



深圳市勋瑞光电科技有限公司

Xunrui photoelectric technology (shenzhen) CO.,LTD.



CERT. No. QAC0946535
(ISO9001)

CERT. No. HKG002005
(ISO14001)

Product Specification

Customer: _____

Model Name: _____ H123FCA1 _____

Date: _____

Version: _____

Preliminary Specification

Final Specification

For Customer's Acceptance

Approved by	Comment

Approved by	Reviewed by	Prepared by

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1. OVERVIEW

H123FCA1 is 12.3" color TFT-LCD (Thin Film Transistor Liquid Crystal Display) module composed of LCD panel, driver ICs ,control circuit and LED backlight. The 12.3" screen produces 1920×RGB×720 resolution image. By applying R.G.B input signal, full color images are displayed.

General specifications are summarized in the following table :

ITEM	SPECIFICATION
Display Area (mm)	292.032(H) X 109.512(V) (mm)
Number of Pixels	1920(H) x 3(RGB) x 720(V)
Pixel Pitch (mm)	0.1521(H) X 0.1521(V) (mm)
Color Pixel Arrangement	RGB vertical stripe
Interface	2 Port LVDS
Outline Dimension	307.9 x 130.27 x 7.0(D) mm(W/O Cover & CONN.)
Display Mode	Normally Black
Number of Color	16.7M (Real 8 bit)
Viewing Direction	Full
Response Time (Tr+Tf)	25ms (Typ.)/35ms(Max.)
NTSC	70%(TYP.)
Power Consumption(W)	LCD : 1.98W(TYP.) BLU : 10.04W(TYP)/11.02W(MAX)
Surface Treatment	Anti-Glare
Brightness (cd/m ²)	800nits(TYP.)/600nits(MIN.)
Backlight Unit	LED
Weight(g)	TBD

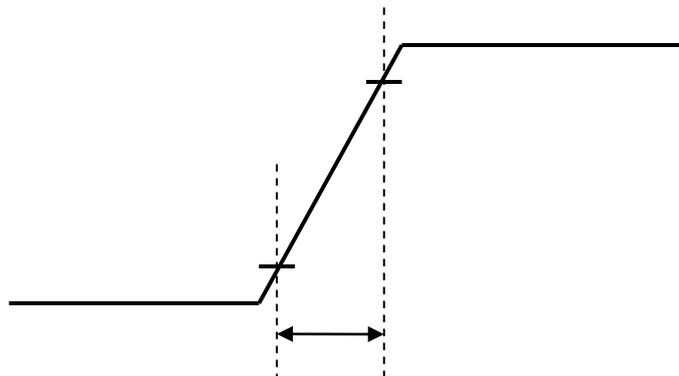
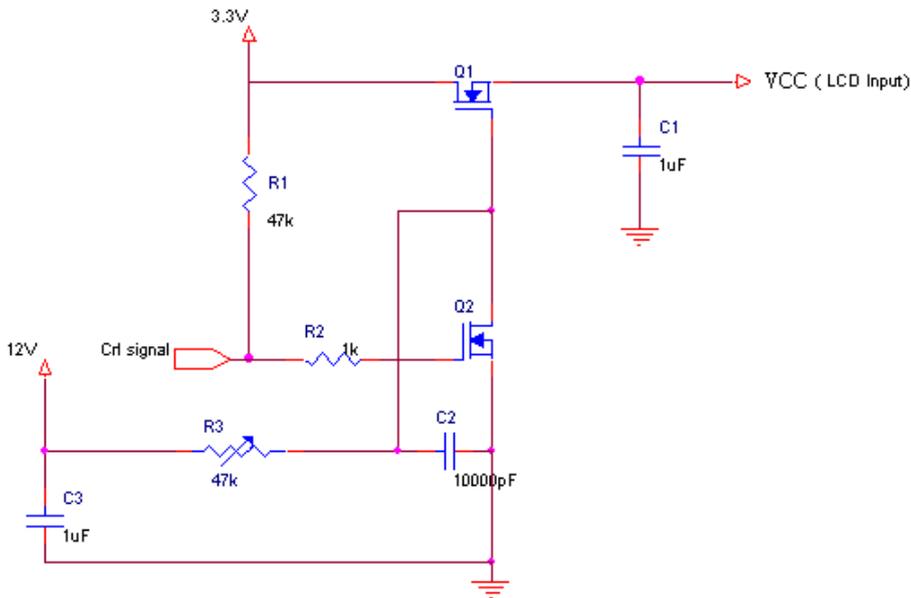
2. ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
Power Supply Voltage for LCD	VCC	-0.3	4.0	V	
Signal Input Voltage	RxIN0+ ~ RxIN3+ RxIN0- ~ RxIN3- RxCLKIN +/-	-0.3	VCC	V	
ICC Rush current	IRUSH	-	2	A	Note 1
Operation Temperature	Top	-30	85	°C	
Storage Temperature	Tstg	-40	90	°C	

Note 1: The input pulse-current measurement system is as below:

Control signal: High (+3.3V) → Low (GND)

Supply Voltage of rising time should be from R3 and C2 tune to 550 μs.



3. ELECTRICAL CHARACTERISTICS

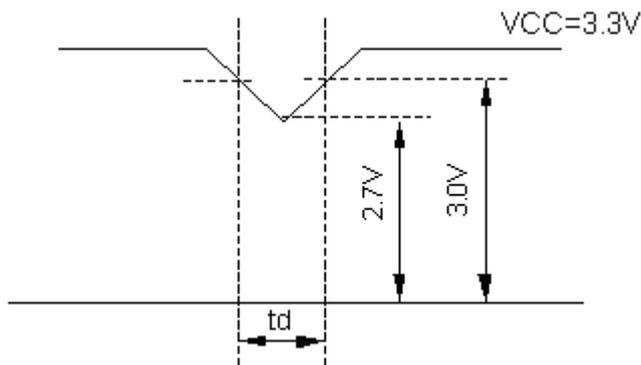
3.1 TFT LCD

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
LCD Supply Voltage	VCC	3.0	3.3	3.6	V	*1)
Logic Input Voltage (LVDS:IN+,IN-)	VCM	1	1.2	1.7- VID /2	V	*2)
	VID	200	-	600	mV	*2)
	VTH	-	-	100	mV	*2)
	VTL	-100	-	-	mV	*2)
1 Data time	UI	-	tclk*1/7	-	tclk	*3)
LVDS clock to data skew	tskew	-	-	0.2	UI	
input data eye width	teyew	0.6	-	-	UI	

*1) VCC-dip state

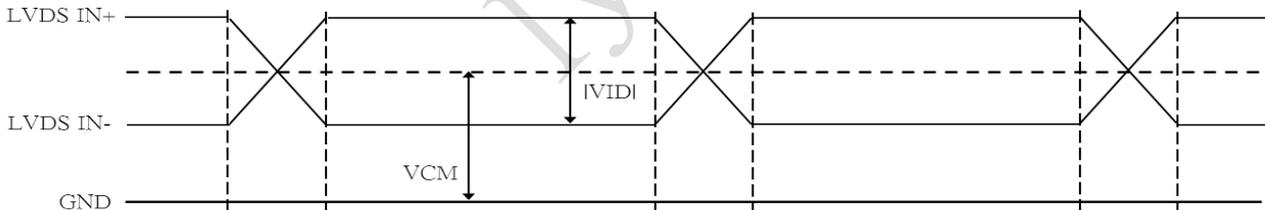
(1) when $3.0V > VCC \geq 2.7V$, $t_d \leq 10$ ms.

(2) when $VCC < 2.7V$, VCC-dip condition should as the VCC-turn-off condition.

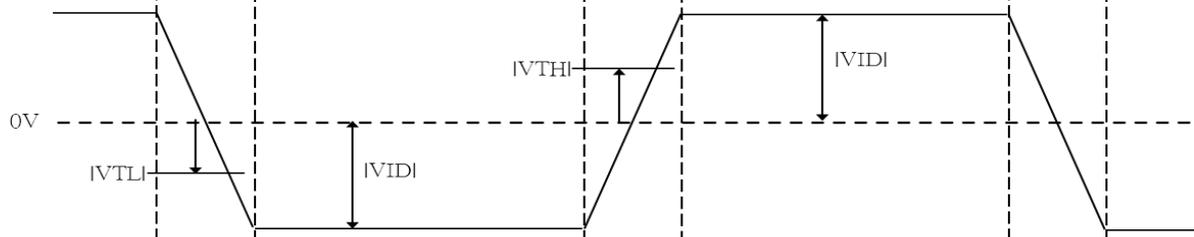


Note2: LVDS DC electrical characteristics

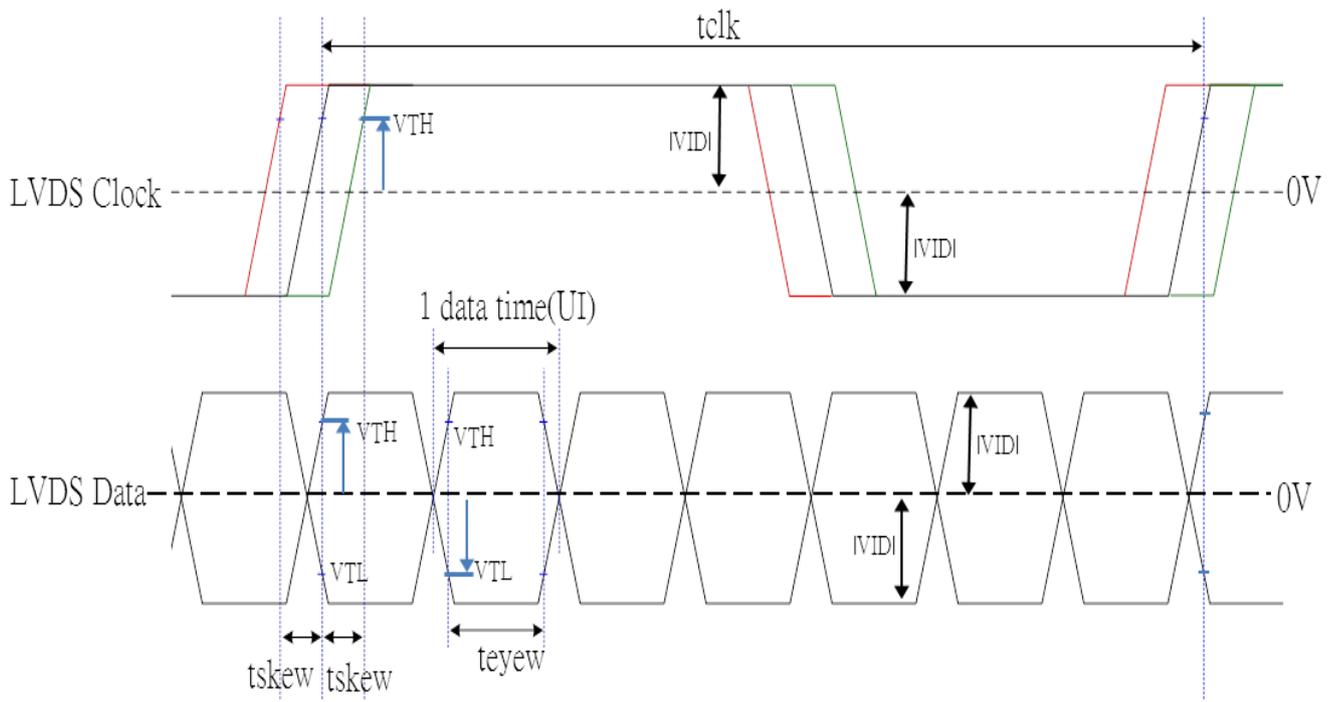
LVDS Single-End Signal



LVDS Differential Signal



Note3 LVDS AC electrical characteristics



3.2 TFT-LCD Current Consumption

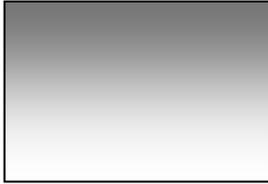
ITEM	SYMBOL	MIN	TYPE	MAX	UNIT	NOTE
LCD Supply current	ICC	--	(600)	(825)	mA	*1)

Remarks:

*1) Typical: Under 256 gray pattern

Maximum: Under White pattern

The current is root mean square value (RMS)

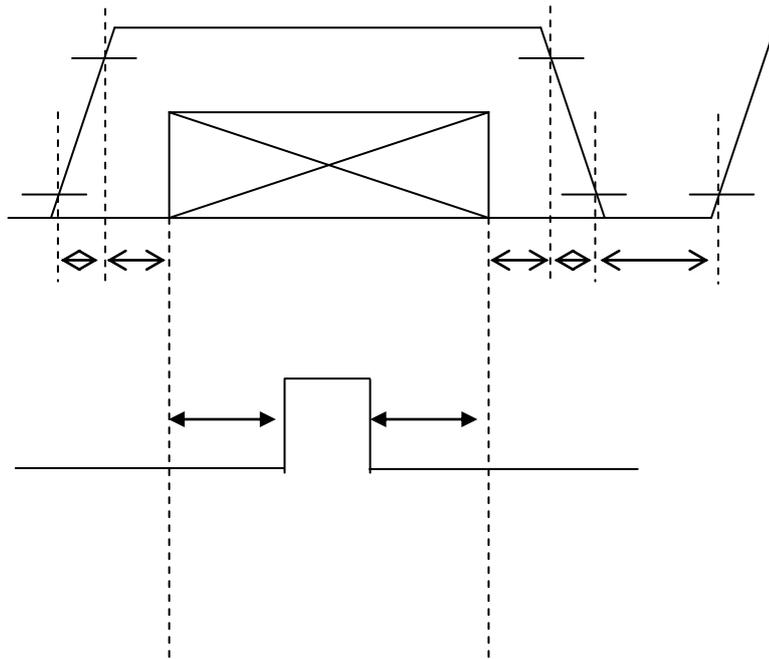


256 gray pattern



White pattern

3.3 Power 、Signal Sequence

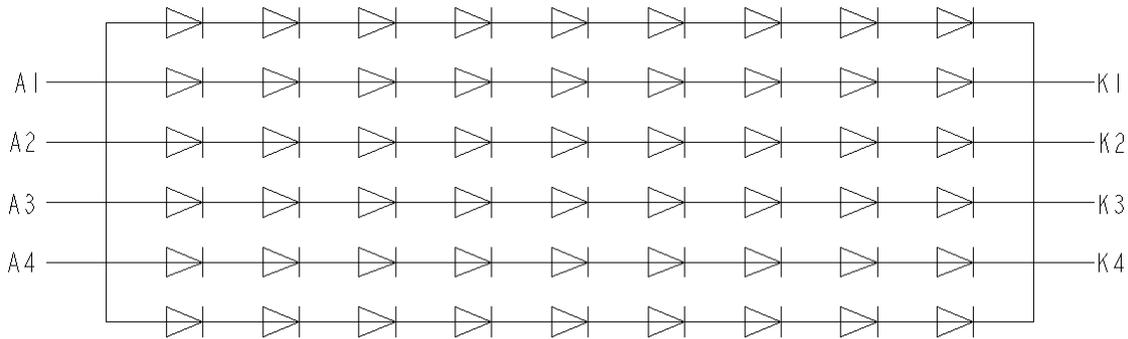


3.4 Backlight unit

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
LED current	IL	Ta=25°C IF=60mA	--	360	--	mA	
LED voltage	VL	Ta=25°C IF=60mA	25.2	--	30.6	V	
Power consumption	WL	Ta=25°C IF=60mA	--	--	11.02	W	
LED LifeTime		Ta=25°C IF=60mA	50000	--	--	Hr	

Note

*1)LED Circuit Diagram



*2) A : Anode(+) · K : Cathode(-)

*3) Suggestion: Using the constant current control to avoid the leakage light and brightness quality issue.

*4) Definition of Led lifetime : Luminance < Initial luminance 50%.

4. INTERFACE CONNECTION

4.1 CN1 (Input Signal) :

Used connector: FI-RE41S-HF (JAE) or equivalent

PIN NO.	SYMBOL	FUNCTION
1	GND	Power ground
2	RXOIN0-	Odd pixel negative LVDS differential data inputs
3	RXOIN0+	Odd pixel positive LVDS differential data inputs
4	GND	Power ground
5	RXOIN1-	Odd pixel negative LVDS differential data inputs
6	RXOIN1+	Odd pixel positive LVDS differential data inputs
7	GND	Power ground
8	RXOIN2-	Odd pixel negative LVDS differential data inputs
9	RXOIN2+	Odd pixel positive LVDS differential data inputs
10	GND	Power ground
11	RXOCLK-	Odd pixel negative LVDS differential clock inputs
12	RXOCLK+	Odd pixel positive LVDS differential clock inputs
13	GND	Power ground
14	RXOIN3-	Odd pixel negative LVDS differential data inputs
15	RXOIN3+	Odd pixel positive LVDS differential data inputs
16	GND	Power ground
17	RXEIN0-	Even pixel negative LVDS differential data inputs
18	RXEIN0+	Even pixel positive LVDS differential data inputs
19	GND	Power ground

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20	RXEIN1-	Even pixel negative LVDS differential data inputs
21	RXEIN1+	Even pixel positive LVDS differential data inputs
22	GND	Power ground
23	RXEIN2-	Even pixel negative LVDS differential data inputs
24	RXEIN2+	Even pixel positive LVDS differential data inputs
25	GND	Power ground
26	RXECLK-	Even pixel negative LVDS differential clock inputs
27	RXECLK+	Even pixel positive LVDS differential clock inputs
28	GND	Power ground
29	RXEIN3-	Even pixel negative LVDS differential data inputs
30	RXEIN3+	Even pixel positive LVDS differential data inputs
31	GND	Power ground
32	VDD	Digital power (3.3V)
33	VDD	Digital power (3.3V)
34	GND	Power ground
35	RESET	Global reset pin.
36	GND	Power ground
37	LEDK	LED Cathode -
38	LEDK	LED Cathode -
39	LEDA	LED Anode +
40	LEDA	LED Anode +
41	GND	Power ground

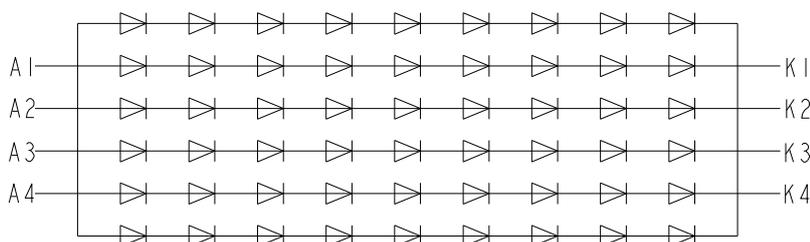
4.2 CN2: BLU Pin assignment

LB connector : FH52-10S-0.5SH(HIROSE)

PIN #	SYMBOL	FUNCTION
10	VLED+	Anode(+) (A1)
9	VLED+	Anode(+) (A2)
8	VLED+	Anode(+) (A3)
7	VLED+	Anode(+) (A4)
6	NC	Not Connect
5	NC	Not Connect
4	LED-4	Cathode(-) (K4)
3	LED-3	Cathode(-) (K3)
2	LED-2	Cathode(-) (K2)
1	LED-1	Cathode(-) (K1)

NOTE.

*1)LED Circuit Diagram suggestion :



*2) A : Anode(+) , K : Cathode(-)

5. INPUT SIGNAL

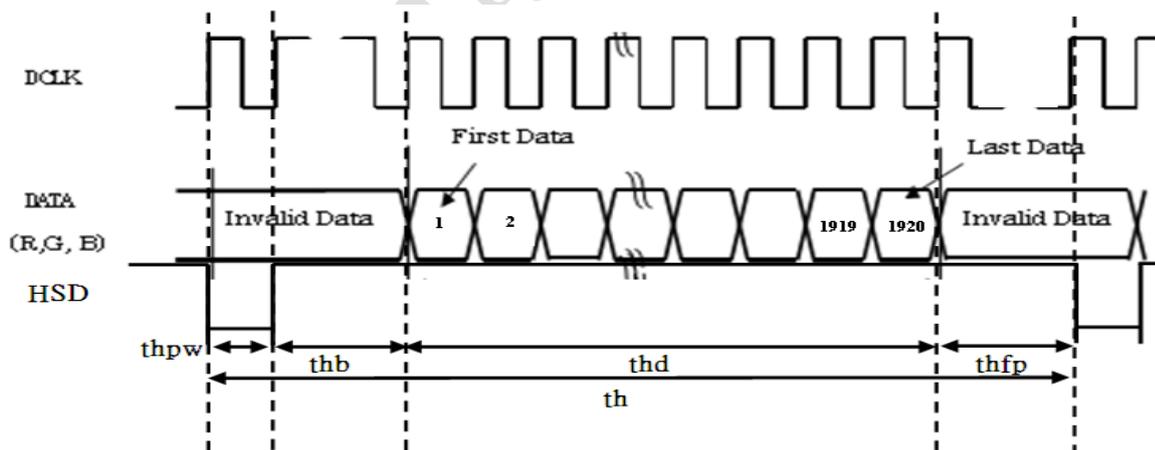
5.1 Timing Specification

ITEM		SYMBOL	MIN.	TYP.	MAX.	UNIT	Note
DCLK	Dot Clock	$1/t_{CLK}$	43.74	44.1	47.75	MHz	
	DCLK pulse duty	Tcwh	40	50	60	%	
SYNC	HSYNC Setup Time	Thst	5	-	-	ns	
	HSYNC Hold Time	Thhd	5	-	-	ns	
	VSYNC Setup Time	Tvst	5	-	-	ns	
	VSYNC Hold Time	Tvhd	5	-	-	ns	
	Horizontal Period	Th	992	992	1005	t_{CLK}	
	Horizontal Pulse Width	thpw	-	8	-	t_{CLK}	thb + thpw=16 DCLK is fixed
	Horizontal Back Porch	thb	-	8	-	t_{CLK}	
	Horizontal Front Porch	thfp	16	16	29	t_{CLK}	
	Horizontal Valid	thd	960			t_{CLK}	
	Vertical Period	tv	735	741	792	th	
	Vertical Pulse Width	tpw	-	2	-	th	tpw + tvb = 5 th is fixed
	Vertical Back Porch	tvb	-	3	-	th	
	Vertical Front Porch	tvfp	10	16	67	th	
Vertical Valid	tvd	720			th		
DATA	Setup Time	Tdsu	5	-	-	ns	
	Hold Time	Tdhd	5	-	-	ns	

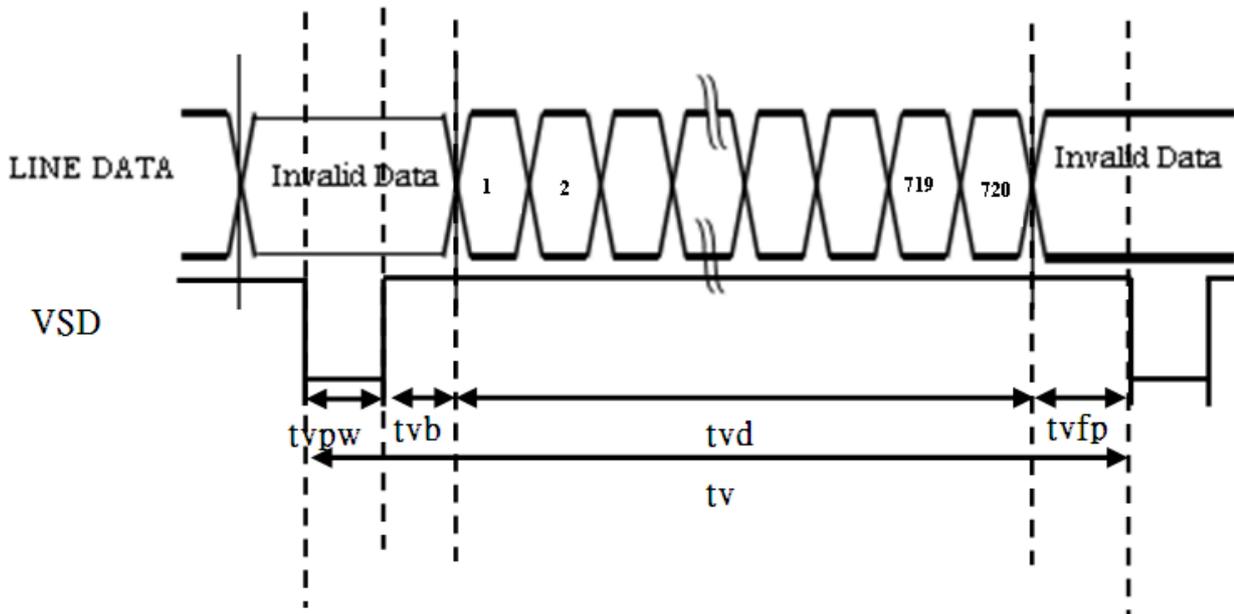
5.2 Timing Sequence(Timing Chart)

SYNC mode

Horizontal timing :

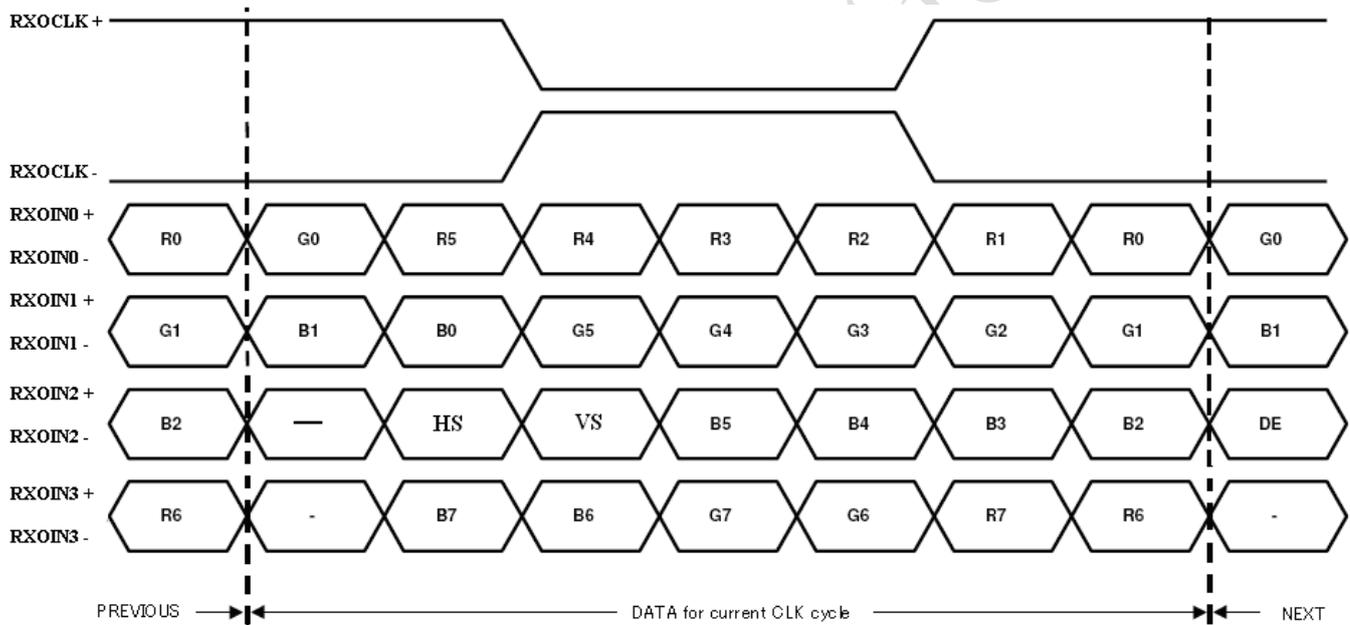


Vertical timing :

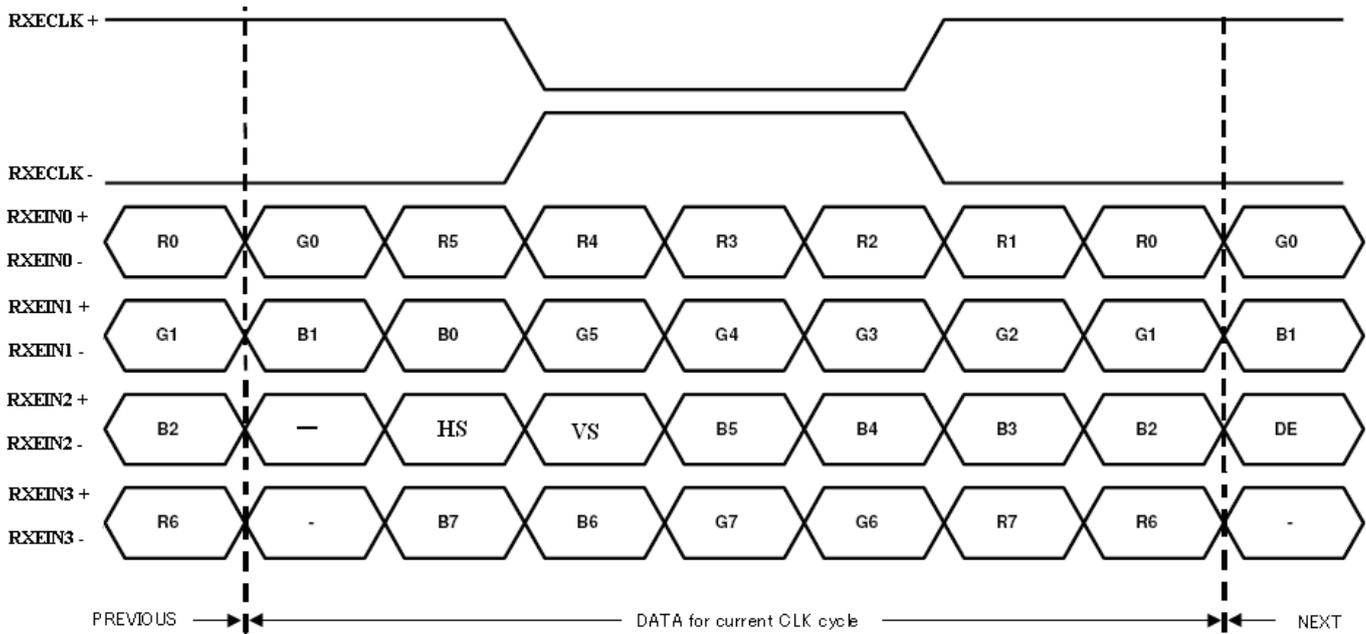


5.3 LVDS Input Data mapping

LVDS DATA (VESA) : Timing Chart



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DATA mapping

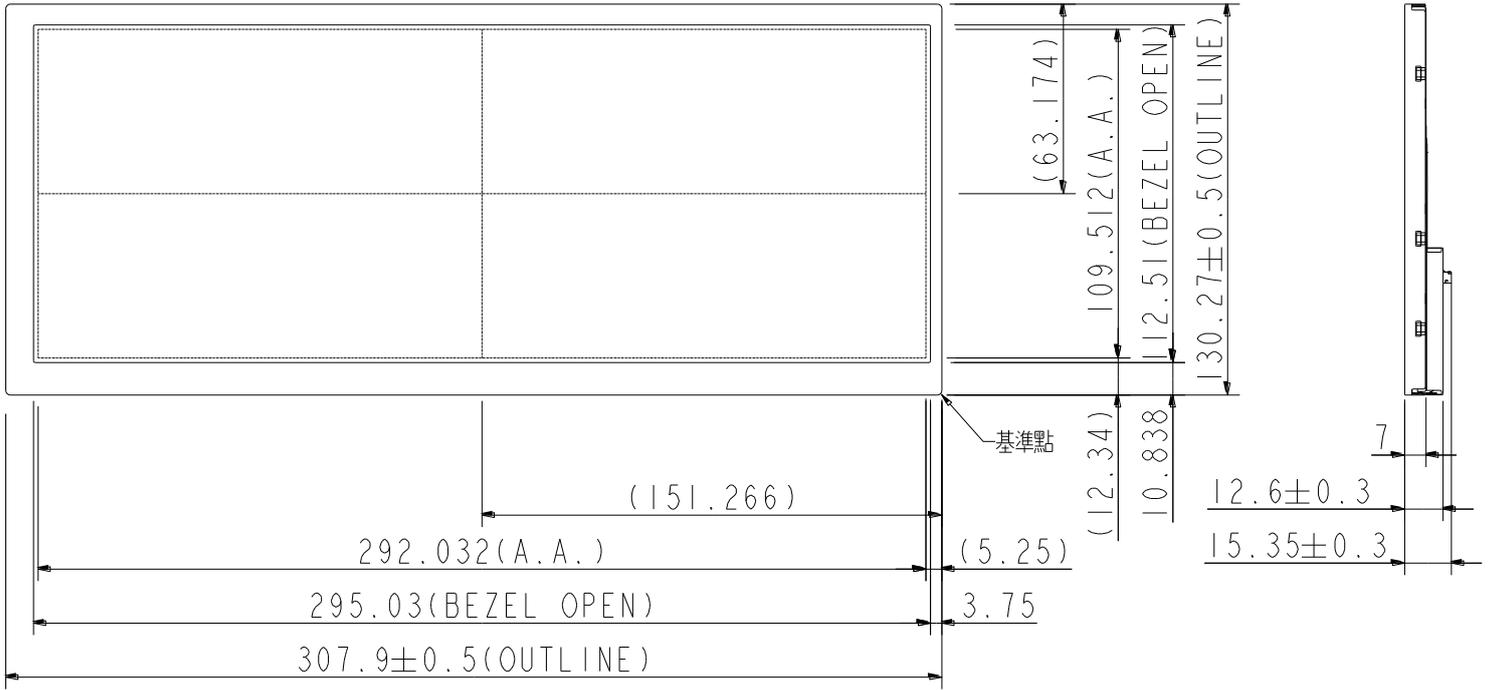
COLOR	INPUT DATA	R DATA								G DATA								B DATA							
		R7 MSB	R6	R5	R4	R3	R2	R1	R0 LSB	G7 MSB	G6	G5	G4	G3	G2	G1	G0 LSB	B7 MSB	B6	B5	B4	B3	B2	B1	B0 LSB
BASIC COLOR	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	RED(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	GREEN(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	
	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	
	CYAN	0	0	0	0	0	0	0	0	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	
	YELLOW	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	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	
RED	RED(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)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	RED(2)	0	0	0	0	0	0	1	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		
	RED(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
GREEN	GREEN(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	GREEN(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0		
	GREEN(2)	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		
	GREEN(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0		
BLUE	BLUE(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	BLUE(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		
	BLUE(2)	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	1	1	1	1	1	1	1		
	BLUE(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1		

[Note]

- 1) Definition of gray scale:
Color (n): n indicates gray scale level; higher n means brighter level.
- 2) Data: 1-High, 0-Low.
- 3) This assignment is applied to both odd and even data.

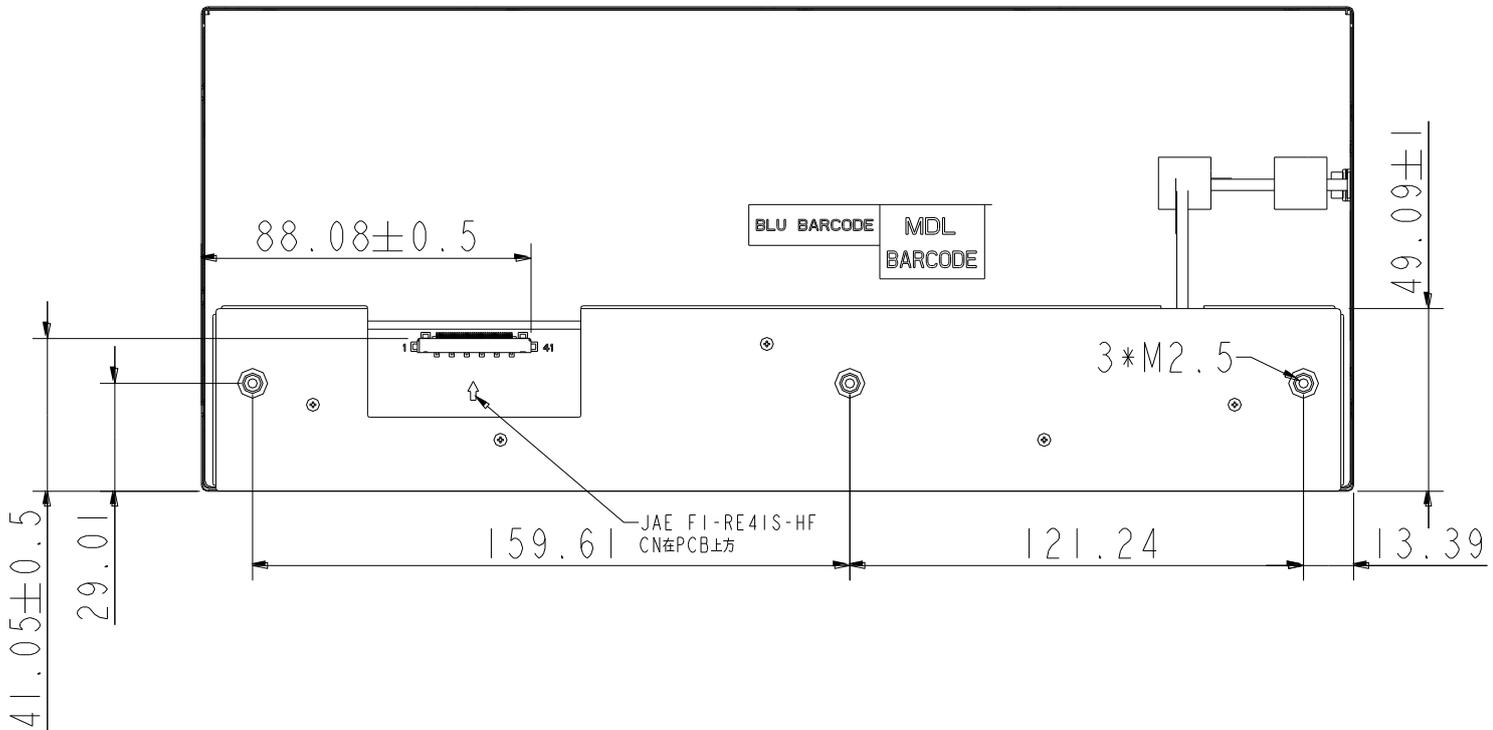
6. MECHANICAL DIMENSION

6.1 Front Side



(Unit : mm)

6.2 Rear Side



(Unit : mm)

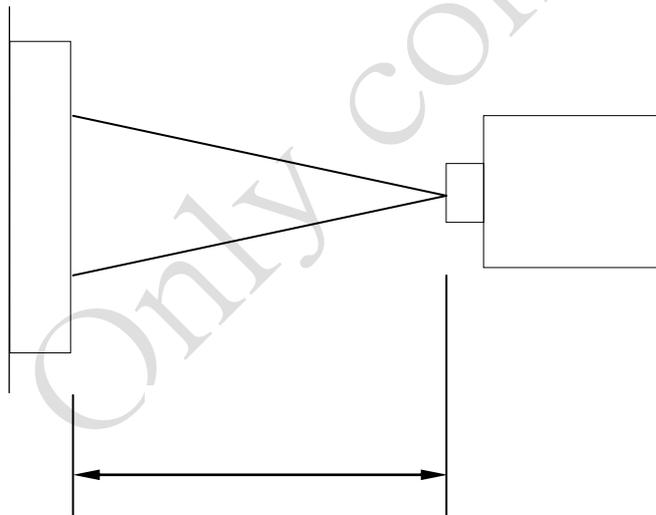
7. OPTICAL CHARACTERISTICS

Ta=25°C

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE	
Contrast Ratio	CR	Point-5	800	1000	--		3	
Luminance(CEN)	Lw	Point-5	600	800		cd/m ²	1、3	
Luminance Uniformity	ΔL		75	80		%	1、3	
Response Time	Tr +Tf	Point-5	--	25	35	ms	3	
Viewing Angle	Horizontal	Left(Ψ)	Point-5 CR ≥ 10	75	85		°	4
		Right(Ψ)		75	85			
	Vertical	Up(Θ)		75	85			
		Down(Θ)		75	85			
NTSC			65	70	--	%		
Color Coordinate	White	x	θ = φ = 0°	(0.267)	(0.307)	(0.347)		5
		y		(0.298)	(0.338)	(0.378)		5
	Red	x	θ = φ = 0°	(0.612)	(0.652)	(0.692)		5
		y		(0.292)	(0.332)	(0.372)		5
	Green	x	θ = φ = 0°	(0.269)	(0.309)	(0.349)		5
		y		(0.577)	(0.617)	(0.657)		5
	Blue	x	θ = φ = 0°	(0.112)	(0.152)	(0.192)		5
		y		(0.019)	(0.059)	(0.099)		5

【Note1】

Measure condition : 25°C ±2°C , 60±10%RH , under 1 Lux in the dark room.BM-5A (TOPCON) , viewing angle2° , IL=360mA (Backlight current) , measurement after lighting on 10 mins.

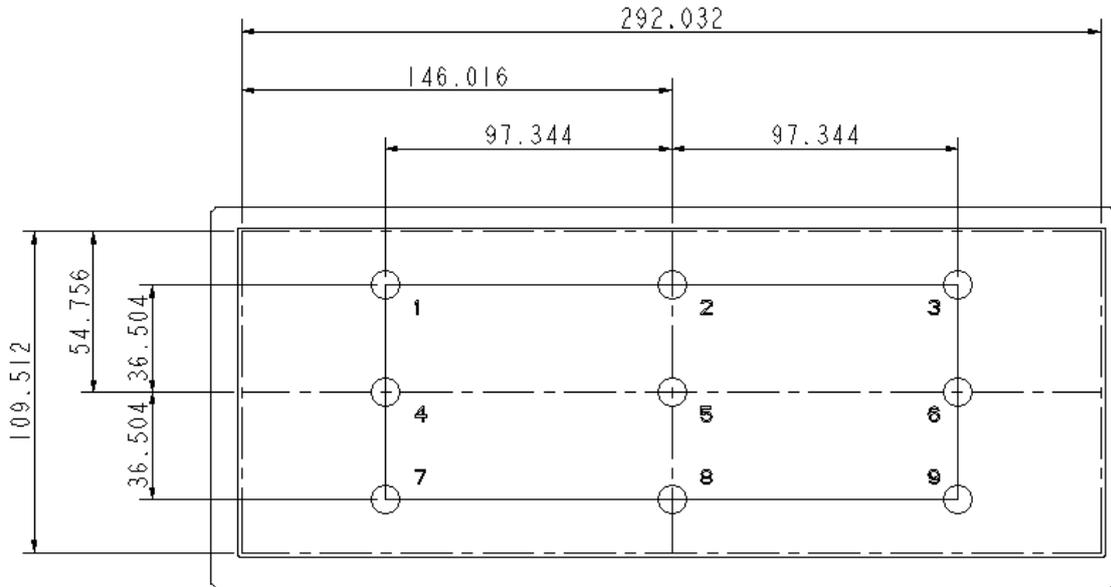


【Note2】

Definition of luminance : Measure white luminance on the point 5 as figure.7-1

Definition of Luminance Uniformity: Measure white luminance on the point1~9 as figure.7-1

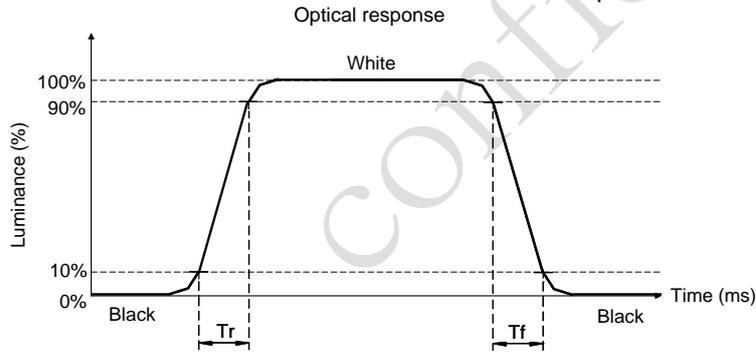
$$\Delta L = [L(\text{MIN})/L(\text{MAX})] \times 100$$



【Note3】

Definition of Response Time.(White-Black)

The response time is defined as the time interval between the 10% and 90% amplitudes.



【Note4】

Definition of Viewing Angle(θ, ψ)

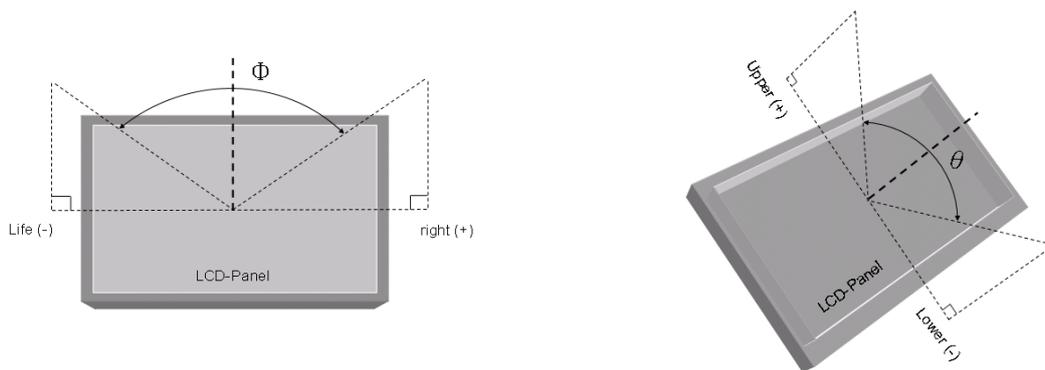


Fig. Definition of Viewing Angle

【Note5】

Use CPT LED Backlight

8. RELIABILITY TEST

8.1 Temperature and Humidity

TEST ITEMS	CONDITIONS
High Temp. Operation	85°C, 1000 hrs
High Temp. and Humidity Operation	60°C, 90%RH, 1000 hrs
Low Temp. Operation	-30°C, 1000 hrs
High Temp. Storage	90°C, 1000 hrs
Low Temp. Storage	-40°C, 1000 hrs
Thermal Shock (No operation)	-40°C <-> 85°C (各 0.5hr), 500 cycles
Temperature /humidity cyclic test	-10~65°C, 90~95%RH, 10 cycles

8.2 Shock and Vibration

ITEMS	CONDITIONS
Shock (Non-Operation)	<ul style="list-style-type: none"> 980m/s² (100G)6msec±XYZ 3Times each
Vibration (Non-Operation)	<ul style="list-style-type: none"> 10~500Hz 49m/s² (5G)8h × 3(±X、±Y、±Z) · 1.3mm

8.3 Electrostatic Discharge

TEST ITEM	CONDITIONS	NOTE
ESD (power off)	150pF · 150Ω · ±15kV air& contact test	1
	- (MM Mode) C = 200pF R = 0Ω min 200V 3Times	1
	- (HBM Mode) C = 100pF R = 1.5kΩ min 2000V 3Times	1

Note: Measure point

- LCD glass and metal bezel

8.4 Judgment Standard

The judgment of the above test should be made as follow :

Pass : Normal display image with no line defect.

Fail : No display image, or line defects.

9. WARRANTY

9.1 The period is within 12 months since the date of shipping out under normal using and storage conditions.

9.2 The warranty will be avoided in case of defect induced by customer.