SPECIFICATION
FOR
APPROVAL

(◆) **Preliminary Specification**
( ) **Final Specification**

Title	10.1" HD TFT LCD

Customer	
MODEL	

SUPPLIER	LG Display Co., Ltd.
*MODEL	LP101WH 4
Suffix	SLA

*When you obtain standard approval,
please use the above model name without suffix

APPROVED BY	SIGNATURE
/	
/	
/	

Please return 1 copy for your confirmation with your signature and comments.

APPROVED BY	SIGNATURE
Mighty Peang / S.Manager	
REVIEWED BY	
M. H. Kim / Manager	
PREPARED BY	
W.J. Jeon/ Engineer	

Product Engineering Dept.
LG Display Co., Ltd

Contents

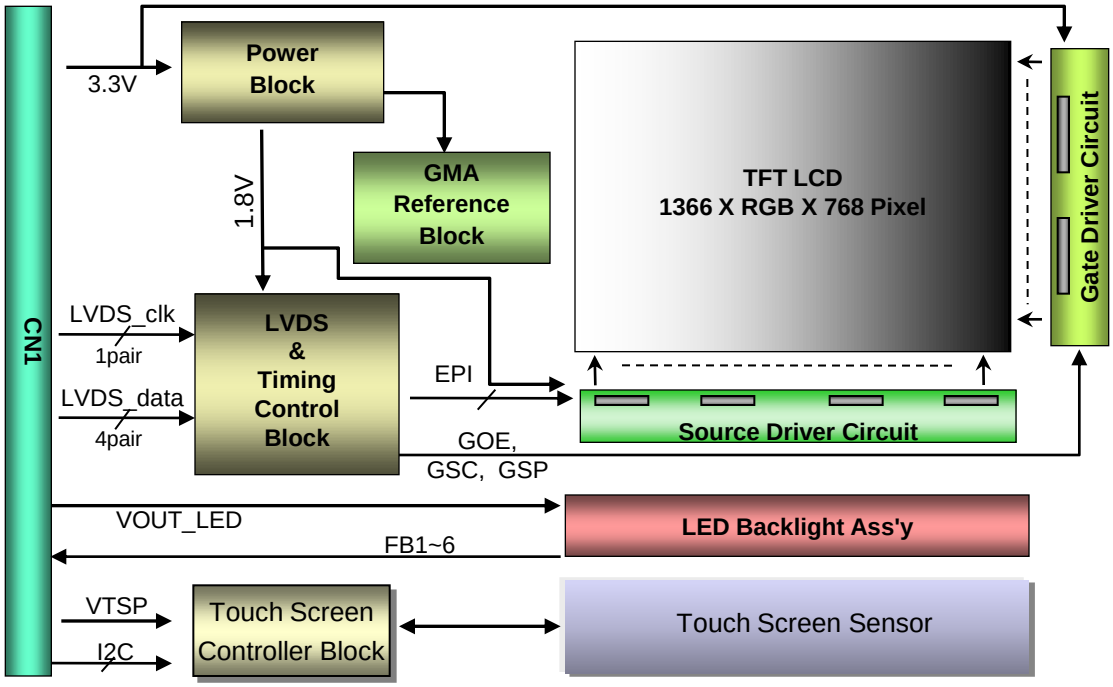
RECORD OF REVISIONS

Revision No	Revision Date	Page	Description	EDID ver
0.0	2012.02.22		First Draft	-

1. General Description

The LP101WH4 is a Color Active Matrix Liquid Crystal Display with an integral LED backlight system. The matrix employs a-Si Thin Film Transistor as the active element. It is a transmissive type display operating in the normally Black mode. This TFT-LCD has 10.1inches diagonally measured active display area with HD resolution(1366 horizontal by 768 vertical pixel array). Each pixel is divided into Red, Green and Blue sub-pixels or dots which are arranged in vertical stripes. Gray scale or the brightness of the sub-pixel color is determined with a 8-bit gray scale signal for each dot, thus, presenting a palette of more than 16,777,216 colors. The LP101WH4 has been designed to apply the interface method that enables low power, high speed, low EMI.

The LP101WH4 is intended to support applications where thin thickness, low power are critical factors and graphic displays are important. In combination with the vertical arrangement of the sub-pixels, the LP101WH4 characteristics provide an excellent flat display



General Features

Active Screen Size	10.1 inches diagonal
Outline Dimension	233.8±0.3 (H) × 139.0±0.3 (V) × 2.40 mm (max.) TSP : 169.37(H) x 171.97 x 4.1(max.)
Pixel Pitch	0.16290 mm × 0.16290 mm
Pixel Format	1366 horiz. by 768 vert. Pixels RGB strip arrangement
Color Depth	8-bit, 16,777,216 colors
Luminance, White(w/ Touch)	400 cd/m^2(Min., @I_{LED}=TBDmA)
Power Consumption	Logic : 0.55(TBD) W(typ.@Mosaic), Back Light : TBD(TBD)W (typ.@ I_{LED}= TBDmA) TSP: TBDW (typ. @ VTSP=3.3V))
Weight	115g (Max., LCM only) 230g(Max. with Touch)
Display Operating Mode	Transmissive mode, normally Black
Surface Treatment	Glare treatment of the front polarizer, 2H, Touch: TBD

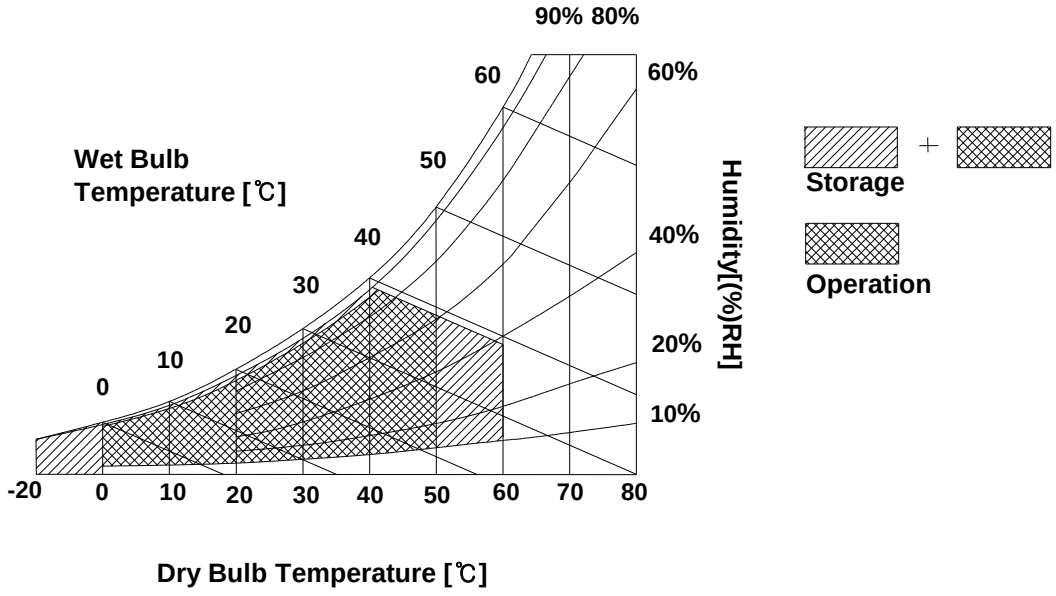
2. Absolute Maximum Ratings

The following are maximum values which, if exceeded, may cause faulty operation or damage to the unit.

Table 1. ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Values		Units	Notes
		Min	Max		
Power Input Voltage	VCC	-0.3	4.0	V_{DC}	at 25 ± 5°C
Operating Temperature	TOP	0	50	°C	1
Storage Temperature	HST	-20	60	°C	1
Operating Ambient Humidity	HOP	10	90	%RH	1
Storage Humidity	HST	10	90	%RH	1

Note : 1. Temperature and relative humidity range are shown in the figure below.
Wet bulb temperature should be 39°C Max, and no condensation of water.



3. Electrical Specifications

3-1. Electrical Characteristics

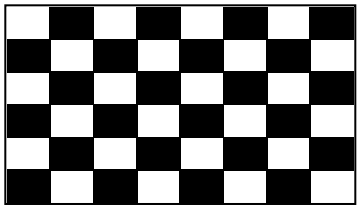
The LP101WH (TBD) requires two power inputs. One is employed to power the LCD electronics and to drive the TFT array and liquid crystal. The second input which powers the LED BL.

Table 2. ELECTRICAL CHARACTERISTICS

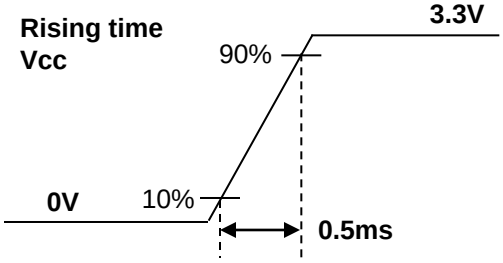
Parameter	Symbol		Values			Unit	Notes
			Min	Typ	Max		
LOGIC :							
Power Supply Input Voltage	VCC		3.0	3.3	3.6	V_{DC}	1
Power Consumption	Pc	Black	-	0.55	0.64	Watt	
		White		0.55	0.64	Watt	
		Mosaic		0.55	0.64	Watt	2
		R/G/B		0.73	0.84	Watt	
Power Supply Inrush Current	I_{CC_P}		-	-	2000	mA	3
Differential Impedance	Zm		90	100	110	Ohm	4
EDID Input Voltage	V_{EDID}		3.0	3.3	3.6	V	
EDID Input Current	I_{EDID}				10	mA	
LED Backlight							
Operating Current per string	I_{LED}			24		mA	5
LED Power Consumption	P_{LED}			2.56	2.65	W	6
LED Forward Voltage	Vf			2.96	3.0	V	@24mA
Life Time			12,000	-	-	Hrs	7
Touch Panel							
Power Supply Input Voltage	V_{TSP}		3.15	3.3	3.45	V	
Power Supply Input Current	ITSP	Active		63.5	69.5	mA	8
		Stand by		18	-	mA	

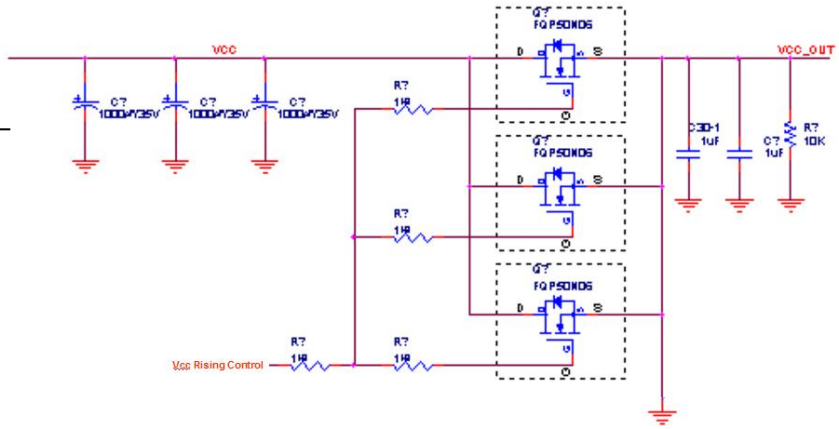
Note)

1. The measuring position is the connector of LCM and the test conditions are under 25℃, fv = 60Hz, Mosaic pattern.
2. The specified Icc current and power consumption are under the Vcc = 3.3V , 25℃, fv = 60Hz condition whereas Mosaic pattern is displayed and fv is the frame frequency.



3. The below figures are the measuring Vcc condition and the Vcc control block LGD used. The Vcc condition is same the minimum of T1 at Power on sequence.





4. This impedance value is needed to proper display and measured form LVDS Tx to the mating connector.
5. The typical operating current is for the typical surface luminance (L_{WH}) in optical characteristics. I_{LED} is the current of each LEDs' string, LED backlight has strings on it.
6. The LED power consumption shown above does not include power of external LED driver circuit for typical current condition.
7. The life time is determined as the time at which the typical brightness of LCD is 50% compare to that of initial value at the typical LED current. These LED backlight has 6 strings on it and the typical current of LED's string is base on 24mA.
8. The specified ITSP current and power consumption (PTSP) are under the VTSP = 3.3V , 25℃, 100Hz at 1-finger and Active mode.

3-2. Interface Connections

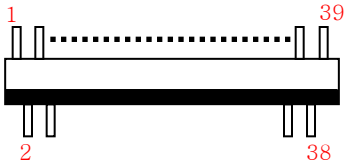
This LCD employs two interface connections, a 39pin connector is used for the module electronics interface and the other connector is used for the integral backlight system.
The electronics interface connector is a model FH35C-39S-0.3SHW manufactured by HIROSE.

Table 3. MODULE CONNECTOR PIN CONFIGURATION (CN1)

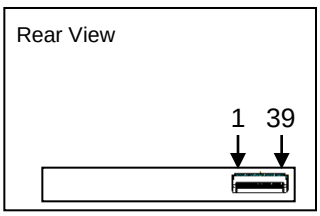
Pin	Symbol	Description	Notes
1	NC	No Connection.	
2	VCC	Power Supply, 3.3V Typ.	
3	VCC	Power Supply, 3.3V Typ.	
4	V EEDID	DDC 3.3V power	
5	NC	No Connection	
6	Clk EEDID	DDC Clock	
7	DATA EEDID	DDC Data	
8	R_{IN} 0-	Negative LVDS differential data input	
9	R_{IN} 0+	Positive LVDS differential data input	
10	GND	Ground	
11	R_{IN} 1-	Negative LVDS differential data input	
12	R_{IN} 1+	Positive LVDS differential data input	
13	GND	Ground	
14	R_{IN} 2-	Negative LVDS differential data input	
15	R_{IN} 2+	Positive LVDS differential data input	
16	GND	Ground	
17	CLKIN-	Negative LVDS differential clock input	
18	CLKIN+	Positive LVDS differential clock input	
19	GND	Ground	
20	R_{IN} 3+	Negative LVDS differential data input	
21	R_{IN} 3+	Positive LVDS differential data input	
22	GND	Ground	
23	VTSP	Power Supply, 3.3~5V (Typ.)	
24	VTSP	Power Supply, 3.3~5V (Typ.)	
25	GND	Ground	
26	I2C_CLK	I2C Clock for Touch	
27	I2C_Data	I2C Data for Touch	
28	Interrupt	MCU(Host) Alert	
29	Reset	Reset TSP	
30	XVDD_EN	XVDD Enable	
31	VCD6	LED Cathode	
32	VCD5	LED Cathode	
33	VCD4	LED Cathode	
34	VCD3	LED Cathode	
35	VCD2	LED Cathode	
36	VCD1	LED Cathode	
37	NC	No Connection	
38	VLED	Power Supply for LED (Anode)	
39	VLED	Power Supply for LED (Anode)	

[Connector]
FH35C-39S-0.3SHW(Hirose), 39pin

[Connector pin arrangement]

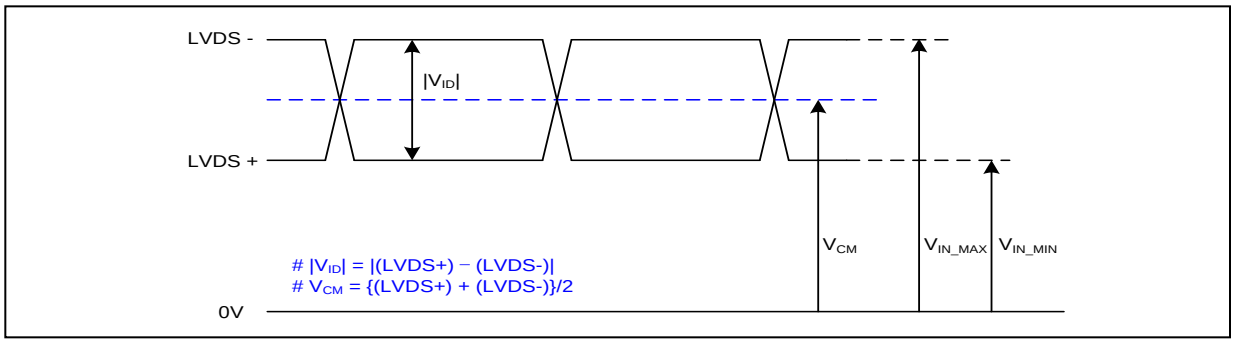


[LCD Module Rear View]



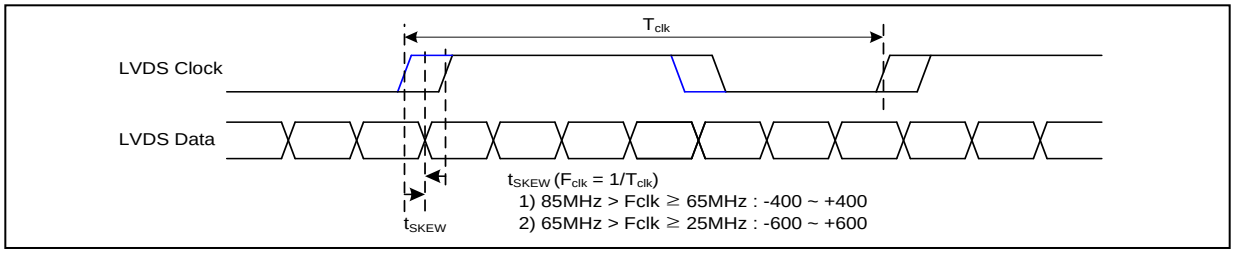
3-3. LVDS Signal Timing Specifications

3-3-1. DC Specification

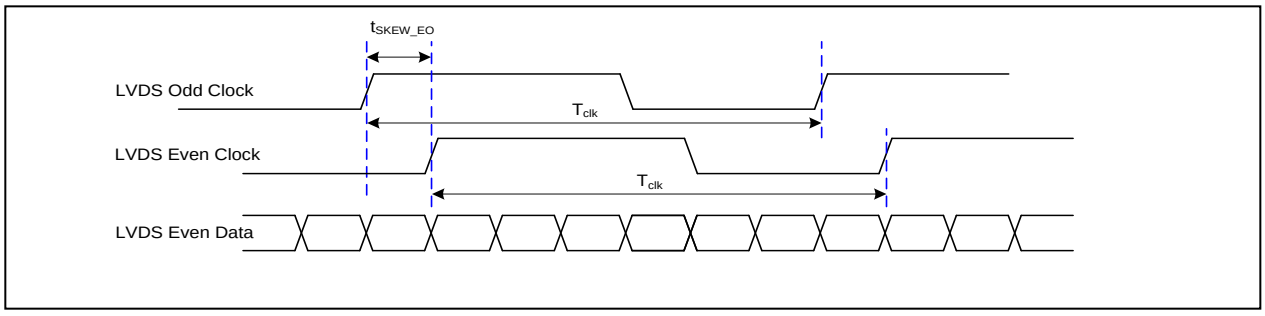


Description	Symbol	Min	Max	Unit	Notes
LVDS Differential Voltage	$\|V_{ID}\|$	100	600	mV	-
LVDS Common mode Voltage	V_{CM}	0.6	1.8	V	-
LVDS Input Voltage Range	V_{IN}	0.3	2.1	V	-

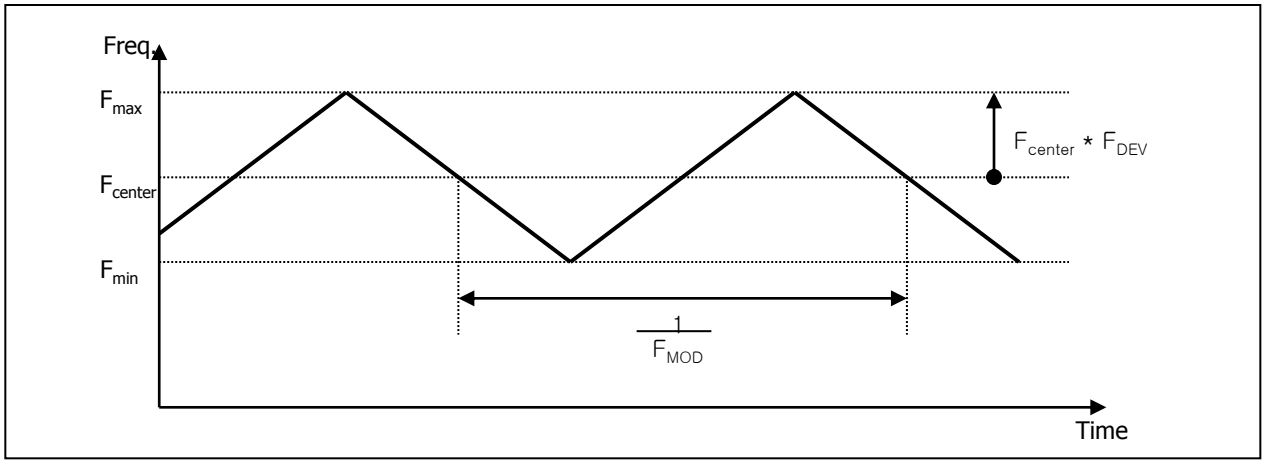
3-3-2. AC Specification



Description	Symbol	Min	Max	Unit	Notes
LVDS Clock to Data Skew Margin	t_{SKEW}	- 400	+ 400	ps	85MHz > Fclk ≥ 65MHz
	t_{SKEW}	- 600	+ 600	ps	65MHz > Fclk ≥ 25MHz
LVDS Clock to Clock Skew Margin (Even to Odd)	t_{SKEW_EO}	- 1/7	+ 1/7	T_{clk}	-
Maximum deviation of input clock frequency during SSC	F_{DEV}	-	± 3	%	-
Maximum modulation frequency of input clock during SSC	F_{MOD}	-	200	KHz	-



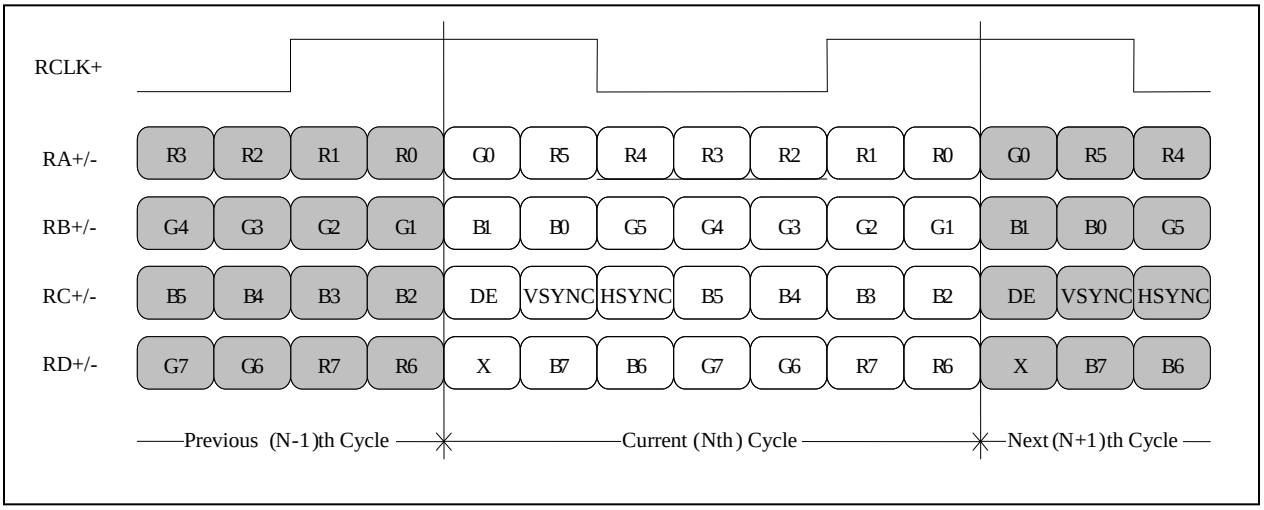
< Clock skew margin between channel >



< Spread Spectrum >

3-3-3. Data Format

- LVDS 1 Port



< LVDS Data Format >

3-4. Signal Timing Specifications

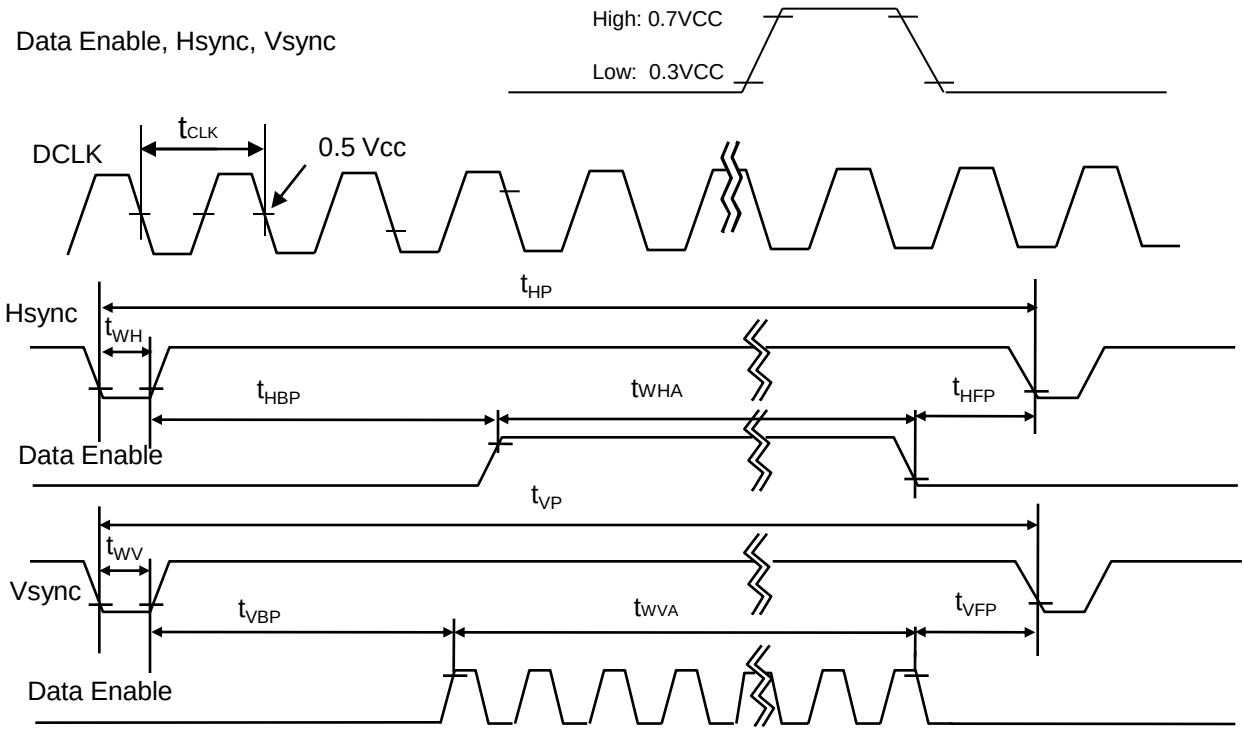
This is the signal timing required at the input of the User connector. All of the interface signal timing should be satisfied with the following specifications and specifications of LVDS Tx/Rx for its proper operation.

Table 5. TIMING TABLE

ITEM	Symbol		Min	Typ	Max	Unit	Note
DCLK	Frequency	f_{CLK}	-	72	-	MHz	1port
Hsync	Period	t_{HP}	1470	1520	1586	Tclk	
	Width	t_{WH}	23	32	40		
	Width-Active	t_{WHA}		1366			
Vsync	Period	t_{VP}	779	790	881	tHP	
	Width	t_{VW}	2	5	8		
	Width-Active	t_{VWA}		768			
Data Enable	Horizontal back porch	t_{HBP}	72	80	124	tCLK	
	Horizontal front porch	t_{HFP}	8	48	48		
	Vertical back porch	t_{VBP}	8	14	20	tHP	
	Vertical front porch	t_{VFP}	1	3	5		

3-5. Signal Timing Waveforms

Condition : VCC =3.3V



3-6. Color Input Data Reference

The brightness of each primary color (red, green and blue) is based on the 8-bit gray scale data input for the color ; the higher the binary input, the brighter the color. The table below provides a reference for color versus data input.

Table 7. COLOR DATA REFERENCE

Color		Input Color Data																									
		RED								GREEN								BLUE									
		MSB							LSB	MSB							LSB	MSB							LSB		
		R7	R6	R5	R4	R3	R2	R1	R0	R7	R6	R5	R4	R3	R2	R1	R0	R7	R6	R5	R4	R3	R2	R1	R0		
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		
	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		
	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		
	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		
	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		
	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		
RED	RED (00)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	RED (01)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	...	...								...								...									
	RED (254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	RED (255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
GREEN	GREEN (00)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	GREEN (01)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0		
	...	...								...								...									
	GREEN (254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0		
	GREEN (255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0		
BLUE	BLUE (00)	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 (01)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		
	...	...								...								...									
	BLUE (254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0		
	BLUE (255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1		

3-7. Power Sequence

3-7-1. Power Sequence for LCM

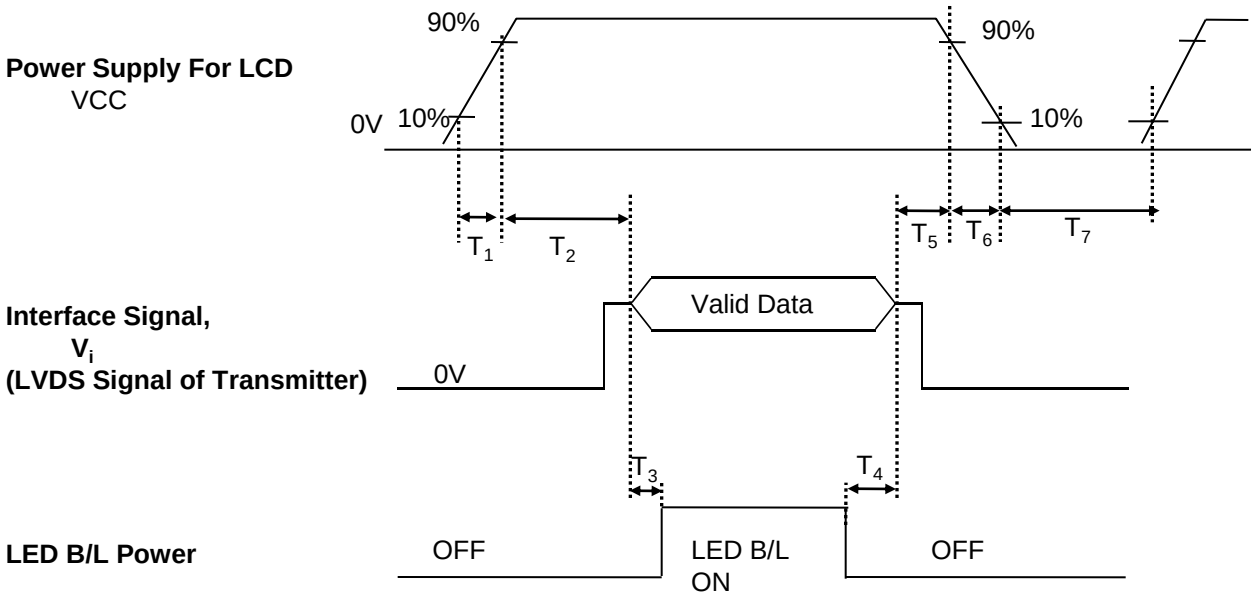


Table 8. POWER SEQUENCE TABLE

Parameter	Value			Units
	Min.	Typ.	Max.	
T_1	0.5	-	10	(ms)
T_2	0	-	50	(ms)
T_3	200	-	-	(ms)
T_4	200	-	-	(ms)
T_5	0	-	50	(ms)
T_6	0	-	10	(ms)
T_7	400	-	-	(ms)

Note)
1. Valid Data is Data to meet “3-3. Signal Timing Specifications”
2. Please avoid floating state of interface signal at invalid period.
3. When the interface signal is invalid, be sure to pull down the power supply for LCD VCC to 0V.
4. LED B/L power must be turn on after power supply for LCD and interface signal are valid.

3-7-2. Power Sequence for Touch

Power Supply Input
V_TSP 3.3V

Interface Signal, V_i
I2C

CHG
State change Interrupt

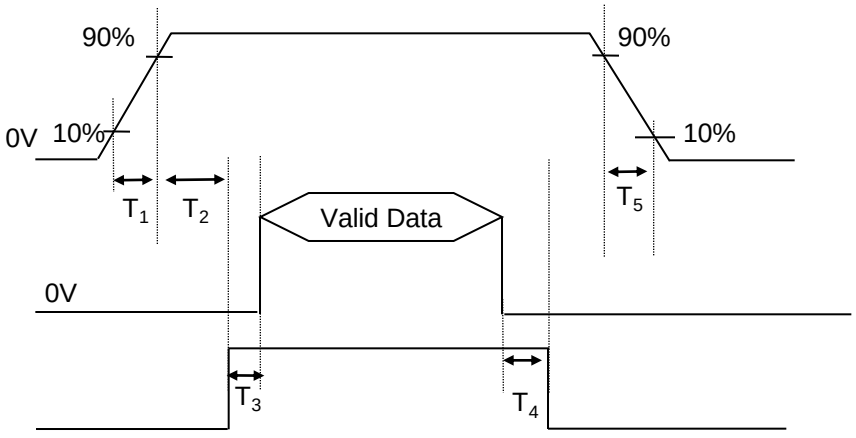


Table 6. POWER SEQUENCE TABLE

Parameter	Value			Units
	Min.	Typ.	Max.	
T_1	0.5	-	10	ms
T_2	15	-	-	ms
T_3	0.1	-	-	ms
T_4	-	-	0.5	ms
T_5	-	-	10	ms

4. Optical Specification

Optical characteristics are determined after the unit has been 'ON' and stable for approximately 20 minutes in a dark environment at 25°C. The values specified are at an approximate distance 50cm from the LCD surface at a viewing angle of Φ and Θ equal to 0°.
FIG. 1 presents additional information concerning the measurement equipment and method.

FIG. 1 Optical Characteristic Measurement Equipment and Method

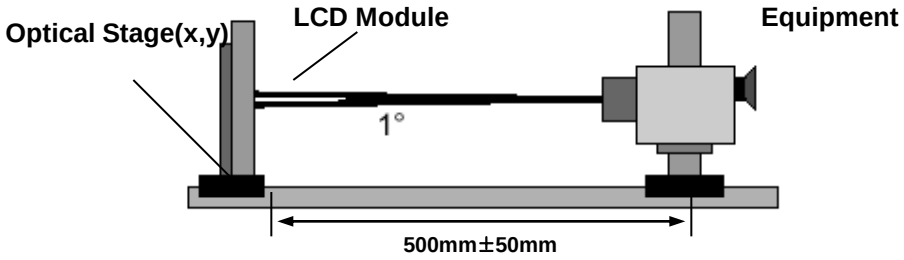


Table 9. OPTICAL CHARACTERISTICS Ta=25°C, VCC=3.3V, fv=60Hz, f_{CLK}= 72(TBD)MHz, ILED = TBDmA

Parameter		Symbol	Condition	Min	Typ	Max	Units	Notes
Average Luminance (with Touch)		LAVE	5 Points (ILED= TBDmA)	400		-	cd/㎡	2
Luminance variation		δ_{WHITE}	5points	-	1.20	1.40		
			13 point	-	1.40	1.60		3
C/R		-	Center 1 Point	500	800	-	-	1
Response time			-	-	25	-	㎳	4
Viewing angle	Horizontal	Θ	φx(Left,Right)	±80	±85	-	°	5
	Vertical	Θ	φyu(Up)	80	85	-		
		Θ	φyd(Down)	80	85	-		
Color Coordinates		RED	RX	TBD	TBD	TBD		
			RY	TBD	TBD	TBD		
		GREEN	GX	TBD	TBD	TBD		
			GY	TBD	TBD	TBD		
		BLUE	BX	TBD	TBD	TBD		
			BY	TBD	TBD	TBD		
		WHITE	WX	0.283	0.313	0.343		
			WY	0.299	0.329	0.359		
Cross Talk		DSHA	-	-	-	TBD	%	Fig.5
Gray Scale		-	-	Gamma 2.2				6

Note)

1. Contrast Ratio(CR) is defined mathematically as

$$\text{Contrast Ratio} = \frac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all black pixels}}$$

2. Surface luminance is the average of 5 point across the LCD surface 50cm from the surface with all pixels displaying white. For more information see FIG 1.

$$L_{WH} = \text{Average}(L_1, L_2, \ldots L_5)$$

3. The variation in surface luminance , The panel total variation (δ_{WHITE}) is determined by measuring L_N at each test position 1 through 17 and then defined as followed numerical formula.
For more information see FIG 2.

$$\delta_{WHITE} = \frac{\text{Maximum}(L_1, L_2, \ldots L_{13})}{\text{Minimum}(L_1, L_2, \ldots L_{13})}$$

4. Response time is the time required for the display to transition from white to black (rise time, Tr_R) and from black to white(Decay Time, Tr_D). For additional information see FIG 3.

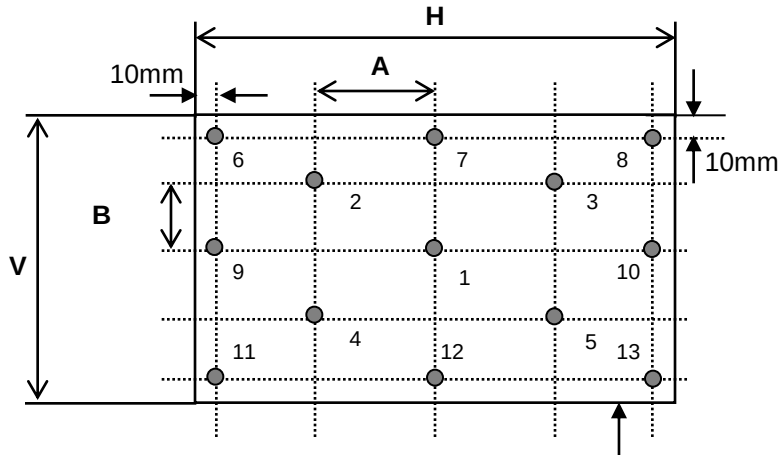
5. Viewing angle is the angle at which the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see FIG 4.

6. Gray scale specification * f_V = 60Hz

Gray Level	Luminance [%] (Typ)
L0	TBD
L7	TBD
L15	TBD
L23	TBD
L31	TBD
L39	TBD
L47	TBD
L55	TBD
L63	TBD

FIG. 2 Luminance

<Measuring point for Average Luminance & measuring point for Luminance variation>



H,V : ACTIVE AREA
A : H/4 mm
B : V/4 mm
H : 196.61 mm
V : 147.46 mm

FIG. 3 Response Time

The response time is defined as the following figure and shall be measured by switching the input signal for “black” and “white”.

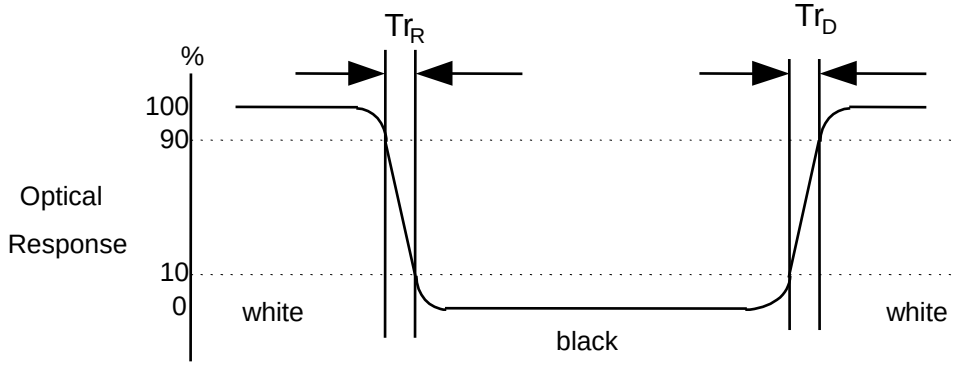


FIG. 4 Viewing angle

<Dimension of viewing angle range>

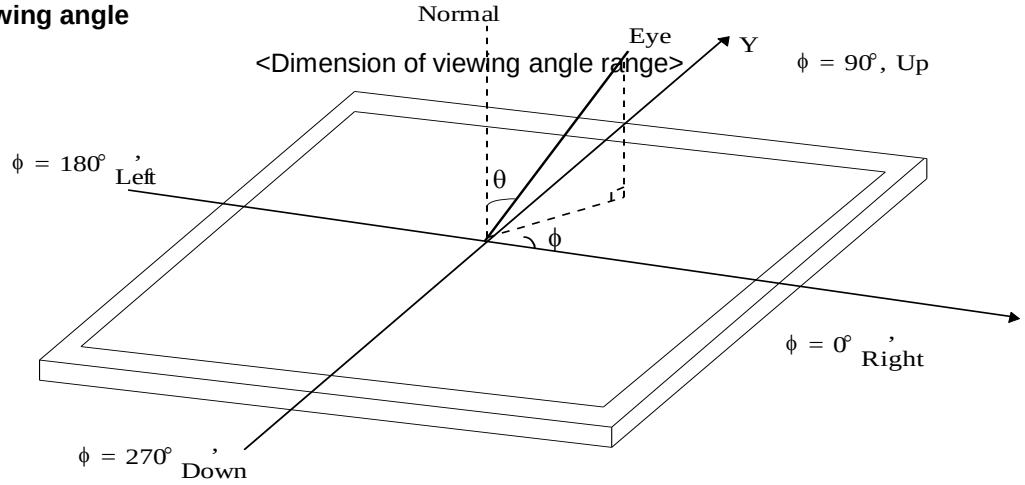


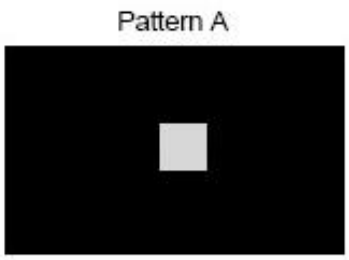
FIG. 5 Cross talk

No visual cross-talk will be allowed. Two luminance values are measured at center spot with 50 x 50 pixels. The cross-talk, D_{SHA}, is defined as,

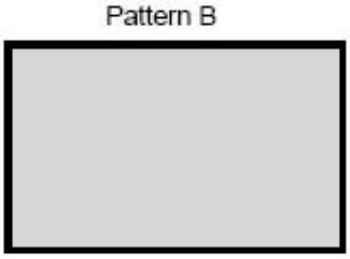
$$D_{SHA} = (L_B - L_A)/L_B \bullet 100\%,$$

Where, L_A = Luminance in Pattern A

L_B = Luminance in Pattern B.



Pattern A
Gray Scale = 31 in center
Black in surrounding area



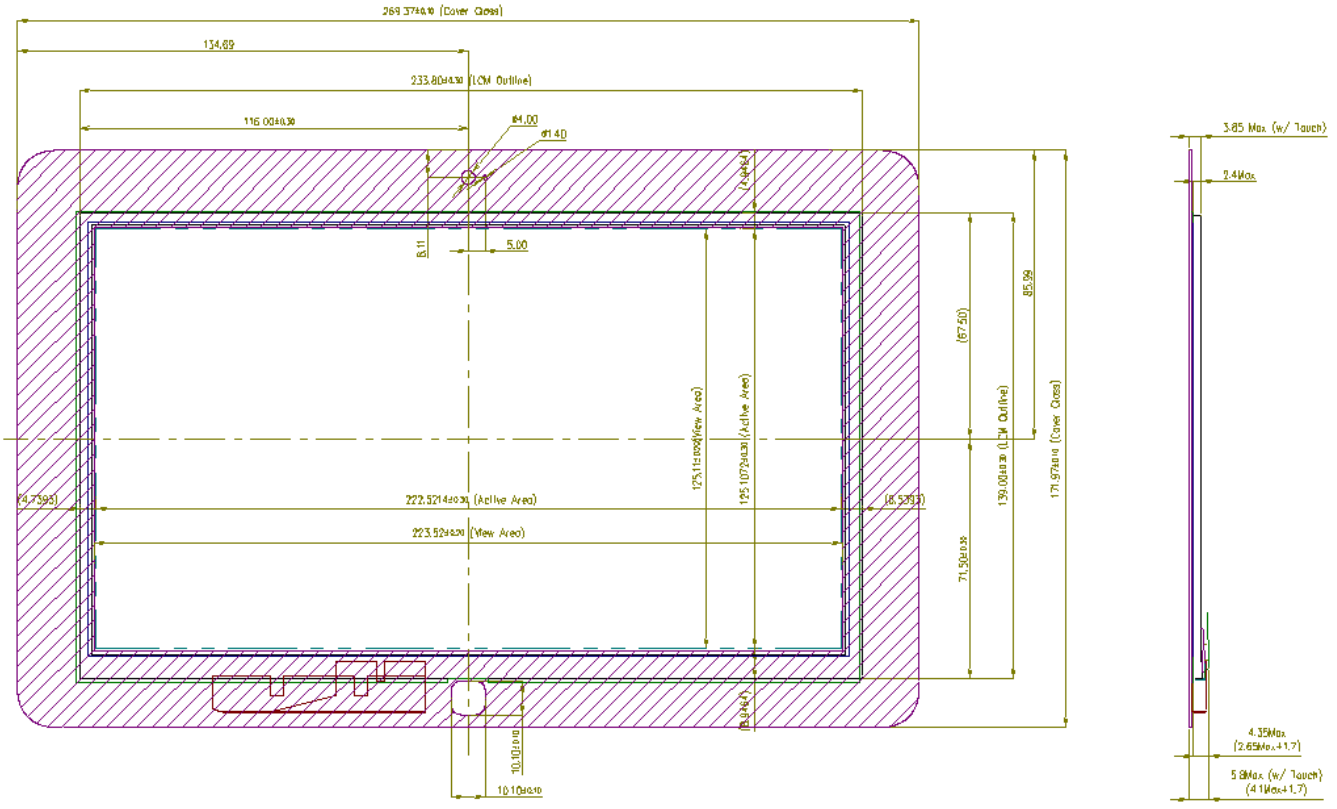
Pattern B
Gray Scale = 31 full screen

5. Mechanical Characteristics

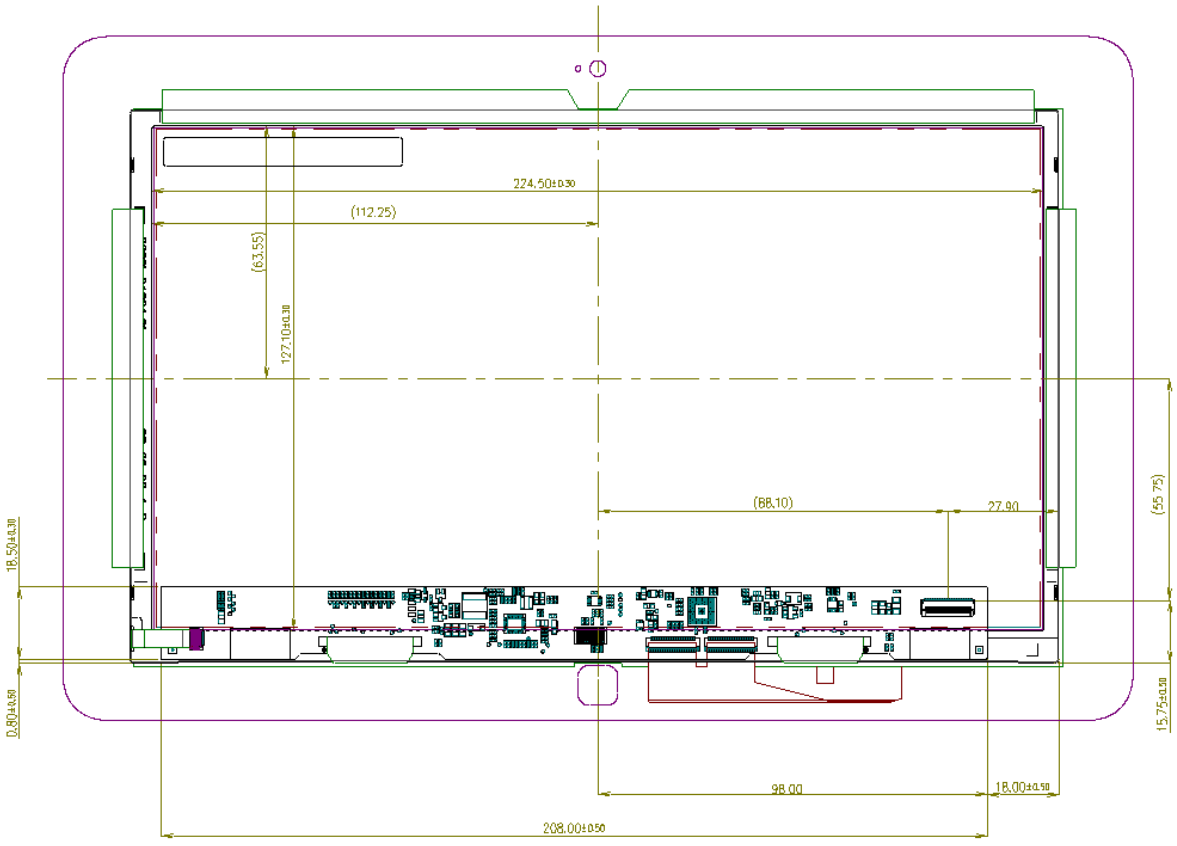
The contents provide general mechanical characteristics for the model LP101WH (TBD). In addition the figures in the next page are detailed mechanical drawing of the LCD.

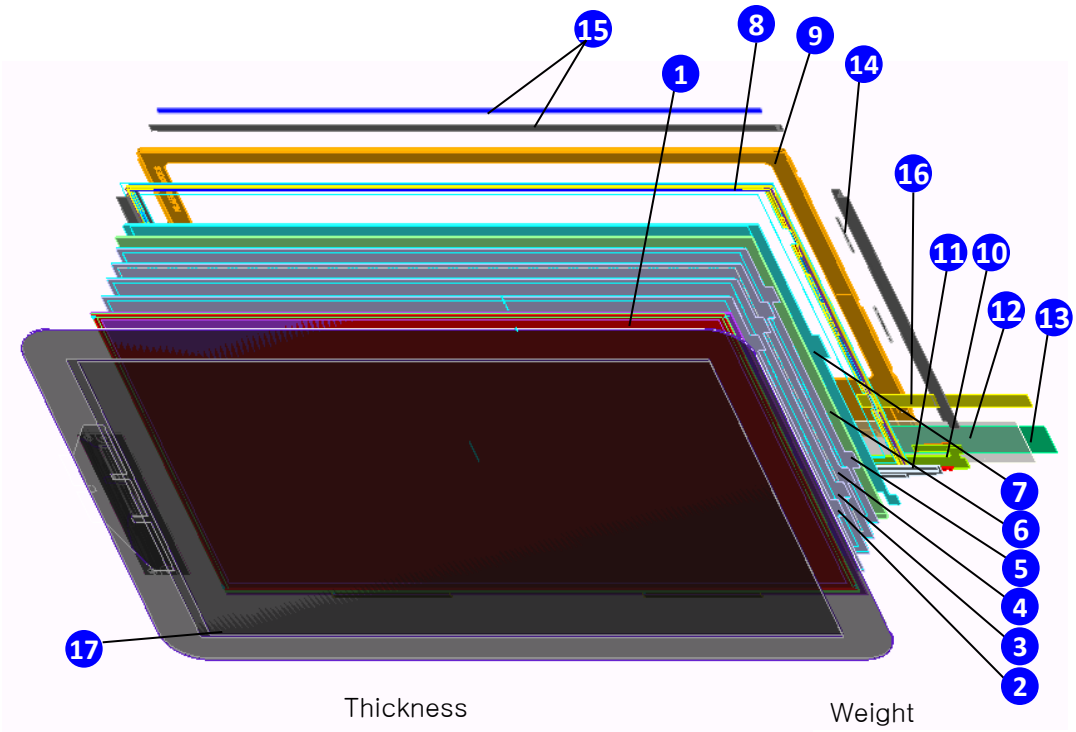
Outline Dimension	Horizontal	233.8 ± 0.3mm (without bracket length)
	Vertical	139.0 ± 0.3mm (without bracket length)
	Thickness	2.40mm (max.)
Bezel Area	Horizontal	TBD
	Vertical	TBD
Active Display Area	Horizontal	222.5214mm
	Vertical	125.1072mm
Touch Screen Panel	Horizontal	169.37mm
	Vertical	171.97mm
	Thickness	1.45 Max
Weight	115g (Max.) w/o Touch, 230g (Max) w/ Touch	
Surface Treatment	LCD : Glare treatment of the front polarizer, 2H Touch : TBD	
Viewing Angle	Viewing Angle(When Active area can be seen) ≤ 30°	

<FRONT VIEW>


269.37±0.10 (Cover Glass)
134.69
233.80±0.30 (LCM Outline)
116.00±0.30
ø4.00
ø14.0
5.11
5.00
(67.50)
85.99
139.00±0.30 (LCM Outline)
171.97±0.10 (Cover Glass)
125.11±0.05 (View Area)
125.10±0.30 (Active Area)
71.50±0.30
(4.7395)
222.52±0.30 (Active Area)
(8.5393)
223.52±0.30 (View Area)
10.10±0.10
10.10±0.10
3.85 Max. (w/ Touch)
2.4Max.
4.35Max.
(2.65Max.+1.7)
5.8Max. (w/ Touch)
(4.1Max.+1.7)

<REAR VIEW>


224.50±0.30
(112.25)
(63.55)
127.10±0.30
(88.10)
27.90
(55.75)
18.50±0.30
0.80±0.50
15.75±0.50
98.00
18.00±0.50
208.00±0.50



	Component	EA
1	Board Assembly	1
2	Diffuser up sheet	1
3	Prism up sheet	1
4	Prism down sheet	1
5	Diffuser down sheet	1
6	Light Guide Panel	1
7	Reflector sheet	1
8	Supporter Main	1
9	Plate Bottom	1
10	LED Array Assembly	1
11	LED Housing	1
12	Source Cover Shield	1
13	LCM Label	1
14	Sheet fixing pad	3
15	Double side tape	9
16	BL Label	1
17	Touch Screen Panel	1
total		27

Thickness

No	Item	w/o PCBA	with PCBA
1)	POL UPPER	0.135	0.135
2)	Glass	0.5	0.5
3)	POL LOWER	0.163	0.163
4)	Gap	0.1	0.1
5)	DIFFUSER UP	0.08	0.08
6)	PRISM UP	0.155	0.155
7)	PRISM DOWN	0.09	0.09
8)	DIFFUSER DOWN	0.065	0.065
9)	LIGHT GUIDE	0.5	0.7
10)	Reflector	0.15	0.15
11)	Gap	0.012	0.062
12)	Plate Bottom	0.2	0.2
13)	Tape	0.05	0.05
		2.20	2.45
		2.40	2.65
1)	Double Tape		0.05
2)	PCB		0.5
3)	Component		1.05
4)	Insulation		0.1
			1.70
		2.20	4.15
		2.40	4.35
1)	Cover Glass	0.7	0.7
2)	OCA	0.1	0.1
3)	Sensor Film	0.2	0.2
4)	Resin	0.3	0.3
Touch Area Typ.		1.30	1.30
Touch Area Max.		1.45	1.45
Touch Module Typ.		3.50	5.45
Touch Module Max.		3.85	5.80

Weight

	No		
Weight (LCM)		BOARD ASS'Y	56.1
	1)	PANEL	36.5
	2)	POL(2EA)	11.5
	3)	SOURCE PWB	8.0
	4)	SOURCE FPC	0.1
		BACKLIGHT ASS'Y	48.6
	1)	SUPPORT MAIN	2.5
	2)	LIGHT GUIDE	18.2
	3)	REFLECTER	2.8
	4)	DIFFUSE DOWN	2.5
	5)	PRISM DOWN	3.4
	6)	PRISM UP	5.9
	7)	DIFFUSER UP	3.3
	8)	LED ASS'Y	1.2
	9)	Plate Bottom	8.6
	10)	LED HOUSING	0.2
		ETC	1.0
	1)	COVER SHIELD	0.6
	2)	PAD	0.3
	3)	LABEL	0.1
LCM Typ. Total			105.7
LCM Max. Total			115.0
		Cover Glass	81.4
		sensor film	14.8
		FPC	1
		Resin	11
Touch Typ.			108.20
Touch Max.			115.00
Touch Module Typ.			213.9
Touch Module Max.			230

6. Reliability

Environment test condition

No.	Test Item	Conditions
1	High temperature storage test	Ta= 60°C, 240h
2	Low temperature storage test	Ta= -20°C, 240h
3	High temperature operation test	Ta= 50°C, 50%RH, 240h
4	Low temperature operation test	Ta= 0°C, 240h
5	Vibration test (non-operating)	Sine wave, 10 ~ 500 ~ 10Hz, 1.5G, 0.37oct/min 3 axis, 1hour/axis
6	Shock test (non-operating)	Half sine wave, 180G, 2ms one shock of each six faces(I.e. run 180G 6ms for all six faces)
7	Altitude operating storage / shipment	0 ~ 10,000 feet (3,048m) 24Hr 0 ~ 40,000 feet (12,192m) 24Hr

{ Result Evaluation Criteria }
There should be no change which might affect the practical display function when the display quality test is conducted under normal operating condition.

7. International Standards

7-1. Safety

a) UL 60950-1, Underwriters Laboratories Inc.
Information Technology Equipment - Safety - Part 1 : General Requirements.

b) CAN/CSA C22.2 No.60950-1-07, Canadian Standards Association.
Information Technology Equipment - Safety - Part 1 : General Requirements.

c) EN 60950-1, European Committee for Electrotechnical Standardization (CENELEC).
Information Technology Equipment - Safety - Part 1 : General Requirements.

d) IEC 60950-1, The International Electrotechnical Commission (IEC).
Information Technology Equipment - Safety - Part 1 : General Requirements.

7-2. EMC

a) ANSI C63.4 “Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electrical Equipment in the Range of 9kHZ to 40GHz. “American National Standards Institute(ANSI), 1992

b) C.I.S.P.R “Limits and Methods of Measurement of Radio Interface Characteristics of Information Technology Equipment.“ International Special Committee on Radio Interference.

c) EN 55022 “Limits and Methods of Measurement of Radio Interface Characteristics of Information Technology Equipment.“ European Committee for Electrotechnical Standardization.(CENELEC), 1998
(Including A1: 2000)

8. Packing

8-1. Designation of Lot Mark

a) Lot Mark

A	B	C	D	E	F	G	H	I	J	K	L	M

A,B,C : SIZE(INCH)
E : MONTH
D : YEAR
F ~ M : SERIAL NO.

Note

1. YEAR

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Mark	A	B	C	D	E	F	G	H	J	K

2. MONTH

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mark	1	2	3	4	5	6	7	8	9	A	B	C

b) Location of Lot Mark

Serial No. is printed on the label. The label is attached to the backside of the LCD module.
This is subject to change without prior notice.

8-2. Packing Form

a) Package quantity in one box : TDB pcs

b) Box Size : TDB

9. PRECAUTIONS

Please pay attention to the followings when you use this TFT LCD module.

9-1. MOUNTING PRECAUTIONS

(1) You must mount a module using holes arranged in four corners or four sides.
(2) You should consider the mounting structure so that uneven force (ex. Twisted stress) is not applied to the module. And the case on which a module is mounted should have sufficient strength so that external force is not transmitted directly to the module.
(3) Please attach the surface transparent protective plate to the surface in order to protect the polarizer. Transparent protective plate should have sufficient strength in order to the resist external force.
(4) You should adopt radiation structure to satisfy the temperature specification.
(5) Acetic acid type and chlorine type materials for the cover case are not desirable because the former generates corrosive gas of attacking the polarizer at high temperature and the latter causes circuit break by electro-chemical reaction.
(6) Do not touch, push or rub the exposed polarizers with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment.
Do not touch the surface of polarizer for bare hand or greasy cloth.(Some cosmetics are detrimental to the polarizer.)
(7) When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with petroleum benzene. Normal-hexane is recommended for cleaning the adhesives used to attach front / rear polarizers. Do not use acetone, toluene and alcohol because they cause chemical damage to the polarizer.
(8) Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading.
(9) Do not open the case because inside circuits do not have sufficient strength.

9-2. OPERATING PRECAUTIONS

(1) The spike noise causes the mis-operation of circuits. It should be lower than following voltage :
V=± 200mV(Over and under shoot voltage)

(2) Response time depends on the temperature.(In lower temperature, it becomes longer.)
(3) Brightness depends on the temperature. (In lower temperature, it becomes lower.)
And in lower temperature, response time(required time that brightness is stable after turned on) becomes longer.
(4) Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.
(5) When fixed patterns are displayed for a long time, remnant image is likely to occur.
(6) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimized the interference.

9-3. ELECTROSTATIC DISCHARGE CONTROL

Since a module is composed of electronic circuits, it is not strong to electrostatic discharge. Make certain that treatment persons are connected to ground through wrist band etc. And don't touch interface pin directly.

9-4. PRECAUTIONS FOR STRONG LIGHT EXPOSURE

Strong light exposure causes degradation of polarizer and color filter.

9-5. STORAGE

When storing modules as spares for a long time, the following precautions are necessary.

(1) Store them in a dark place. Do not expose the module to sunlight or fluorescent light. Keep the temperature between 5°C and 35°C at normal humidity.
(2) The polarizer surface should not come in contact with any other object.
It is recommended that they be stored in the container in which they were shipped.

9-6. HANDLING PRECAUTIONS FOR PROTECTION FILM

(1) When the protection film is peeled off, static electricity is generated between the film and polarizer. This should be peeled off slowly and carefully by people who are electrically grounded and with well ion-blown equipment or in such a condition, etc.
(2) The protection film is attached to the polarizer with a small amount of glue. If some stress is applied to rub the protection film against the polarizer during the time you peel off the film, the glue is apt to remain on the polarizer.
Please carefully peel off the protection film without rubbing it against the polarizer.
(3) When the module with protection film attached is stored for a long time, sometimes there remains a very small amount of glue still on the polarizer after the protection film is peeled off.
(4) You can remove the glue easily. When the glue remains on the polarizer surface or its vestige is recognized, please wipe them off with absorbent cotton waste or other soft material like chamois soaked with normal-hexane.