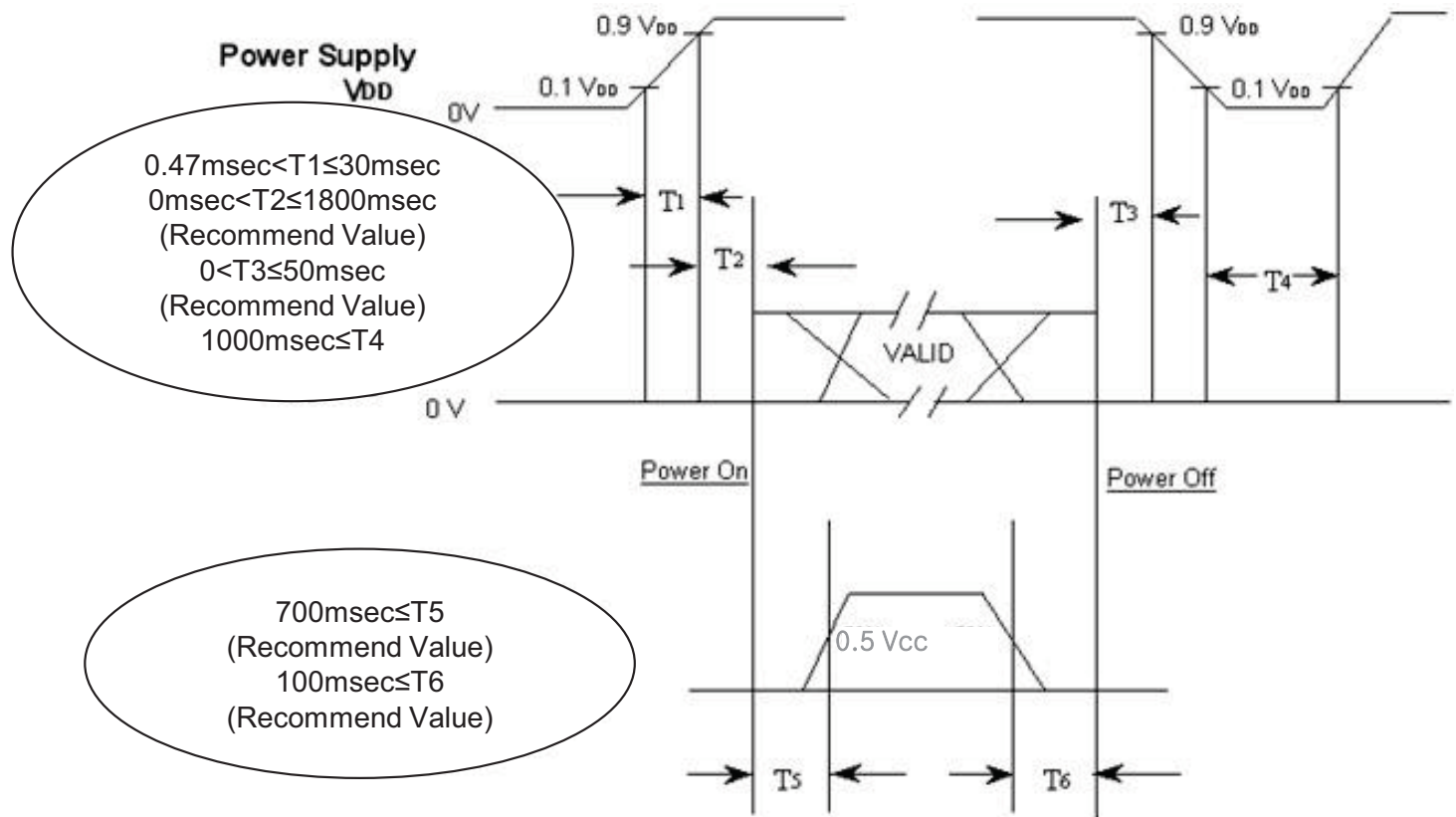
T1 : V_{DD} rising time from 10% to 90%
T2 : The time from V_{DD} to valid data at power ON.
T3 : The time from valid data off to V_{DD} off at power Off.
T4 : V_{DD} off time for Windows restart
T5 : The time from valid data to B/L enable at power ON.
T6 : The time from valid data off to B/L disable at power Off.

- 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.
- In Case T5 is less than 1000msec and T6 is less than 100msec, Garbage Display can be seen. (It is not related to electrical function issue, Just for recommendation to prevent Garbage Display)

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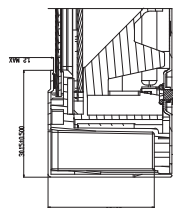
SECTION AA'
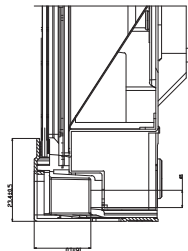
SECTION BB'

SECTION CC'

* NOTE
1. BACKLIGHT : 10 COLD CATHODE FLUORESCENT LAMPS
2. USERHOLE
   - TAP SIZE & TOLERANCE DESIGNED FOR GENERAL PURPOSE METRIC SCREW THREAD ACCORDING TO GENERAL GRADE OF "KS B 0211"
   - ALLOWED SCREW TORQUE
   - M3 TAP : 0.7 N·m MAX × 10TIMES
   - M4 TAP : 1.0 N·m MAX × 10TIMES
3. GAP BETWEEN TOP CHASSIS AND GLASS IS 1.2mm(MAX).
4. WEIGHT : 8,000g(MAX)
5. MIDDLE FLATNESS MAX:0.8mm
6. BLACK MATRIX SPEC

	-	A - B	≤	2.0 mm
	-	C - D	≤	2.0 mm
	-	E - F	≤	2.0 mm

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

MODEL NAME: LTA400HM19
PART/SHEET NAME: OUTLINE DIMENSION
SPEC. NO:
CODE NO:

SAMSUNG ELECTRONICS

CHK'D BY
SHEET 1/2
REV. 000

DRAW'N BY: K.W.LEE   2011.10.28
LEVEL 2

4-Φ (USERHOLE)

955

SET STRUCTURE SUPPORTING EMBO
HEIGHT MAX. 3.0

M3 TAP * 6EA, Depth 10.0

LAMP SUPPORT AREA : HEIGHT 1.3± 0.5

Indenting Embo

FLATNESS BEAD HEIGHT MAX 1.0

M4 TAP * 4EA, Depth 9.6

M4 TAP * 3EA, Depth 8.0

M4 TAP * 6EA, Depth 8.0

M4 TAP * 12EA, Depth 8.0

LIPS AREA: BEAD FORBIDDEN
M3 TAP * 5EA, Depth 7.0

Indenting Embo

EMBO * 3EA, HEIGHT MAX. 3.0

Indenting Embo

STUD #1

End of round
Straight Min 1.0
Notch
Thickness Min 0.15

Round
End of round
Notch

SECTION Indenting Emboss (4EA)

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	±0.1	±0.25	±0.5
64 < X < 256	±0.25	±0.4	±0.8

SAMSUNG ELECTRONICS

LTA400HM19

OUTLINE DIMENSION

SHEET 2/2

M.J.KIM 2011. 11. 04

7. Reliability Test

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Item	Test condition	Quantity
TSS	-20℃ ~ 65℃, 440cycle determination	4EA
HTOL	50℃, 500hr determination	4EA
LTOL	-5℃, 500hr determination	4EA
HTS	70℃, 250hr determination	4EA
LTS	-25℃, 250hr determination	4EA
THB	50℃ / 90%RH, 250hr determination	4EA
TS	-20℃ 30min ~ 60℃ 30min, 100cycle determination	4EA
ESD (non-operation)	C D M : ± 10 kV, 150pF/330 Ω, 9Point, 3times/Point	3EA
ESD(operation)	contact : ± 10 kV, 150pF/330Ω, 210Point, 1 time/Point non-contact : ± 20 kV, 150pF/100Ω, 210Point, 1 time/Point	3EA
POWER ON/OFF	30sec (on) / 30sec(off) : 12,000 times	4EA
Vibration	10 ~ 300Hz/1.5G/10minSR, XYZ, 30min/axis	3EA
Shock	Half Sine, 50G, 11msec, ± XYZ 1time/axis	3EA
PALLET Vibration	1.05Grms, 5-200Hz, Random, z-axis, 2Hr	1PALLET
PALLET Drop	20cm, Bottom, Front, Rear 1times	1PALLET

[Result Evaluation Criteria]

Under the display quality test conditions with normal operation state, these should be no change which may affect practical display functions.

    *   HTOL/ LTOL : High/Low Temperature Operating Life
    ** THB   : Temperature Humidity Bias
   *** HTS/LTS   : High/Low Temperature Storage

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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
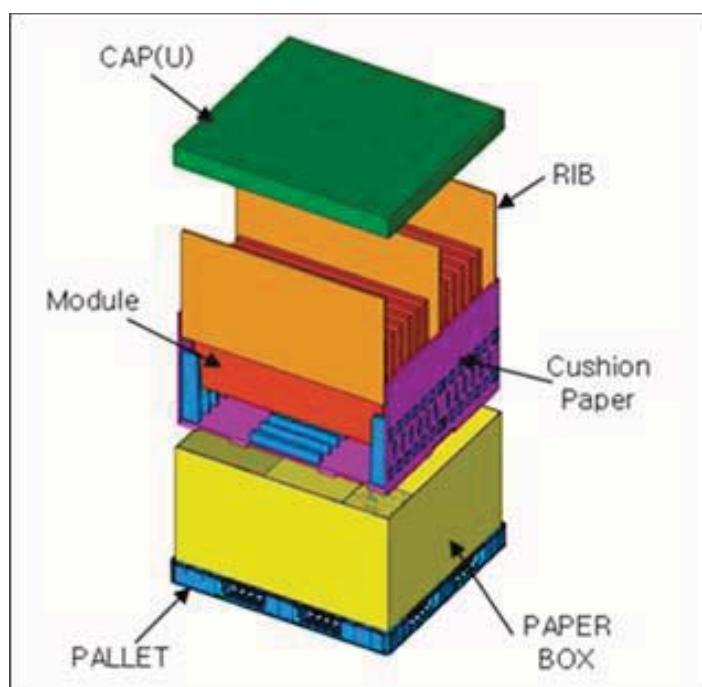
8.2 Packing Specification

Item	Specification	Remark
LCD Packing	11ea /Box (Packing Pallet Box)	- 88kg/LCD(11ea) - 20kg /Packing-Pallet Box(1ea) - Packing Material :Paper
Pallet	1Box / Pallet	1. Pallet weight = 8 kg
Packing Direction	Vertical	
Total Pallet Size	H x V x height	1150mm(H) x 985mm(V) x 719mm(height)
Total Pallet Weight	124kg	Module (88kg) + Pallet(8kg) + Packing-Pallet Box(20kg)

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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) Part number : LTA400HM19
    (2) Revision: Three letters
    (3) Lot number : X X X X XXX XX X

Cell Position No. (In the Glass)
Glass No. (In the one Lot)
Lot No. (Glass)
Month
Year (Note1)
Product code
Line

(4) Nameplate Indication

T C (UL)us (LEAD-FREE)   SAMSUNG

1005   **LTA400HM19**

XXXX

XXXXXXXXXX   XXX

MADE IN KOREA

80mm

40mm

Week code : 09 25
    week
    year

Revision code

Lot number

(5) Packing box attach

DVC :   **LTA400HM19**
TYPE: XXX
QTY :   11
(LEAD-FREE)   ZAT53K0003   G1

100mm

165mm

Part number

Box serial number
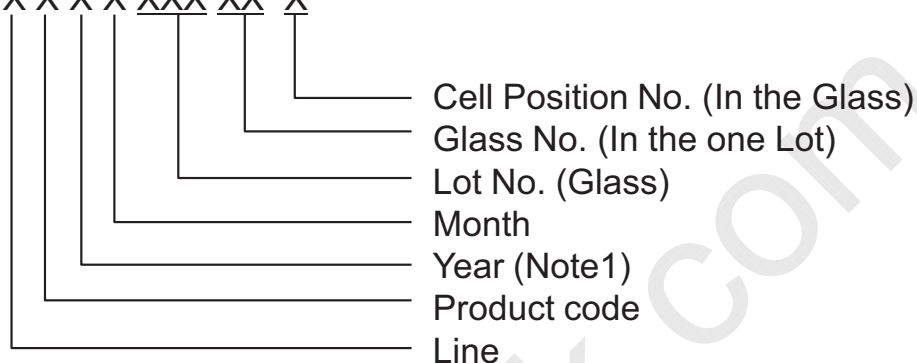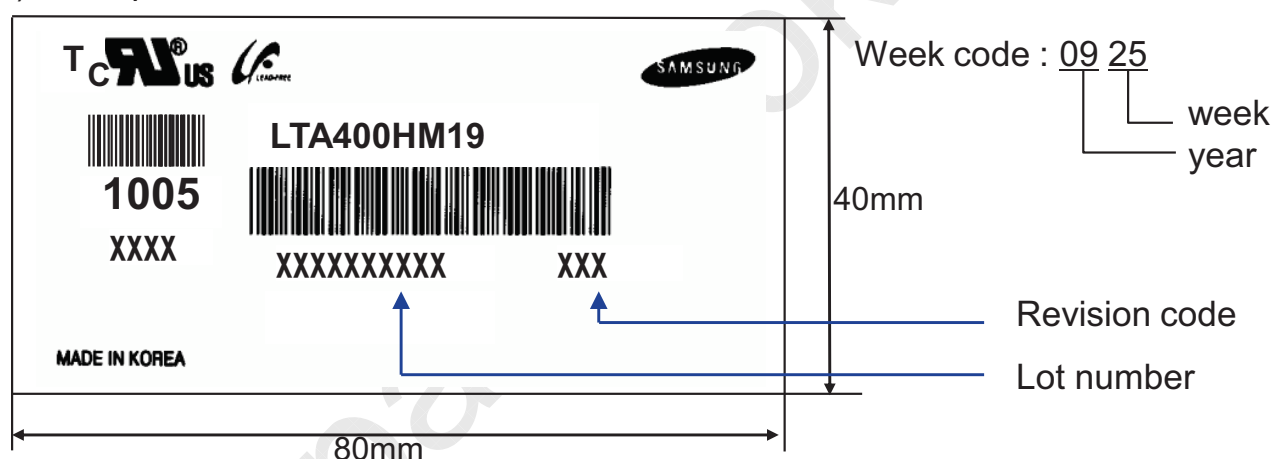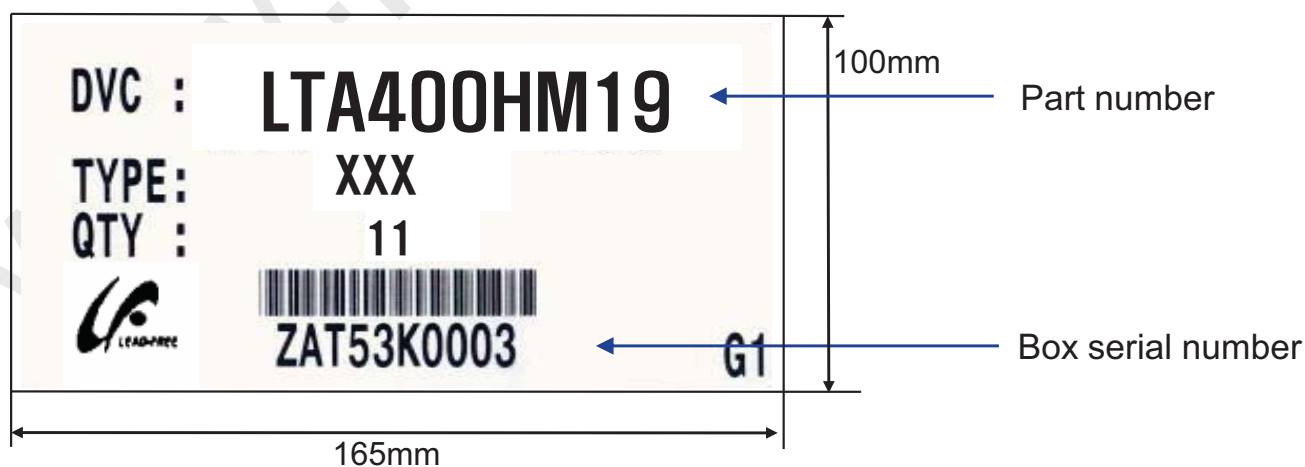
(6) Others
  1. After service part
    Lamps cannot be replaced because of the narrow bezel structure.

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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 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 CCFL 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 connect N.C pins. (Samsung internal use only)

(m) 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 handling a module

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

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10.2 Storage

We highly recommend to comply with the criteria in the table below.

ITEM	UNIT	Min.	Max.
Storage Temperature	(℃)	5	40
Storage Humidity	(%rH)	35	75
Storage Life	12 months		
Storage Condition	- The storage room should provide good ventilation and temperature control. - Products should not be placed on the floor, but on the Pallet away from a wall. - Prevent products from direct sunlight, moisture nor water; Be cautious of a build up of condensation. - Avoid other hazardous environment while storing goods. - If products delivered or kept in conditions of over the storage period of 3 months, the recommended temperature or humidity range, we recommend you leave them at a temperature of 20℃ and a humidity of 50% for 24 hours.		

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 lamp(CCFT) and may require higher startup voltage(Vs).

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10.4 Operation Condition Guide

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(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.

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