Product Specification

(√) **Preliminary Specification**
( ) **Approval Specification**

The information described in this specification is preliminary and can be changed without prior notice

CUSTOMER	To-Top
DATE OF ISSUE	2014/04/15

MODEL NO.	LTA750HQ01
EXTENSION CODE	-

Approved by	2014/04/15
Prepared by	**HY MOON** 2014/04/15
LCD Sales & Marketing Team **Samsung Display Co., Ltd**	

REVISION HISTORY

Date.	Rev.No.	Page	Revision Description
2014/03/17	P00		Initial Release

GENERAL DESCRIPTION

DESCRIPTION

The LTA750HQ01 is the one of liquid crystal display devices(LCD) that uses an amorphous silicon TFT(Thin Film Transistor) as switching components and a color active matrix. This model is composed of a TFT LCD panel, a driver circuit, and a back-light unit. This 75.0 model has a resolution of 1920 x 1080 pixels and can display up to 1.07 Billion colors with the wide viewing angle of 89° or higher in all directions.

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
UHD resolution(16:9)
Low Power consumption
Direct Type LED(Light Emitted Diode) BLU
DE(Data enable) mode
The interface 240Hz V by one

APPLICATIONS

Home-alone Multimedia TFT-LCD TV
High Definition TV

GENERAL INFORMATION

Items	Specification	Unit	Note
Module Size	1675.8 (H) x 953.8 (V)	㎜	± 1.9(H) ± 1.25(V)
	Source (Top, Bottom) : 32.5 (D) Bottom (Left, Right) : 25.0(D)		Source : -1+2.5 Bottom : ± 1.0
Weight	30,000	g	± 10%
Active Display Area	1650.24 (H) x 928.26 (V)	㎜	
Surface Treatment	Glare (Haze 0%)		± 2.1%
Display Colors	1.07B (Dithered 10bit)	colors	
Number of Pixels	1,920 x 1,080	pixel	16 : 9
Pixel Arrangement	RGB vertical stripe		
Display Mode	Normally Black		
Luminance of White	500	cd/m^2	

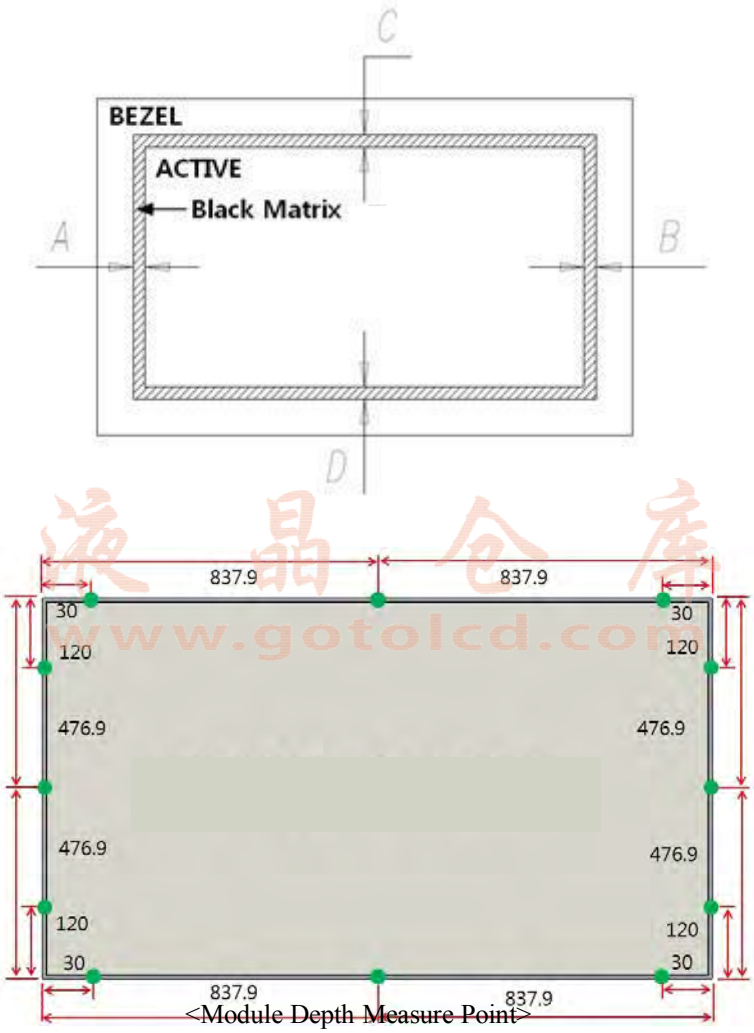
MECHANICAL INFORMATION

Item		Min.	Typ.	Max.	Note
Module size	Horizontal(H)	1673.9	1675.8	1677.7	mm
	Vertical(V)	952.55	953.8	955.05	mm
	Depth(D)	Max Depth : 31.5 Min Depth : 24.0	Max Depth : 32.5 Min Depth : 25.0	Max Depth : 35.0 Min Depth : 26.0	mm
Bezel Open	Horizontal(H)	1650.5	1652.4	1654.3	mm
	Vertical(V)	930.95	932.2	933.45	mm
Weight		-	30000	33000	g

NOTE (1) Measure the figure for **Black Matrix shift** to be recorded on the spec. with referring to the drawings.

[redacted] - B | ≤ Horizontal Spec

[redacted] - D | ≤ Vertical Spec



<Module Depth Measure Point>

1. ABSOLUTE MAXIMUM RATINGS

1.1 ENVIRONMENTAL ABSOLUTE RATINGS

Item	Symbol	Min.	Max.	Unit	Note
Storage temperate	TSTG	-20	65	°C	(1)
Operating temperate	TOPR	0	50	°C	(1)
Humidity for storage	HSTG	5	90	%RH	
Operating humidity	HOPR	20	90	%RG	
Endurance on static electricity			150	V	(2)
Vibration (non-operating)	Vnop	-	1.5	G	(3),(4)

Note (1) The ranges of temperature and relative humidity are shown in the graph below. 90% RH Max.
(The temperature of Ta shall be over 39℃.)
The maximum temperature of wet–bulb shall be less than 39℃.
No condensation

Note (2) Although abnormal visual problems can be occurred in Tsur range, the polarizer is not damaged in this range.
Note (3) 11ms, sine wave, one time for ± X, ± Y, ± Z axis
Note (4) 10-300 Hz, Sweep rate 10min, 30min for X,Y,Z axis

2. OPTICAL CHARACTERISTICS

The optical characteristics shall be measured in the dark room or the space surrounded by the similar ambient setting.
Measuring equipment : TOPCON RD-80S, TOPCON SR-3, ELDIM EZ-Contrast

Ta = 25 ± 2 °C, V_{VDD} =3.3V, fv= 60Hz, fDCLK = 148.5MHz, IF = 100% duty

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR		4000	5000	-	-	(1) SR-3
Response time	G-to-G	$T_{PAN.SUR}$	= 29.9℃	-	4	12	msec	(3) RD-80S
Luminance of White (At the center of screen)		Y_L		400	500	-	cd/m^2	(4) SR-3
Color Chromaticity (CIE 1931)	Red	R_X	Normal $\phi = 0$ $\theta = 0$ Viewing Angle	-0.03	0.640	+0.03	-	(5),(6) SR-3
		R_Y			0.328			
	Green	G_X			0.299			
		G_Y			0.627			
	Blue	B_X			0.157			
		B_Y			0.055			
	White	W_X			0.270			
		W_Y			0.290			
Color Gamut		-	-	-	72	-	%	(5) SR-3
Color temperature		-	-	8000	11000	14000	K	
Viewing Angle	Hor.	θ_L	CR ≥ 10	75	89	-	Degree	(6) SR-3 EZ-Contrast
		θ_R		75	89	-		
	Ver.	ϕ_U		75	89	-		
		ϕ_D		75	89	-		
Brightness Uniformity (9 Point)		B_{uni}	-	-	-	25	%	(2) SR-3

- Test equipment for setup

The measurement shall be executed under the condition including a stable, windless and dark room for 40min or 60min with lighting the back-light at the given temperature, which is suitable to stabilize the back-light.
The module shall be measured at the center of screen.
The ideal temperature for setup shall be the value derived from the formula, Ta = 25 ± 2 °C.

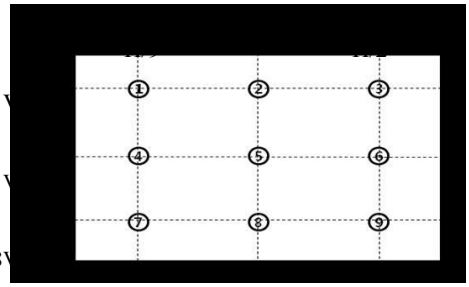
Note (1) Definition of Viewing angle : The range of Viewing angle (10 ≤ C/R)
: Ratio of max. gray (Gmax) & min. gray (Gmin) at the center point of the panel

Gmax : Luminance in all white pixels
Gmin : Luminance in all black pixels.

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

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

Bmax : Maximum brightness
Bmin : Minimum brightness

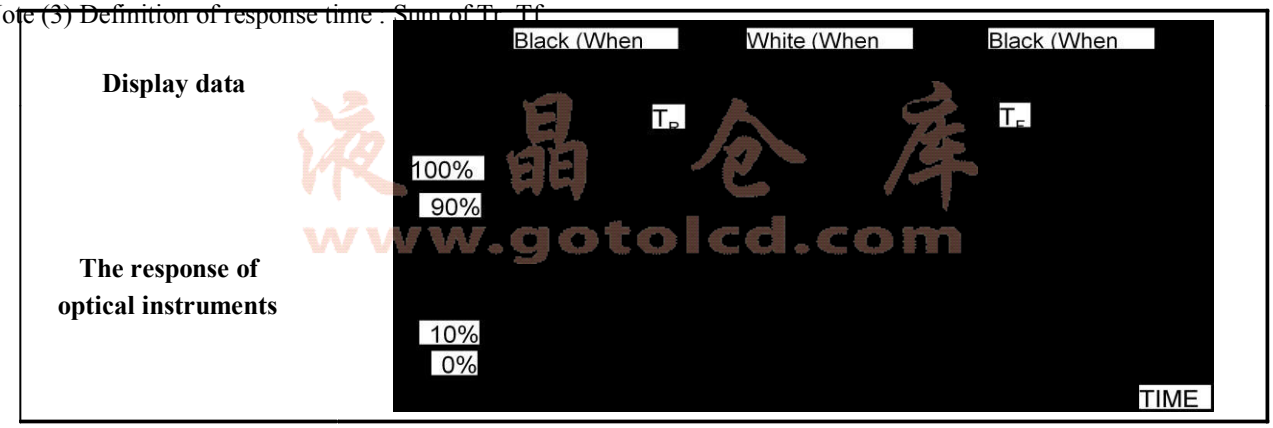


8H/9

8V

H : Horizontal length of Active Area
V : Vertical height of Active Area.

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

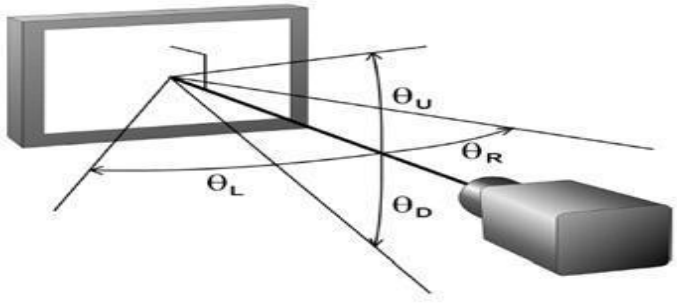


※ G-to-G : Average response time between the whole gray scale to the whole gray scale.

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

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

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



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

3. ELECTRICAL CHARACTERISTICS

3.1 TFT LCD MODULE

The connector to transmit a display data and a timing signal shall be connected.

* Ta = 25 ± 2 °C

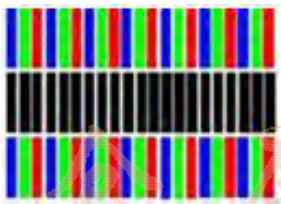
Item		Symbol	Min.	Typ.	Max.	Unit	Note
Voltage of Power Supply		V_{DD}	10.8	12.0	13.2	V	(1)
Current of Power Supply	(a) Black	I_{DD}	0.903	1.005	1.257	A	(2), (3)
	(b) White		0.834	0.912	1.176		
	(c) H-Stripe		3.005	3.420	4.532		
Vsync Frequency		f_V	192	240	245	Hz	-
Hsync Frequency		f_H	216	270	276	kHz	-
Main Frequency		F_{dclk}	59.4*8	74.25*8	76.25*8	MHz	-
Rush Current		I_{RUSH}	-	-	10	A	(4)

Note (1) The voltage for ripple shall be controlled under the range, which is lower than 10% of V_{DD} voltage.

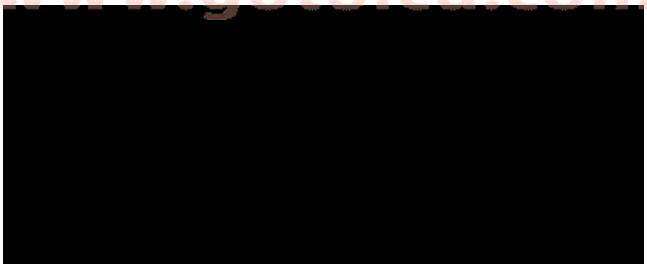
Note (2) fV=240Hz, fDCLK =594MHz, V_{DD} = 12.0V, DC Current.

Note (3) The pattern for checking the power dissipation (LCD module only)

a) Black Pattern	b) White Pattern	c) H-Stripe

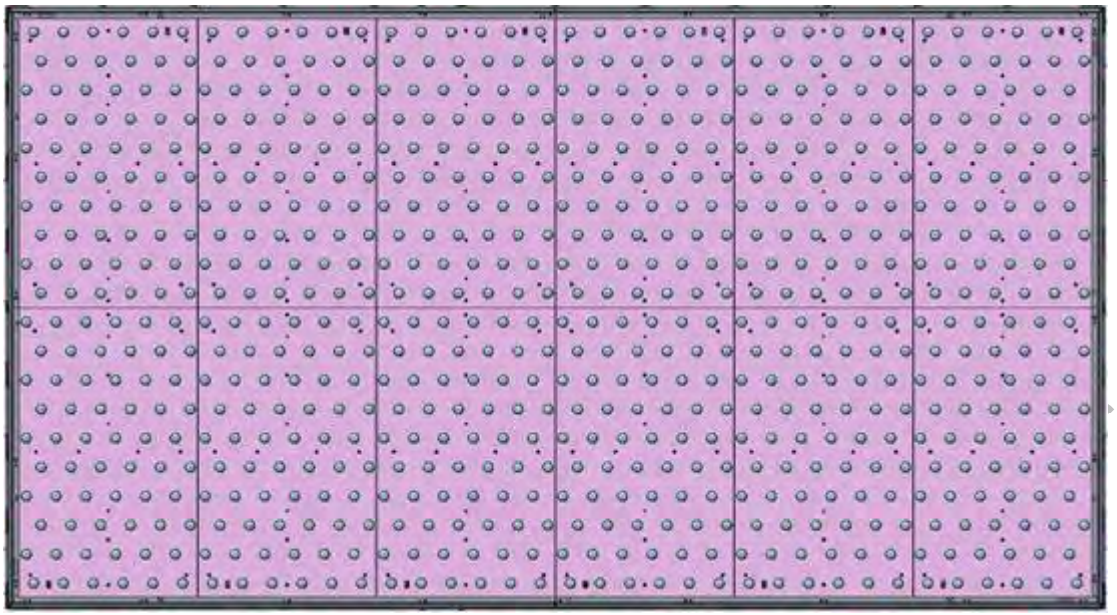


Note (4) Conditions for measurement



3.2 BACK LIGHT UNIT

* Back light unit is composed of 12–LED bars. (60 PCS of LEDs).



Item	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Temperature range	Top	-30		85	℃	Note
Storage Temperature range	Tstg	-40		100	℃	
Junction Temperature	Tj			145	℃	
LED Forward Current	IF	89.1	93.8	98.5	mA	Continuous operation @String (15 String/PCB) Operating Current 132mA
	IFP			276	mA	120Hz/Duty25%
LED Forward Voltage	VF	11.2	11.8	12.4	V	@132mA/string@ Tj 25℃
	VFP			14.17	V	120Hz/Duty25%
Thermal Resistance Junction to PCB	Rth, JS			30	K/W	
Power Consumption	P	179.7	199.3	219.9	W	IF * VF * 15BLK * 12PCB
Operating Life Time	Hr	35000				MTTF, 2D Only
LED Counts	Q	720			EA	60LEDs/PCB, 12PCB/BLU

Note : LED unit absolute rating

3.3. Condition & Specification of Converter's input

(Local Dimming)(Ta = 25℃ ± 2℃)

ITEM	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	NOTE
Input Voltage	V_{IN}		22	24	26	V	
Inrush Current Note(2)(3)	$I_{INRUSH,N}$	V_{IN} = 24V, Dim=Max 3D ENA=Off			12.58	A	Normal Mode
	$I_{INRUSH,3D}$	V_{IN} = 24V, 3D ENA = On			19.8	A	3D Mode
Output Current Note(1)	$I_{LED,N}$	V_{IN} = 24V, Dim=Max 3D ENA=Off	89.1	93.8	98.5	mAmean	Max Duty : 99%
		Local Dimming with SCN	152	159.6	167	mAmean	Max Duty : 49.5%, x1.7
	$I_{LED,3D}$	V_{IN} = 24V, 3D ENA = On	251	262.6	275	mAdc Note(5)	Fixed Duty : 25%, x2.8
Converter On/Off Control	ENA	Enable	2.4		5.5	V	
		Disable	0		0.4		
Local Dimming Frequency	f_{IM_LD}	Local dimming Mode	198	200	202	Hz	VSYNC_IN:200Hz
			238	240	242		VSYNC_IN:240Hz
3D Frequency	f_{IM_3D}	3D Mode	99	100	101		VSYNC_IN:100Hz
			119	120	121		VSYNC_IN:120Hz
Dimming Data resolution				10		bit	
Frequency	VSYNC_IN	f_{sync_in} Local dimming Mode	198	200	202	Hz	Normal Mode
			238	240	242		
		3D Mode	99	100	101		3D Mode
			119	120	121		
	SERIAL_CLK	f_{s_clk}	2.9	3	3.1	MHz	
3D_EN SW_RESET SCAN_EN LOCAL_EN VSYNC_IN SERIAL_STT SERIAL_DATA SERIAL_CLK	V	High	2.4	-	3.3	V	Local dimming Interface Signal
		LOW	0	-	0.4		

(Global Dimming)(Ta = 25℃ ± 2℃)

ITEM	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	NOTE
Input Voltage	V_{IN}		22	24	26	V	
Inrush Current Note(2)(3)	$I_{INRUSH,N}$	V_{IN} = 24V, Dim=Max 3D ENA=Off			12.58	A	Normal Mode
	$I_{INRUSH,3D}$	V_{IN} = 24V, 3D ENA = On			19.8	A	3D Mode
Output Current Note(1)	$I_{LED,N}$	V_{IN} = 24V, Dim=Max 3D ENA=Off	89.2	93.9	98.6	mAmean	Max Duty : 99%
	$I_{LED,3D}$	V_{IN} = 24V, 3D ENA = On	251	262.6	275	mAdc Note(5)	Fixed Duty : 25%, x2.8
Converter On/Off Control	ENA	Enable	2.4		5.5	V	
		Disable	0		0.4		
EXT_DIM	V_{EXT_DIM}	High Level	2.4		5.5	V	Note(4)(5)(6)
		Low Level	0		0.4		
	D_{EXT_DIM} (Duty)	V_{IN} = 24V	1		99	%	
	F_{EXT_DIM}		90		240	Hz Note(7)	
	T_{RISING}				200	ns	
	$T_{FALLING}$				200	ns	
Global Dimming Frequency	f_{DIM_2D}	2D (Global dimming)	198	200	202	Hz	VSYNC_IN:200Hz
			238	240	242		VSYNC_IN:240Hz
3D Frequency	f_{DIM_3D}	3D Mode	99	100	101		3D_VSYNC : 100Hz
			119	120	121		3D_VSYNC : 120Hz
Frequency 2D_VSYNC	f_{2D_vsync}		198	200	202		
			238	240	242		
Frequency 3D_VSYNC	f_{3D_vsync}		98	100	101		
			119	120	121		
3D_EN 2D_VSYNK 3D_VSYNC	V	High	2.4	-	3.3	V	Global dimming interface Signal
		Low	0	-	0.4		

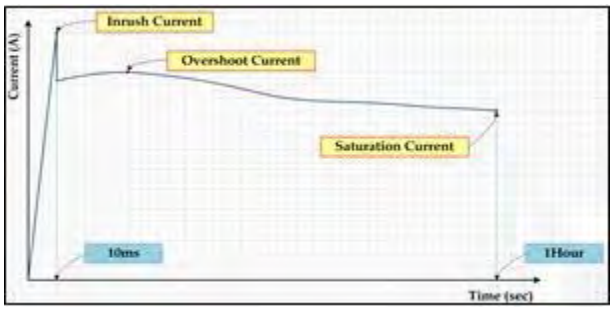
Note

(*1) All data was approved after running 120 minutes.

(*2) Inrush is measured within BLU on 10ms after leaving the BLU as it is at least 1hr or more at room temperature(25℃)

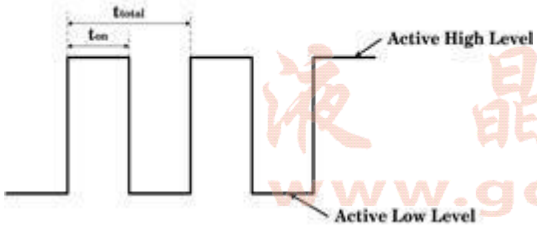
(*3) Additional Appendix for Input current at room temperature(25℃)

ITEM	SYMBOL	CONDITION	SPECIFICATION			UNIT	NOTE
			MIN	TYP	MAX		
Input Current (Normal Mode)	I overshoot, N	Vin=24V, Dim=Max	-	10	11.0	A mean	Overshoot Current After Turn-on
	I saturation, N		-	10	11	A mean	Saturation current after 1hr aging
Input Current (3D Mode)	Iovershoot,3D	Vin=24V 3D PWM=56%	-	8.48	8.6	Amean	Overshoot Current After Turn-on
	Isaturation,3D		-	8.2	8.42	Amean	Saturation current after 1hr aging
	Iovershoot,3D		-		17.46	Amax	Overshoot Current After Turn-on

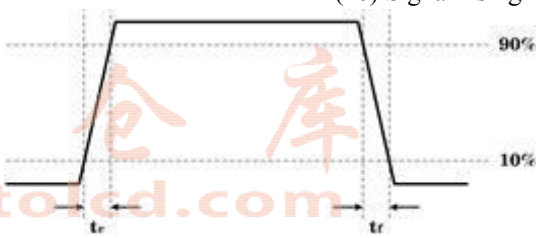


(*4) Internal PWM mode and External PWM mode are not available at the same time. In other word, if one of the dimming control signal was input (connected), the other dimming control signal must be floating (No Connection)

(*5) duty=ton/ttotal



(*6) Signal rising/falling time



(*7) Use an external frequency which doesn't make a waterfall and a sound noise within this range.

4. INPUT TERMINAL PIN ASSIGNMENT

4.1 INPUT SIGNAL & POWER

51Pin (8Lane) Connector : FI-RXE51S-HF (JAE)

PIN	Symbol	Description	PIN	Symbol	Description
1	NC	12V_PW	26	LOCKN	1.8V OR 3.3V LEVEL, (NOTE 2)
2	NC	12V_PW	27	GND	Ground
3	NC	12V_PW	28	Rx0n	V-by-1 HS Data Lane0
4	NC	12V_PW	29	Rx0P	V-by-1 HS Data Lane0
5	NC	12V_PW	30	GND	Ground
6	NC	12V_PW	31	Rx1n	V-by-1 HS Data Lane1
7	NC	12V_PW	32	Rx1P	V-by-1 HS Data Lane1
8	NC	12V_PW	33	GND	Ground
9	NC	12V_PW	34	Rx2n	V-by-1 HS Data Lane2
10	GND	Ground	35	Rx2P	V-by-1 HS Data Lane2
11	GND	Ground	36	GND	Ground
12	GND	Ground	37	Rx3n	V-by-1 HS Data Lane3
13	GND	Ground	38	Rx3P	V-by-1 HS Data Lane3
14	GND	Ground	39	GND	Ground
15	NC	NOTE1	40	Rx4n	V-by-1 HS Data Lane4
16	NC	NOTE1	41	Rx4P	V-by-1 HS Data Lane4
17	NC	NOTE1	42	GND	Ground
18	NC	NOTE1	43	Rx5n	V-by-1 HS Data Lane5
19	NC	NOTE1	44	Rx5P	V-by-1 HS Data Lane5
20	NC	NOTE1	45	GND	Ground
21	3D_EN	3D Function enable	46	Rx6n	V-by-1 HS Data Lane6
22	3D_Sync_O	3D_Sync Out	47	Rx6P	V-by-1 HS Data Lane6
23	3D_Sync_I	3D_Sync In	48	GND	Ground
24	GND	Ground	49	Rx7n	V-by-1 HS Data Lane7
25	HTPDN	1.8V OR 3.3V LEVEL, (NOTE 2)	50	Rx7P	V-by-1 HS Data Lane7
			51	GND	Ground

LCD Power Connector (15Pin) Connector

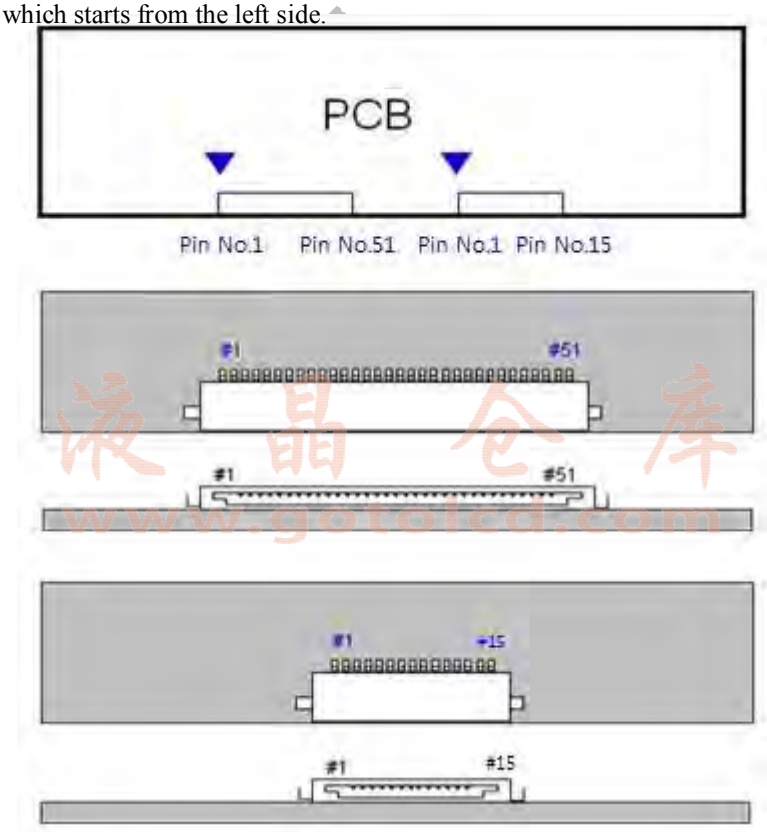
20037WR-H15 (YEONHO)					
PIN	**Symbol**	**Description**	**PIN**	**Symbol**	**Description**
1	NC	12V_PW	26	LOCKN	NOTE1
2	NC	12V_PW	27	GND	Ground
3	NC	12V_PW	28	Rx0n	Ground
4	NC	12V_PW	29	Rx0P	Ground
5	NC	12V_PW	30	GND	Ground
6	NC	12V_PW	31	Rx1n	Ground
7	NC	12V_PW	32	Rx1P	Ground
8	NC	12V_PW	33	GND	Ground

NOTE(1) : Not connection, PINs are used SDC only.

NOTE(2) :

Characteristics		Min	Typ	Max	Unit
Supply Voltage	1.8V	1.65	1.8	1.95	V
	3.3V	3.0	3.3	3.6	V

NOTE(3) : Pin number, which starts from the left side.



a. Pins for power GND shall be connected to the LCD s metal chassis.
b. All input pins for power shall be connected together.
c. All NC pins shall be designed with being separated from other signal or power.

4.2 Configuration of Input Pin of Converter

Input Connector Model No. : 22022WR-H14B2 (YEONHO) or Equivalent Connector

PIN NO	SYMBOL	REMARK
1,2,3,4,5	Vin	Power Supply DC 24V
6,7,8,9,10	GND	Ground
11	NC	No Connection
12	ENA	Converter On/Off Control Signal
13	NC	No Connection
14	EXT_DIM	External Dimming Control Signal (Global Dimming Only, If Local Dimming = N.C.)

Input Connector Model No. : 22022WR-H14B2 (YEONHO) CON1(Slave)

PIN NO	SYMBOL	REMARK
1,2,3,4,5	Vin	Power Supply DC 24V
6,7,8,9,10	GND	Ground
11	NC	No Connection
12	NC	No Connection
13	NC	No Connection
14	NC	No Connection

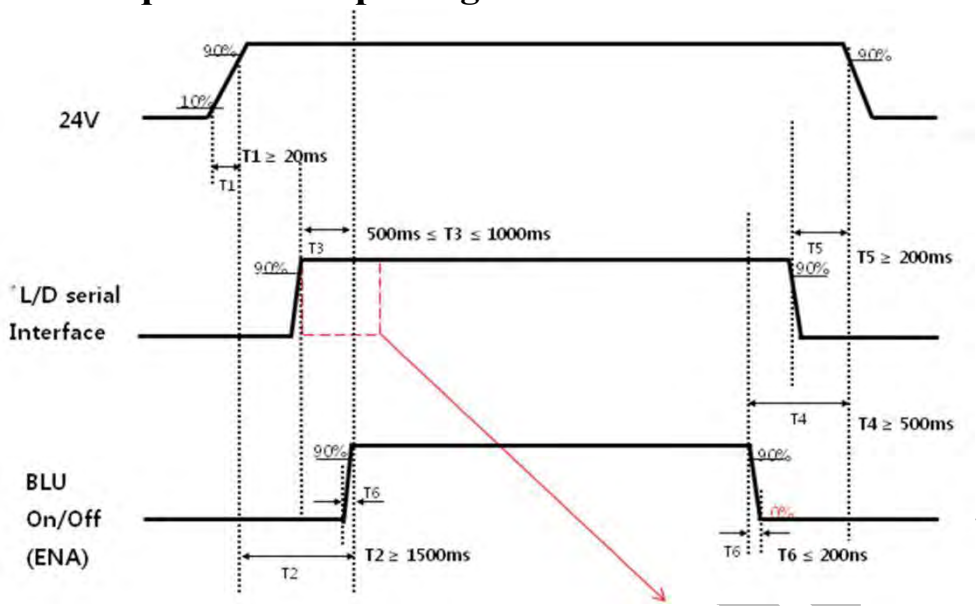
Input Connector Model No. : 196047-05021 (P-TWO) CON5
(Global Dimming Only, If Local Dimming, No Connection)

PIN NO	SYMBOL	REMARK
1	2D_VSYNC	2D Dimming Sync Signal
2	3D_ENA_SCN	3D Mode Enable Signal
3	3D_VSYNC	3D Sync Signal
4	NC	No Connection
5	NC	No Connection

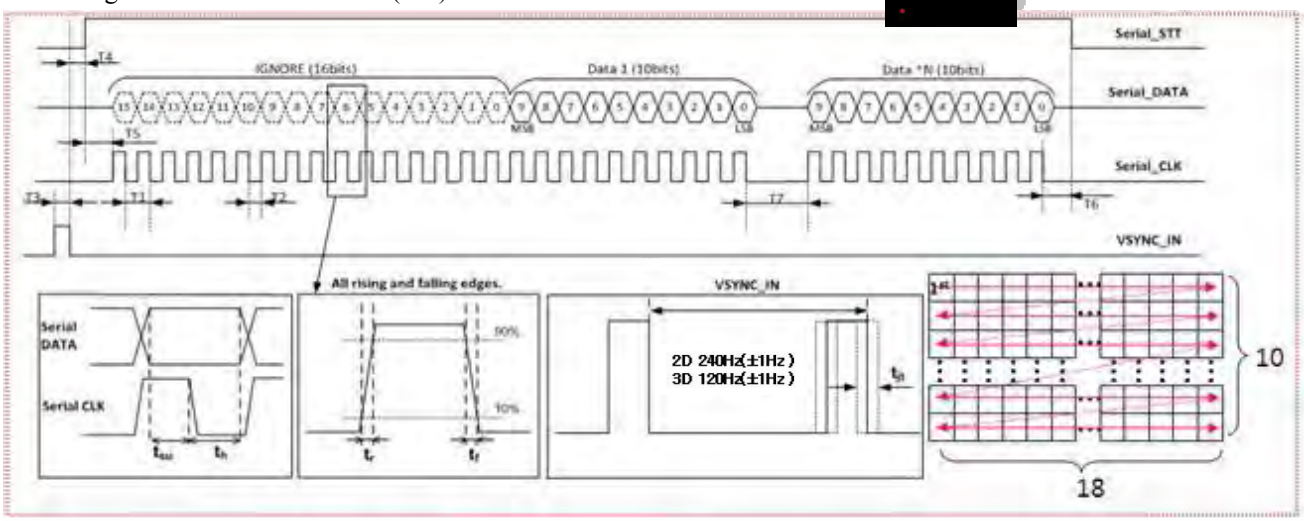
L/D Interface CNT pin description(104091-2020, 20Pin, MOLEX)
(Local Dimming Only, if Global Dimming = No Connection)

PIN NO	SYMBOL	REMARK
1	3D_EN	3D Scanning (Active High)
2	GND	Ground
3	SW_RESET	Scanning Demo Enable (Active High)
4	GND	Ground
5	SCAN_EN	Scanning Dimming Enable (Active Low)
6	GND	Ground
7	N.C	N.C
8	GND	Ground
9	LOCAL_EN	Local Dimming Enable (Active Low)
10	GND	Ground
11	VSYNC_IN	Dimming Sync Frequency Input (120Hz)
12	GND	Ground
13	SERIAL_STT	Signal Timing Trigger
14	GND	Ground
15	SERIAL_DATA	Serial DATA
16	GND	Ground
17	GND	Ground
18	SERIAL_CLK	Serial DATA Clock
19	GND	Ground
20	TEST_MODE	Contact

4.3 The Power Sequence for inputting to the converter



- Dimming Control Interface Format(SPI)

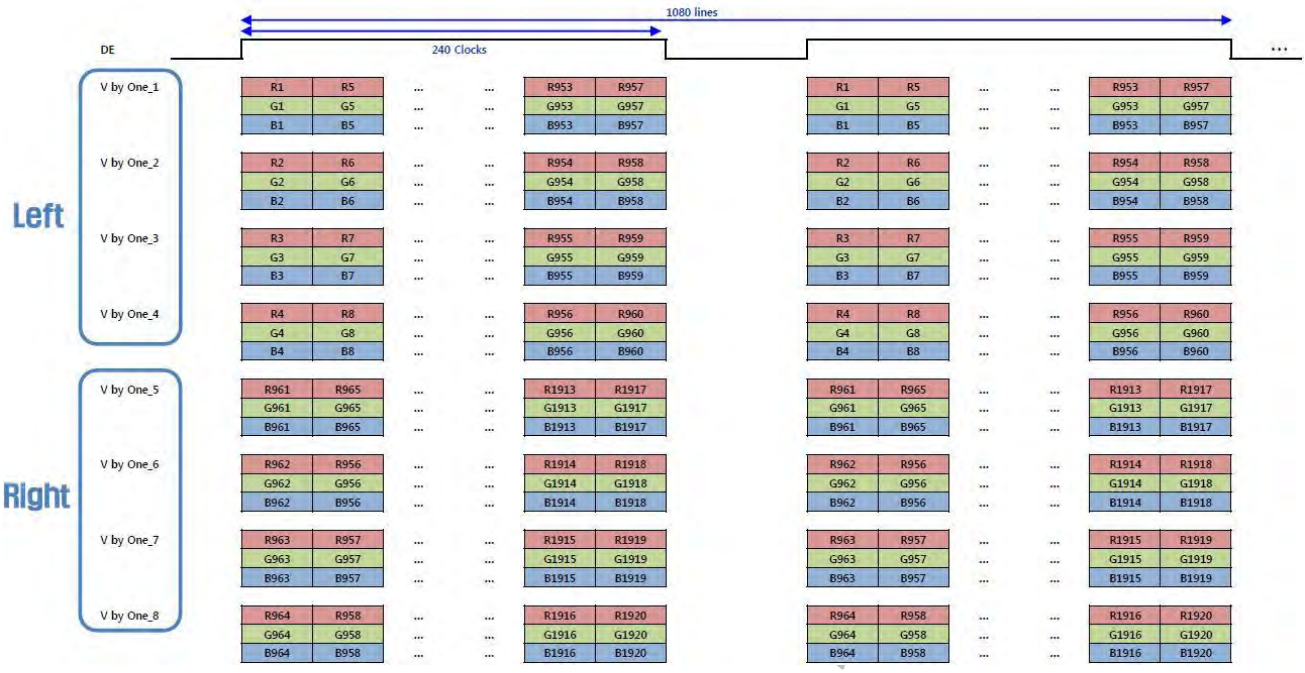


Parameter	Min	Typ	Max	Unit	Remark
T1	0.323	0.333	0.344	µs	S_CLK frequency 3MHz.
T2	0.162	0.167	0.172	µs	S_CLK duty cycle 50%.
T3	6	7	8	µs	Vertical VSYNC_IN width.
T4	1		160	µs	Time between VSYNC_IN falling edge and STT rising edge.
T5	0.5		3	µs	Time between STT rising edge and first S_CLK rising edge.
T6	0.5		3	µs	Time between last S_CLK falling edge and STT falling edge.
T7			2	clock	Blank time (Clock and S_DATA must stop at the same time)
t_{su}	0.1			µs	S_DATA Setup time.
t_h	0.05			µs	S_DATA Hold time.
t_r / t_f			0.06	µs	Rising/Falling edge time of all signals.
t_{jt}			1	µs	VSYNC_IN Jitter time (120Hz / 240Hz input)

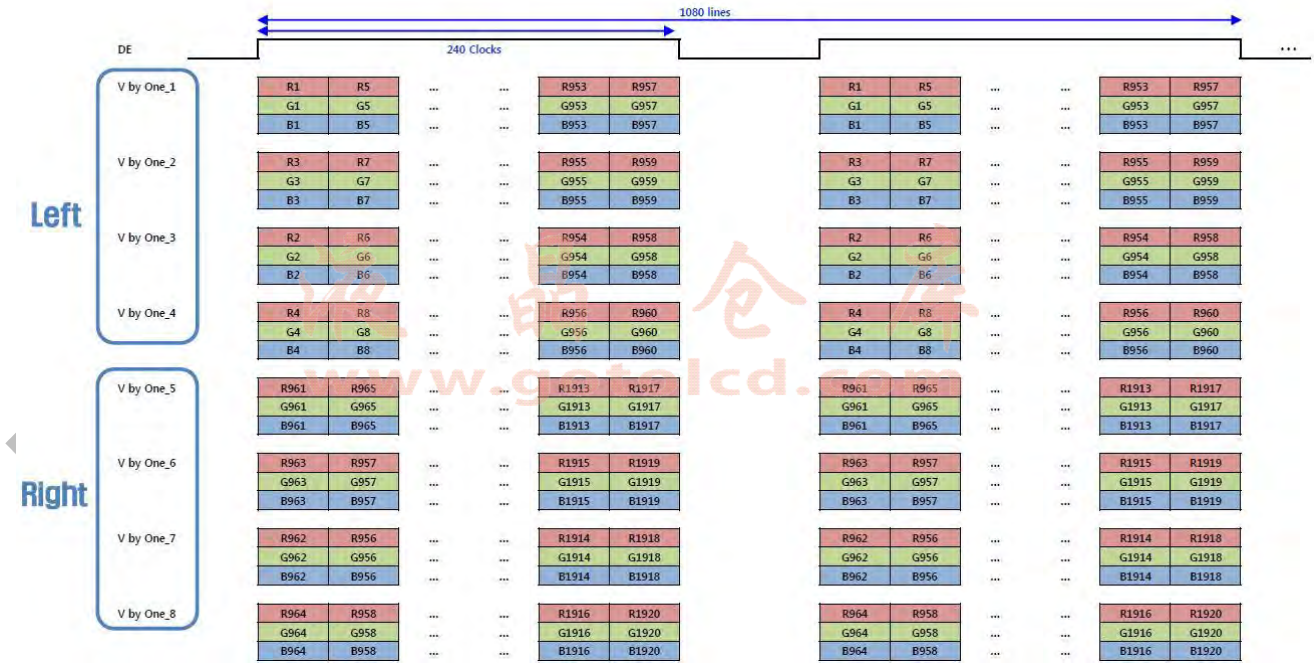
4.4 V by 1 INTERFACE

- Input Data format @ FHD 240Hz

1) Divided input (FRC 2chip – Normal)



2) Divided input (FRC 2chip – Cross)



5. INTERFACE TIMING

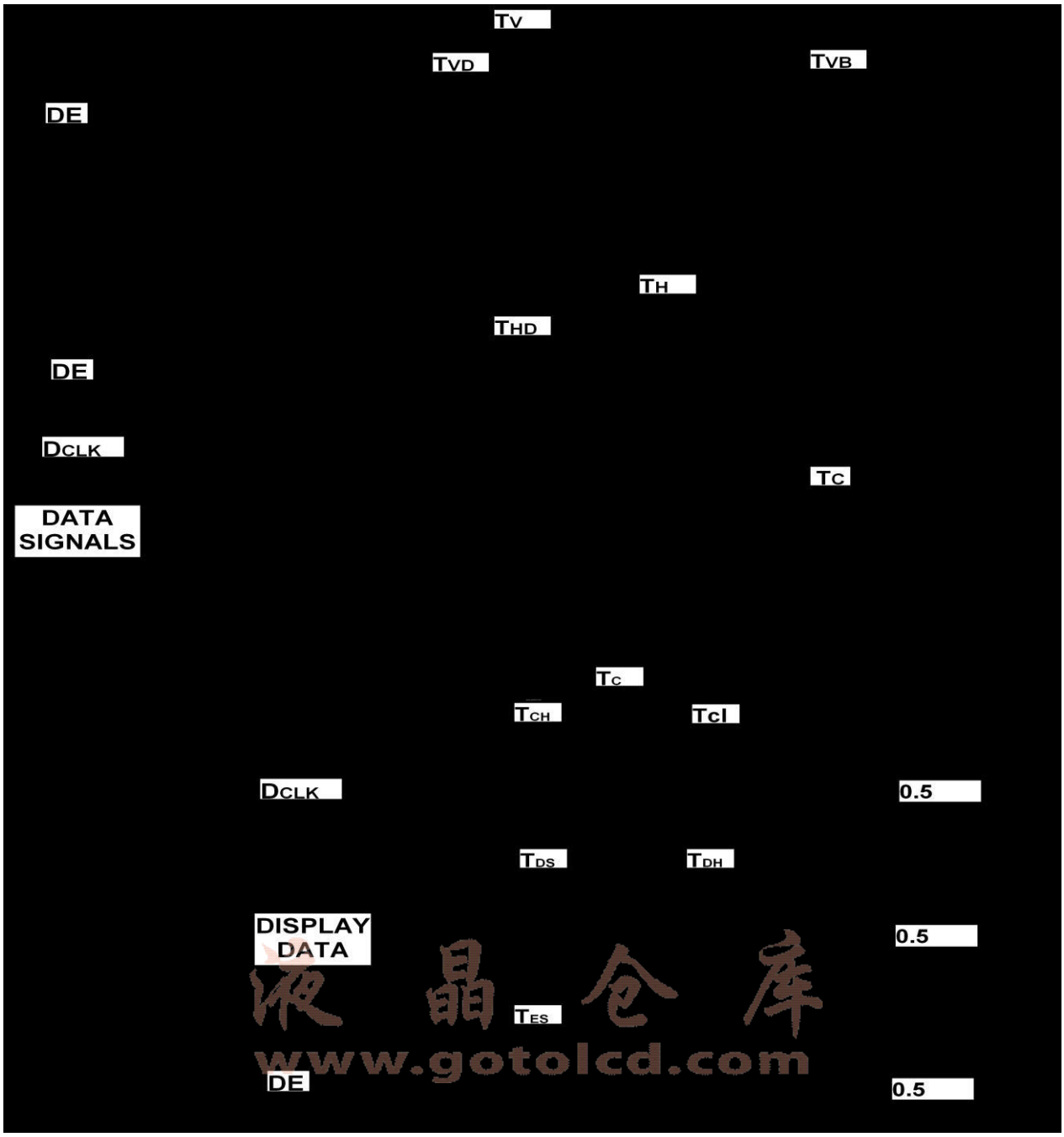
5.1 THE PARAMETERS OF TIMING

SIGNAL	ITEM	SMBOL	MIN.	TYP.	MAX.	Unit	NOTE
Clock	Frequency	Fdclk	475.2	594	610	MHz	-
Hsync		F_H	216	270	276	KHz	-
Vsync		F_V	192	240	245	Hz	-
Term for the vertical display	Active display period	T_{VD}		1080		Lines	-
	Total vertical	T_{VB}	1100	1125	2000	Lines	-
Term for the horizontal display	Active display period	T_{HD}		1920		Clocks	-
	Total Horizontal	T_H	2160	2200	3000	clocks	-

Note) The spread spectrum

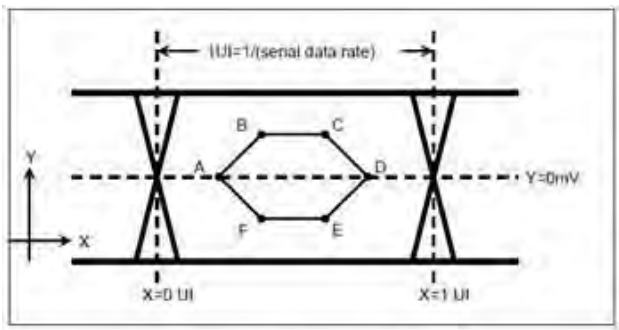
- The limit of spread spectrum's range of SET in which the LCD module is assembled should be within ± 0.5 %.
- Modulation frequency : max 30 kHz

5.2 TIMING DIAGRAMS OF INTERFACE SIGNAL(Only DE mode)



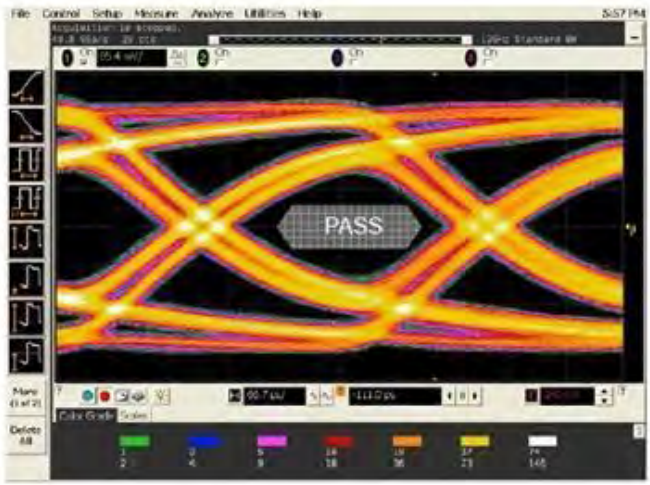
5.3 V by 1 Rx Electrical Specifications

(1) V by 1 Rx EYE spec (Rx PLL Loop Bandwidth : 15MHz)



	X[UI]	Y[mV]
A	0.25	0
B	0.3	50
C	0.7	50
D	0.75	0
E	0.7	-50
F	0.3	-50

(a) Eye Mask



(b) Example of Eye Diagram

(2) V by 1 Rx DC Characteristics

SIGNAL	SMBOL	MIN.	TYP.	MAX.	Unit
1.2V Supply Voltage	VDD12_VX	1.14	1.23	1.32	V
3.3V Supply Voltage	VDD33_VX	3.0	3.3	3.6	V
Differential Input High Threshold	V_{RTH}			50	mV
Differential Input Low Threshold	V_{RTL}	-50			Mv
CML Differential Input Resistance	R_{IN}	80	100	120	Ohm
External Resistor for Internal Impedance Calibration	R_{EXT}		1.18		Kohm
External Resistor Variation for Internal Impedance Calibration	R_{VAR}			1	%

(3) V by 1 Rx AC Charateristics

Characteristics	SMBOL	MIN.	TYP.	MAX.	Unit
Data rate	F	2.376	2.97	3.05	Gbps

(4) V by 1 Characteristics in Initialization Period

Characteristics	SMBOL	MIN.	TYP.	MAX.	Unit
Initialization Time from HTPDN LOW to normal 8b10b data	T_{init}			65	ms

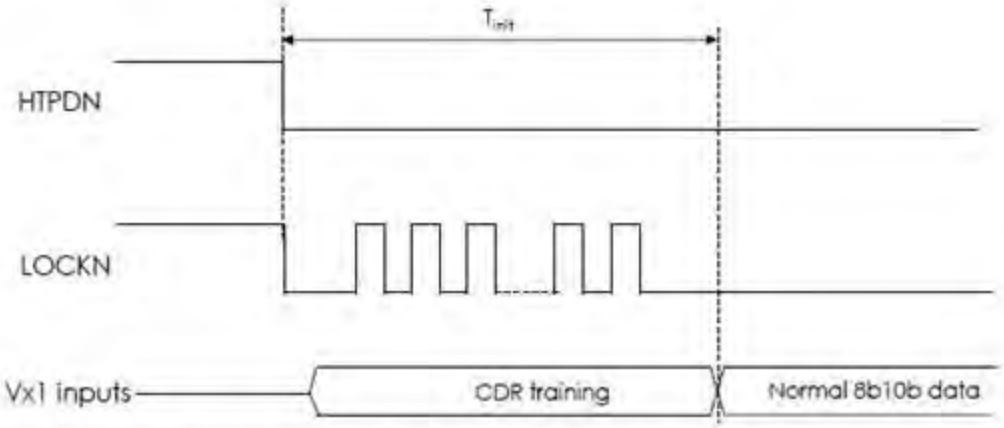


Figure 4. Signal Diagram in Initialization Period

(5) V by 1 Characteristics in Normal Operation

Characteristics	SMBOL	MIN.	TYP.	MAX.	Unit
Lock Time from clock training pattern to LOCKN LOW in normal operation	T_{LOCK}			10	ms
Latency from LOCKN HIGH to clock training pattern	L1			5	Ms
Latency from LOCKN LOW to normal 8b10b data pattern	L2			5	ms

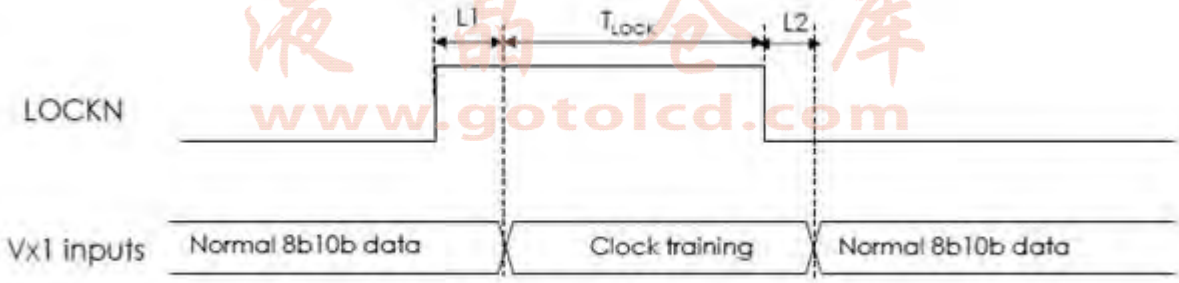


Figure 5. Signal Diagram in Normal Operation

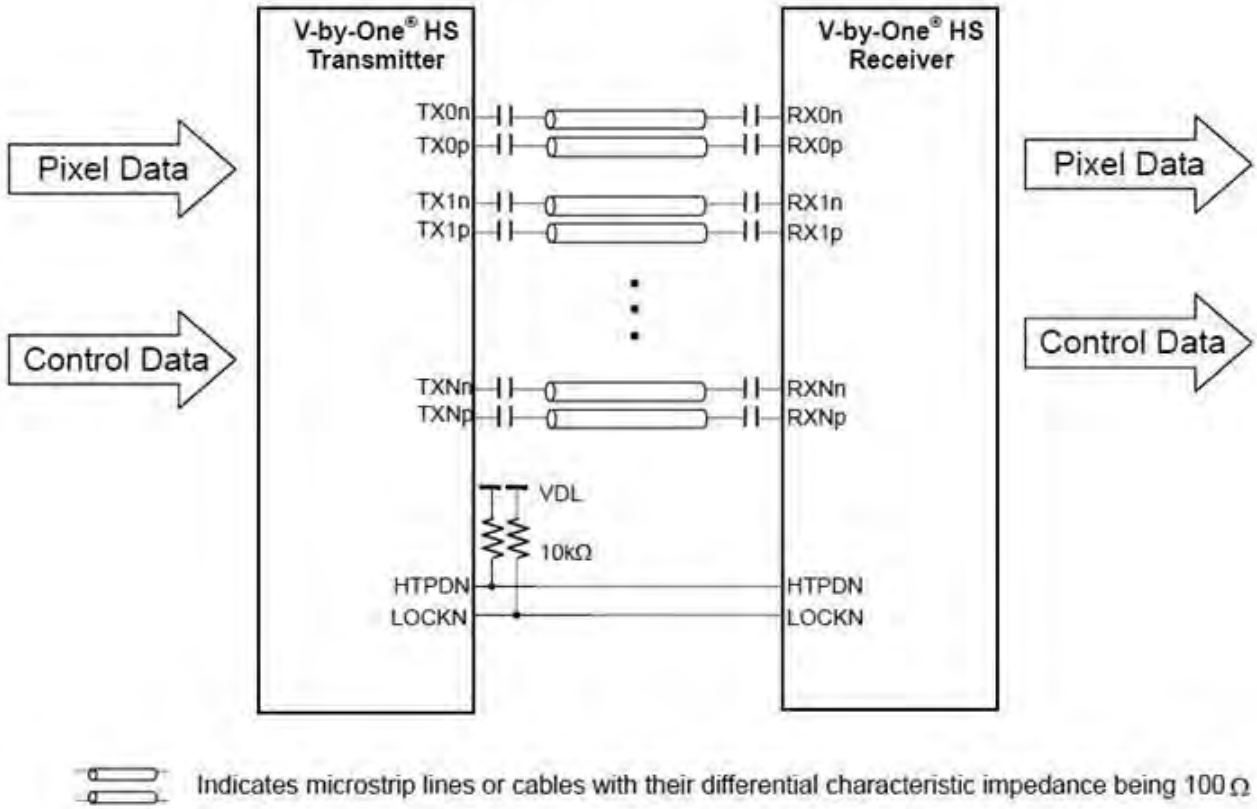
(6) Byte Length and Color Mapping : 4byte mode & 30bpp RGB mode

Mode	Packer input & Unpacker output		36bpp RGB /YCbCr444	30bpp RGB /YCbCr444
5byte mode / 4byte mode / 3byte mode	Byte0	D[0]	R/Cr[4]	R/Cr[2]
		D[1]	R/Cr[5]	R/Cr[3]
		D[2]	R/Cr[6]	R/Cr[4]
		D[3]	R/Cr[7]	R/Cr[5]
		D[4]	R/Cr[8]	R/Cr[6]
		D[5]	R/Cr[9]	R/Cr[7]
		D[6]	R/Cr[10]	R/Cr[8]
		D[7]	R/Cr[11]	R/Cr[9]
	Byte1	D[8]	G/Y[4]	G/Y[2]
		D[9]	G/Y[5]	G/Y[3]
		D[10]	G/Y[6]	G/Y[4]
		D[11]	G/Y[7]	G/Y[5]
		D[12]	G/Y[8]	G/Y[6]
		D[13]	G/Y[9]	G/Y[7]
		D[14]	G/Y[10]	G/Y[8]
		D[15]	G/Y[11]	G/Y[9]
	Byte2	D[16]	B/Cb[4]	B/Cb[2]
		D[17]	B/Cb[5]	B/Cb[3]
		D[18]	B/Cb[6]	B/Cb[4]
		D[19]	B/Cb[7]	B/Cb[5]
		D[20]	B/Cb[8]	B/Cb[6]
		D[21]	B/Cb[9]	B/Cb[7]
		D[22]	B/Cb[10]	B/Cb[8]
		D[23]	B/Cb[11]	B/Cb[9]
	Byte3	D[24]	(3DLR*)	(3DLR*)
		D[25]	(3DEN*)	(3DEN*)
		D[26]	B/Cb[2]	B/Cb[0]
		D[27]	B/Cb[3]	B/Cb[1]
		D[28]	G/Y[2]	G/Y[0]
		D[29]	G/Y[3]	G/Y[1]
		D[30]	R/Cr[2]	R/Cr[0]
		D[31]	R/Cr[3]	R/Cr[1]
	Byte4	D[32]	-	-
		D[33]	-	-
		D[34]	B/Cb[0]	-
		D[35]	B/Cb[1]	-
		D[36]	G/Y[0]	-
		D[37]	G/Y[1]	-
		D[38]	R/Cr[0]	-
		D[39]	R/Cr[1]	-

Table 2 Packer mapping

condition					Packer Output
byte mode	DE	Enable	Disable		-
	Framing Symbol	FSACTIVE	FSBS	FSBP	FSBE / FSBE_SR	-
5byte mode / 4byte mode / 3byte mode	Byte0	D[0]	Vsync: H ⇒ SYNH L ⇒ SYNL	Vsync: H ⇒ 0xFF L ⇒ 0x00	Vsync: H ⇒ SYNH L ⇒ SYNL	PD[0]
		D[1]				PD[1]
		D[2]				PD[2]
		D[3]				PD[3]
		D[4]				PD[4]
		D[5]				PD[5]
		D[6]				PD[6]
		D[7]				PD[7]
	Byte1	D[8]	Hsync: H ⇒ SYNH L ⇒ SYNL	Hsync: H ⇒ 0xFF L ⇒ 0x00	Hsync: H ⇒ SYNH L ⇒ SYNL	PD[0]
		D[9]				PD[1]
		D[10]				PD[2]
		D[11]				PD[3]
		D[12]				PD[4]
		D[13]				PD[5]
		D[14]				PD[6]
		D[15]				PD[7]
	Byte2	D[16]	BS	CTL[0]	BE/BE_SR	PD[0]
		D[17]		CTL[1]		PD[1]
		D[18]		CTL[2]		PD[2]
		D[19]		CTL[3]		PD[3]
		D[20]		CTL[4]		PD[4]
		D[21]		CTL[5]		PD[5]
		D[22]		CTL[6]		PD[6]
		D[23]		CTL[7]		PD[7]
	Byte3	D[24]	BS	CTL[8]	BE/BE_SR	PD[0]
		D[25]		CTL[9]		PD[1]
		D[26]		CTL[10]		PD[2]
		D[27]		CTL[11] *		PD[3]
		D[28]		CTL[12] *		PD[4]
		D[29]		CTL[13]		PD[5]
		D[30]		CTL[14]		PD[6]
		D[31]		CTL[15]		PD[7]
	Byte4	D[32]	BS	CTL[16]	BE/BE_SR	PD[0]
		D[33]		CTL[17]		PD[1]
		D[34]		CTL[18]		PD[2]
		D[35]		CTL[19]		PD[3]
		D[36]		CTL[20]		PD[4]
		D[37]		CTL[21]		PD[5]
		D[38]		CTL[22]		PD[6]
		D[39]		CTL[23]		PD[7]
-		D	K	D	K	D/K

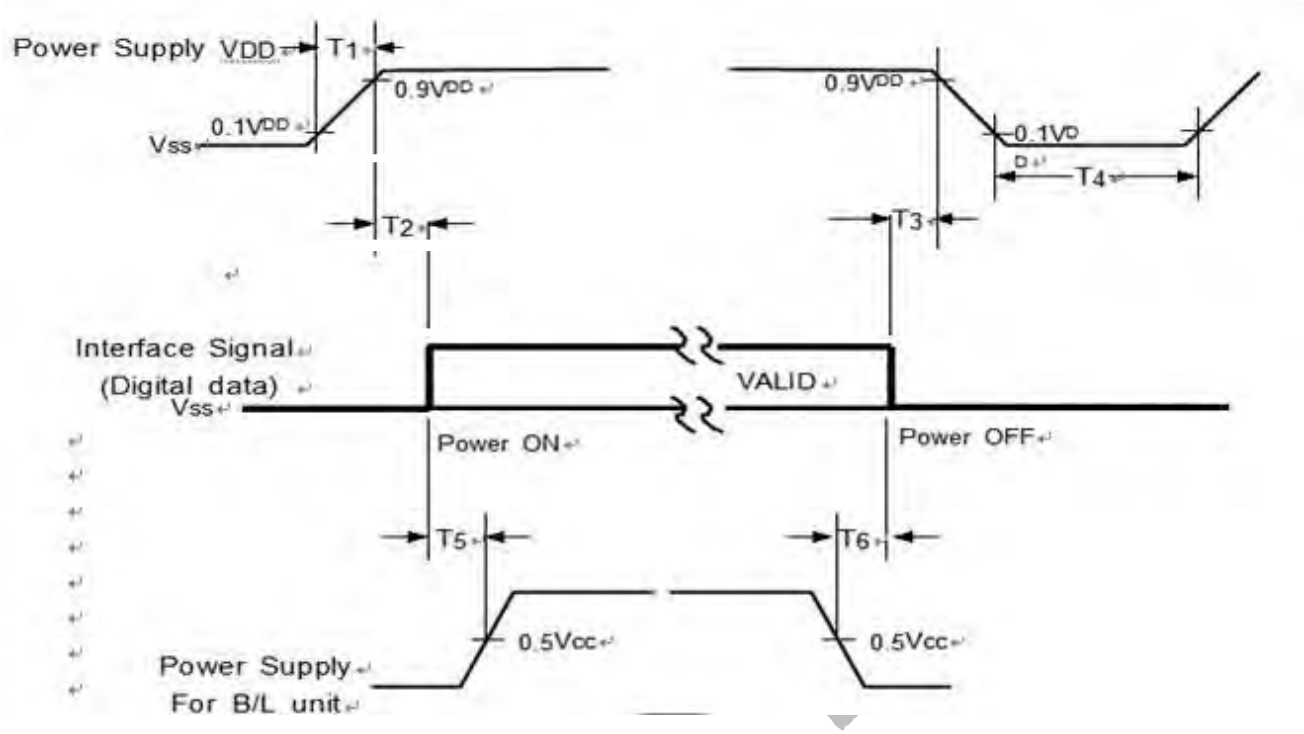
(7) V by 1 HS Link System diagram : HTPDN & LOCKN Pull-up resistor is needed at the transmitter side



* VDL : 3.3V

5.4 THE SEQUENCE OF POWER ON AND OFF

To prevent the product from being latched up or the DC in the LCD module from starting an operation, the order to turn the power on and off should be changed to the order as shown in the diagram below.



Timing	Spec	Remarks
T_1	0.5 msec<T1≤10msec	The time, during which the level of V_{DD} is rising from 10% to 90%.
T_3	0msec<T3≤50msec	The changing time, during which the valid data of signal starts leaving out until the V_{DD} starts falling below 90%.
T_4	1000msec≤T4	The changing time, during which the V_{DD} starts falling below 10% to restart the Windows.
T_5	2600msec≤T5 (BLU ON TIME)	The changing time, during which the signal of BLU starts rising beyond 50%.
T_6	100msec≤T6 (BLU OFF TIME)	The changing time, during which the signal of BLU starts falling below 50%.

- The inputted V_{DD}s value for supply voltage, BLU, and signal to the external system of the module shall be computed with referring to the former mentioned value.
- The method to apply the voltage to the lamp within the range, which the LCD operates. When the back-light is turned on before the LCD is operated or the power of LCD is turned off before the back-light is turned off, the abnormal display on the screen may be shown momentarily.
- Please keep the level of input signal low or keep the level of impedance high when the value of V_{DD} is off.
- The value shall be measured after the module has been fully discharged between the period, which the power is turned on and the period, which the power is turned off like the T4 timing. The backlight may be flashed if the interface signal remains floated when the above-mentioned signal becomes invalid.

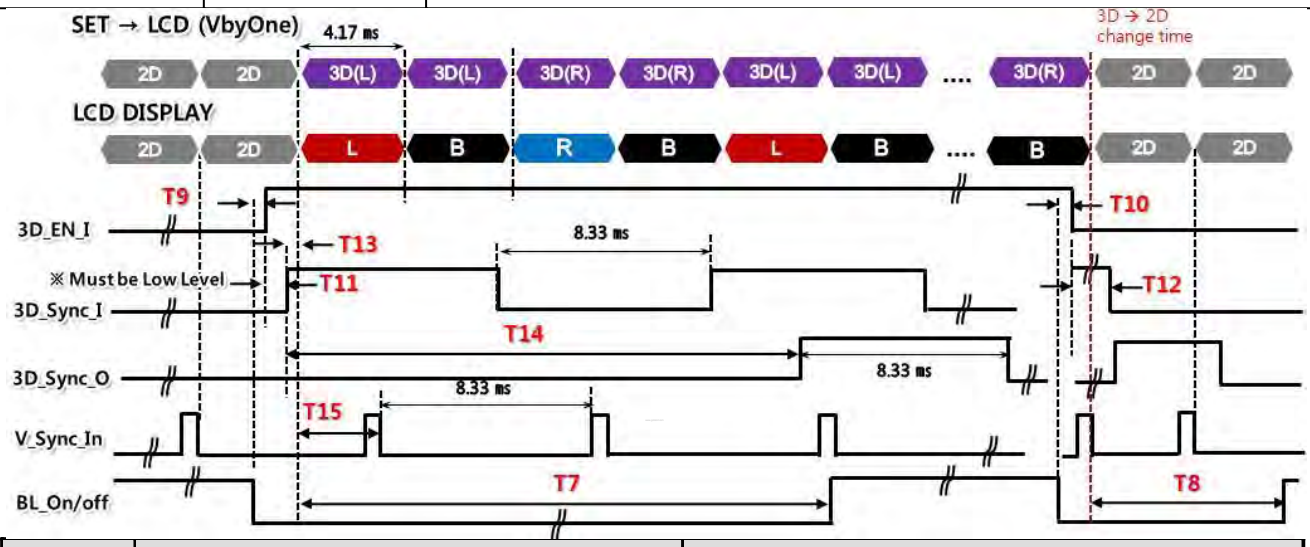
5.5 THE SEQUENCE OF 3D ENABLE

(1) 3D Input Source Definitions

For the 3D operating of the Model, 3D drive Source of the 240Hz Frame sequential method must be input.
3D operating cannot support 3D drive Source of another Format.

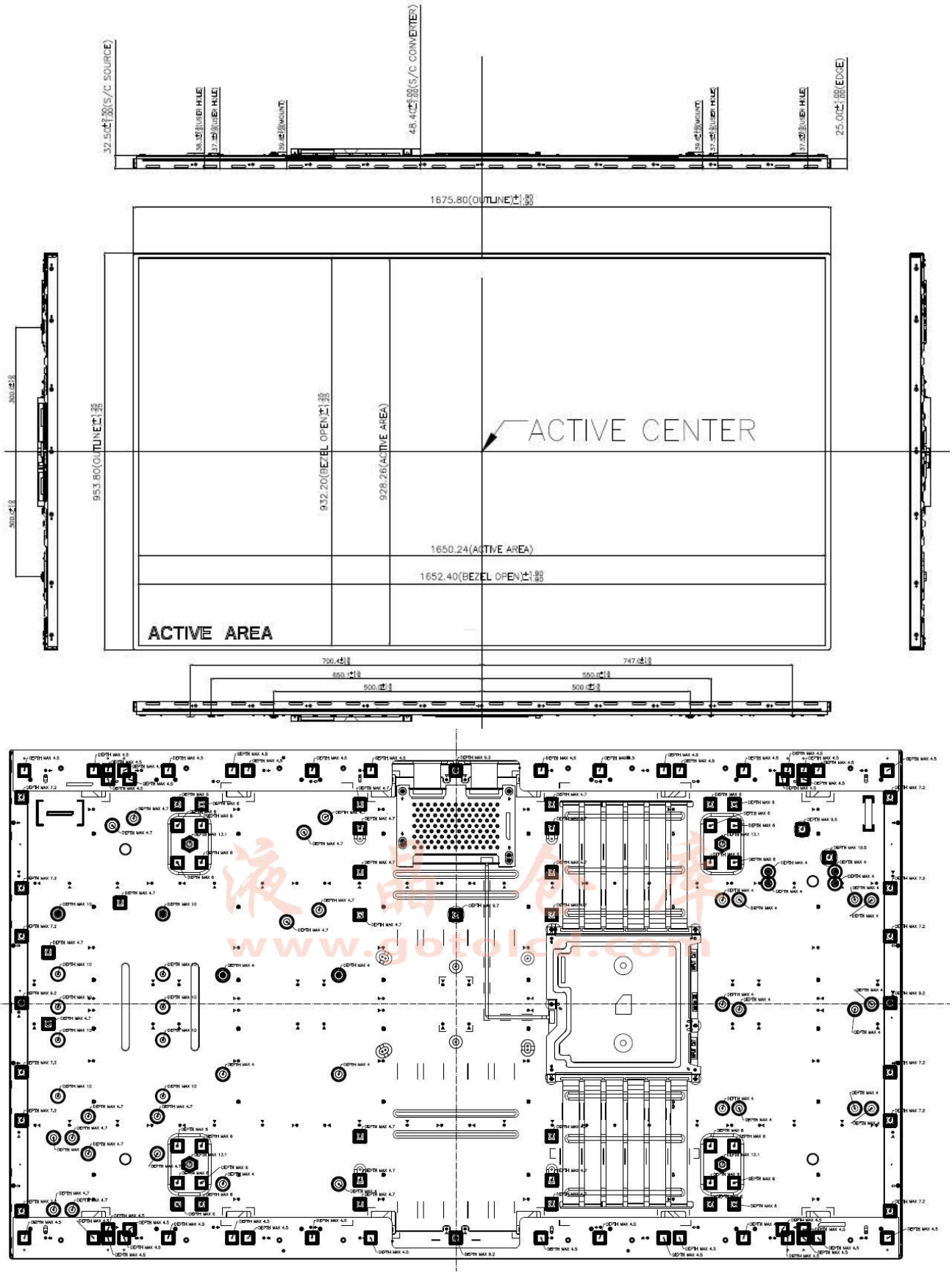
(2) 3D Input Pin Definitions

Pin Number	Pin name	Remark
21	3D_EN	If Voltage Level of 3D_EN Signal is High(3.3V), 3D MODE operate.
22	3D_SYNC_O	This Pin is L/R Sync output signal of Shutter Glass
23	3D_SYNC_I	This Pin is L/R Sync input signal of Shutter Glass



Timing	Spec (ms)			Description 1 frame (=4.17ms / 240Hz)
	Min.	Typ	Max	
T7	≥ 21			Backlight should be on after 5 frame when 3D signal input from SET
T8	≥ 17			Backlight should be off after 4 frame when 3D signal change to 2D signal from SET
T9	≥ 0			
T10	≥ 0			
T11	≥ 1		≤8	
T12	≥ 0		≤8	
T13		1.81		RECOMMEND
T14	19.5	20	20.5	RECOMMEND
T15		3.4		RECOMMEND

6. OUTLINE DIMENSION

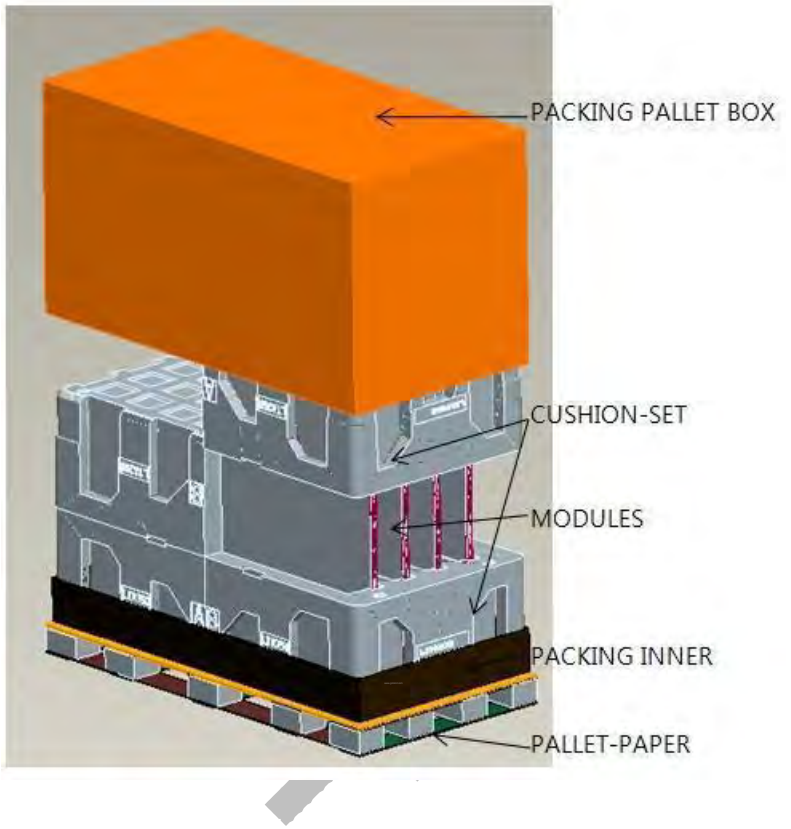


7. PACKING

(1) Packing Form

Corrugated Cardboard box as shock absorber.

(2) Packing Method



(3) Packing Material

Item	Specification	Remark
LCD Packing	4ea / Box	30 Kg / LCD (4ea / Pallet)
Pallet	1Box / Pallet	14Kg
Packing Direction	Vertical	
Total Pallet Size	W x L x H	2025mm(W) x 1050mm(L) x 1208mm (H)
Total Pallet Weight	180Kg	Pallet + Module + Cushion + Pallet box

8. MARKINGS & OTHERS

A nameplate is affixed to the specified location on each product.

(1) Parts number : LTA750HQ01
(2) Revision code : 3 letters
(3) Lot number :
(4) Nameplate Indication

Parts name : LTA750HQ01
Lot number : XXXXXXXXXX
Week code : 1316 (16th week of 2013)
Product Revision Code : 8

(5) Packing box attach

Parts name : LTA750HQ01
Box serial number : ZAT53K003

9. GENERAL PRECAUTIONS

9.1 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 module.

(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 LED back-light.

(c) Note that polarizers are very fragile and could be easily damaged. Do not press or 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) The desirable cleaners are water, IPA (Isoprophyl 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 fingerstalls 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 LED FPC.

(l) Do not touch any component which is located on the back side.

(m) Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.

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

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

9.2 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 be equipped with a good ventilation facility, which has a temperature controlling system. - Products should be placed on the pallet, which is away from the wall not on the floor. - Prevent products from being exposed to the direct sunlight, moisture, and water.; Be cautious not to pile the products up. - Avoid storing products in the environment, which other hazardous material is placed. - If products are delivered or kept in the storage facility more than 3 months,we recommend you to leave products under the condition including a 20℃ temperature and a humidity of 50% for 24 hours. - If you store semi-manufactured products for more than 3 months, bake the products under the condition including the 50℃ temp. and the 10% humidity for 24hrs after being used.		

9.3 OPERATION

(a) Do not connect or disconnect the cable to/ from the module at the "Power On" condition.
(b) The power shall be always turned on/off by the item 6.5. "Power on/off sequence"
(c) The module has a circuit with a high frequency. The system manufacturers shall suppress the electromagnetic interference sufficiently. The methods to ground and shield are important to minimize the interference.
(d) Design the length of cable to connect between the connector for back-light and the Converter as short as possible and the shorter cable shall be connected directly.
The longer cable between that of back-light and that of Converter may cause the luminance of LED package to lower and need a higher startup voltage(Vs).

9.4 Operation Condition Guide

(a) The LCD product should be operated under normal conditions. Normal condition is defined as below;
- Temperature : 20± 15℃
- Humidity : 55± 20%
- Display pattern : continually changing pattern (Not stationary)

(b) If the product will be used in extreme conditions such as high temperature, humidity, display patterns or operation time etc.., It is strongly recommended to contact SDC for Application engineering advice. Otherwise, its reliability and function may not be guaranteed. Extreme conditions are commonly found at Airports, Transit Stations, Banks, Stock market, and Controlling systems.

9.5 OTHERS

(a) The filter for ultra-violet ray is needed when you operate a product outdoor.
(b) Avoid placing the product in the environment, which water is condensed. The former mentioned condition may lead a product to operate improperly or an electrode to be disconnected.
(c) Do not exceed the ceiling of absolute maximum rating. (Various supply voltages, Various input voltages, Various contents on the part, various environmental temperatures, and so on) Otherwise, the module may be damaged.
(d) If the module displays the same pattern for a long time, the situation can be the image sticking to the screen.
(e) This module shall be handled carefully in order not to be stressed by the object from outside since this module contains a circuitry for PCB on the rear side.