SAMSUNG DISPLAY

LEAD-FREE

Product Specification

(√) Preliminary Specification
( ) Approval Specification

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

		MODEL NO.	LSL080AL02
DATE OF ISSUE	2013.07.05	EXTENSION CODE	-S01

Customer Approval & Feedback

Approved by	Matt Lee 13/07/05
Prepared by	Stan Kim 13/07/05
LCD Sales & Marketing Team Samsung Display Co., Ltd	

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REVISION HISTORY

Date.	Rev.No.	Page	Revision Description
13-07-05	A00	All	Initial Release

1. GENERAL DESCRIPTION

DESCRIPTION

LSL080AL02 is a color active matrix TFT (Thin Film Transistor) liquid crystal display (LCD) that uses amorphous silicon TFT as switching devices. This model is composed of a TFT LCD panel, a driver circuit and a backlight unit. The resolution of a 8.0" contains 800 x 1280 and can display up to 16.7M colors. 6 O'clock direction is the optimum viewing angle.

FEATURES

High contrast ratio, Ultra wide viewing angle
WX (800 x 1280) resolution
Low power consumption

APPLICATIONS

Tablet PC
If the intent to use this product is for other purpose, please contact Samsung Display.

GENERAL INFORMATION

Parameter	Specification	Unit	Remarks
Active area	107.64(H) X 172.224(V) (8.0"diagonal) 4.24(H) X 6.78(V)	mm inch	
Display resolution (pixel)	800 * 1280	Pixel	10:16
Pixel pitch	0.04485 (H) x 0.13455 (V) (TYP.)	mm	
Pixel arrangement	RGB vertical stripe	-	
Display colors	16,777,216	Colors	6Bit+ FRC
Display mode	Normally Black, PLS mode	-	
Surface Treatment	HC	-	Glare

MECHANICAL INFORMATION

Item		Min.	Typ.	Max.	Unit	Note
Panel size	Horizontal (H)	-	112.64	-	mm	(1),(2)
	Vertical (V)	-	181.824	-	mm	(1),(2)
	Depth (D)	-	1.254	-	mm	(1),(2)
Weight			-	61	g	(2)

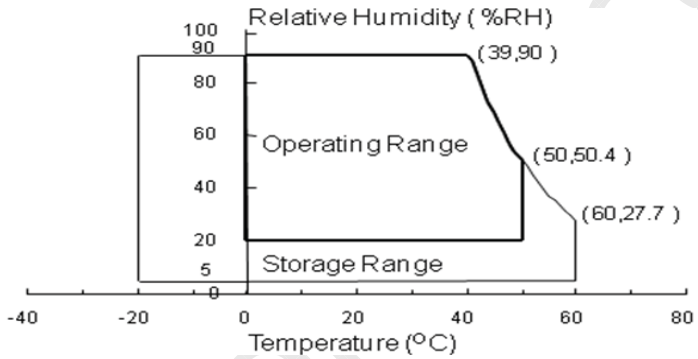
NOTE (1) Thickness Measuring Method
. Equipment : height gauge (150gf)

2. ABSOLUTE MAXIMUM RATINGS

2.1 ENVIRONMENTAL ABSOLTE RATINGS

Item	Symbol	Min.	Max.	Unit	Note
Storage temperate	TSTG	-20	60	°C	(1)
Operating temperature (Temperature of glass surface)	TOPR	-20	50	°C	(1)

Note (1) The range of temperature and relative humidity is shown in the graph below 90% RH Max. . (39℃ ≥ Ta) If the temperature is higher than 40 ℃, the maximum temperature of wet–bulb shall be less than 39℃. No condensation



2.2 ELECTRICAL ABSOLUTE RATINGS

(1) TFT LCD MODULE

VDD =3.7V, VSS = GND = 0V

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	VDD	3.0	3.6	V	(1)
Logic Input Voltage	VIN	V_{SS} - 0.3	V_{DD} + 0.3		(1)
MIPI Differential Input Voltage	I VIDM I	70mV	500mV		(1)

Note (1) Within Ta (25 ± 2 °C)
(2) Permanent damage to the device may occur if exceed maximum values.
(3) Functional operation should be restricted to the conditions described under normal operating conditions.

2.3 THE OTHERS

(1) STATIC ELECTRICITY PRESSURE RESISTANCE

Item	Test Conditions	Remark
CONTACT DISCHARGE	150pF, 330Ω, ± 8kV, 100points, 1 time/point	Operating
AIR DISCHARGE	150pF, 330Ω, ± 15kV, 100points, 1 time/point	Operating

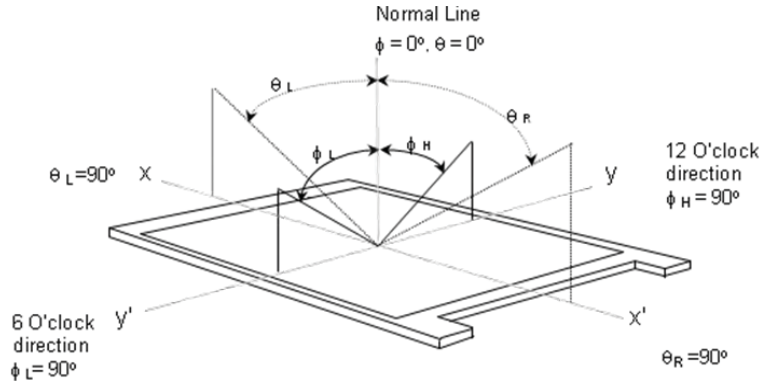
3. OPTICAL CHARACTERISTICS

The following items are measured under the stable conditions.* The optical characteristics should be measured in the dark room or the equivalent environment by the methods shown in the Note (2)- ⑤.
Measuring equipment: CA-210

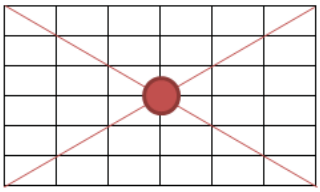
* Ta = 25 ± 2 °C, V_{DD}=3.7V, fv= 60Hz,fDCLK = 77.32Mhz, IF = 100% duty@20.57mA

Item		Symbol	Condition	Min.	Typ.	Max	Unit	Note
Contrast Ratio (Center)		CR	Normal Viewing Angle $\phi = 0$ $\theta = 0$	600	800	-	-	(2)- ①
Response Time at Ta (Rising + Falling)		T_{RT}		-	16	30	msec	(3),(5)
Transmittance		-		4.4	4.85	-	%	(2)- ⑤
Color Chromaticity (CIE)	Red	R_X		-0.03	0.614	+0.03	-	
		R_Y			0.354			
	Green	G_X			0.324			
		G_Y			0.580			
	Blue	B_X			0.145			
		B_Y			0.115			
	White	W_X			0.303			
		W_Y			0.320			
Viewing Angle	Hor.	θ_L	CR ≥ 10 At center	-	85	-	Degrees	(1), (5) SR-3
		θ_H		-	85	-		
	Ver.	ϕ_H		-	85	-		
		ϕ_L		-	85	-		
Color Gamut		CG	-	50	55	60	%	NTSC
Uniformity 9 Points		δ_W	-	80			%	(2)- ③

Note (1) The definition of viewing angle: The range of viewing angle (10 ≤ C/R)



Note (2) Measurement point : Panel center 1 point (CA-210)
BLU for measurement : Center Rank BLU



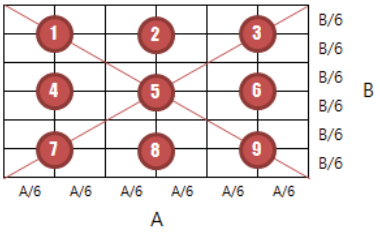
① C/R : Contrast ratio

$$CR = \frac{\text{Full White Luminance of Panel center}}{\text{Full Black Luminance of Panel center}}$$

② The definition of average luminance of white (YL,AVG) :
Measure the luminance of white at center.

③ 9 point white variation(δ w)
:

$$\delta w = \frac{\text{Minimum luminance of 9 points}}{\text{Maximum luminance of 9 points}}$$



④ Gamma Measurement

Equipment : CA-210
Condition : NOTE(2)-⑤

⑤ Color Chromaticity, color temperature, △uv

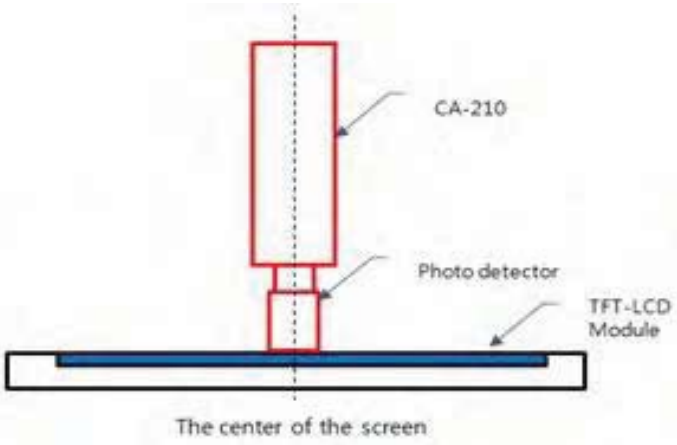
BLU for measurement : Standard BLU

Equipment : CA-210

Measurement point : center (10 sec after operating)

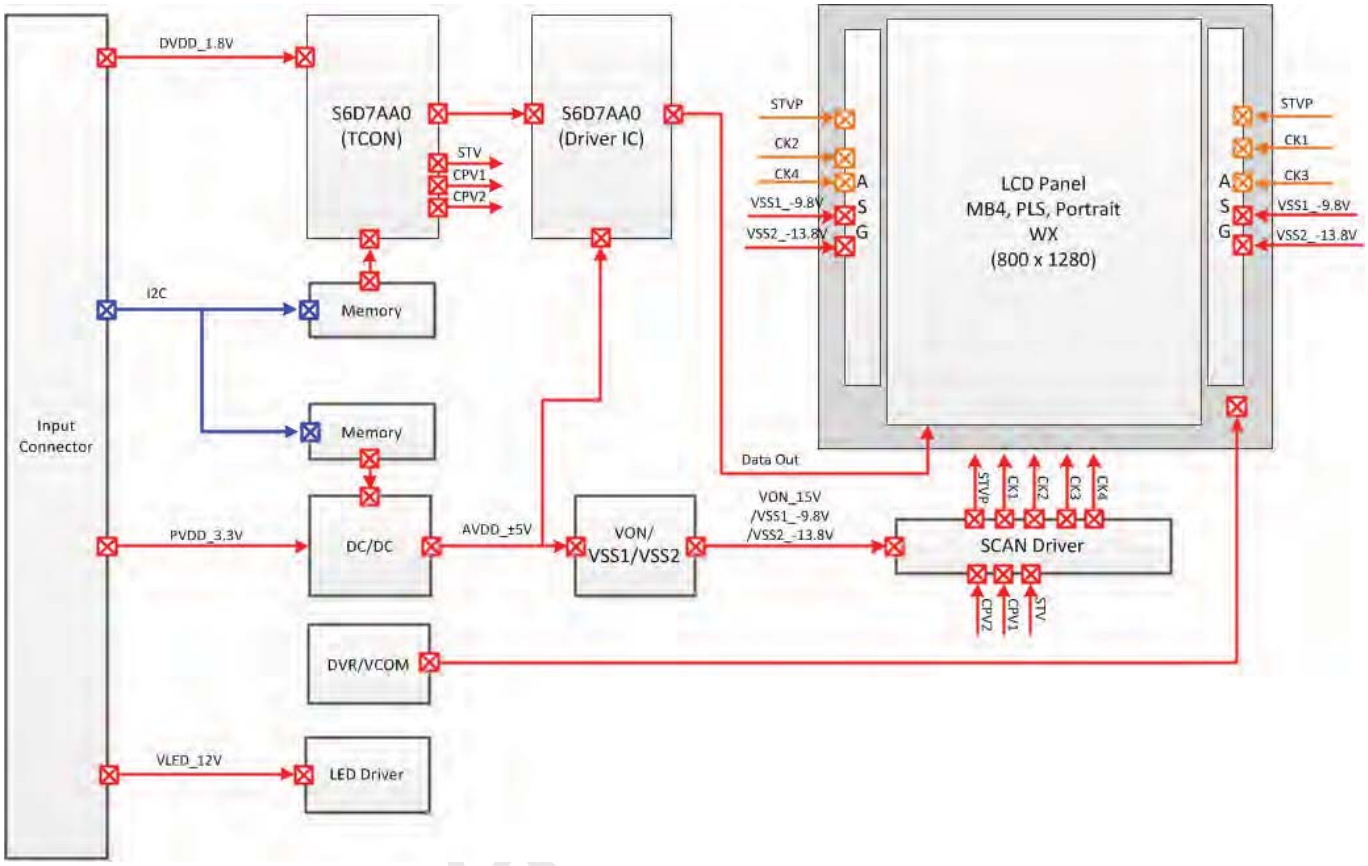
Condition : ambient temp., 25℃±2℃,

the dark room, windless (removed the direct wind), and no vibration



4. BLOCK DIAGRAM

4.1 TFT LCD MODULE



5. ELECTRICAL CHARACTERISTICS

5.1 TFT LCD MODULE

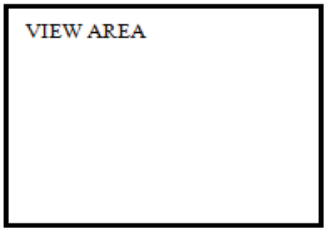
* Ta = 25 ± 2 °C

Item		Symbol	Min.	Typ.	Max.	Unit	Note
Voltage of Power Supply		VCI	3.0	3.3	3.7	V	
		VDD	1.65	1.8	3.3	V	
Differential Input Voltage for MIPI Receiver Threshold	High	VIH	-	-	+100	mV	VCM = +1.2V
	Low	VIL	-100	-	-	mV	
Vsync Frequency	60 Hz	fv	-	60	-	Hz	-
Main Frequency	60 Hz	fDCLK		69.53		MHz	-
Rush Current		IRUSH	-	-	-	1.5	(4)
Current of Power Supply	White	IDD	55	75	107	mA	(3)
Power Consumption (@ white)	-	PCC	-	-	0.35	W	

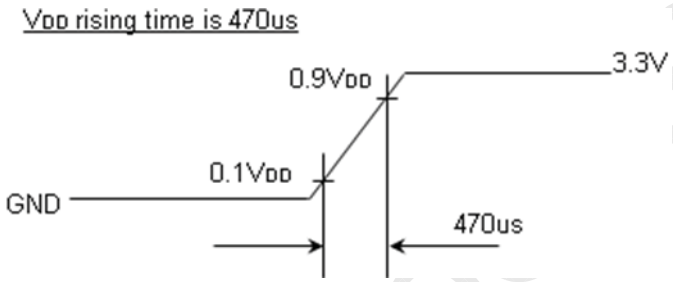
Note (1) The data pins for display and signal pins for timing should be connected.(GND= 0V)
(2) fV = 60Hz, fDCLK = 77.32 MHZ, VDD = 3.3V , DC Current.

Note (3) The dissipation pattern for power

*a) White Pattern



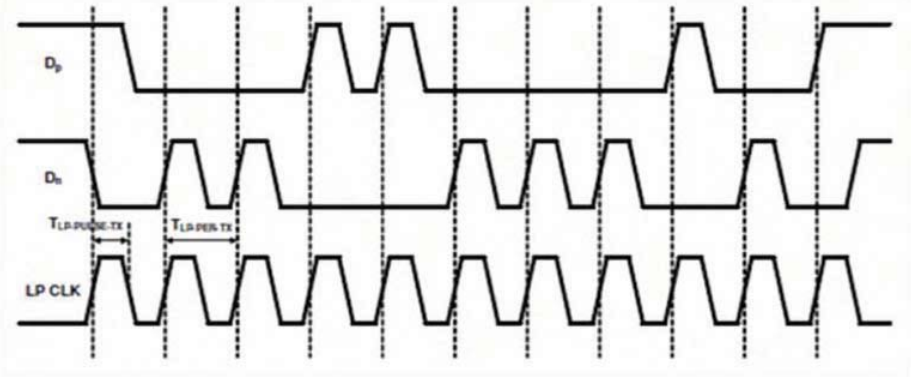
Note (4) The condition for measurement for rush current



5.4 MIPI Interface

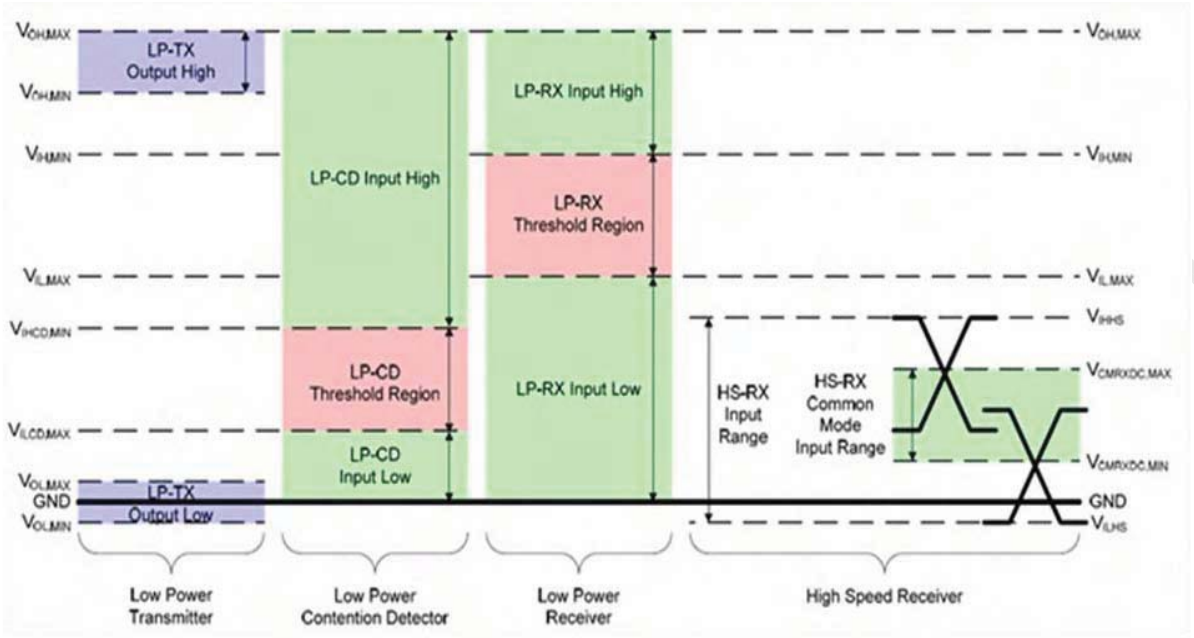
MIPI DC Specifications					
Characteristics	**Symbol**	**Min**	**Typ**	**Max**	**Unit**
Single-end input high voltage (HS Rx mode)	V_{IHHS}	-	-	460	mV
Single-end input low voltage (HS Rx mode)	V_{ILHS}	-40	-	-	mV
Low power input voltage Logic1 (LP Rx mode)	V_{IHLP}	880	-	-	mV
Low power input voltage Logic2 (LP Rx mode)	V_{ILLP}	-	-	550	mV
Differential input high threshold voltage	V_{IDTH}	-	-	70	mV
Output high level (LP Tx mode)	V_{OH}	1.08	1.2	1.32	V
Output low level (LP Tx mode)	V_{OL}	-50	-	50	mV
Differential input low threshold voltage	V_{IDTL}	-70	-	-	mV
Differential input voltage	$\|V_{IDM}\|$	70	-	500	mV
Common mode voltage	V_{CMRX}	70	-	330	mV

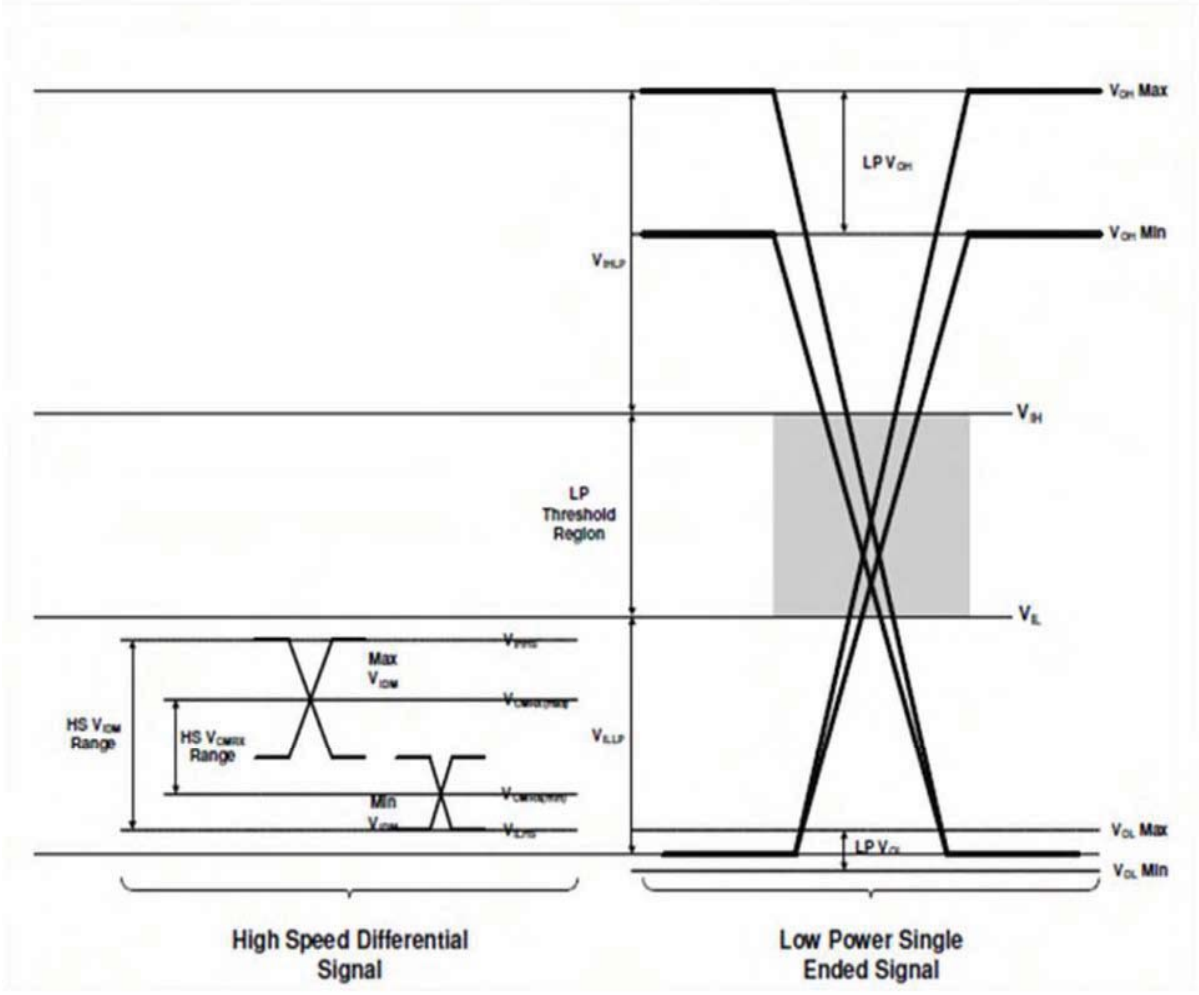
MIPI AC Specifications						
Characteristics		**Symbol**	**Min**	**Typ**	**Max**	**Unit**
Minimum pulse width response		T_{MIN-RX}	50	-	-	ns
Data to clock setup time (SETUP)		T_{SETUP}	0.15	-	-	UI
Data to clock setup time (HOLD)		T_{HOLD}	0.15	-	-	UI
Pulse width of the LP exclusive-OR clock		$T_{LP-PULSE-TX}$	50	55	58	ns
Period of the LP exclusive-OR clock		$T_{LP-PER-TX}$	90	-	-	ns
Rise time and fall time	LP	T_{RLP}/T_{FLP}	-	-	25	ns
	EOT	T_{REOT}	-	-	35	Ns



< Definition of Exclusive-OR Clock in LP Mode>

MIPI Interface





< Definition of MIPI Signal Level>

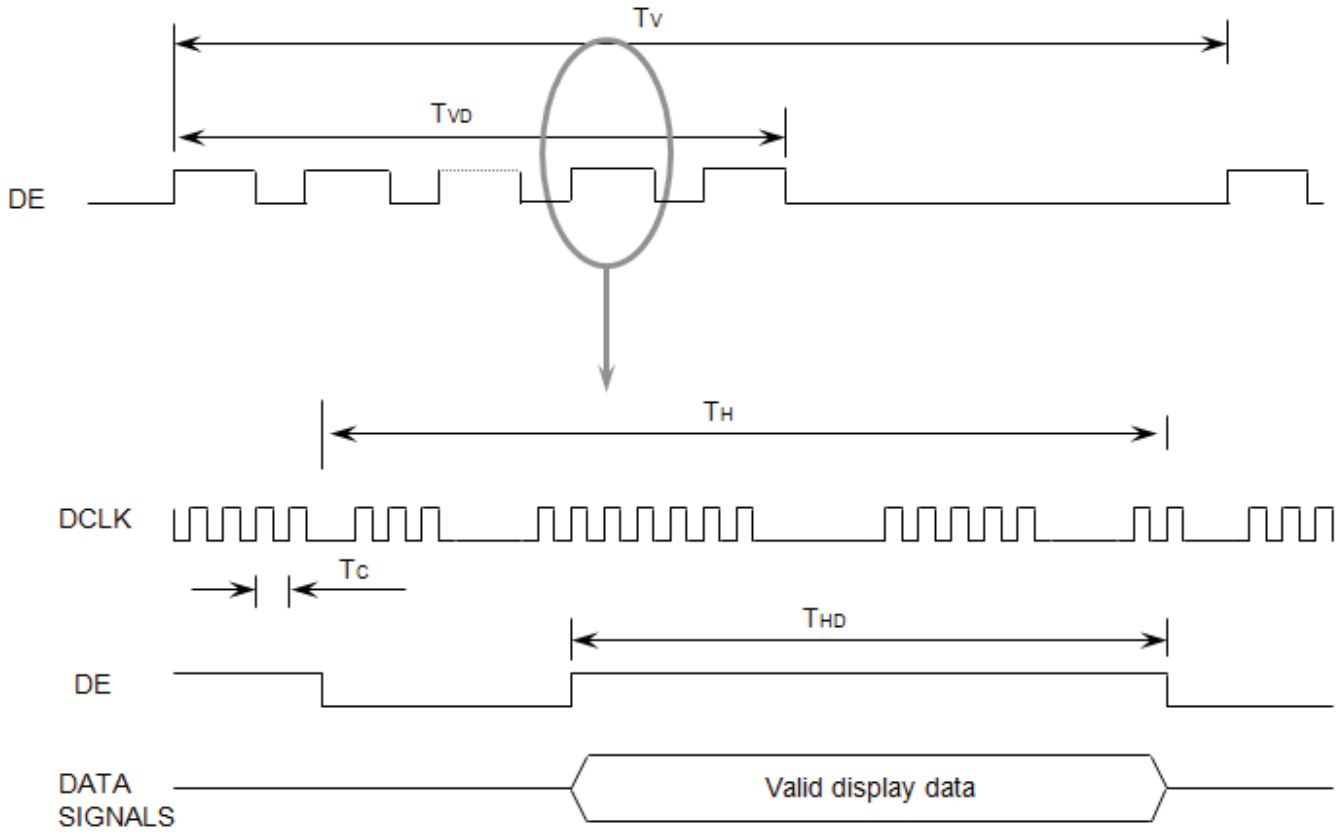
5.5 INTERFACE TIMING

5.5.1 TIMING PARAMETERS

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
Frame Frequency	Cycle	fv	-	60	-	Hz	
		TV	-	1299	-	Lines	
Vertical Active Display Term	Display Period	TVD	-	1280	-	Lines	
One Line Scanning Time	Cycle	TH	-	992	-	Clocks	
Horizontal Active Display Term	Display Period	THD	-	800	-	Clocks	

Note (1) The value of TV x TH x fv should not over Max value of Main CLK freq. (fv=60Hz)
Note (2) CLK Freq. cannot be changed due to MIPI interface

5.5.2 TIMING DIAGRAMS OF INTERFACE SIGNAL



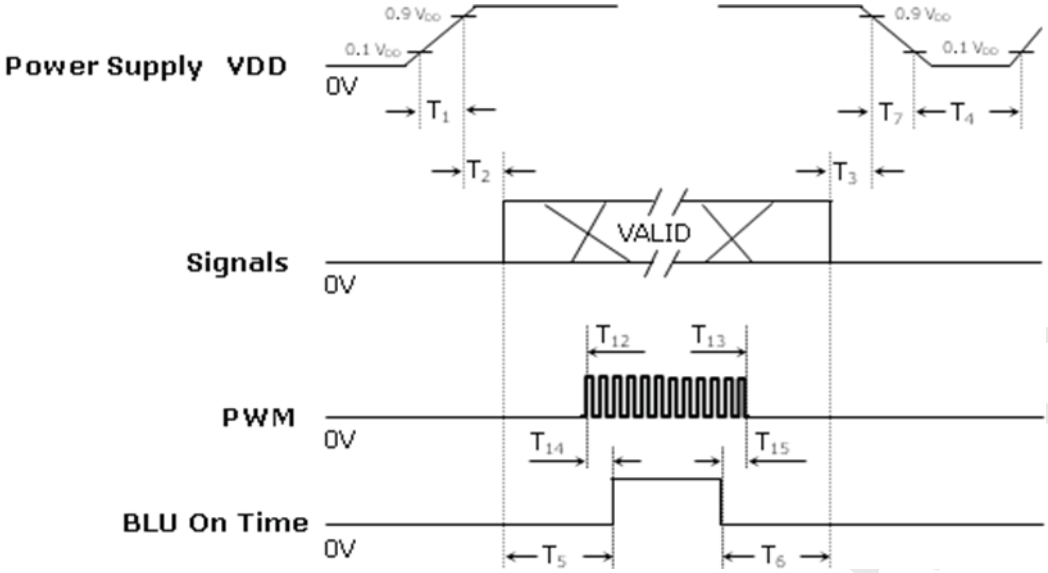
5.6 INPUT COLOR DATA MAPPING

Color	Display	Data Signal																								Gray Scale Level
		Red								Green								Blue								
		R0	R1	R2	R3	R4	R5	R6	R7	G0	G1	G2	G3	G4	G5	G6	G7	B0	B1	B2	B3	B4	B5	B6	B7	
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	-
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	-
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	-
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	-
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
Gray Scale Of Red	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R0
	Dark	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R1
	↑	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R2
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	R3~R252
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	↓	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R253
	Light	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R254
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R255
Gray Scale Of Green	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G0
	Dark	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G1
	↑	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G2
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	G3~G252
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	↓	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	G253
	Light	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	G254
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	G255
Gray Scale Of Blue	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	B0
	Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	B1
	↑	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	B2
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	B3~B252
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	↓	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1	B253
	Light	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	B254
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	B255

Note (1) Definition of gray : Rn: Red gray, Gn: Green gray, Bn: Blue gray (n=gray level)
Note (2) Input signal: 0 =Low level voltage, 1=High level voltage

5.7 POWER ON/OFF SEQUENCE

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.



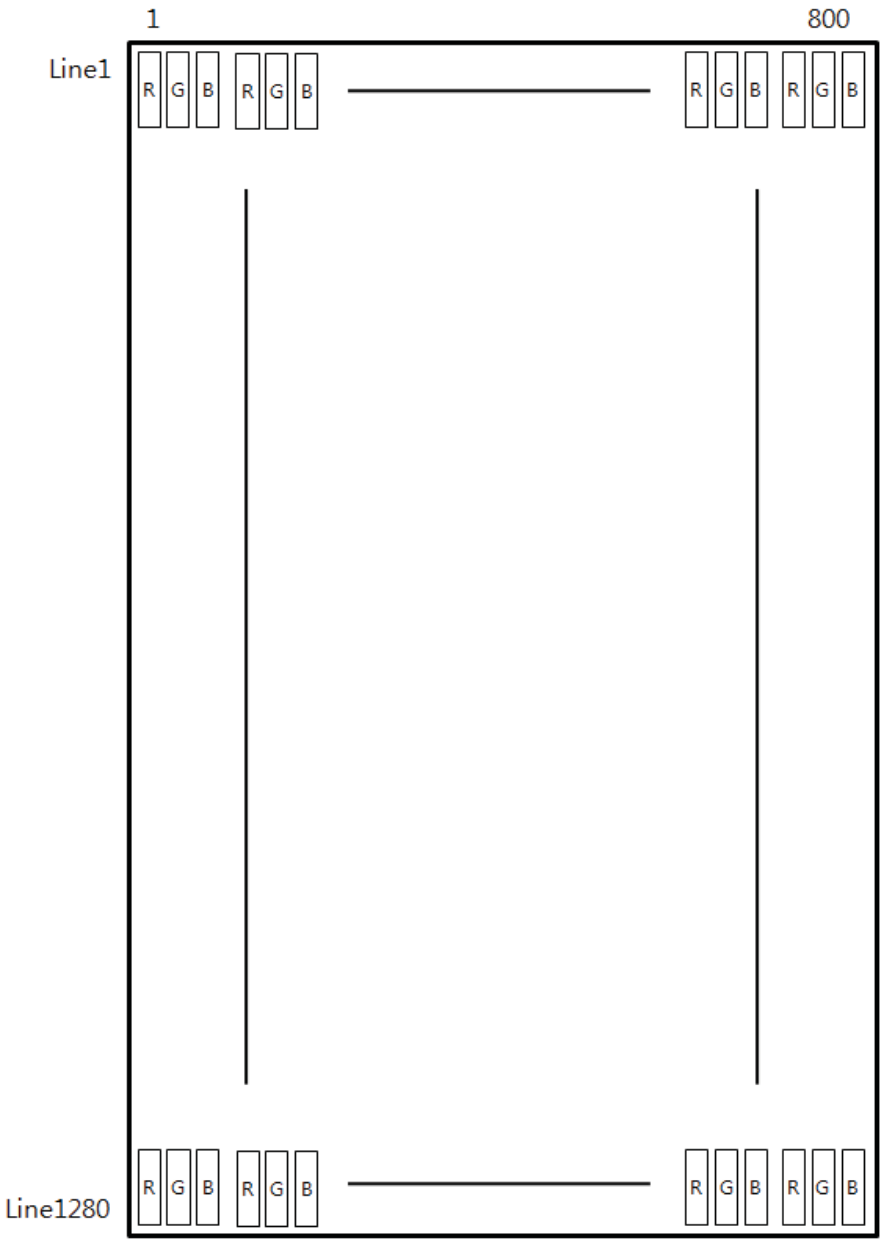
Timing (ms)	Remarks
0.5 < T_1≤10	V_{DD} rising time from 10% to 90%
90 < T_2 ≤250	Delay from V_{DD} to valid data at power ON
0 < T_3 ≤50	Delay from valid data OFF to V_{DD} OFF at power Off
400 ≤T_4	V_{DD} OFF time for Windows restart
200 ≤T_5	Delay from valid data to B/L enable at power ON
200 ≤T_6	Delay from valid data off to B/L disable at power Off
0 < T_7 ≤10	V_{DD} falling time from 90% to 10%
10 < T_8	Delay from valid data on to LED driver Vin rising time 10%
10 < T_9	Delay from LED driver Vin falling time 10% to valid data Off
0.5 < T_{10}≤10	LED V_{in} rising time from 10% to 90%
0.5 < T_{11}≤10	LED V_{in} falling time from 90% to 10%
0 < T_{12}	Delay from LED driver Vin rising time 90% to PWM ON
0 < T_{13}	Delay from PWM Off to LED driver Vin falling time 10%
0 ≤ T_{14}	Delay from PWM ON to B/L Enable ON
0 ≤ T_{15}	Delay from B/L Enable Off to PWM Off

5.8 INPUT TERMINAL PIN ASSIGNMENT

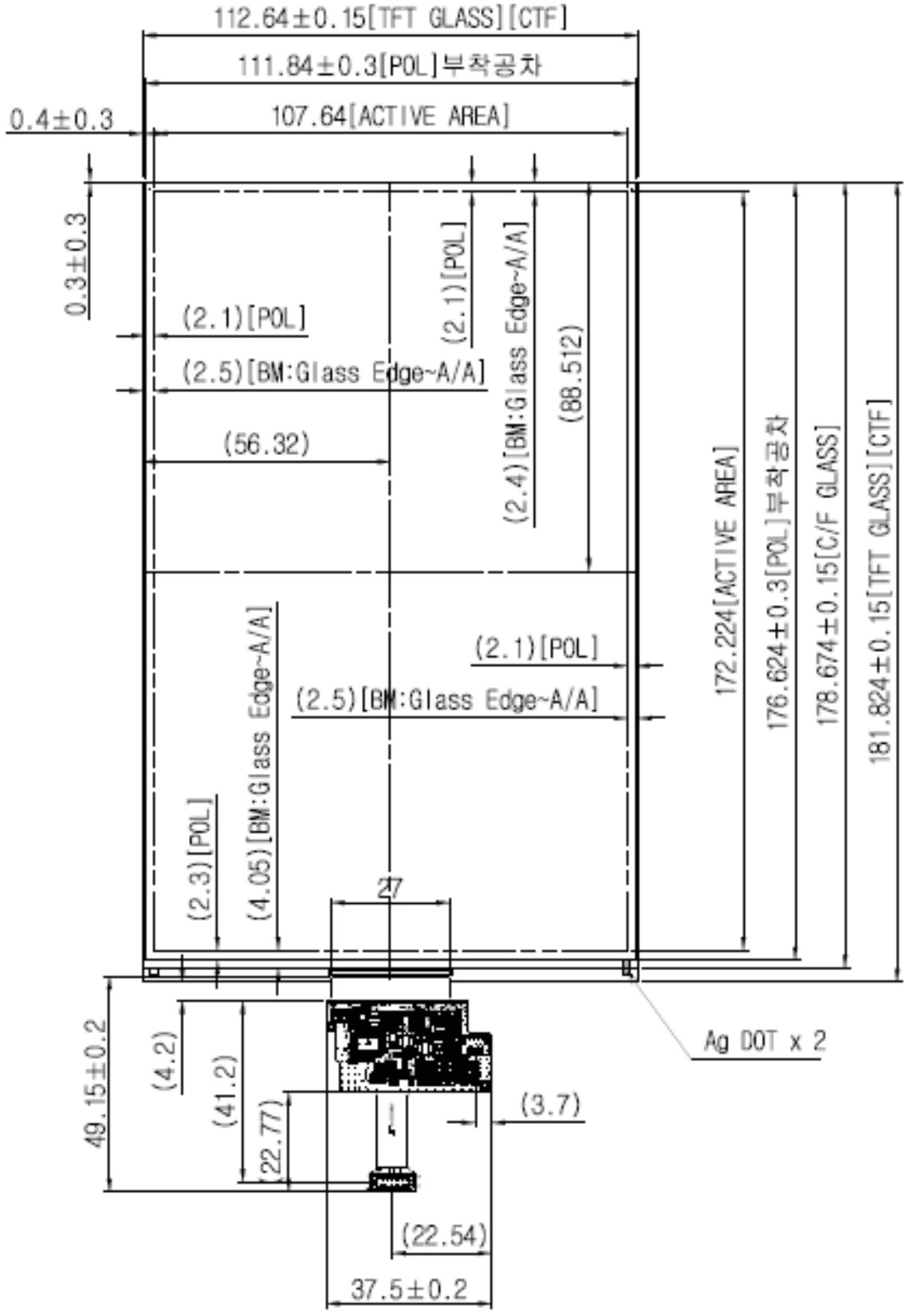
5.8.1 INPUT SIGNAL & POWER (Connector : UJU 34Pin or the equipment with the equivalent capability)

1	VLED	BLU VCC
2	VLED	BLU VCC
3	VLED	BLU VCC
4	BC	Backlight Control
5	NC	No Connect
6	FB1	Feedback1
7	FB2	Feedback2
8	FB3	Feedback3
9	WPN	Write Protection
10	RESET	Reset
11	GND	Ground
12	VPP	7.5V(OTP)
13	MIPI_2P	MIPI Data Positive Signal
14	GND	Ground
15	MIPI_2N	MIPI Data Negative Signal
16	MIPI_1P	MIPI Data Positive Signal
17	GND	Ground
18	MIPI_1N	MIPI Data Negative Signal
19	MIPI_CP	MIPI Clock Channel
20	GND	Ground
21	MIPI_CN	MIPI Clock Channel
22	MIPI_0P	MIPI Data Positive Signal
23	GND	Ground
24	MIPI_0N	MIPI Data Negative Signal
25	SCL	I2C_SCL
26	GND	Ground
27	LOGIC_1.8V	VDD_1.8V
28	MIPI_3P	MIPI Data Positive Signal
29	PVDD_3.3V	Logic power
30	MIPI_3N	MIPI Data Negative Signal
31	PVDD_3.3V	Logic power
32	GND	Ground
33	PVDD_3.3V	Logic power
34	SDA	I2C_SDA

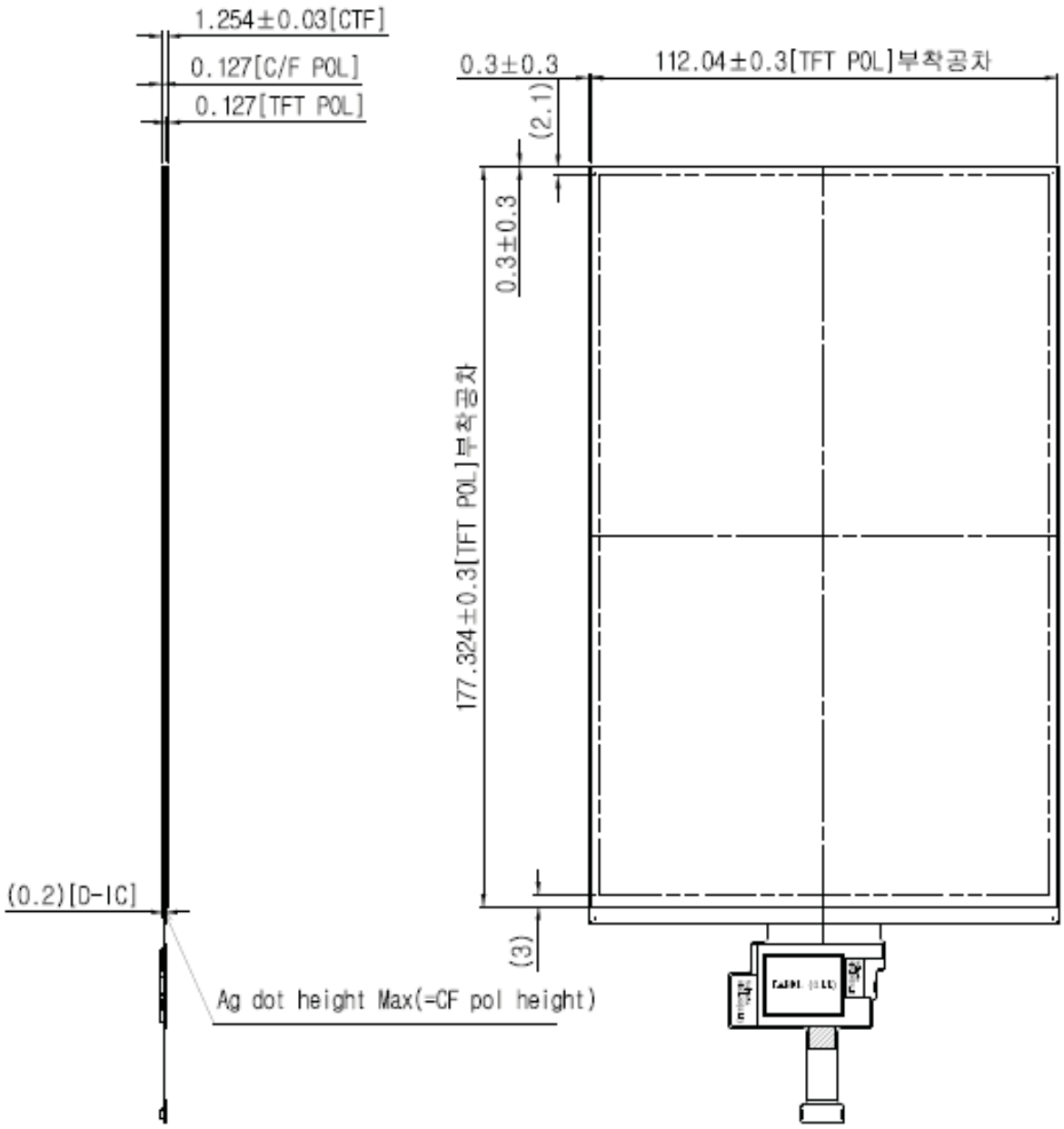
6. PIXEL FORMAT



7. OUTLINE DIMENSION



Preliminary



NOTE
Do not contain any substances which are specified in (OQA-2049)

Preliminary

8. PACKING

8.1 CARTON

TBD

8.2 MARKING

TBD

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 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 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.

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, disconnect the module in the " Power On" condition.

(b) Power supply should always be turned on/off by following item 6.3 " Power on/off sequence ".

(c) 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 minimize the interference.

(d) The FPC cable between the LED chips and its converter power supply shall be a minimized length and be connected directly .The longer cable between the back-light and the converter may cause lower luminance of light source (LED).

(e) The standard limited warranty is only applicable when the module is used for general notebook applications. If used for purposes other than as specified, SEC is not to be held reliable for the defective operations. It is strongly recommended to contact SEC to find out fitness for a particular purpose.

9.4 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, 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's on the rear side and should be handled carefully in order not to be stressed.

* Recommendation
- It is recommended to use high PWM frequency (over 1KHz) to prevent Waterfall.
  High PWM frequency can reduce the interference between LCD panel and PWM frequency.