Product Specification

SPECIFICATION
FOR
APPROVAL

(●) Preliminary Specification
( ) Final Specification

Title	12.3”FHD (1920 X RGB X 720) TFT- LCD

BUYER	
MODEL	

SUPPLIER	LG Display Co.,Ltd.
MODEL	LA123WF1
SUFFIX	SR01

SIGNATURE	DATE
/	
/	
/	

APPROVED BY	DATE
REVIEWED BY	
PREPARED BY	

Product Engineering Dept.
LG Display Co., Ltd

Note : This document is preliminary version. The latest version must be checked from LG Display before detail design.

Product Specification

Record of Revisions

Revision No.	Revision Date	Page	Description	Note
0.1	Sep.22 2015	-	First Draft (Preliminary)	

Product Specification

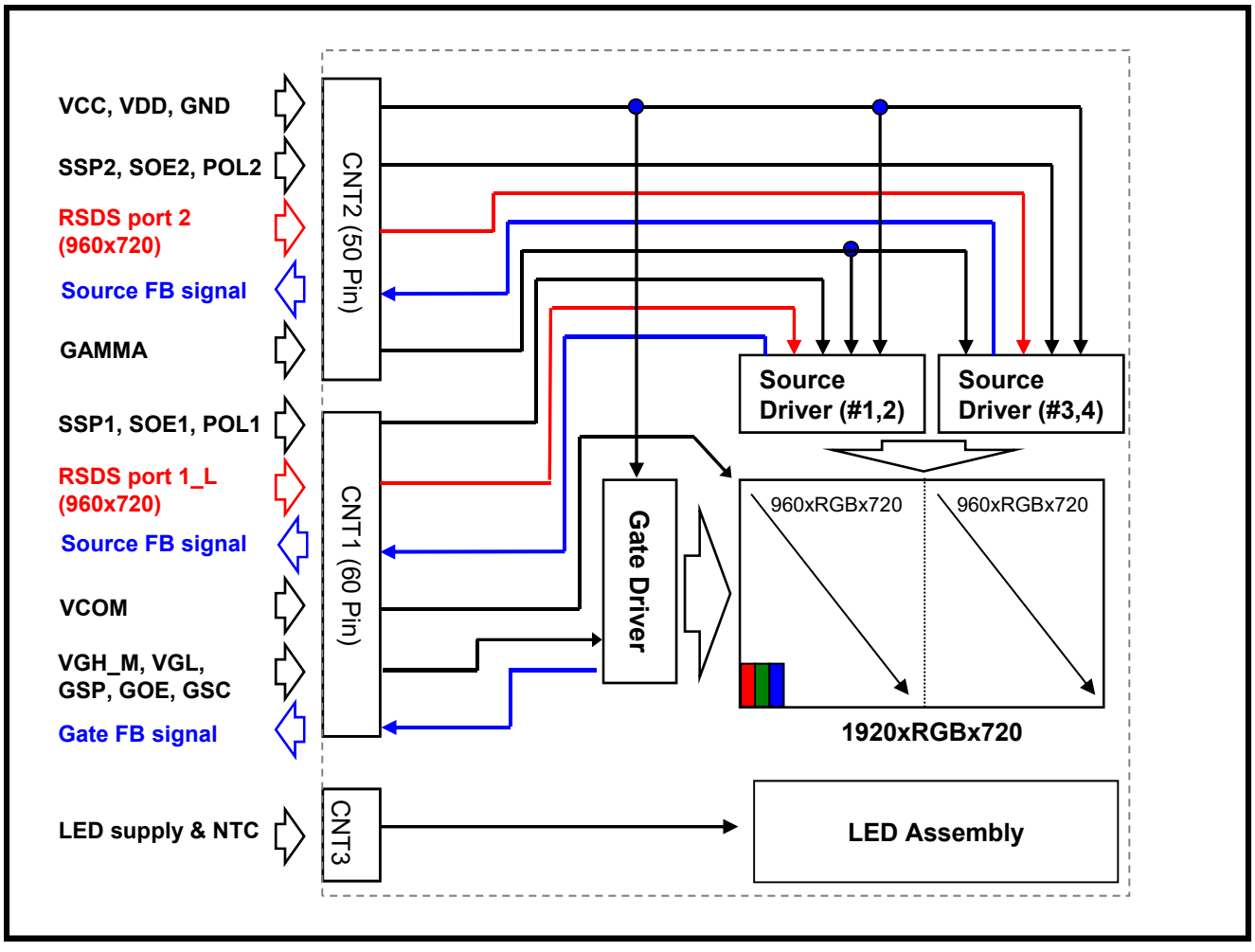
Contents

1. Summary

This module utilizes amorphous silicon thin film transistors and a 8:3 aspect ratio. A 12.3” active matrix liquid crystal display allows 16,777,216 colors to be displayed.
The applications are Cluster/CID (Center Information Display) and others AV system.

2. Features

- Utilizes a panel with a 8:3 aspect ratio, which makes the module suitable for use in wide-screen systems.
- The ” screen produces a high resolution image that is composed of 4,147,200 pixel elements in a stripe arrangement.
- Wide viewing angle technology is employed.
- By adopting an active matrix drive, a picture with high contrast is realized.
- A thin, light and compact module is accomplished through the use of COG mounting technology.
- By adopting a high aperture panel, high transmittance color filter and high transmission polarizing plates, transmittance ratio is realized.
- Gray scale or the brightness of the sub-pixel color is determined with a 8bit gray scale signal.



3. General Specification

Characteristic Item	Specification
Interface	RSDS 2port
Display Mode	Normally Black, Transmitting Type
Screen Size (Diagonal)	12.3”(312.42mm)
Aspect Ratio	8:3
Outline Dimension (W x H x D)	310.0mm (H) X 128.0mm (V) X 8.2mm (T)
Active Area	292.032(H) [mm] X 109.512 (V) [mm]
Display Area	292.032(H) [mm] X 109.512 (V) [mm]
Number of dots	1920(H) X 3(R, G, B) X 720(V)
Color Depth	8 Bit, 16.7M Colors
Pixel Pitch	0.1521mm(H) × 0.1521mm(V)
Color Filter Array	RGB vertical stripes
Weight	388g (Typ.), 405g (Max.)
Backlight	White LED
Surface Treatment	Hard Coating treatment of the front polarizer

4. Pin Configuration

4-1. 60 Pin FPC Pin Configuration

Pin No.	Pin name	Function	Notes
1	VGL	Low level power supply for gate	
2	NC	not connected	
3	VGH	High level power supply for gate	
4	NC	not connected	
5	SCAN1	U/D Scan direction	
6	GSP_FB1	Gate synchronisation signal feedback	
7	GND	Ground	
8	VCC	Power supply for logic	
9	GND	Ground	
10	D23P_L	RSDS input data (Red, left side)	
11	D23N_L	RSDS input data (Red, left side)	
12	D22P_L	RSDS input data (Red, left side)	
13	D22N_L	RSDS input data (Red, left side)	
14	D21P_L	RSDS input data (Red, left side)	
15	D21N_L	RSDS input data (Red, left side)	
16	D20P_L	RSDS input data (Red, left side)	
17	D20N_L	RSDS input data (Red, left side)	
18	GND	Ground	
19	D13P_L	RSDS input data (Green, left side)	
20	D13N_L	RSDS input data (Green, left side)	
21	D12P_L	RSDS input data (Green, left side)	
22	D12N_L	RSDS input data (Green, left side)	
23	D11P_L	RSDS input data (Green, left side)	
24	D11N_L	RSDS input data (Green, left side)	
25	D10P_L	RSDS input data (Green, left side)	
26	D10N_L	RSDS input data (Green, left side)	
27	GND	Ground	
28	D03P_L	RSDS input data (Blue, left side)	
29	D03N_L	RSDS input data (Blue, left side)	
30	D02P_L	RSDS input data (Blue, left side)	
31	D02N_L	RSDS input data (Blue, left side)	
32	D01P_L	RSDS input data (Blue, left side)	
33	D01N_L	RSDS input data (Blue, left side)	
34	D00P_L	RSDS input data (Blue, left side)	
35	D20N_L	RSDS input data (Blue, left side)	
36	GND	Ground	
37	CLKP_L	RSDS input clock (left side)	
38	CLKN_L	RSDS input clock (left side)	
39	GSP_1	Gate start pulse	
40	GSC_1	Gate shipt clock	

4-1. 60 Pin FPC Pin Configuration

Pin No.	Pin name	Function	Notes
41	GOE_1	Gate output enable	
42	SSP_1	Source start pulse	
43	SOE_1	Source on enable	
44	POL_1	Polarity signal	
45	SCAN2	L/R Scan direction	
46	SSP_FB1	Source synchronisation signal feedback	
47	GND	Ground	
48	VCOM	Common electrode power supply	
49	VCOM	Common electrode power supply	
50	VDD	Power supply for source	
51	VDD	Power supply for source	
52	V0	Gamma reference voltage (highest voltage)	
53	V1	Gamma reference voltage	
54	V2	Gamma reference voltage	
55	V3	Gamma reference voltage	
56	V4	Gamma reference voltage	
57	V5	Gamma reference voltage	
58	V6	Gamma reference voltage	
59	V7	Gamma reference voltage	
60	V8	Gamma reference voltage	

[Connector] Kyocera 6288 060

4-2. 50 Pin FPC Pin Configuration

Pin No.	Pin name	Function	Notes
1	V9	Gamma reference voltage	
2	V10	Gamma reference voltage	
3	V11	Gamma reference voltage	
4	V12	Gamma reference voltage	
5	V13	Gamma reference voltage	
6	V14	Gamma reference voltage	
7	V15	Gamma reference voltage	
8	V16	Gamma reference voltage	
9	V17	Gamma reference voltage (lowest voltage)	
10	GND	Ground	
11	SSP_2	Source start pulse	
12	SOE_2	Source on enable	
13	POL_2	Polarity signal	
14	SCAN2	L/R Scan direction	
15	SSP_FB2	Source synchronisation signal feedback	
16	GND	Ground	
17	D23P_R	RSDS input data (Red, left side)	
18	D23N_R	RSDS input data (Red, left side)	
19	D22P_R	RSDS input data (Red, left side)	
20	D22N_R	RSDS input data (Red, left side)	
21	D21P_R	RSDS input data (Red, left side)	
22	D21N_R	RSDS input data (Red, left side)	
23	D20P_R	RSDS input data (Red, left side)	
24	D20N_R	RSDS input data (Red, left side)	
25	GND	Ground	
26	D13P_R	RSDS input data (Green, left side)	
27	D13N_R	RSDS input data (Green, left side)	
28	D12P_R	RSDS input data (Green, left side)	
29	D12N_R	RSDS input data (Green, left side)	
30	D11P_R	RSDS input data (Green, left side)	
31	D11N_R	RSDS input data (Green, left side)	
32	D10P_R	RSDS input data (Green, left side)	
33	D10N_R	RSDS input data (Green, left side)	
34	GND	Ground	
35	D03P_R	RSDS input data (Blue, left side)	
36	D03N_R	RSDS input data (Blue, left side)	
37	D02P_R	RSDS input data (Blue, left side)	
38	D02N_R	RSDS input data (Blue, left side)	
39	D01P_R	RSDS input data (Blue, left side)	
40	D01N_R	RSDS input data (Blue, left side)	

4-2. 50 Pin FPC Pin Configuration

Pin No.	Pin name	Function	Notes
41	**D00P_R**	RSDS input data (Blue, left side)	
42	**D20N_R**	RSDS input data (Blue, left side)	
43	**GND**	Ground	
44	**CLKP_R**	RSDS input clock (left side)	
45	**CLKN_R**	RSDS input clock (left side)	
46	**VCC**	Power supply for logic	
47	**GND**	Ground	
48	**VGL**	Low level power supply for gate	
49	**NC**	not connected	
50	**VGH**	High level power supply for gate	

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4-3. Backlight LED FPC Pin Configuration

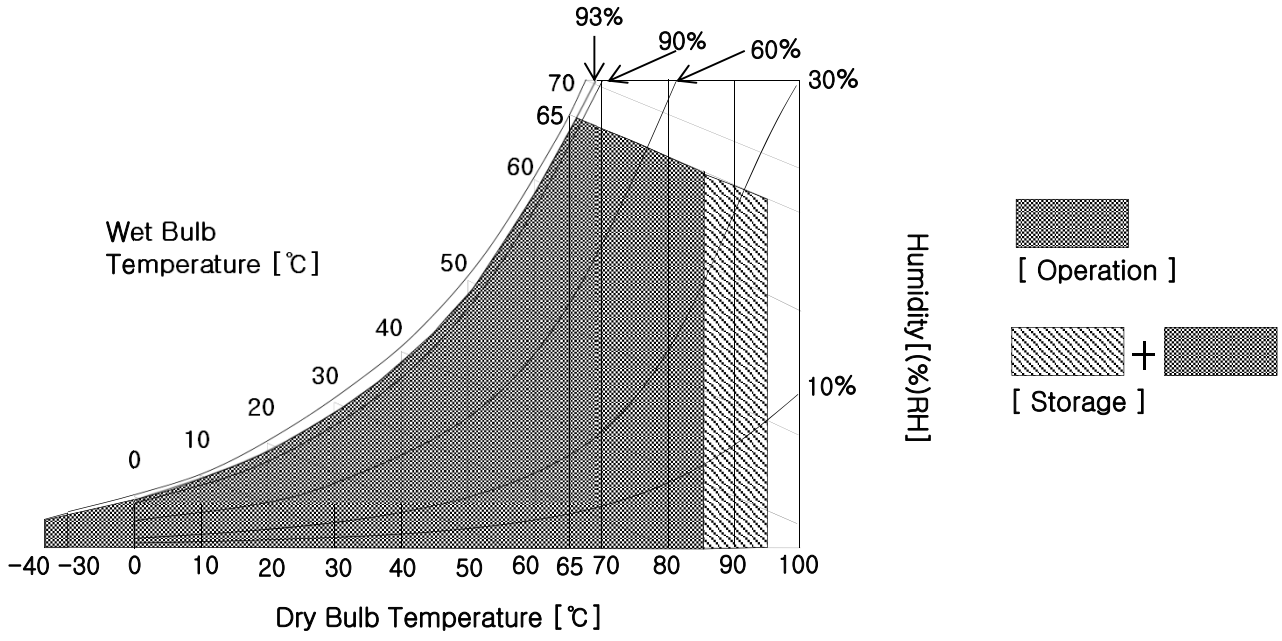
Pin No.	Pin name	Function	Notes
1	NTC_A	Thermal Sensor	
2	NTC_B	Thermal Sensor	
3	VC6	LED Cathode Terminal 6	
4	NC	-	
5	VA6	LED Anode Terminal 6	
6	VA5	LED Anode Terminal 5	
7	NC	-	
8	VC5	LED Cathode Terminal 5	
9	VC4	LED Cathode Terminal 4	
10	NC	-	
11	VA4	LED Anode Terminal 4	
12	VA3	LED Anode Terminal 3	
13	NC	-	
14	VC3	LED Cathode Terminal 3	
15	VC2	LED Cathode Terminal 2	
16	NC	-	
17	VA2	LED Anode Terminal 2	
18	VA1	LED Anode Terminal 1	
19	NC	-	
20	VC1	LED Cathode Terminal 1	

[Connector] Kyocera 6288 020

5. Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit	Notes
Digital Supply Voltage	VCC	-0.5	4	V	
Gamma Reference Voltage	V_{GMA} (GMA 0~17)	GND+0.2	VDD-0.2	V	
Source Driver Analog Voltage	VDD	-0.5	14	V	
Gate Driver Voltage	VGH-VGL	-0.3	39.0	V	
	VGL	-12.0	0.3	V	
Storage Temperature	Ta	-40	95	℃	5-1,2
Operating Temperature	Ta	-40	85	℃	5-1,2,3

[Note 5-1] This rating applies to all parts of the module and should not be exceeded.
[Note 5-2] Maximum wet-bulb temperature is 65℃. Condensation of dew must be avoided as electrical current leaks will occur, causing a degradation of performance specifications.
[Note 5-3] The operating temperature only guarantees operation of the LCM and doesn't guarantee all the contents of Electro-optical specification.



6. Electrical Specification

6-1. Electrical Characteristics (Typical value is only reference)

Ta=25℃

Parameter			Symbol	Min.	Typ.	Max.	Unit	Notes
Source Driver	Digital Supply Voltage		VCC	3.0	3.3	3.6	V	
	Supply Voltage		VDD	12.75	13 (Reference)	13.5	V	
	Gamma Reference Voltage		VGMA (GMA0~17)	GND+0.2	-	VDD-0.2	V	6-1.1
Gate Driver	TFT	Hi	VGH	16	20 (Reference)	22	V	6-1.2
		Low	VGL	-10	-7.5 (Reference)	-5	V	
		Modulation Voltage	VDD_M	12.6	13 (Reference)	16	V	6-1.2
		Voltage Difference	VGH-VGL	17	-	32	V	
	Logic Supply Voltage		VCC	3.0	3.3	3.6	V	
Common Voltage			VCOM	5.0	-	7.0	V	6-1.3
Digital Supply Voltage Current			I_{VCC}	-		100	mA	6-1.4
VCC Inrush current			I_{VCC_Inrush}	-	-	200	mA	6-1.4
Source Driver Analog Voltage Current			I_{VDD}	-		130	mA	6-1.4
VDD Inrush current			I_{VDD_Inrush}	-	-	200	mA	6-1.4
VDD Current ripple			I_{VDD_Ripple}	-	-	600	mA	6-1.4
Gate High Voltage Current			I_{VGH}	-		3	mA	6-1.5
Gate Low Voltage Current			I_{VGL}	-		3	mA	6-1.5
Common Voltage Current			I_{VCOM}	-		1	mA	6-1.5

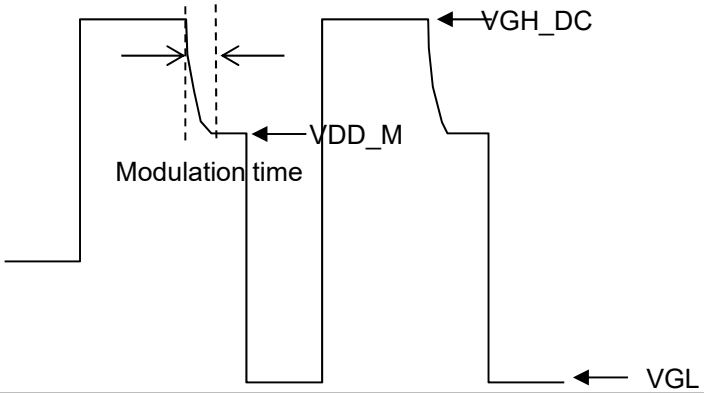
Product Specification

[Note 6-1.1] Recommended Gamma Correction Voltage [Reference Only, GMA0 to GMA17]

Symbol	Min.	Typ.	Max.	Unit
GMA0	12.42	12.47	12.52	V
GMA1	12.35	12.38	12.43	V
GMA2	10.95	11.00	11.05	V
GMA3	10.34	10.39	10.44	V
GMA4	9.67	9.72	9.77	V
GMA5	9.02	9.07	9.12	V
GMA6	8.39	8.44	8.49	V
GMA7	7.25	7.30	7.35	V
GMA8	6.73	6.78	6.83	V
GMA9	6.33	6.38	6.43	V
GMA10	5.77	5.82	5.87	V
GMA11	4.64	4.69	4.74	V
GMA12	3.99	4.04	4.09	V
GMA13	3.38	3.43	3.48	V
GMA14	2.68	2.73	2.78	V
GMA15	2.09	2.14	2.19	V
GMA16	0.73	0.78	0.83	V
GMA17	0.61	0.66	0.71	V

[Note 6-1.2] VGH Modulation Method (Frame Rate 60Hz)

Parameter	Min.	Typ.	Max.	Unit	Notes
VGH_DC	16	20 (Reference)	22	V	
VDD_M	12.6		16	V	
Modulation time	5.3	6.3	7.3	us	Slew rate : 1.1 V/us (Typ.)
VGH_DC Time	12.1	13.1	14.1	us	

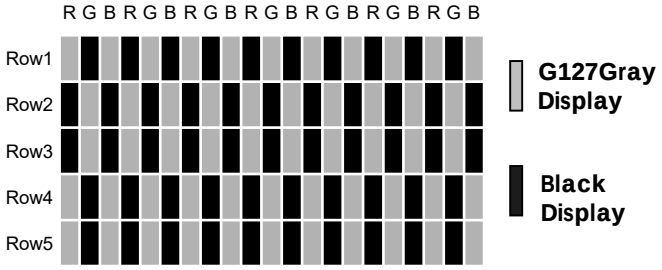


[Note 6-1.3] VCOM adjustment method.

* Pattern : Flicker pattern (Horizontal 1dot Vertical 2dot)

* Method : Adjust the VCOM Voltage to the minimum flicker phenomenon.

(adjustment must be finished within 30 sec)



Horizontal 1 Dot Flicker Pattern

[Note 6-1.4] f_{CLK} = 44.7MHz, VCC = 3.3V, VDD = 12.9V, GMA0 = 12.75V / GMA17 = 0.67V, with Probe Load.

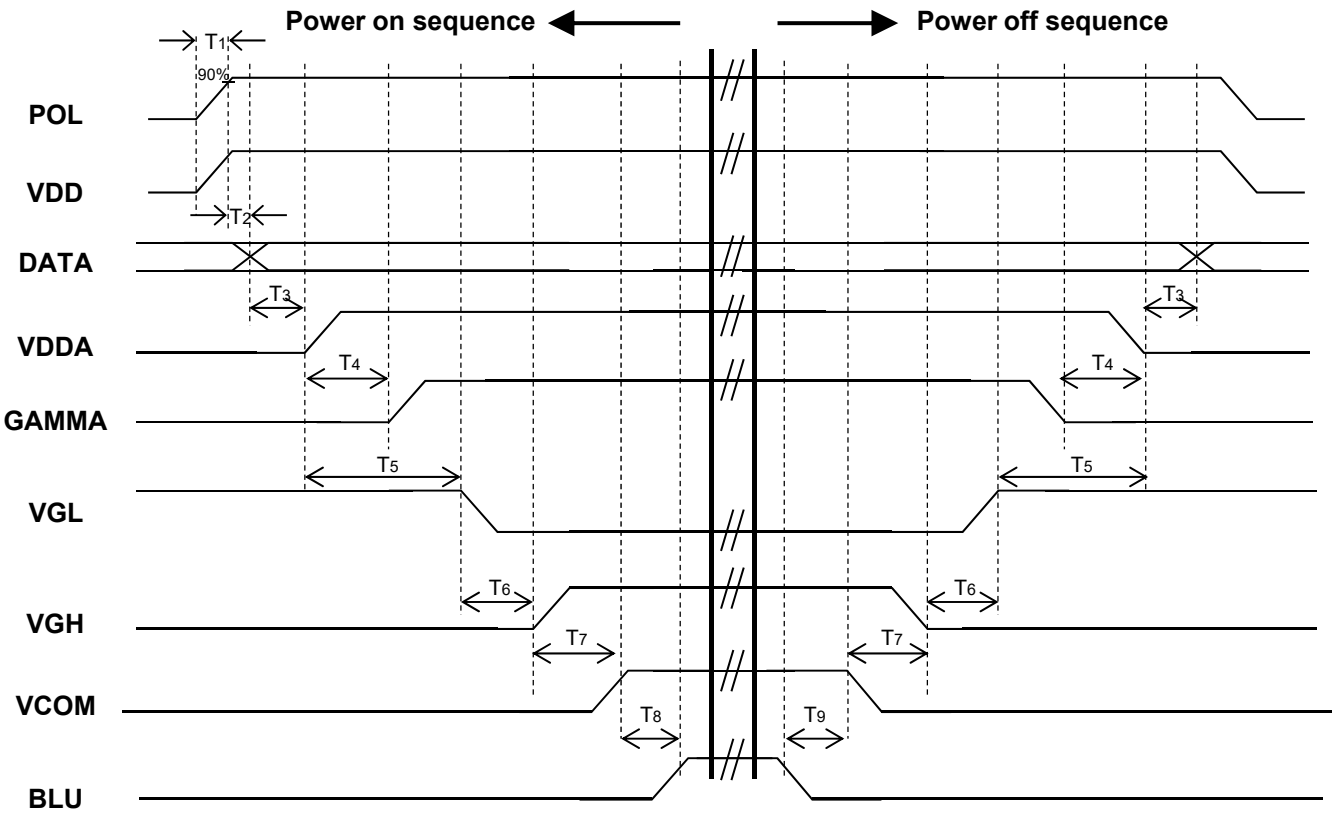
* Test pattern : White (256 Gray)

[Note 6-1.5] f_{CLK} = 44.7MHz, VGH = 21V, VGL = -8V, with Probe Load.

* Test pattern : White (256 Gray)

6-2. Power On/Off Sequence

Parameter		Timing				Notes
		Min.	Typ.	Max.	Unit	
Power On/off	t1	0	-	20	ms	
	t2	20	-	-		
	t3	5	-	-		
	t4	0.2	-	-		
	t5	5	-	-		
	t6	5	-	-		
	t7	5	-	-		
	T8	200				
	T9	500				



6-3. LED Backlight Characteristics

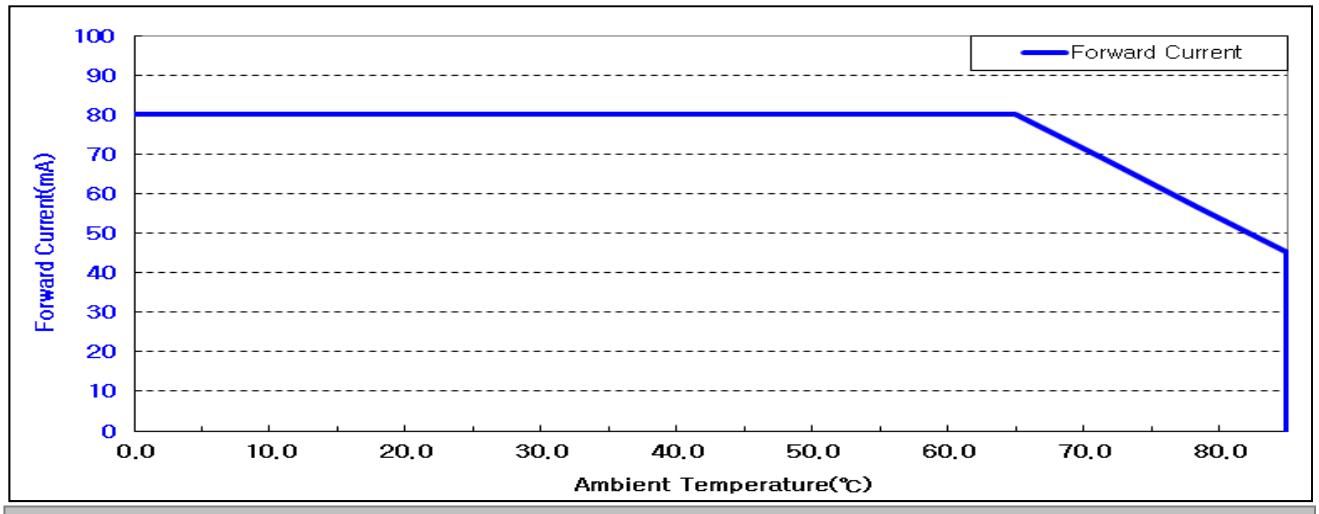
6-3-1. LED Backlight Characteristics

Ta=25℃

Parameter		Symbol	Values			Unit	Notes
			Min.	Typ.	Max.		
LED Current		I_{LED}	75	80	85	mA	Per LED
LED Voltage	-30℃	V_{LED}	21.3	24.5	27.7	V	Per chain
	+25℃		20.5	23.6	26.7		
	+85℃		20.0	23.0	26.0		
LED Power		P_{LED}	9.00	11.33	14.13	W	
LED chain			-	6	-		6-3.1
LED Quantity			-	48	-	EA	

[Note 6-3.1] LED PCB chain

Thermistor P/N: NCP15XH103F0SRC



6-4. Timing Characteristics

6-4-1. Input Signals Timing

This is the signal timing required at the input of the RSDS Transmitter. All of the interface signal timing should be satisfied with the following specifications for it's proper operation.

Ta=25℃

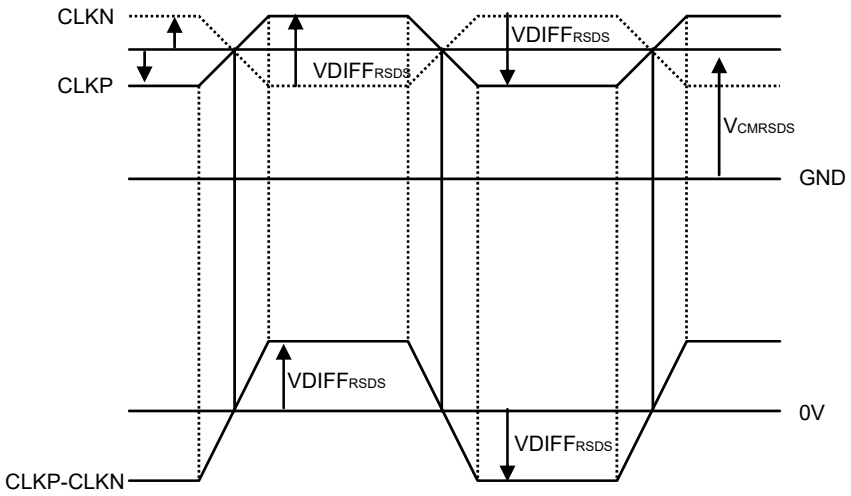
Parameter	Symbol	Min.	Typ.	Max.	Unit
CLK frequency	Fclk	44.4	44.7	56	MHz
Horizontal display area	THD		960		CLK
HS period time	TH	1020	1024	1120	CLK
HS blanking	THBW + THBP	60	64	160	CLK
Vertical display area	TVD		720		H
VS period time	TV	726	728	810	H
VS blanking	TVBW + TVBP	6	8	90	H

6-5. RSDS Input characteristics

6-5-1. DC Specification

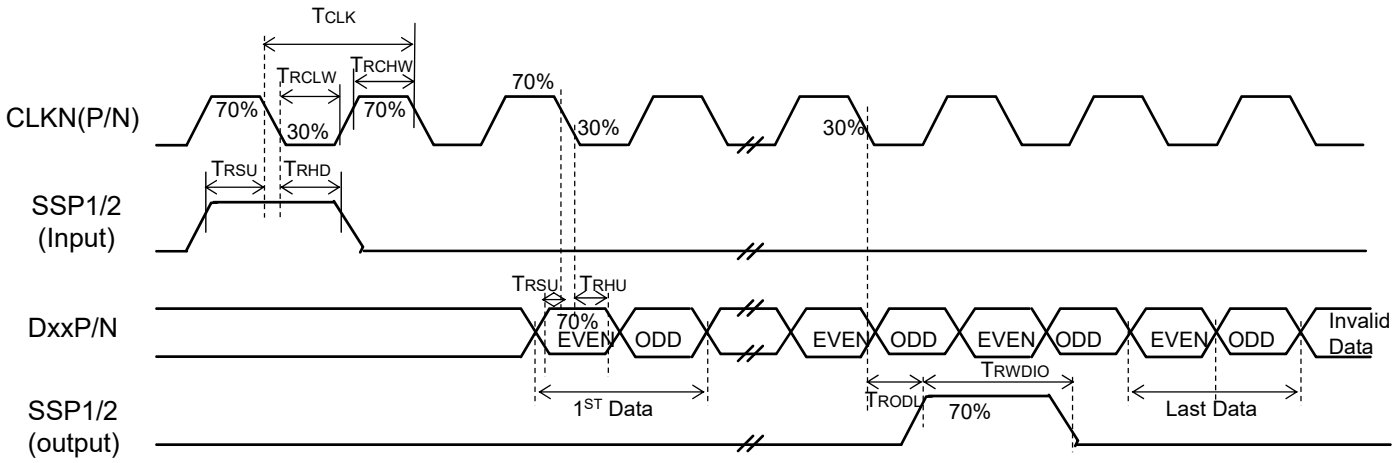
(VDD_IF=VDD=3.0V to 3.6V, VDDA = 8V to 13.5V, GND_IF=GND=GNDA=0V, TA=-40℃ to 85℃)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
RSDS Low Level Input Voltage	VILRSDS	-	-150	-100	mV	
RSDS High Level Input Voltage	VIHRSDS	100	150	-	mV	
RSDS Differential Input Voltage	VDIFFRSDS	200	300	600	mV	
RSDS Common Voltage	VCMRSDS	0.5	1.2	VCC-1.6	V	
RSDS input Leakage Current	ILRSDS	-	-	±1	uA	Other input pins
RSDS Digital Stand-by Current	ISTRSDS	-	-	1	mA	CLK is stopped, Inputs are default, VDD_IF=3.3V
RSDS Operating Current	IVDDRSDS	-	-	1	mA	Fclk = 80MHz, FLD=60KHz, VDD_IF=3.3V, Input pattern: Data Pattern='101010…"

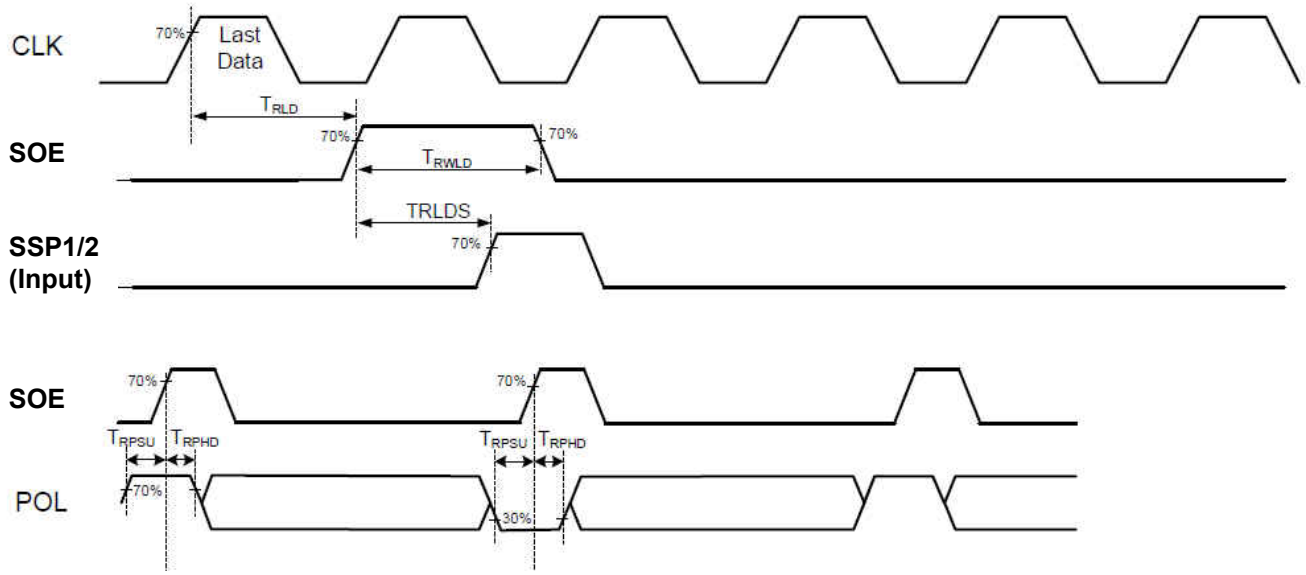


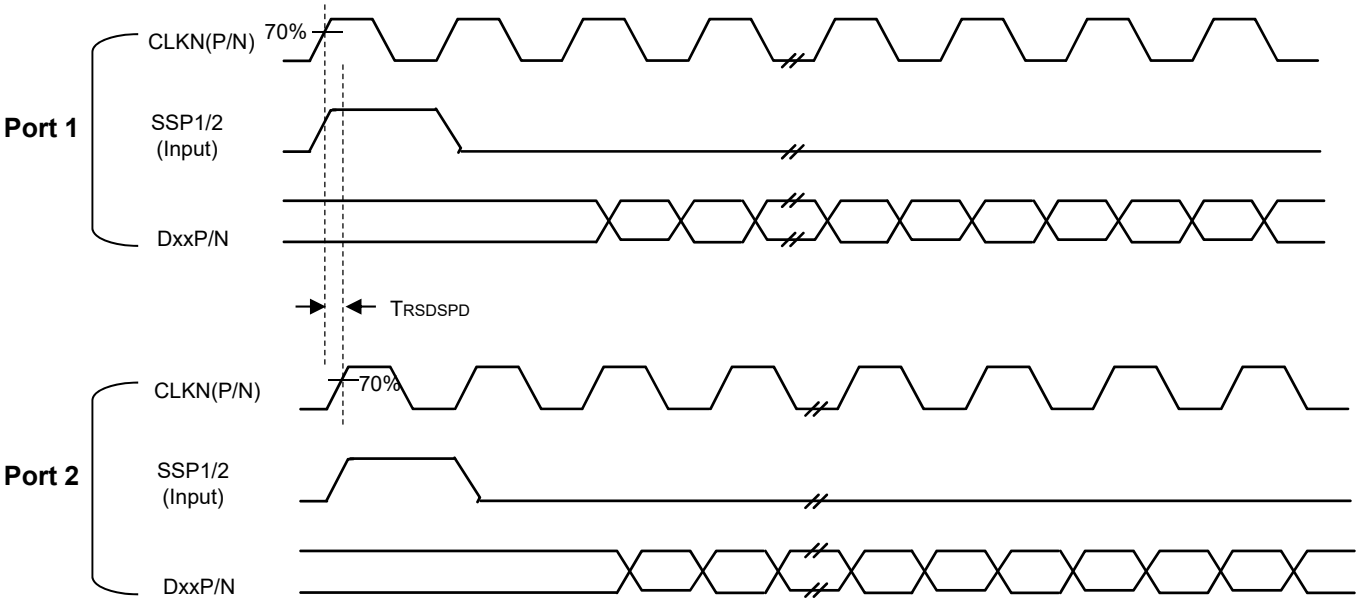
6-5-2. AC Specification for Source D-IC

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
CLK Frequency	FCLK	44.4	-	56	MHz	
CLK Period	TCLK		-	-	ns	
CLK High Width	TRCHW	40%		60%	TCLK	
CLK Low Width	TRCLW	40%		60%	TCLK	
Data setup time	TRSU	3	-	-	ns	
Data hold time	TRHD	3.5	-	-	ns	
Output Delay of SSP2/1	TRDL	-	-	15	TCLK	CL=25pF (Output)
Last data to SOE	TRLD	16	-	-	TCLK	
Pulse width of SOE	TRWLD	16	-	-	TCLK	
Pulse width of SSP	TRWDIO	-	1	-	TCLK	
Time that SOE to SSP1/2	TRLDS	16	-	-	TCLK	
POL set-up time	TRPSU	6	-	-	TCLK	POL to SOE
POL hold time	TRPHD	6	-	-	TCLK	POL to SOE
2 PORT Delay	TRSDSPD	-	-	50	ns	



6-5-2. AC Specification for Source D-IC

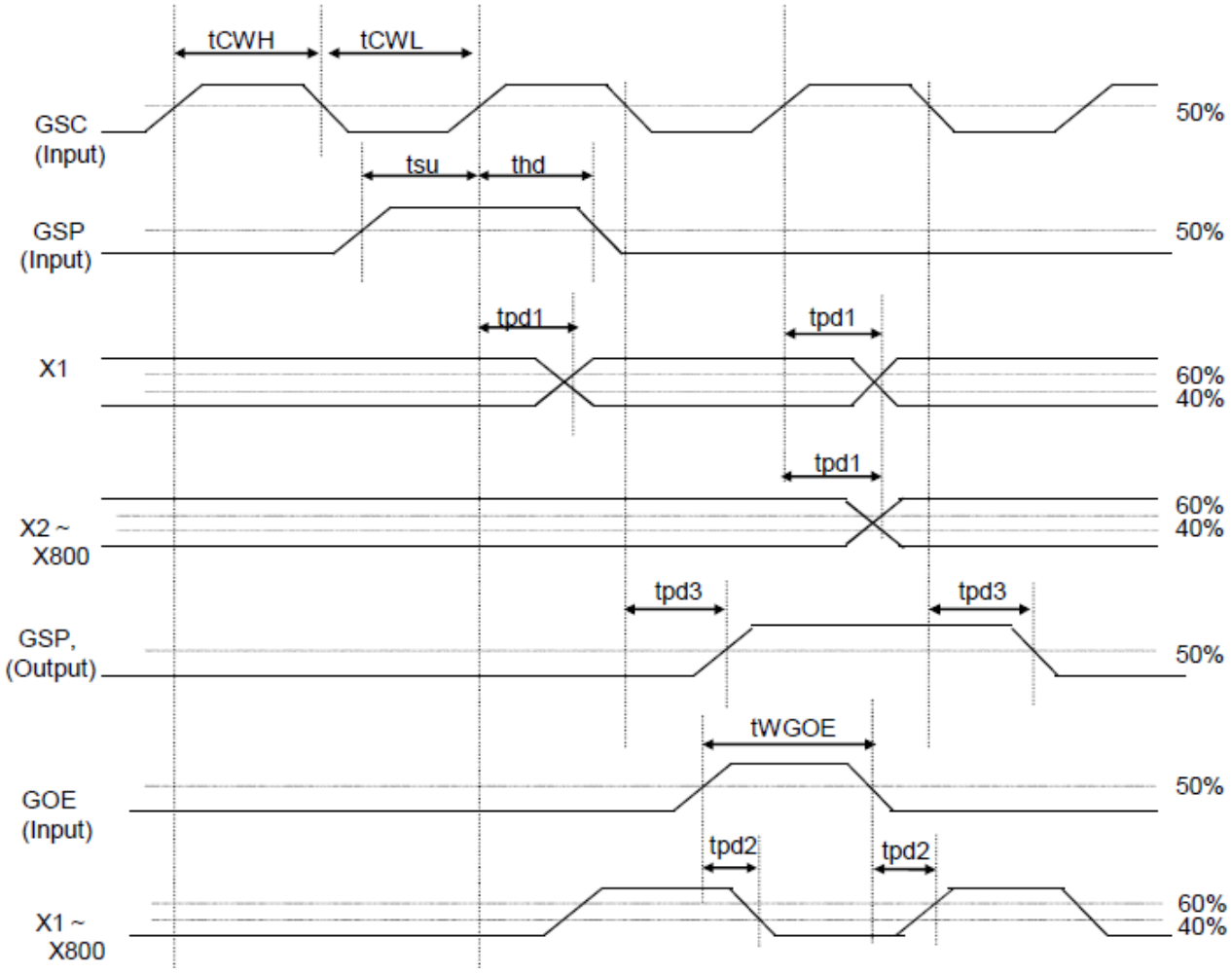




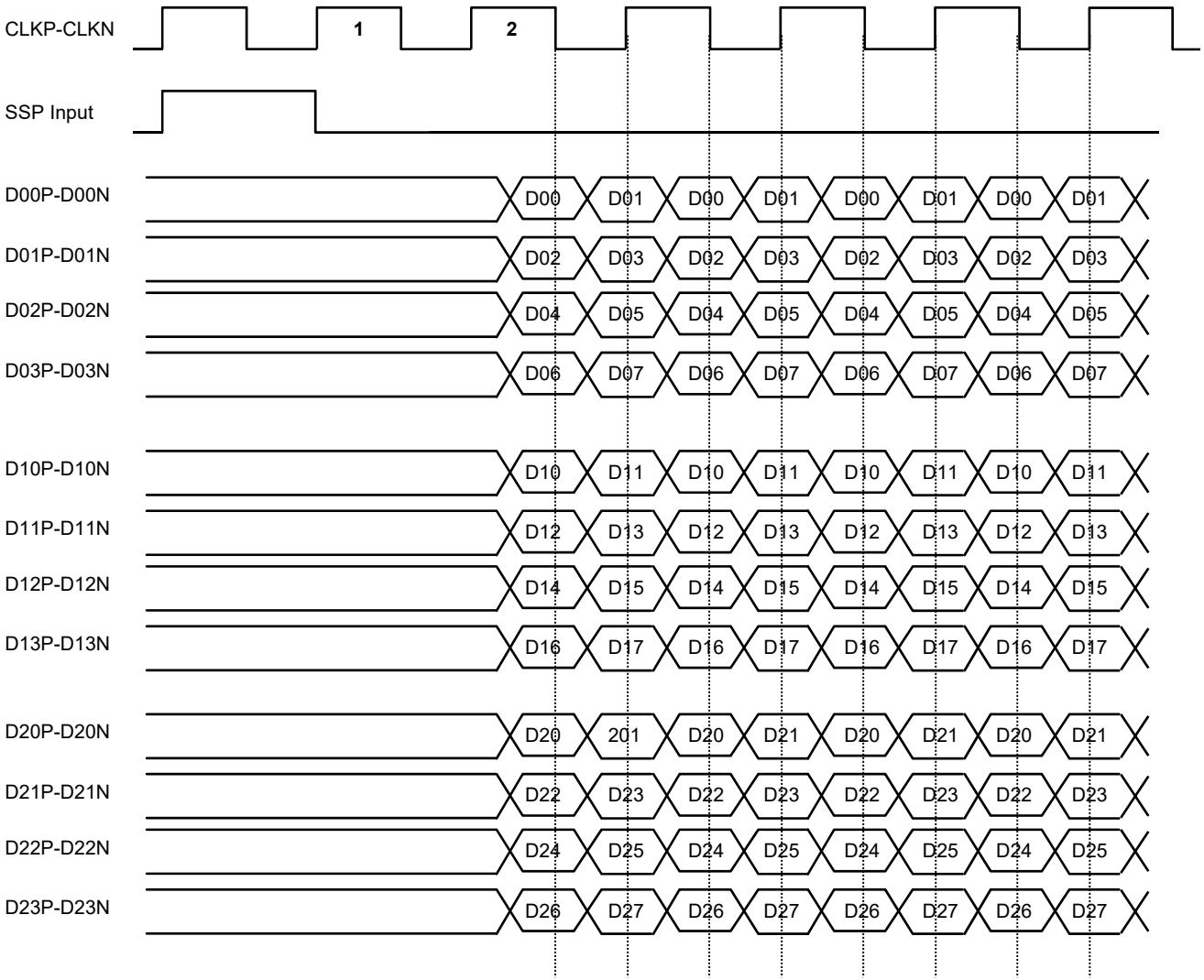
6-5-3. AC Specification for Gate D-IC

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
GSC Clock Frequency	tGSC	-	-	200	KHz	
GSC Clock Pulse Width	tCWH	2	-	-	us	
	tCWL	2	-	-	us	
Input signal Rising Time	trin	-	-	100	ns	
Input signal Falling Time	tfin	-	-	100	ns	
GOE Enable Time	tWGOE	1	-	-	us	
Data Setup Time	tsu	500	-	-	ns	
Data Hold Time	thd	500	-	-	ns	
Output Delay to GSC	tpd1	-	500	1000	ns	CL=300pF
Output Delay to GOE	tpd2	-	500	1000	ns	CL=300pF
Data Output Delay Time	tpd3	-	500	1000	ns	CL=30pF

Note:
- Rising Time and Falling Time is measured between 20% to 80% of the signal.



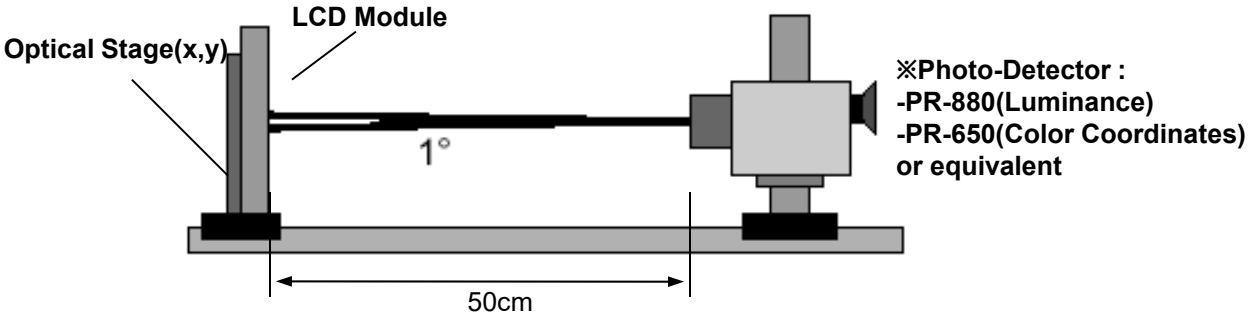
6-5-4. RSDS Data input format (8bit)



7. Electro-optical Characteristics

7-1. Electro-optical Characteristics

Optical Characteristic Measurement Equipment and Method



Measuring Condition ;
-Measuring surroundings : Dark Room
-Measuring temperature : T_a=25℃
-Adjust operating voltage to get optimum contrast at the center of the display.
-Measured value at the center point of LCD panel after more than 30 minutes while backlight turning on.
VCC=3.3V, VDD=12.9V, fv=60Hz, fclk= 44.7MHz, I_{LED} = 80mA

Parameter		Symbol	Condition	Values			Unit	note
				Min.	Typ.	Max.		
Contrast Ratio		CR	Perpendicular	800	-	-	-	7-1.1
Luminance		L	Perpendicula	600	-	-	cd/m²	
White Uniformity		δ_{WHITE}	9P	80	-	-	%	
Viewing Angle (CR>10)	x axis, right(ϕ=0°)	Θr	CR≥10	89		-	degree	7-1.2
	x axis, left (ϕ=180°)	Θl		89		-		
	y axis, up (ϕ=90°)	Θu		89		-		
	y axis, down (ϕ=270°)	Θd		89		-		
Response Time		$Tr_R + Tr_D$	+25℃	-	-	30	ms	7-1.3
Color Coordinates [CIE1931]	RED	Rx		Typ -0.03	0.661	Typ +0.03		
		Ry			0.306			
	GREEN	Gx			0.298			
		Gy			0.662			
	BLUE	Bx			0.137			
		By			0.067			
	WHITE	Wx			0.313			
		Wy			0.329			
LED Life Time		Hrs		10,000	-	-	-	7-1.4

[Note 7-1.1]

1. Contrast Ratio(CR) is defined mathematically as :

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

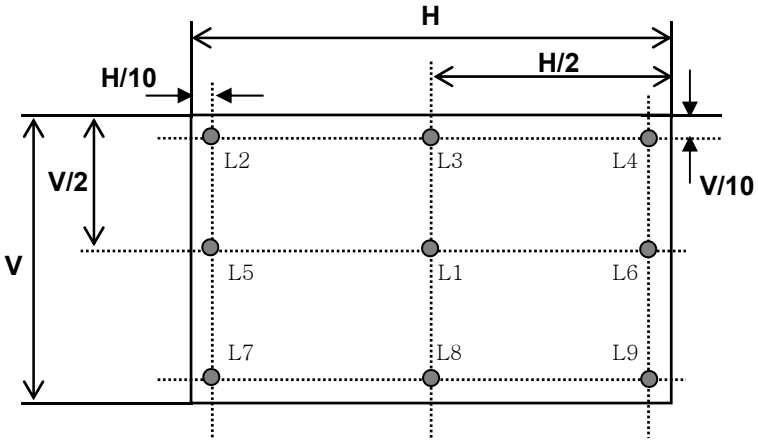
It is measured at center 1-point.

2. Surface luminance are determined after the unit has been 'ON' and More than 15 Minute after lighting the backlight in a dark environment at 25±2°C. Surface luminance is the luminance value at center 1-point across the LCD surface 50cm from the surface with all pixels displaying white. For more information see the 9 Point for Luminance Measure

3. The Luminance Uniformity (δ_{WHITE}) is determined by measuring LN at each test position 1 through 9. The Luminance Uniformity (δ_{WHITE}) is defined as follows ;

$$\text{Luminance Uniformity } (\delta_{WHITE}) = \frac{\text{Minimum(L1, L2, L3, L4, L5, L6, L7, L8, L9)}}{\text{Maximum(L1, L2, L3, L4, L5, L6, L7, L8, L9)}} \times 100\ (\%)$$

For more information see the 9 Point for Luminance Measure

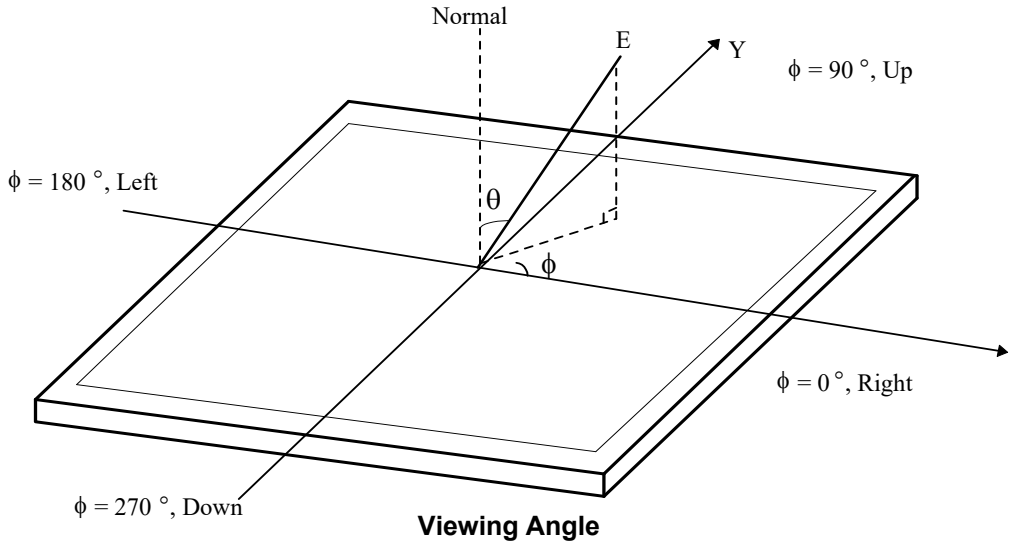


***H,V : ACTIVE AREA**

9 Points for Luminance Measure

[Note 7-1.2]

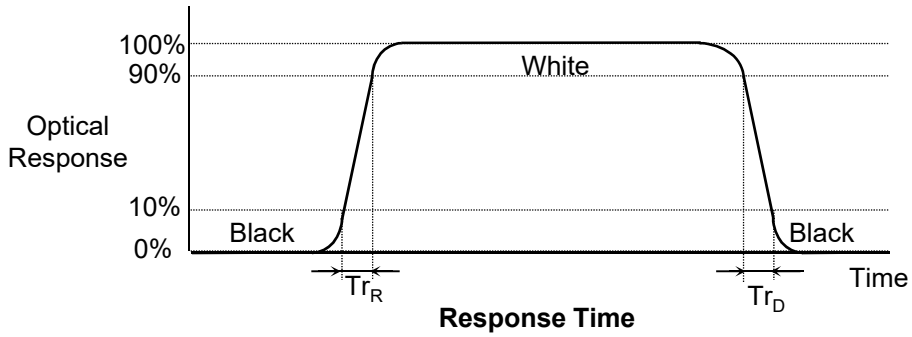
Viewing angle is the angle at which the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD module surface.



Viewing Angle

[Note 7-1.3]

. Response time is obtained by measuring the transition time of photo detector output, when input signals are applied to make center point “black” and “white”.



Response Time

[Note 7-1.4]

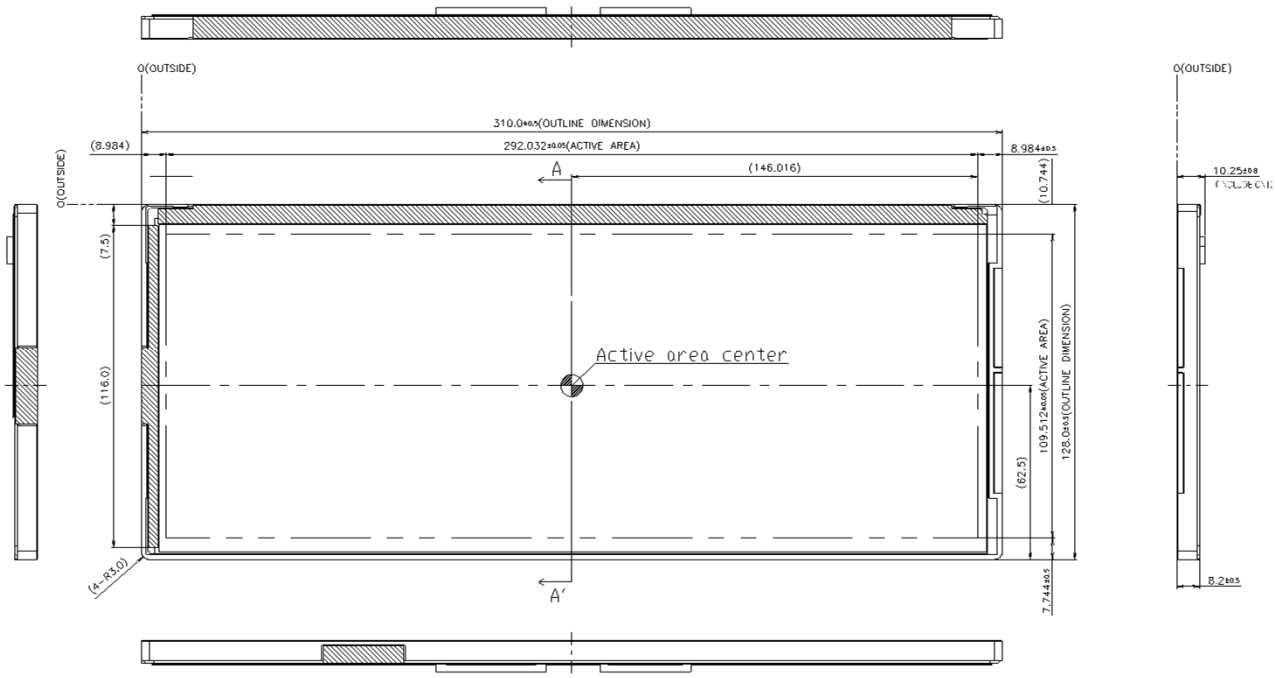
The life time is determined as the time at which brightness of LED is 80% compare to that of initial value at the typical LED current.

8. Mechanical Characteristics

Parameter	Specification		Unit
Outline Dimension	Width	310.0 ±0.5	mm
	Height	128.0 ±0.5	mm
	Depth	8.2 ±0.5	mm
Active Display Area	Width	292.032	mm
	Height	109.512	mm
Weight	390g(Typ.), 405g(Max.)		G
Rattle Noise	50		dB

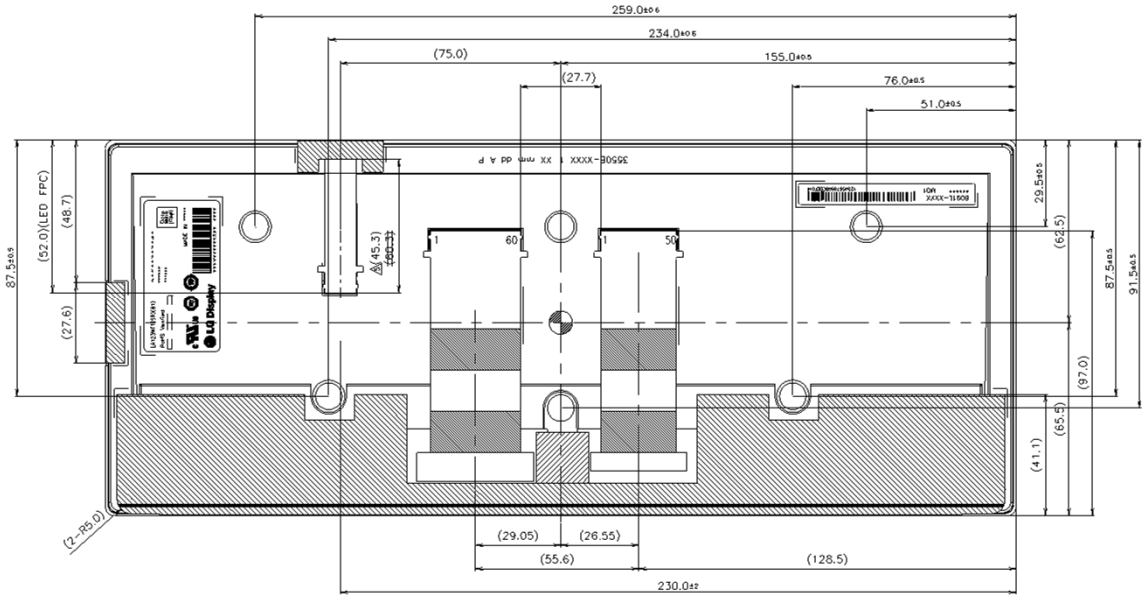
<FRONT VIEW>

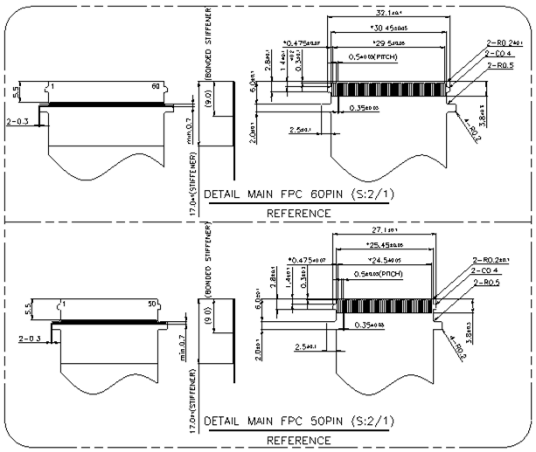
Unit:[mm], General tolerance: ± 0.3mm

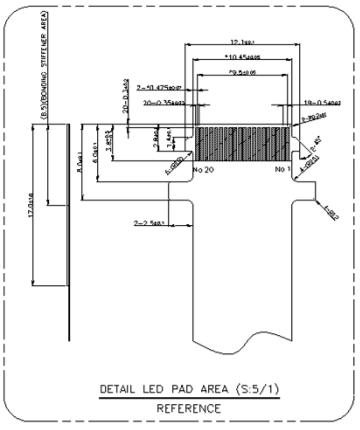


<REAR VIEW>

Unit:[mm], General tolerance: ± 0.3mm







- LED FPC CNT: 6288 (KYOCERA)
- LED FPC PIN MAP:

1	THERMISTOR+
2	THERMISTOR-
3	CATHODE6
4	-
5	ANODE6
6	ANODE5
7	-
8	CATHODE5
9	CATHODE4
10	-
11	ANODE4
12	ANODE3
13	-
14	CATHODE3
15	CATHODE2
16	-
17	ANODE2
18	ANODE1
19	-
20	CATHODE1

9. Reliability Test

No.	Test Items	Test Condition	Notes
1	High Temperature Storage Test	T_a =95℃ 500h	9-1,2,3
2	High Temperature Operation Test	T_P =85℃ 240h	9-1,2,3
3	Low Temperature Storage Test	T_a =-40℃ 100h	9-1,3
4	High Temperature and High Humidity Operation Test	T_a =65℃ 93%RH 500h	9-1,2,3
5	Light-proof	UV exposure 42℃, 750W/m^2, 300hrs	9-1,2,3
6	Thermal Shock Test (non-operating)	T_a=-40℃ to T_P=+95℃ 10cycles 2h duration	9-1,2,3
7	Electro Static Discharge Test	Panel Surface : 150pF ±15kV 330Ω (Direct Discharge, Five Times) FPC Input Terminal : 200pF ±200V 0Ω	9-3
8	Shock Test (non-operating)	3 shocks in each direction Peak acceleration: 981 m/s² Duration of nominal shock: 6 ms Waveform: saw-tooth with slow rise (2,94 m/s) or half-sine	9-3
9	Vibration Test (non-operating)	10 - 30 Hz: ± 0,75mm 30 - 500 Hz: 3g 1 Oct./min Random 3Grms 3 x (16 h sinusoidal and 8 h random) in X, Y, and Z direction	9-3

[Note 9-1] T_a = Ambient Temperature, T_P = Panel Surface Temperature

[Note 9-2] After this test has been done, a display is rejected when one of the following defects occurs:

- optical and electrical defects as specified in the test specification
- exceeding the specified “on” and “off” switching times
- reduction of the original contrast ratio perpendicular of more than 30%
- doubling of specified max. total consumption
- reduction of the original min. brightness from LED more than 50%
- TFT-LCD panels should take place at room temperature for 24 hours after the reliability tests finish.

[Note 9-3] After this test has been done, the specimen should function normally without any fatal defect.
(no picture, line defect, out of synchronization)

10. International Standards

10-1. Safety

a) UL 60950-1, Second Edition, Underwriters Laboratories Inc.
Information Technology Equipment - Safety - Part 1 : General Requirements.
b) CAN/CSA C22.2 No.60950-1-07, Second Edition, Canadian Standards Association.
Information Technology Equipment - Safety - Part 1 : General Requirements.
c) EN 60950-1:2006 + A11:2009, European Committee for Electro technical Standardization (CENELEC).
Information Technology Equipment - Safety - Part 1 : General Requirements.

10-2. 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 Electro technical Standardization.(CENELEC), 1998
(Including A1: 2000)

10-3. Environment

a) RoHS, Directive 2011/65/EU of the European Parliament and of the council of 8 June 2011

11. Packing

11-1. 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)
D : YEAR
E : MONTH
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

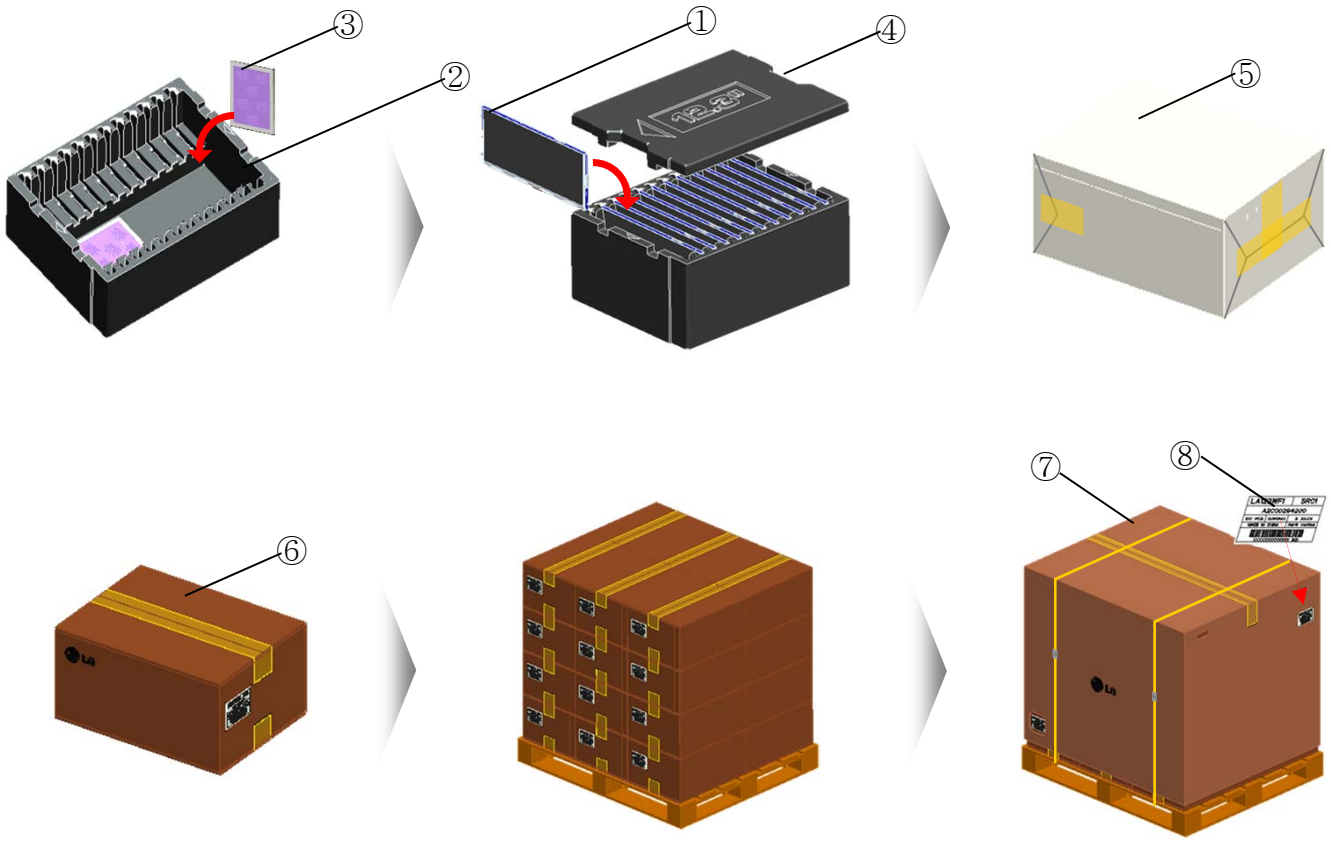
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mark	1	2	3	4	5	6	7	8	9	A	B	C

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.

11-2. Packing Form

a) Package quantity in one pallet :288 pcs (36 pcs in one packing)
b) Pallet Size : 1140×990×1105 (mm)



NO.	Description	Material
1	Module	
2	Packing Bottom	EPP
3	Desiccant	POWER DRY, 60G, UX
4	Packing Top	EPP
5	Bag	Al Bag, 610X800
6	Box	PAPER, 355 X 468 X 226
7	Angle Packing	SE, 1105 X 966 X 964
8	Label	YUPO 100X70
-	Tape	OPP 70MMx300M

12. PRECAUTIONS

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

12-1. MOUNTING PRECAUTIONS

(1) Please attach a 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.
(2) You should adopt radiation structure to satisfy the temperature specification.
(3) 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.
(4) 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 deteriorate the polarizer.)
(5) When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with petroleum benzine. 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.
(6) Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading.
(7) Do not open the case because inside circuits do not have sufficient strength.
(8) The metal case of a module should be contacted to electrical ground of your system.

12-2. 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 higher temperature, it becomes lower.)
(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 minimize the interference.

12-3. 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.

12-4. PRECAUTIONS FOR STRONG LIGHT EXPOSURE

Strong light exposure causes degradation of polarizer and color filter.

12-5. 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.

12-6. 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.