SAMSUNG
ELECTRONICS

TO   :

DATE   :

SAMSUNG TFT-LCD
MODEL NO. : LTM150XH-L06

APPROVED BY :

Any Modification of Spec is not allowed without SEC's permission.

Approved by :

PREPARED BY : AMLCD Technical Customer Service Team

SAMSUNG ELECTRONICS CO., LTD.

CONTENTS

Approval

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Date	Rev.No.	Page	Summary		
June. 25, 02	000		Approval spec of LTM150XH -L06 model is issued for the first time.		

GENERAL DESCRIPTION

DESCRIPTION

LTM150XH-L06 is a color active matrix TFT (Thin Film Transistor) liquid crystal display that uses amorphous silicon TFT switching devices. This model is composed of a TFT LCD panel, a driver circuit and a back-light system. The resolution of 15.0- inch contains 1,024 x 768 pixels and can display up to 16.2M colors. 6 o'clock direction is the optimum viewing angle.

FEATURES

- High contrast ratio, High aperture structure
- Wide viewing angle
- High-speed response
- XGA(1024x768 pixels) resolution
- 8-bit color depth, Display 16.2M colors
- Low power consumption
- 4 CCFTs (Cold Cathode Fluorescent Tube)
- DE Only Mode
- LVDS Interface with 1 pixel / clock

APPLICATIONS

- TV & Desktop monitors
- Display terminals for AV application products
- Monitors for Industrial machine

GENERAL SPECIFICATIONS

ITEM	SPECIFICATION	UNIT	NOTE
Active area	304.1(H) x228.1(V) (15.0 inch diagonal)	mm	
Driver element	a-Si TFT active matrix		
Display colors	16,2M		
Number of pixel	1024 x 768	pixel	
Pixel arrangement	RGB vertical stripe		
Pixel pitch	0.297(H) x 0.297(W)	mm	
Display Mode	Normally white		
Surface treatment	Haze 25 , Anti-glare & Hard - Coating (3H)		

Mechanical Information

ITEM		MIN.	TYP.	MAX.	NOTE
Module size	Horizontal (H)	331.1	331.6	332.1	mm
	Vertical (V)	254.4	254.9	255.4	mm
	Depth (D)	-	12.5	13.0	mm
Weight		-	-	1350	g

1. ABSOLUTE MAXIMUM RATINGS

1.1 ABSOLUTE RATINGS OF ENVIRONMENT

ITEM	SYMBOL	MIN.	MAX.	UNIT	NOTE
Storage temperature	T_{STG}	-20	60	°C	(1),(5)
Operating temperature (Surface of Glass)	T_{OPR}	0	50	°C	(1),(5)
Shock (non-operating)	Snop	-	50	G	(2),(4)
Vibration (non-operating)	Vnop	-	1.5	G	(3),(4)

Note (1) Temperature and relative humidity range are shown in the figure below.
   90 % RH Max. (40 °C ≥ Ta)
   Maximum wet - bulb temperature at 39 °C or less. (Ta > 40 °C) No condensation.
   (2) 11ms, sine wave, 1 time for ±X, ±Y, ±Z.
   (3) 10 - 300 - 10 Hz, Sweep rate: 10 min, 30 min for X,Y,Z.
   (4) At testing Vibration and Shock, the fixture in holding the Module to be tested have to be
       hard and rigid enough so that the Module would not be twisted or bent by the fixture.
   (5) If product is used for extended time excessively or exposed to high temperatures for extended time,
       there is a possibility of wide viewing angle film damage which could affect visual characteristics.

Relative Humidity (%RH)

Operating Range

(40, 90)

(50, 50.4)

(60,27.7)

Storage Range

Temperature (°C)
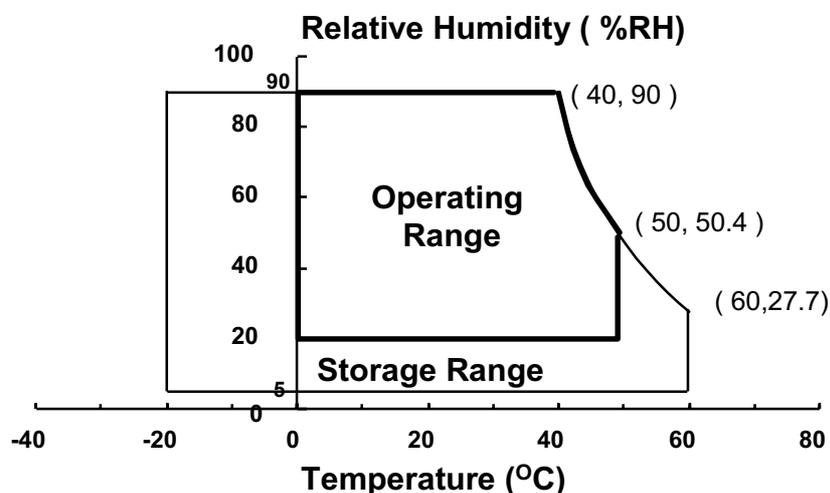
1.2 ELECTRICAL ABSOLUTE RATINGS

(1) TFT LCD MODULE

(Vss = GND = 0 V)

ITEM	SYMBOL	MIN.	MAX.	UNIT	NOTE
Power Supply Voltage	V_{DD}	GND-0.3	3.6	V	(1)

NOTE (1) With Ta ($25 \pm 2\,^{\circ}C$)

(2) BACK-LIGHT UNIT

Ta = $25 \pm 2\,^{\circ}C$

ITEM	SYMBOL	MIN.	MAX.	UNIT.	NOTE
Lamp current	I_L	3.0	6.5	mArms	(1)
Lamp frequency	f_L	40	80	KHz	(1)

NOTE (1) Permanent damage to the device may occur if maximum values are exceeded.
Functional operation should be restricted to the conditions described under Normal Operating Conditions.
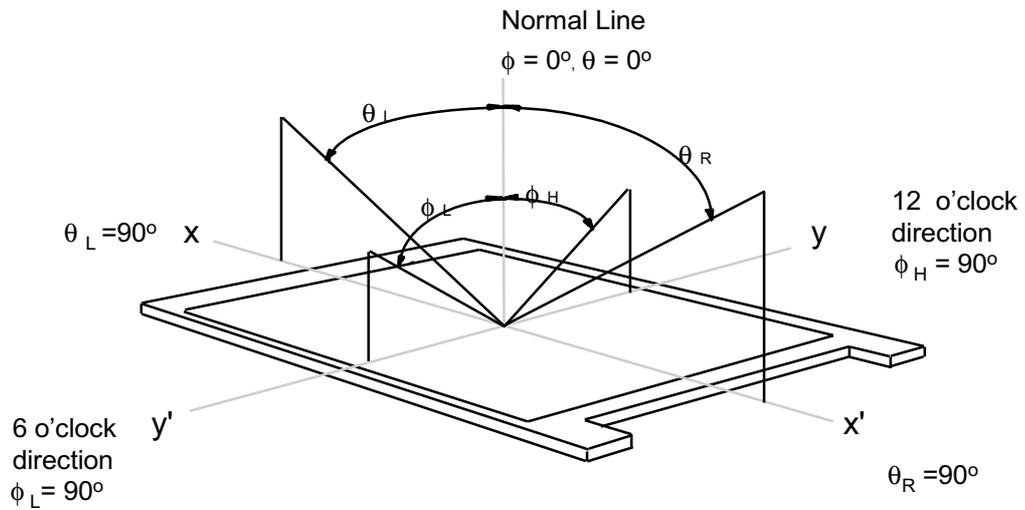
2. OPTICAL CHARACTERISTICS

The following items are measured under stable conditions. The optical characteristics should be measured in a dark room or equivalent state with the methods shown in Note (4).
Measuring equipment : TOPCON BM-5A

* $Ta = 25 \pm 2 \,^{\circ}C$, $V_{DD} = 3.3V$,   fv= 60Hz, f_{DCLK}=65MHz, I_L = 6.5 mArms

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Contrast Ratio (Center of screen)		CR		300	400	-		(1), (2), (4)
Response Time at Ta	Rising	T_R		-	5	10	msec	(1), (3)
	Falling	T_F		-	20	25		
Luminance of White (Center of screen)		Y_L	$\phi = 0$, $\theta = 0$ Normal Viewing Angle	400	450	-	cd/m^2	
Color Chromaticity (CIE 1931)	Red	R_X		0.598	0.628	0.658		(1), (4)
		R_Y		0.323	0.353	0.383		
	Green	G_X		0.260	0.290	0.320		
		G_Y		0.565	0.595	0.625		
	Blue	B_X		0.114	0.144	0.174		
		B_Y		0.058	0.088	0.118		
	White	W_X		0.274	0.304	0.334		
		W_Y		0.295	0.325	0.355		
Viewing Angle	Hor.	θ_L	CR $\geq$ 10	60	70	-	Degrees	
		θ_R		60	70	-		
	Ver.	ϕ_H		50	55	-		
		ϕ_L		55	60	-		
Brightness Uniformity		B_{UNI}		-	-	25	%	(5)

Note 1) Definition of Viewing Angle : Viewing angle range (10 ≤ CR)

Normal Line
$\phi = 0^o, \theta = 0^o$

θ_L

θ_R

ϕ_L ϕ_H

$\theta_L = 90^o$ x

y

12 o'clock direction
$\phi_H = 90^o$

6 o'clock direction
$\phi_L = 90^o$ y'

x'

$\theta_R = 90^o$

Note 2) Definition of Contrast Ratio (CR) : Ratio of gray max (Gmax) ,gray min (Gmin) at the center point of panel.

$$CR = \frac{\text{Luminance with all pixels white (Gmax)}}{\text{Luminance with all pixels black (Gmin)}}$$

Note 3) Definition of Response time : Sum of T_R , T_F

Display data White(TFT OFF) | Black(TFT ON) | White(TFT OFF)

Optical Response

100%
90%

T_R T_F

10%
0%

Time
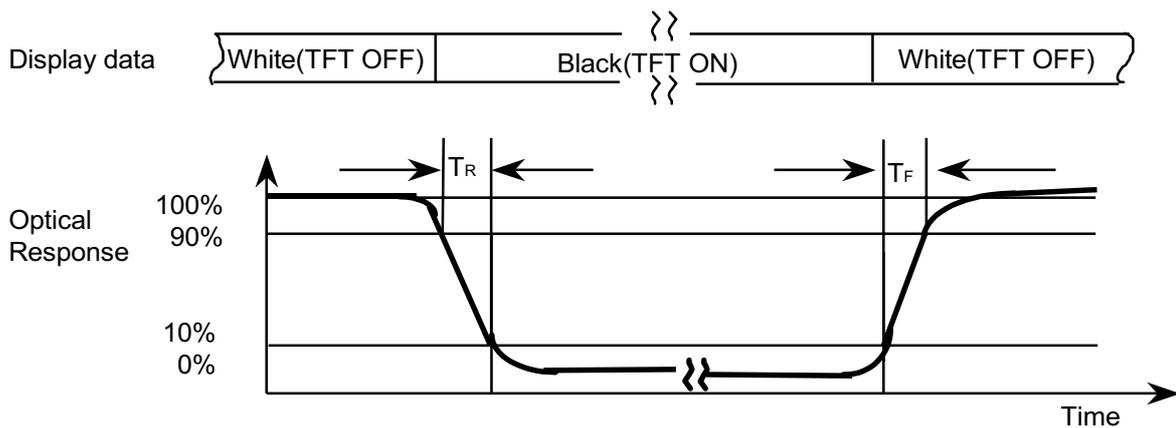
Note 4) After stabilizing and leaving the panel alone at a given temperature for 30 min , the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. 30 min after lighting the back-light. This should be measured in the center of screen.
Lamp current : 6.5mA , Environment condition : Ta = 25 ± 2 °C

Photo-detector
(TOPCON BM-5A)

Field = 2 °

40 cm

TFT-LCD module

LCD panel

center of the screen

Optical characteristics measurement setup

Note 5) Definition of 9 points brightness uniformity

$$B_{UNI} = \frac{\left| B_{max} \text{ or } B_{min} - B_{ave} \right|}{B_{ave}} \times 100$$
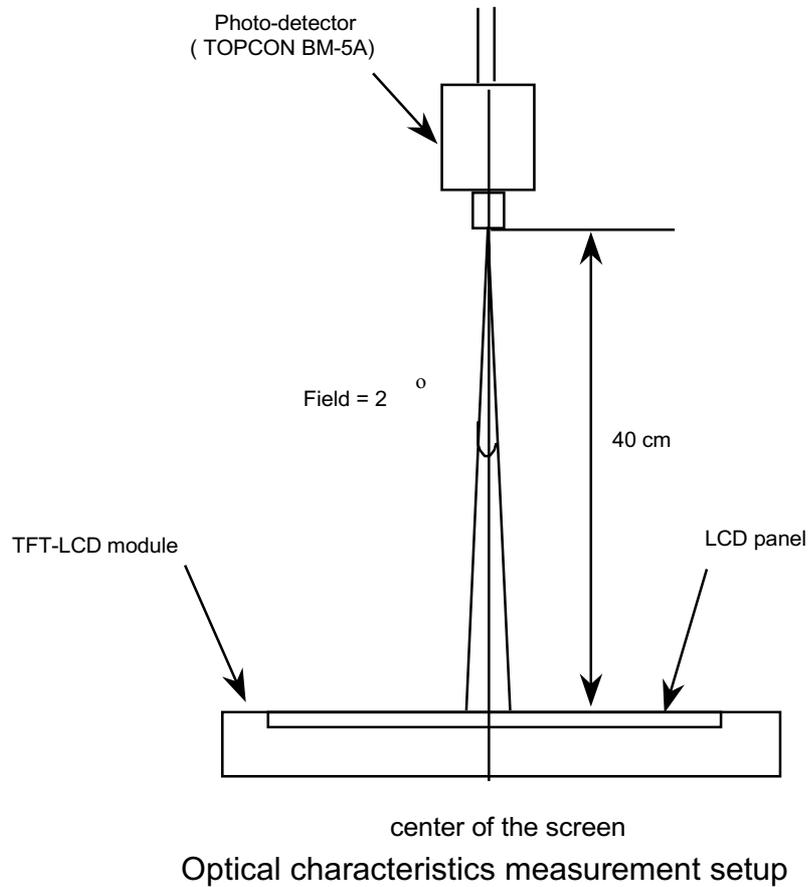
Bmax : Maximum Brightness

Bmin : Minimum Brightness

Bave : Average Brightness $= \dfrac{\sum\limits_{k=1}^{9} (B(k))}{9}$

128   512   896

VIEW AREA

⑨   ⑧   ⑦   — 96

⑥   ⑤   ④   — 384   ◯   : test point

③   ②   ①   — 672
(lines)

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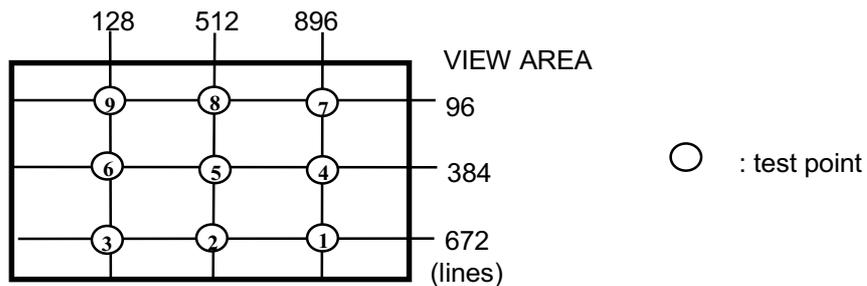
3. ELECTRICAL CHARACTERISTICS

3.1 TFT LCD MODULE

Ta= 25 ± 2 °C

ITEM			SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Voltage of Power Supply			V_{DD}	3.0	3.3	3.6	V	
Differential Input Threshold Voltage		High	V_{IH}	-	-	+100	mV	(1)
		Low	V_{IL}	-100	-	-	mV	
Current of Power Supply	White		I_{DD}	-	400	-	mA	(2)(4)*a
	Mosaic			-	420	-	mA	(2)(4)*b
	Sub-pixel checker			-	470	550	mA	(2)(4)*c
Vsync Frequency			fv	-	60	75	Hz	
Hsync Frequency			fH	-	48.3	60.0	kHz	
Main Frequency			fDCLK	47	65	80	MHz	(3)
Rush Current			Irush	-	-	1.5	A	(5)

Note (1) Condition : VCM = +1.2V (Typical)

(2) fv=60Hz, fDCLK =65MHZ, V_{DD} = 3.3V, DC Current.

(3) 1 Pixel / clock

(4) Power dissipation check pattern

*a) White Pattern

*b) Mosaic Pattern

VIEW AREA

Display Brightest Gray Level

Display Darkest Gray Level
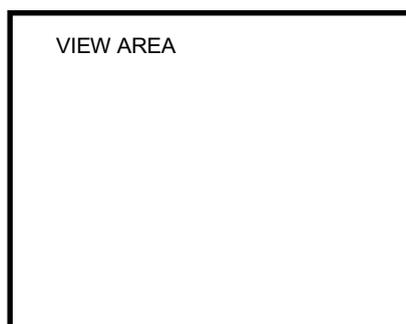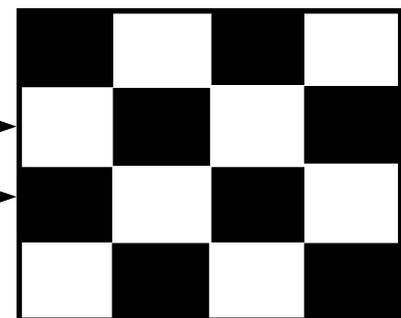
c) Sub-pixel Checker Pattern
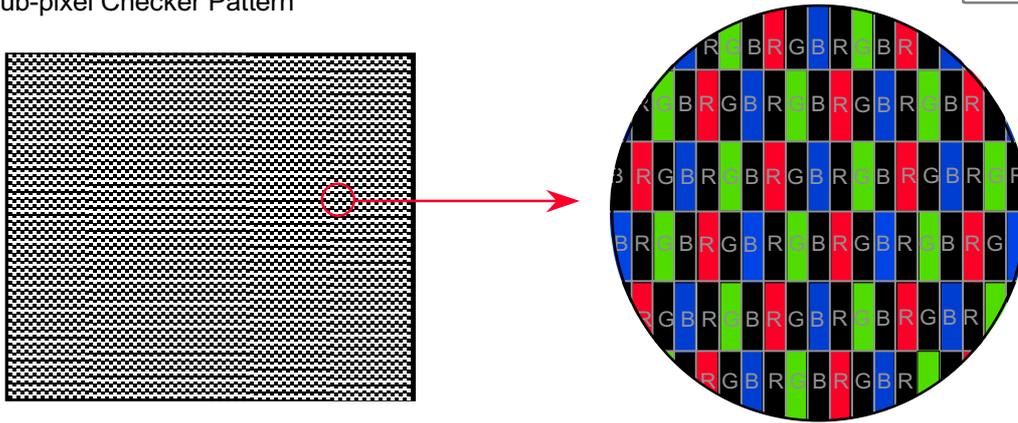
(5) Measurement Conditions

V_{DD} rising time : 470us

Input Power 3.3V

M1
2SK1059

FUSE

V_{DD} (LCD INPUT)

R1
47K

C1
1uF

CONTROL SIGNAL
(HIGH to LOW)

R2
1K

M2
2SK1399

12V

R3
47K

C2
10000pF

C3
1uF
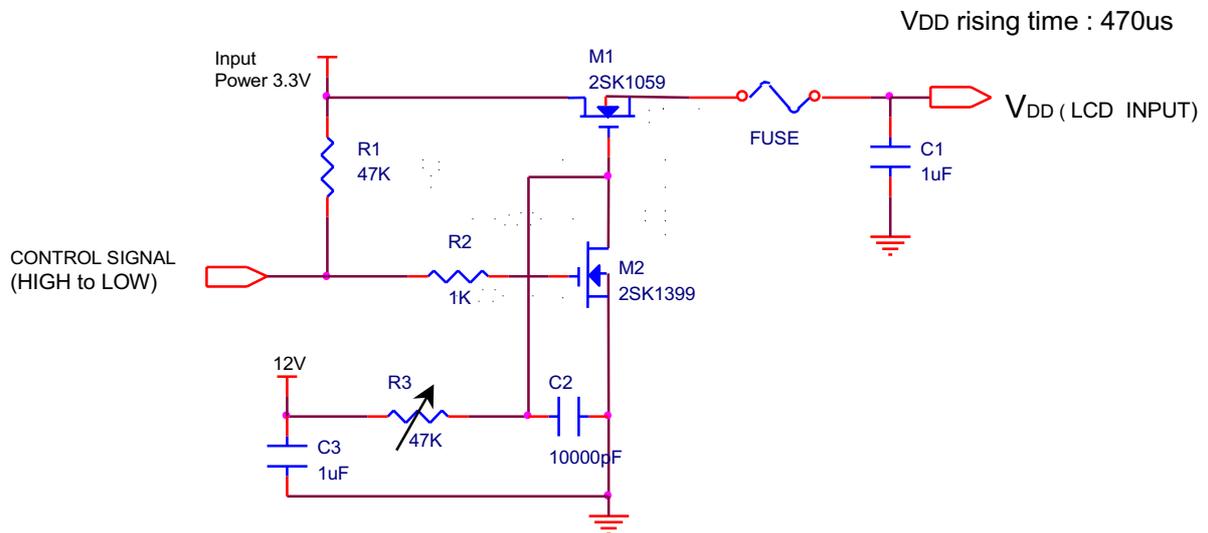
Note : Control Signal : High(+3.3V) -->Low(Ground)

All Signal lines to panel except for power 3.3V : Ground

The rising time of supplied voltage is controlled to 470us by R3 and C2 value.

0.9 V_{DD}   3.3V

GND   0.1 V_{DD}

Rising Time
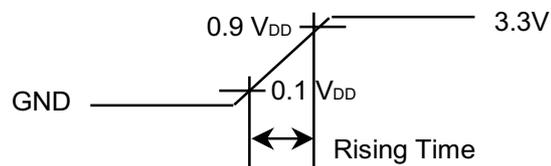
3.2 BACK-LIGHT UNIT

The back-light system is an edge-lighting type with 4 CCFTs(Cold Cathode Fluorescent Tube).

The characteristics of four lamps are shown in the following tables.

Ta= 25 ± 2 °C

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Lamp Current	I_L	3.0	6.0	6.5	mArms	(1)
Lamp Voltage	V_L	-	665	-	Vrms	I_L=6.0 mArms
Lamp Frequency	F_L	40	-	60	kHz	(2)
Operating Life Time of Lamp	Hr	25,000	35,000	-	Hour	(3)
Startup Voltage	Vs	-	-	1120 (25°C)	Vrms	(4)
				1570 (0°C)		

Note) The waveform of the inverter output voltage must be area symmetric and the design of the inverter must have specifications for the modularized lamp.

The performance of the back-light, for example life time or brightness, is much influenced by the characteristics of the DC-AC inverter for the lamp. So all the parameters of an inverter should be carefully designed so as not to produce too much leakage current from high-voltage output of the inverter. When you design or order the inverter, please make sure that a poor lighting caused by the mismatch of the back-light and the inverter(miss lighting, flicker, etc.) never occur. When you confirm it, the module should be operated in the same condition as it is installed in your instrument.

Note (1) Lamp current is measured with current meter for high frequency as shown below.
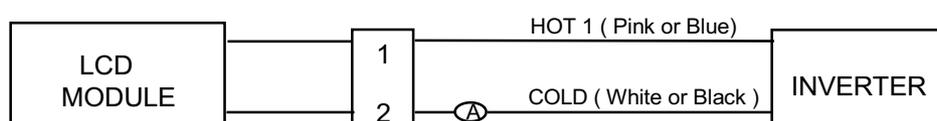
(2) Lamp frequency may produce interference with horizontal synchronous frequency and this may cause line flow on the display. Therefore lamp frequency shall be detached from the horizontal synchronous frequency and its harmonics as far as possible in order to avoid interference.

(3) Life time (Hr) of a lamp is defined as the time in which it continues to operate under the condition of Ta = 25 ± 2 °C and I_L = 6.0 mArms until the brightness becomes 50% or lower than it's original value.

(4) The voltage above this value should be applied to the lamps for more than 1 second to startup. Otherwise the lamps may not to be turned on.

4. BLOCK DIAGRAM

4.1 TFT LCD MODULE

4.2 BACK-LIGHT UNIT

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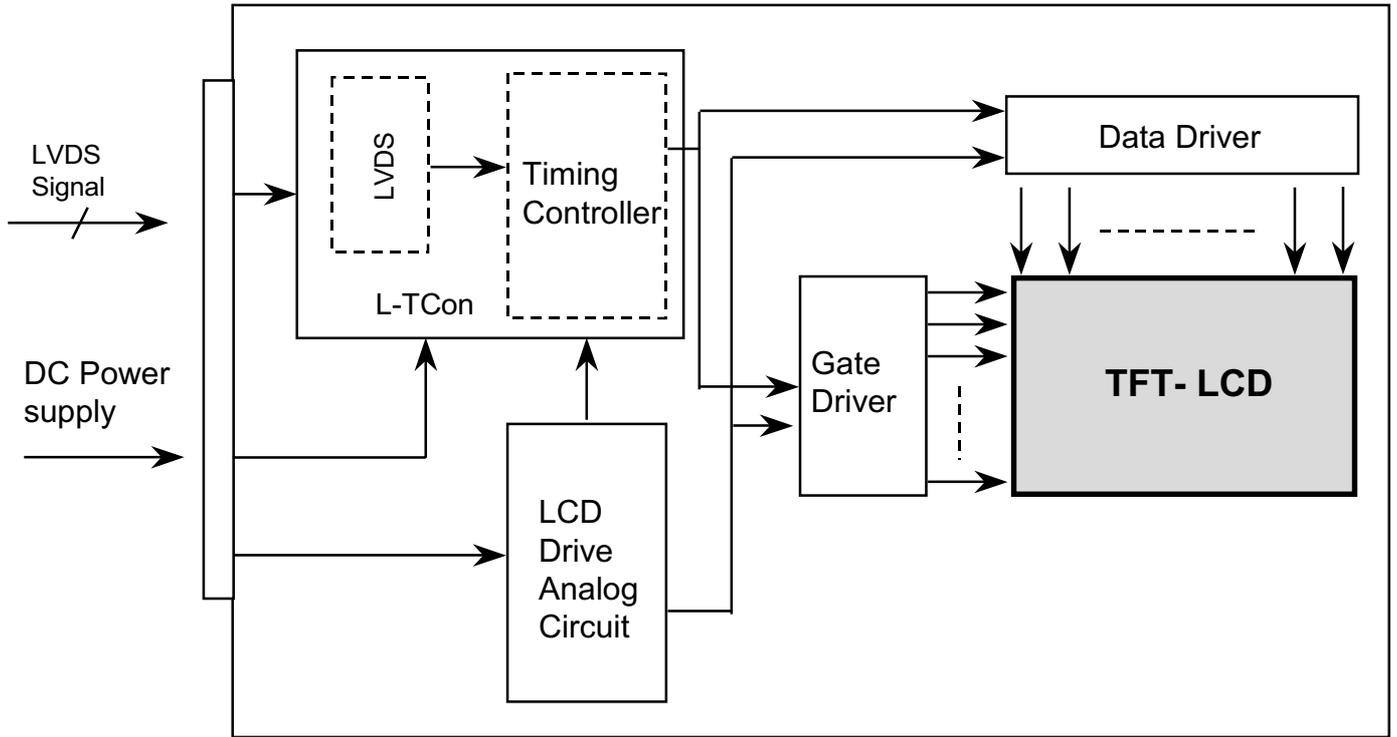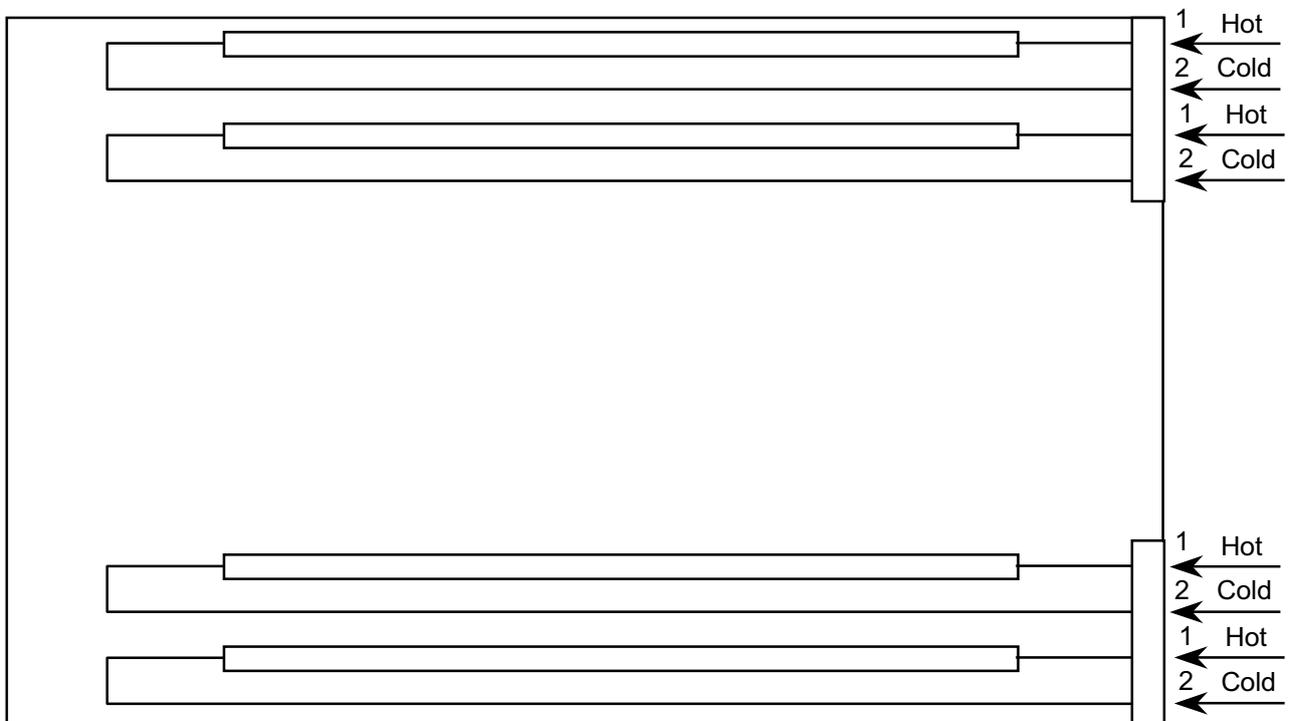
5. INPUT TERMINAL PIN ASSIGNMENT

5.1 Input Signal & Power (LVDS, Connector : Hirose DF14H-20P-1.25H)
Matching Socket : Hirose DF14-20S-1.25C

PIN NO	SYMBOL	FUNCTION	POLARITY	Output Pin# (LVDS Tx)
1	VDD	Power Supply +3.3 V		
2	VDD	Power Supply +3.3 V		
3	GND	Power Ground		
4	GND	Power Ground		
5	RXIN0 -	LVDS Receiver Signal(-)	Negative	PIN#48
6	RXIN0 +	LVDS Receiver Signal(+)	Positive	PIN#47
7	GND	Ground	-	
8	RXIN1 -	LVDS Receiver Signal(-)	Negative	PIN#46
9	RXIN1 +	LVDS Receiver Signal(+)	Positive	PIN#45
10	GND	Ground	-	
11	RXIN2 -	LVDS Receiver Signal(-)	Negative	PIN#42
12	RXIN2 +	LVDS Receiver Signal(+)	Positive	PIN#41
13	GND	Ground	-	
14	RXCLK IN -	LVDS Receiver Clock Signal(-)	Negative	PIN#40
15	RXCLK IN+	LVDS Receiver Clock Signal(+)	Positive	PIN#39
16	GND	Ground	-	
17	RXIN3 -	LVDS Receiver Signal(-)	Negative	PIN#38
18	RXIN3 +	LVDS Receiver Signal(+)	Positive	PIN#37
19	GND	Ground	-	
20	NC	Reserved	-	

5.2 LVDS Interface

LVDS INTERFACE

DS90C385
THC63LVDM83A

DF14A-20P-1.25H

Host System 24-bit		DS90C385 THC63LVDM83A		DF14A-20P-1.25H			
RED0		51					
RED1		52	TxOUT0- 48	5		9	RxIN0-
RED2		54			100Ω	10	
RED3		55	TxOUT0+ 47	6			RxIN0+
RED4		56					
RED5		3					
RED6		50	TxOUT1- 46	8		11	RxIN1-
RED7		2			100Ω	12	
GREEN0		4	TxOUT1+ 45	9			RxIN1+
GREEN1		6					
GREEN2		7					
GREEN3		11	TxOUT2- 42	11		15	RxIN2-
GREEN4		12			100Ω	16	
GREEN5		14	TxOUT2+ 41	12			RxIN2+
GREEN6		8					
GREEN7		10	TxCLKOUT- 40	14		17	RxCLKIN-
BLUE0		15			100Ω	18	
BLUE1		19	TxCLKOUT+ 39	15			RxCLKIN+
BLUE2		20					
BLUE3		22					
BLUE4		23	TxOUT3- 38	17		19	RxIN3-
BLUE5		24			100Ω	20	
BLUE6		16	TxOUT3+ 37	18			RxIN3+
BLUE7		18					
Hsync		27					
Vsync		28					
Enable		30					
CLOCK		31					

Note : The LCD Module uses a 100ohm resistor between positive and negative lines of each receiver input.

5.3 BACK-LIGHT UNIT

Connector : JST BHSR - 02VS -1
Mating Connector : SM02B-BHSS-1(JST)

Pin NO.	Symbol	Color	Function
1	HOT	Pink or Blue	High Voltage
2	COLD	White or Black	Ground

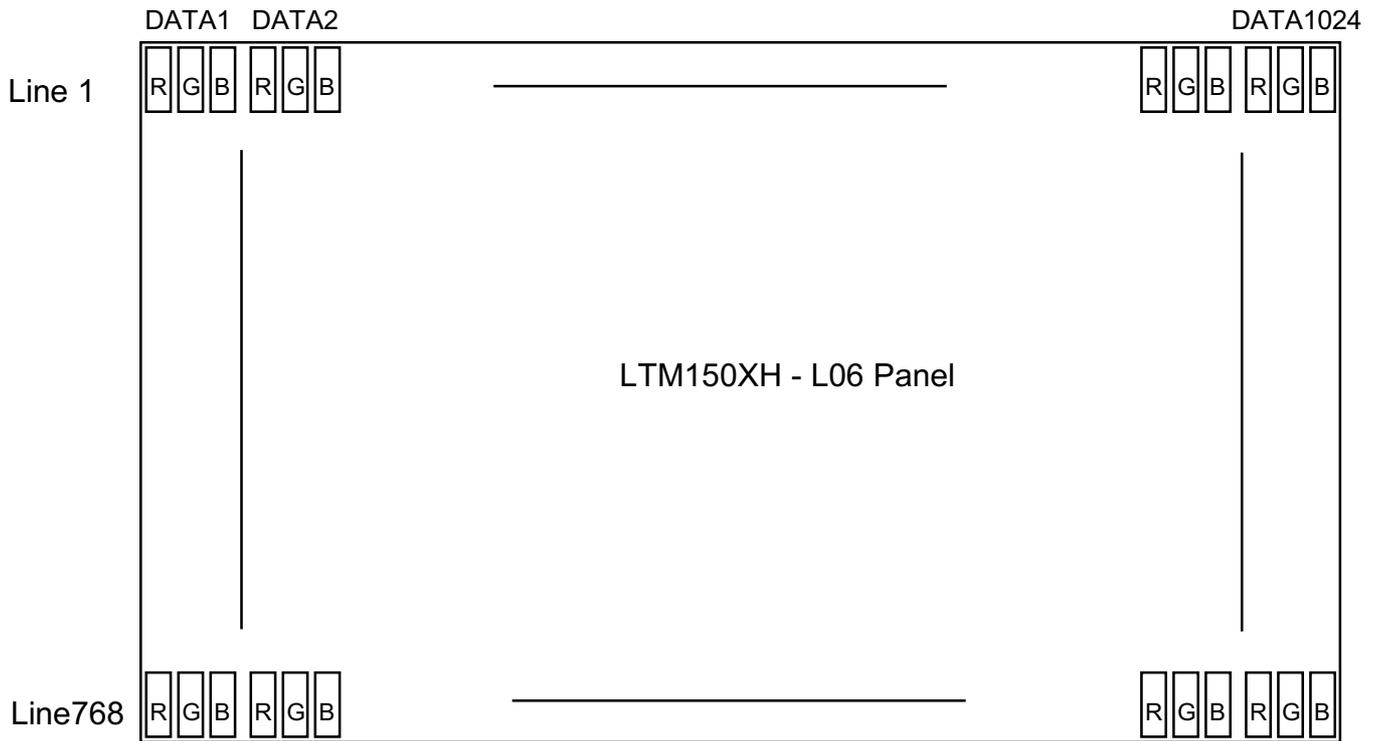## 5.4 Input Signal,Basic Display Colors and Gray Scale of Each Colors

Color	Display	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	R000
	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	R001
		0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R002
	↑	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R003
	↓	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	~ 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	R252
		0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R252
	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	R252
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	G000
	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	G001
		0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G002
	↑	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	G003
	↓	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	~ 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	G252
		0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	G252
	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	G252
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	B000
	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	B001
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	B002
	↑	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	B003
	↓	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	~ 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	B252
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	B252
	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	B252

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

5.5 PIXEL FORMAT

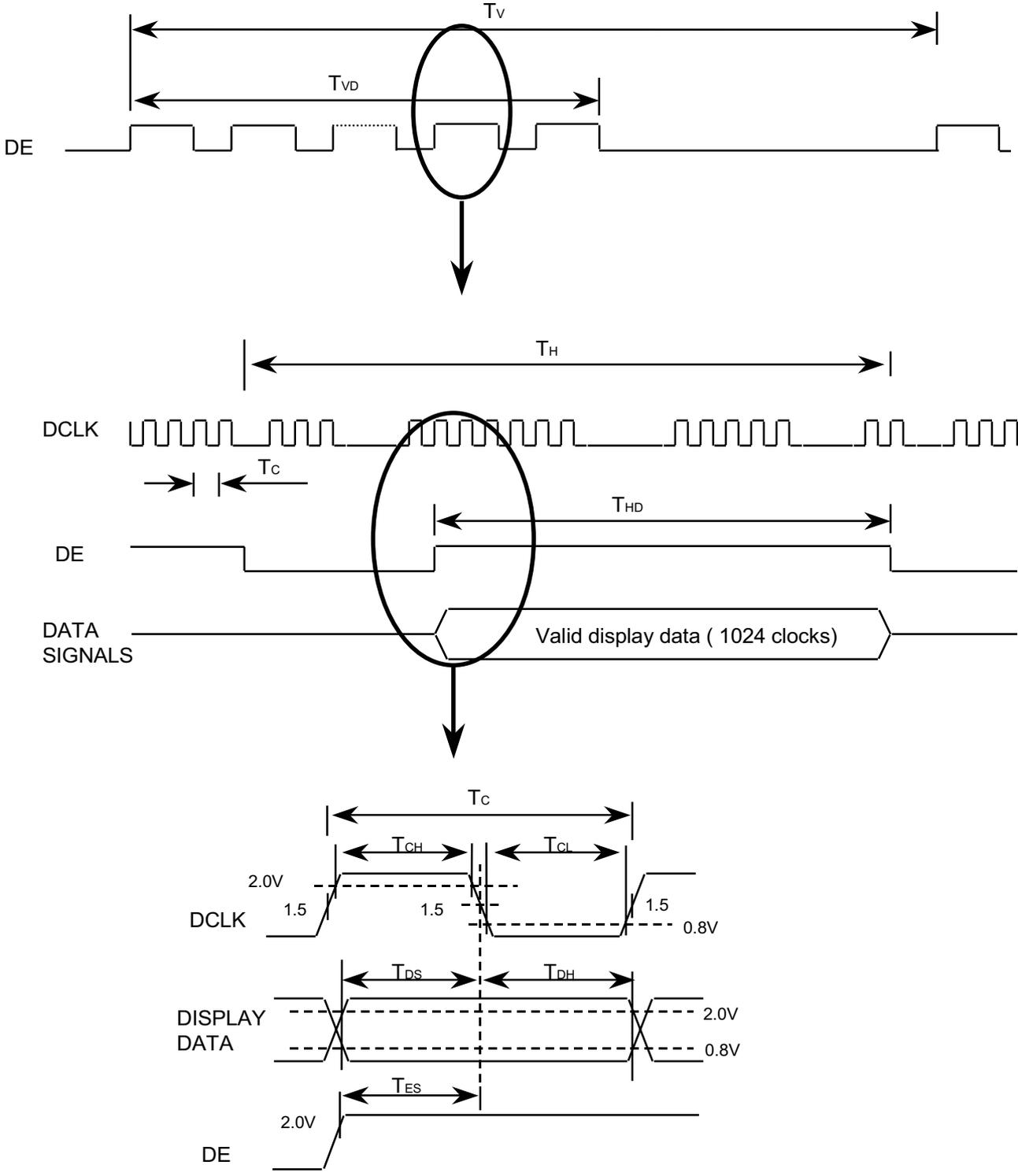DATA1 DATA2   DATA1024

Line 1   R G B R G B   ————————————   R G B R G B

LTM150XH - L06 Panel

Line768   R G B R G B   ————————————   R G B R G B

6. INTERFACE TIMING

6.1 Timing Parameters (DE only mode, LVDS Transmitter Input)

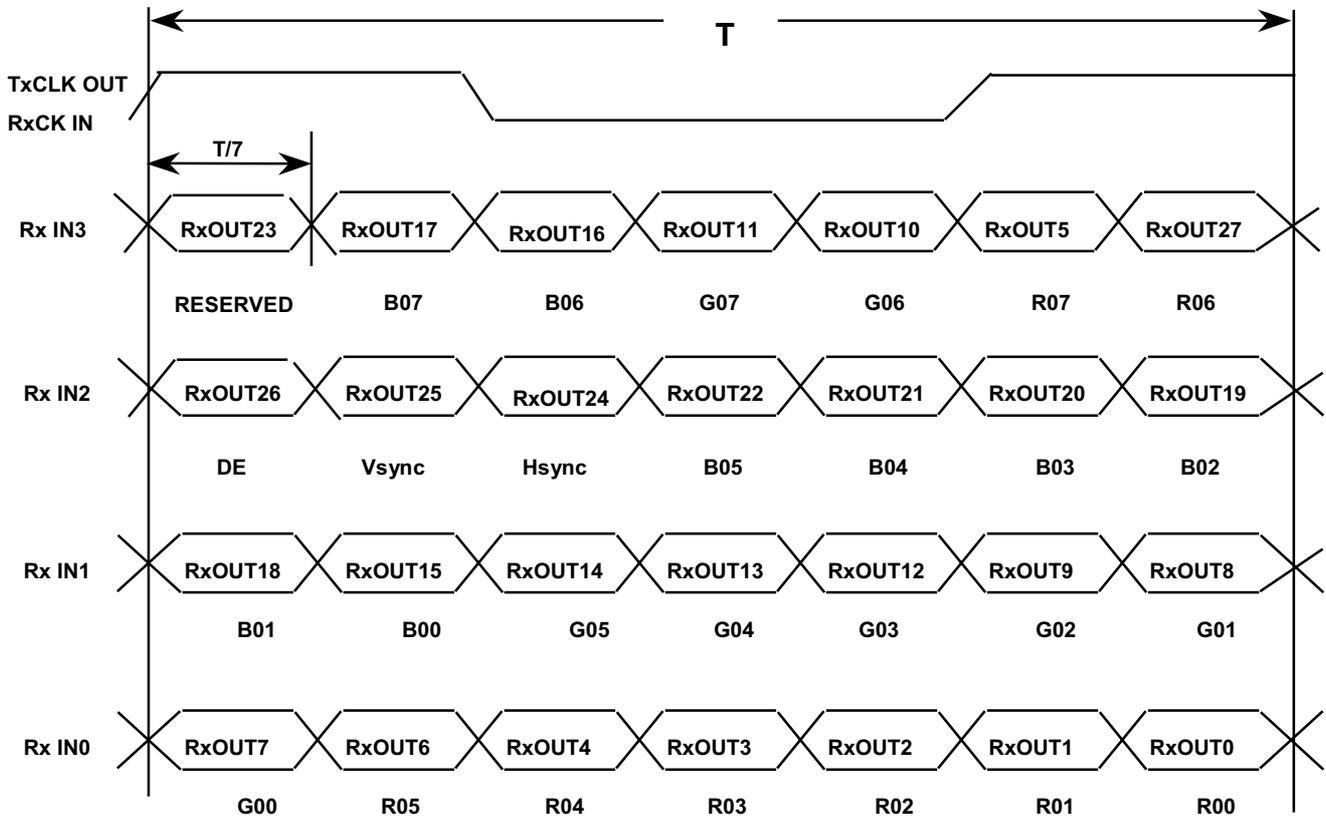| Signal	Item	Symbol	MIN	TYP	MAX	Unit	Note
Clock	Frequency	1 / T$_C$	47	65	80	MHz	
	High Time	T$_{CH}$	4.5	-	-	nsec	
	Low Time	T$_{CL}$	4.5	-	-	nsec	
Data	Setup Time	T$_{DS}$	2.7	-	-	nsec	
	Hold Time	T$_{DH}$	0	-	-	nsec	
Data Enable	Setup Time	T$_{ES}$	2.7	-	-	nsec	(1)
Frame Frequency	Cycle	T$_V$	772	16.7 | 806	-	msec | lines	
Vertical Active Display Term	Display Period	T$_{VD}$	768	768	768	lines	
One Line Scanning Time	Cycle	T$_H$	1100	1344	1800	clocks	
Horizontal Active Display Term	Display Period	T$_{HD}$	1024	1024	1024	clocks	

Note (1) When LTM150XH-L06 model is operated by DE only mode, Hsync and Vsync input signals should be fixed to "Low" for stable operation. Otherwise, the module could operate abnormally.

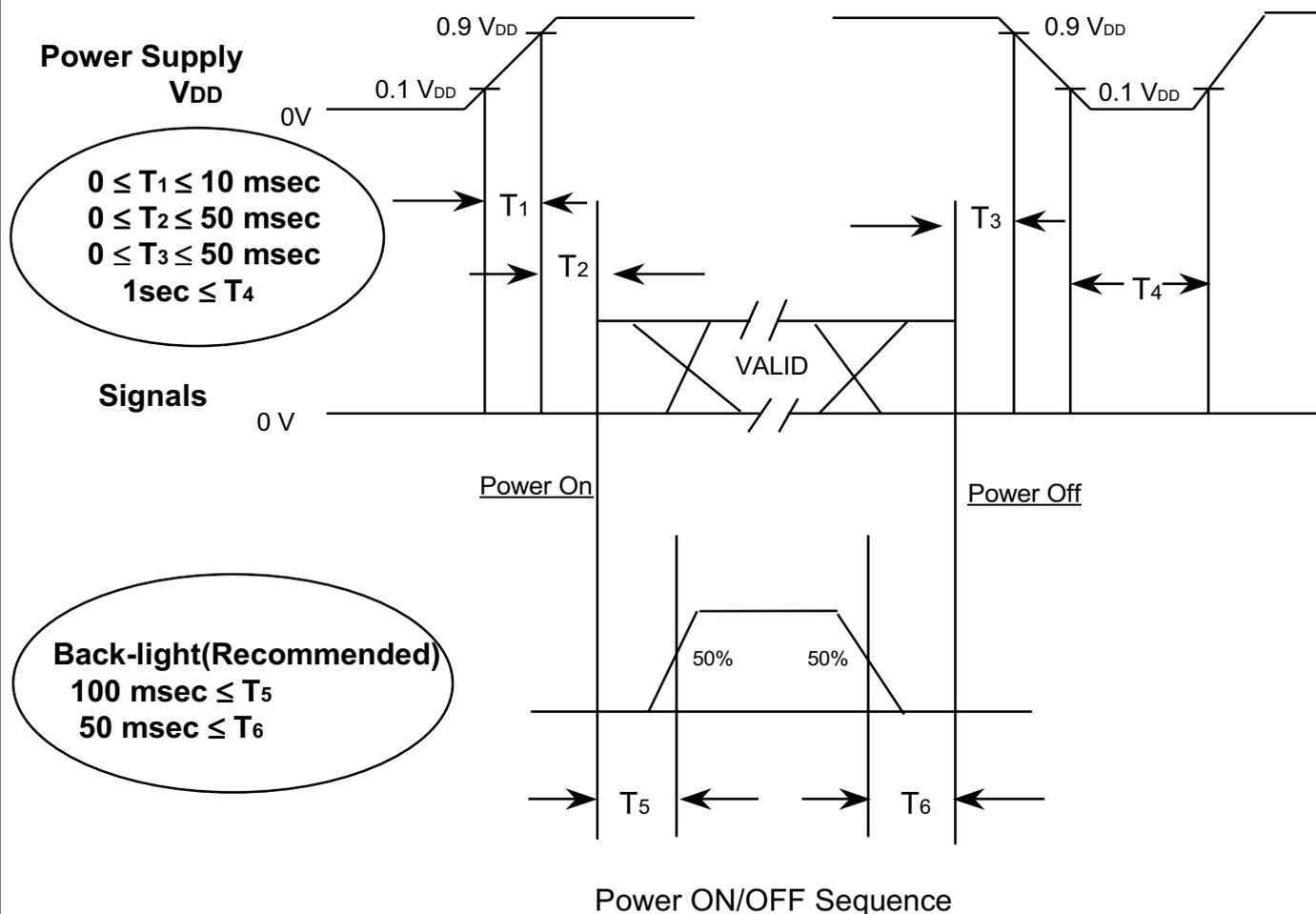6.2 Timing diagrams of interface signal (DE mode)

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6.3 Timing Diagrams of LVDS

LVDS Transmitter : National Semiconductor DS90C385MTD

T

TxCLK OUT
RxCK IN

T/7

Rx IN3	RxOUT23	RxOUT17	RxOUT16	RxOUT11	RxOUT10	RxOUT5	RxOUT27
	RESERVED	B07	B06	G07	G06	R07	R06

Rx IN2	RxOUT26	RxOUT25	RxOUT24	RxOUT22	RxOUT21	RxOUT20	RxOUT19
	DE	Vsync	Hsync	B05	B04	B03	B02

Rx IN1	RxOUT18	RxOUT15	RxOUT14	RxOUT13	RxOUT12	RxOUT9	RxOUT8
	B01	B00	G05	G04	G03	G02	G01

Rx IN0	RxOUT7	RxOUT6	RxOUT4	RxOUT3	RxOUT2	RxOUT1	RxOUT0
	G00	R05	R04	R03	R02	R01	R00

6.4 Power ON/OFF Sequence

: To prevent a latch-up or DC operation of the LCD module, the power on/off sequence
  should be as the diagram below.
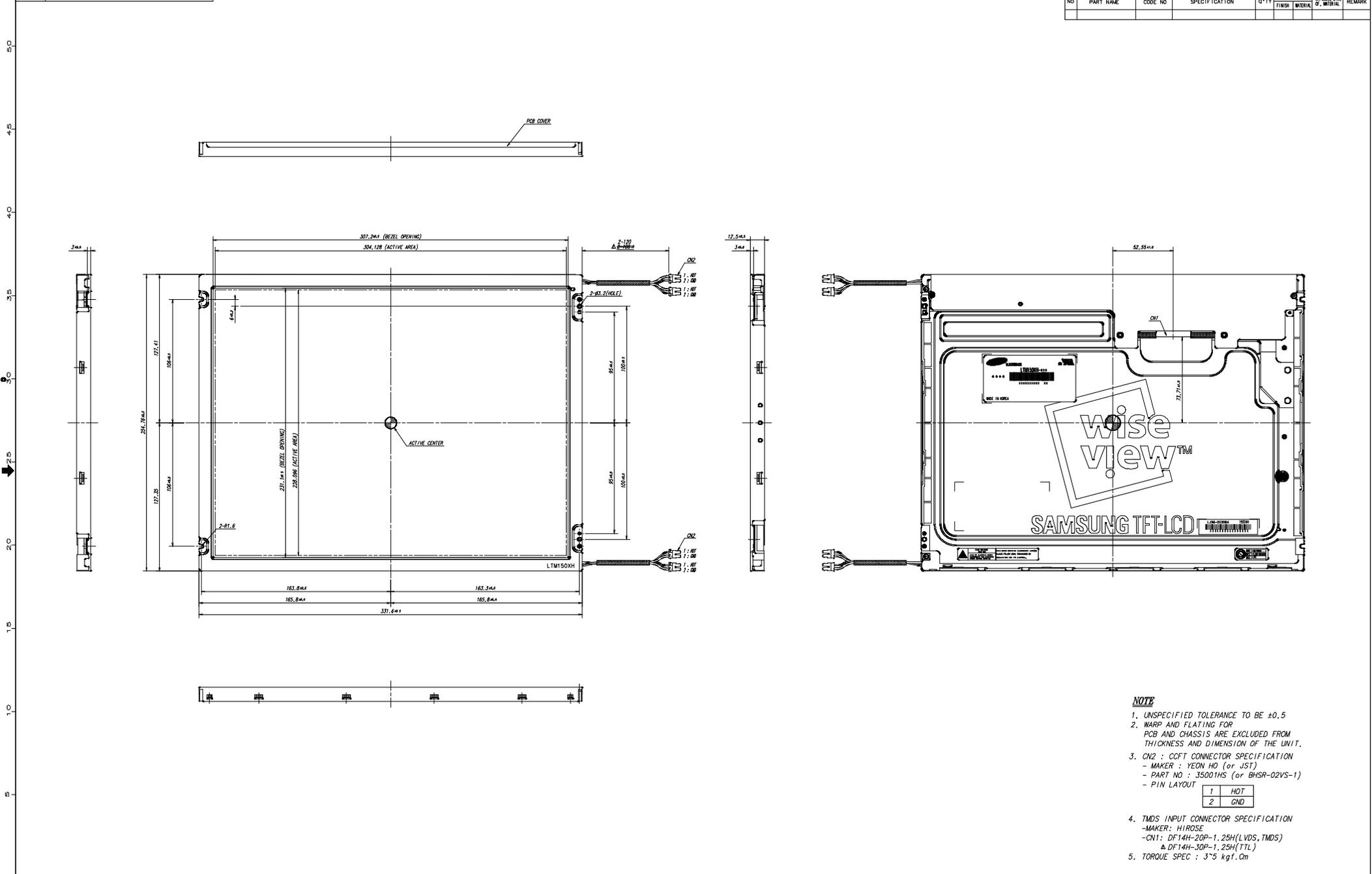
Power Supply
V$_{DD}$

$0 \le T_1 \le 10$ msec
$0 \le T_2 \le 50$ msec
$0 \le T_3 \le 50$ msec
1sec $\le T_4$

Signals

0.9 V$_{DD}$
0.1 V$_{DD}$
0V

T_1
T_2
T_3
T_4

VALID

0 V

Power On   Power Off

Back-light(Recommended)
100 msec $\le T_5$
50 msec $\le T_6$

50%   50%

T_5 T_6

Power ON/OFF Sequence

NOTE.

(1) The supply voltage of the external system for the module input should be the same
    as the definition of V$_{DD}$.

(2) Apply the lamp voltage within the LCD operation range. When the back-light turns on
    before the LCD operation or the LCD turns off before the back-light turns off, the
    display may momentarily become white.

(3) In case of V$_{DD}$ = off level, please keep the level of input signals on the low or keep
    a high impedance.

(4) T4 should be measured after the module has been fully discharged between power
    off and on period.

(5) Interface signal shall not be kept at high impedance when the power is on.

7. OUTLINE DIMENSION

[Refer to the next page]

NO	PART NAME	CODE NO	SPECIFICATION	Q'TY	WEIGHT		UNFOLDED DIM.	REMARK
					FINISH	MATERIAL	OF. MATERIAL	

PCB COVER

307.2±.5 (BEZEL OPENING)
304.128 (ACTIVE AREA)

2-120
Δ 2-100

12.5±.5

52.55±.5

CN2
1 : HOT
1 : GND
1 : HOT
1 : GND

2-Φ3.2(HOLE)

CN1

127.41

64±.5

95±.5
100±.5

3±.5

254.78±.5 231.04±.5 (BEZEL OPENING)
228.096 (ACTIVE AREA)

ACTIVE CENTER

73.71±.5

95±.5
100±.5

127.35

SAMSUNG
LTM150XH-0□□

MADE IN KOREA

wise view™

SAMSUNG TFT-LCD

2-R1.6

CN2
1 : HOT
1 : GND
1 : HOT
1 : GND

LTM150XH

163.8±.5   163.3±.5
165.8±.5   165.8±.5
331.6±.5

NOTE

1. UNSPECIFIED TOLERANCE TO BE ±0.5
2. WARP AND FLATING FOR
   PCB AND CHASSIS ARE EXCLUDED FROM
   THICKNESS AND DIMENSION OF THE UNIT.
3. CN2 : CCFT CONNECTOR SPECIFICATION
   - MAKER : YEON HO (or JST)
   - PART NO : 35001HS (or BHSR-02VS-1)
   - PIN LAYOUT

1	HOT
2	GND

4. TMDS INPUT CONNECTOR SPECIFICATION
   -MAKER: HIROSE
   -CN1: DF14H-20P-1.25H(LVDS,TMDS)
   Δ DF14H-30P-1.25H(TTL)
5. TORQUE SPEC : 3~5 kgf.Cm

GENERAL TOLERANCE				01	01.02.2?	⚠ CHANGED DIMENSION		LAMP WIRE LENGTH 100mm → 120mm		
STEP	LEVEL 1	LEVEL 2	LEVEL ?	REV	DATE	DESCRIPTION OF REVISION		REASON		CHG'D BY
0 < X ≤ 4	±0.05	±0.1	±0.2	UNIT	mm	DRA'N BY	DES'D BY	CHK'D BY	APP'D BY	MODEL NAME	LTM150XH	
4 < X ≤ 16	±0.08	±0.15	±0.3	SCALE	N/S	Y.I.KIM			H.C.LEE			
16 < X ≤ 64	±0.12	±0.25	±0.5	TOLERANCE ±0.5		00.07.24			00.07.24	PART/SHEET NAME	OUTLINE DIMENSION	SHEET /
64 < X ≤ 256	±0.25	±0.4	±0.8	SPEC. NO S004154-001		SAMSUNG ELECTRONICS				CODE NO.	—	VER. 01

8. RELIABILITY TEST

Test Items	Conditions	Time/Cycle	Sample
HTOL*	50°C , Bias	500 hrs	5
LTOL*	0°C , Bias	500 hrs	5
THB**	40°C / 95% , Bias	500 hrs	5
HTS***	70°C , No Bias	250 hrs	5
LTS***	-30°C , No Bias	250 hrs	5
Thermal Cycle	-20°C/30min ~ +60°C/30min , No bias	200 cycle	5
Box Drop	1 angle , 3 edge , 6 side , 66 cm		5
Shock (Non-operatine)	50G , 11msec Sine wave , ± x/y/z axis	1 time/axis	3
Vibration (Non-operating)	1.5G , 10~300 Hz x/y/z axis , sweep rate : 10 min	30min/axis	3
ESD (Non-Operating)	contact : 150pF , 330 ohm ,200point Air : 150pF , 330 ohm ,200point * oprating : TBD	± 8kV ± 15kV	3 3

[Result Evaluation Criteria]

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

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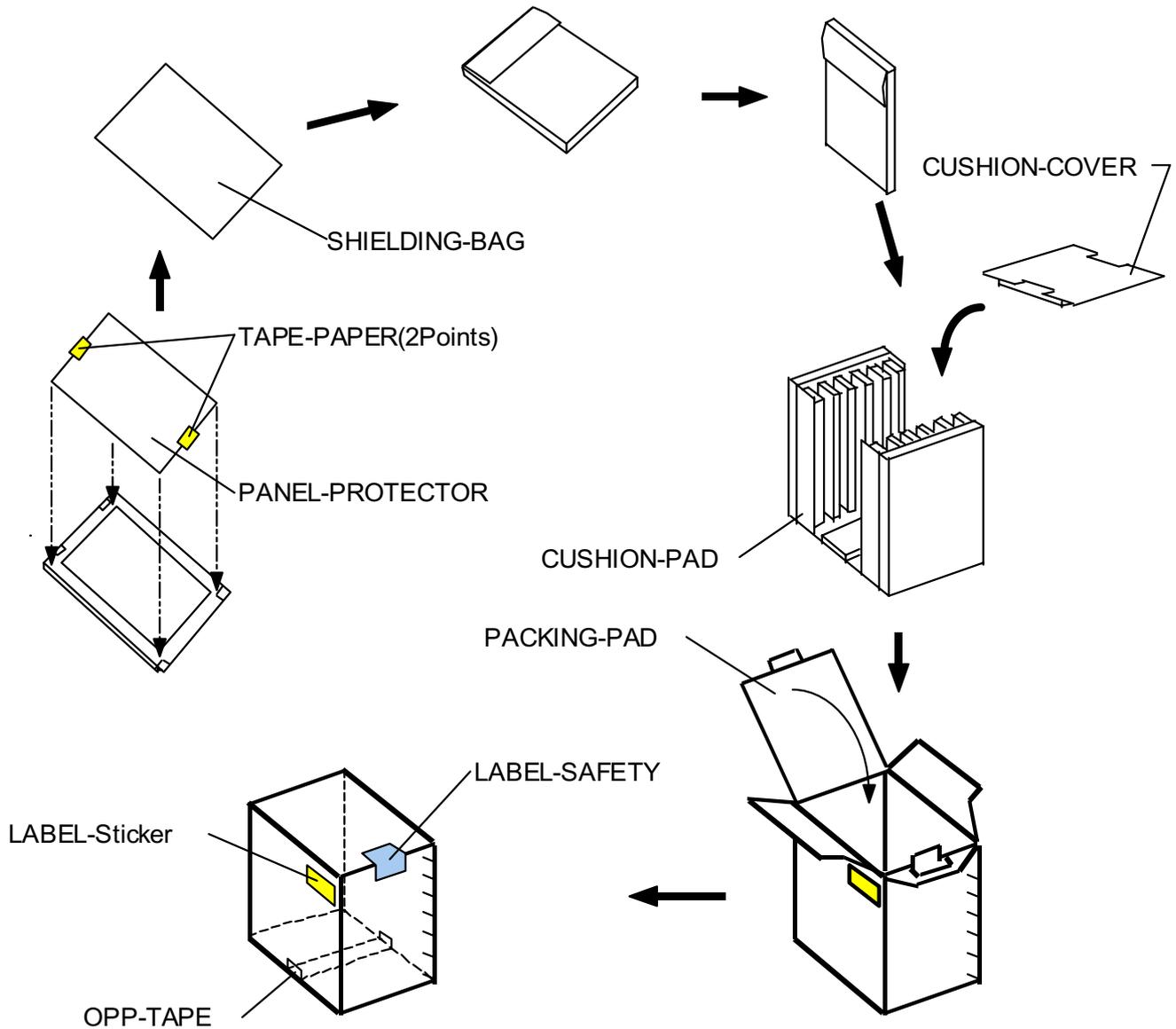**** HTS/LTS : High/Low Temperature Storage

9. PACKING

9.1 CARTON(Internal Packing)

(1) Packing Form
Corrugated fiberboard box and corrugated foam as shock absorber
(2) Packing Method

SHIELDING-BAG

CUSHION-COVER

TAPE-PAPER(2Points)

PANEL-PROTECTOR

CUSHION-PAD

PACKING-PAD

LABEL-SAFETY

LABEL-Sticker

OPP-TAPE

Note (1)Total : Approx.   13.0 Kg

(2)Acceptance number of piling : 10 sets

(3)Carton size : 450 (W) X 348 (D) X 440 (H)

(4)Max accumulation quantity : 7 cartons

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(3) Packing Material

No	Part name	Quantiity	No	Part name	Quantiity
1	PROTECTOR-PANEL	1	6	SHIELDING-BAG	1
2	TAPE-PAPER	0.06MT	7	OPP-TAPE	0.2MT
3	PACKING-CASE	0.1	8	LABEL-STICKER	1
4	CUSHION-PAD	0.1	9	LABEL-SAFETY	1
5	CUSHION-COVER	0.1			

10. MARKING & OTHERS

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

(1)Parts number : LTM150XH-L06

(2)Revision   : One letter

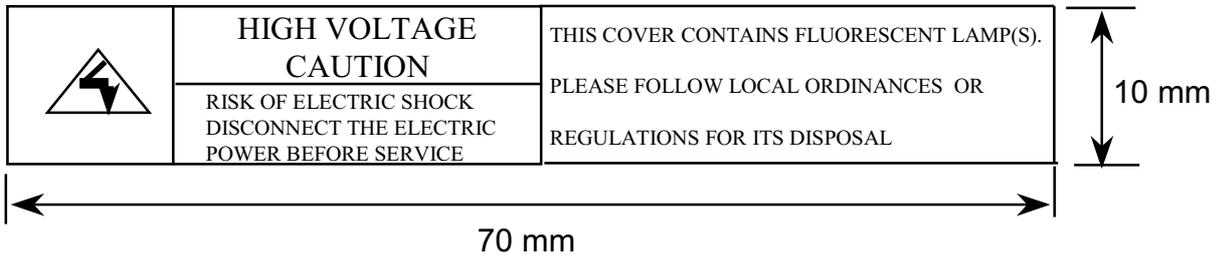(3)Control Code : One letter

(4)Lot number   : 4 K 0 H 123 01 01

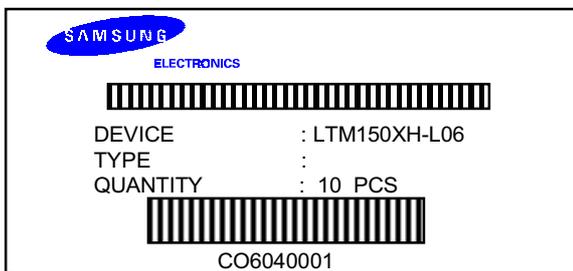- Cell No.
- Glass No.
- Lot Code
- Month
- Year
- Device
- Line
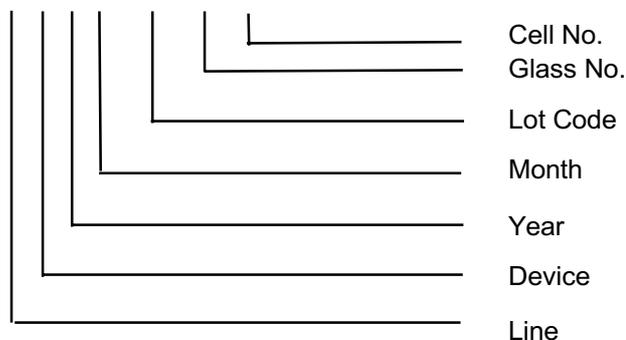
(5) Nameplate Indication

40 mm

80 mm
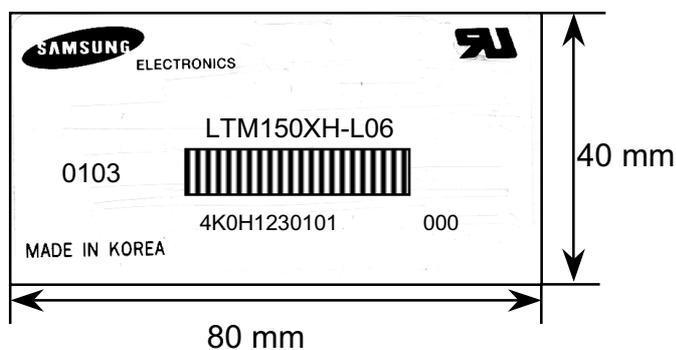
Parts name : LTM150XH-L06
Lot number : 4K0H1230101
Inspected work week : 0103

■ High voltage caution

	HIGH VOLTAGE CAUTION RISK OF ELECTRIC SHOCK DISCONNECT THE ELECTRIC POWER BEFORE SERVICE	THIS COVER CONTAINS FLUORESCENT LAMP(S). PLEASE FOLLOW LOCAL ORDINANCES OR REGULATIONS FOR ITS DISPOSAL

10 mm

70 mm

(6) Packing box attach

SAMSUNG
ELECTRONICS

DEVICE   : LTM150XH-L06
TYPE   :
QUANTITY   : 10 PCS

CO6040001

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11. General Precautions

11.1 Handling

(a) When the module is assembled, It should be attached to the system firmly
using every mounting holes. Be careful not to twist and bend the modules.

(b) Refrain from strong mechanical shock and / or any force to the module. In addition to
damage, this may cause improper operation or damage to the module and CCFT back-light.

(c) Note that polarizers are very fragile and could be easily damaged. Do neither press nor
scratch the surface harder than a HB pencil lead.

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

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

(f) Desirable cleaners are water, IPA(Isopropyl Alcohol) or Hexane.
Do not use Ketone type materials(ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl
chloride. It might permanent damage to the polarizer due to chemical reaction.

(g) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or
mouth . In case of contact with hands, legs or clothes, it must be washed away thoroughly
with soap.

(h) Protect the module from static , it may cause damage to the C-MOS Gate Array IC.

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

(j) Do not disassemble the module.

(k) Do not pull or fold the lamp wire.

(l) Do not adjust the variable resistor which is located on the back side.

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

11.2 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 °C 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 during the store.

11.3. Operation

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

(b) Power supply should always be turned on/off by following item 6.6
" 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 a
minimized length and be connected directly . The longer cable between the back-light
and the inverter may cause lower luminance of lamp(CCFT) and may require higher
startup voltage(Vs).

11.4 Others

(a) Ultra-violet ray filter is necessary for outdoor operation.

(b) Avoid condensation of water. It may result in improper operation or disconnection
of electrode.

(c) Do not exceed the absolute maximum rating value. (the supply voltage variation, input
voltage variation, variation in part contents and environmental temperature and so on)
Otherwise the module may be damaged.

(d) If the module displays the same pattern continuously for a long period of time, it can be
the situation when the image "sticks" to the screen.

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