

SPECIFICATION

Product Type: 7" TFT LCD Module

LCD Nunmber: CLAP070LF02CW

Module Number: 070- 251

CUSTOMER APPROVED	PREPARE BY	CHECK BY	APPROVED BY
SUPPLIER APPROVED	PREPARE BY	CHECK BY	APPROVED BY

REVISION STATUS

[illegible]

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1. OVERVIEW

CLAP070LF02CW is 7.0" color TFT-LCD (Thin Film Transistor Liquid Crystal Display) OLB module (finish outer lead bonding) composed of LCD panel and driver ICs (the backlight is not included in this OLB module).

The 7.0" screen produces 800(*3)X480 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)	154.08(H) × 85.92(V)
Number of Pixels	800(H) × 3(RGB) × 480(V)
Pixel Pitch (mm)	0.1926(H) × 0.1790(V)
Color Pixel Arrangement	RGB vertical stripe
Display Mode	Normally white
Number of color	16.2M
Response Time (Tr+Tf)	25ms (typ.)
Panel Transmittance (%)	5.1(typ)
Power Consumption(W)	327mW(typ.)
Surface Treatment	Anti-Glare, Hardness:3H

2. ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Min.	Max.	Unit	Note
Digital Supply Voltage	DVDD	-0.3	+5.0	V	
Analog Supply Voltage	AVDD	-0.5	+13.5	V	
Gate On Voltage	VDDG	-0.3	+42	V	
Gate Off Voltage	VEEG	-20	+0.3	V	
Gate On-Gate Off Voltage	VDDG-VEEG	12	40	V	
Operation Temperature	T _{op}	-20	70	°C	Note 1
Storage Temperature	T _{stg}	-30	80	°C	Note 1

Note1 : If users use the product out off the environmental operation range (temperature and humidity) , it will have visual quality concerns.

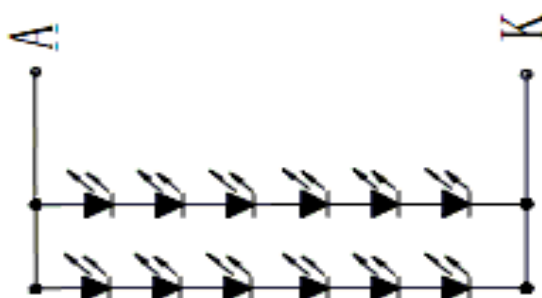
2.1 Backlight Unit:

PARAMETER	Sym.	Min.	Typ.	Max.	Unit	Test Condition	Note
LED Current	IF	–	140	–	mA	–	–
LED Voltage (Total)	VF	9	9.9	10.5	V	–	–
Life Time		–	25000	–	Hr.	I ≤ 140mA	–
Color	White						

Note (1) Permanent damage may occur to the LCD module if beyond this specification. Functional operation should be restricted to the conditions described under normal operating conditions.

(2) Ta=25±2°C

(3) Test condition: LED Current 140mA



Back-Light LED circuit

3. ELECTRICAL CHARACTERISTICS

3.1 Typical operation conditions

Ta=25°C

Item	Symbol	Min.	Typ.	Max.	Unit.	Note.
Digital Supply Voltage	DVDD	3	3.3	3.6	V	
Analog Supply Voltage	AVDD	9.4	9.6	9.8	V	
Gate On Voltage	VDDG	17	18	19	V	
Gate Off Voltage	VEEG	-6.6	-6	-5.4	V	
Common Voltage	VCOM	3.8	4	4.2	V	Note1
Logic Input Voltage	VIH	0.7DVDD	-	DVDD	V	
	VIL	GND	-	0.3DVDD	V	

Note1 : Please adjust VCOM to make the flicker level be minimum.

3.2 Current consumption

Item	Symbol	Condition	Min.	Typ.	Max.	Unit.	Note.
Gate on Current	IVDDG	VDDG =18 V	-	0.5	1	mA	Note1
Gate off Current	IVEEG	VEEG= -6 V	-	0.5	1	mA	Note1
Digital Current	IDVDD	DVDD = 3.3V	-	8	15	mA	Note1
Analog Current	IAVDD	AVDD = 9.6 V	-	30	40	mA	Note1
Total Power Consumption	PC		-	327	458	mW	Note1

Note1: Typ. specification : Gray-level test Pattern

Max. specification : Black test Pattern



(a)Gray-level Pattern

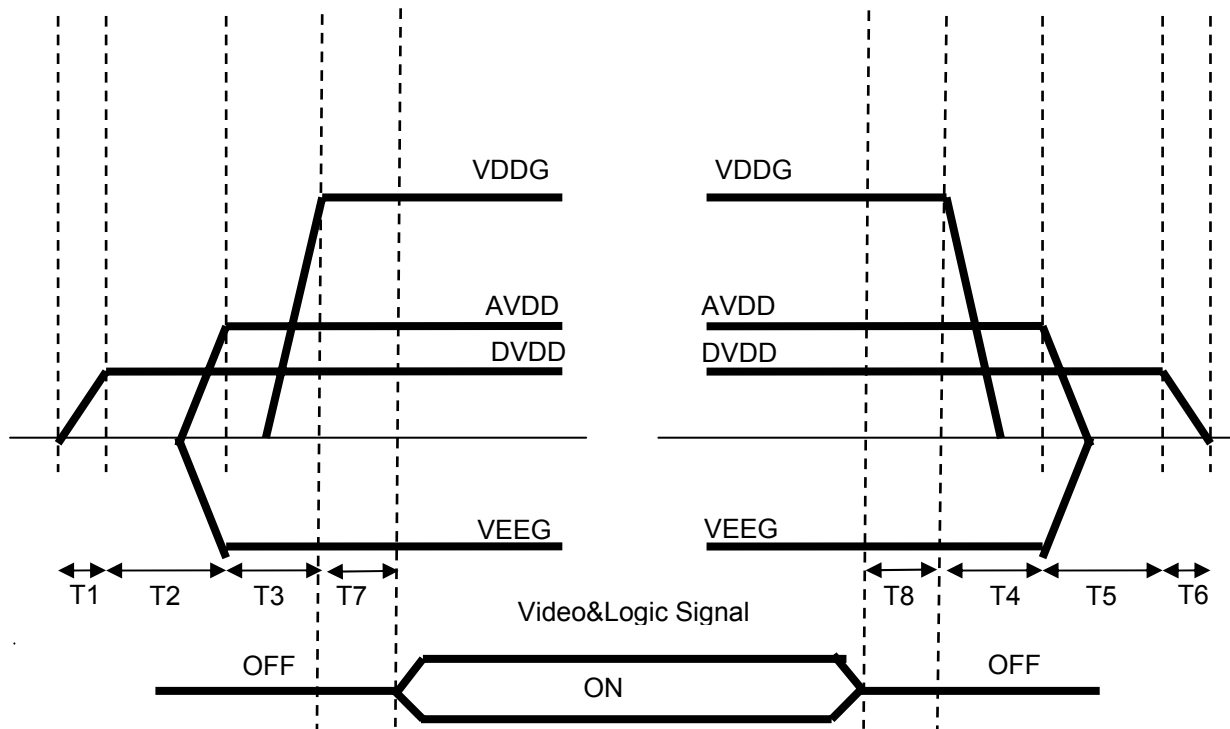


(b)Black Pattern

3.3 Power 、Signal sequence

Power On : DVDD→AVDD/VEEG→VDDG→Video & Logic Signal

Power Off : Video & Logic Signal→VDDG→AVDD/VEEG→DVDD



$$0 < T1 \leq 10\text{ms}$$

$$T2 > 20\text{ms}$$

$$T3 > 10\text{ms}$$

$$T4 > 0\text{ms}$$

$$T5 > 0\text{ms}$$

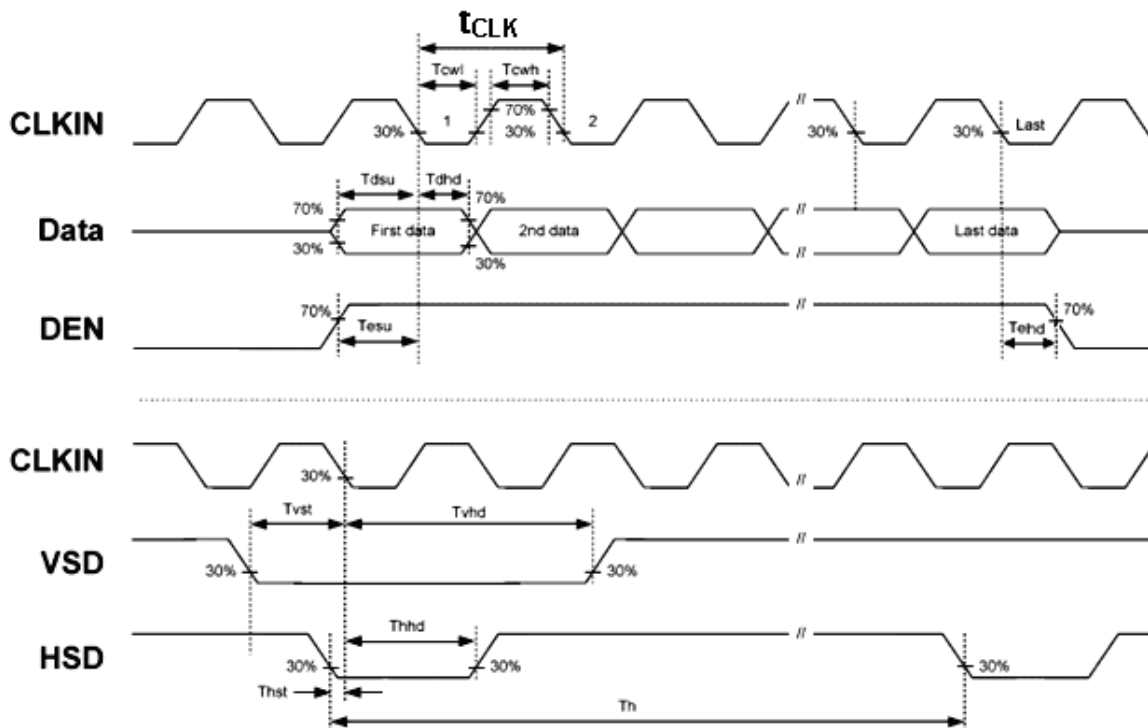
$$T6 > 0\text{ms}$$

$$0 < T7 \leq 10\text{ms}$$

$$0 < T8 \leq 10\text{ms}$$

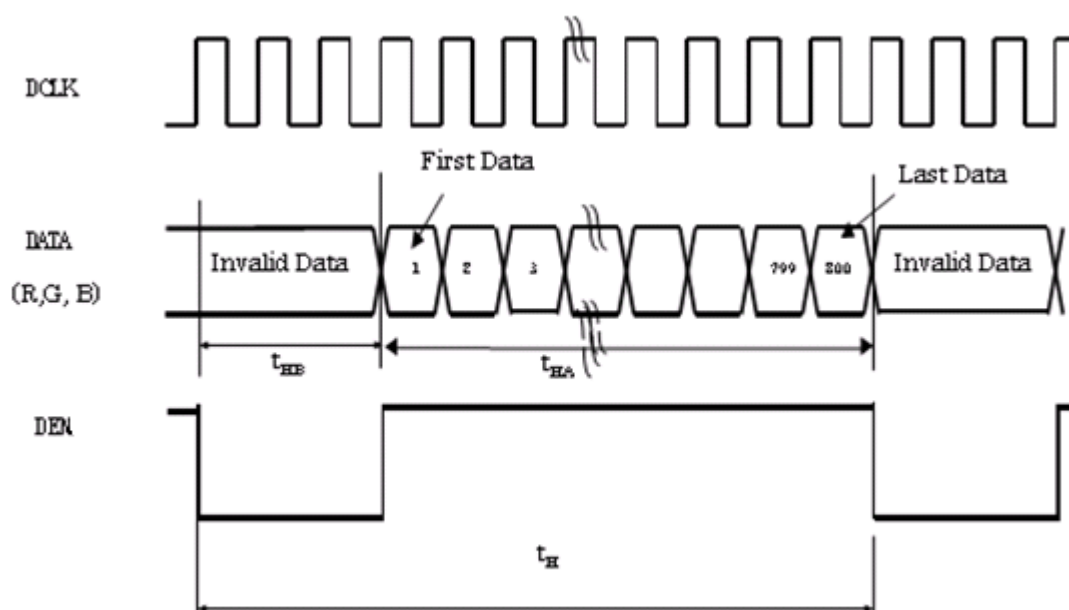
3.4 Timing characteristics of input signals

	ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	Note
DCLK	Dot Clock	$1/t_{CLK}$	29	33	38	MHz	
	DCLK pulse duty	T_{cwh}	40	50	60	%	
DE	Setup Time	T_{esu}	8	-	-	ns	
	Hold time	T_{ehd}	8	-	-	ns	
	Horizontal Period	t_H	1026	1056	1086	t_{CLK}	
	Horizontal Valid	t_{HA}	800			t_{CLK}	
	Horizontal Blank	t_{HB}	226	256	286	t_{CLK}	
	Vertical Period	t_V	515	525	535	t_H	
	Vertical Valid	t_{VA}	480			t_H	
	Vertical Blank	t_{VB}	35	45	55	t_H	
SYNC	HSYNC Setup Time	T_{hst}	8	-	-	ns	
	HSYNC Hold Time	T_{hhd}	8	-	-	ns	
	VSYNC Setup Time	T_{vst}	8	-	-	ns	
	VSYNC Hold Time	T_{vhhd}	8	-	-	ns	
	Horizontal Period	t_H	1026	1056	1086	t_{CLK}	
	Horizontal Pulse Width	t_{HPW}	-	30	-	t_{CLK}	$t_{HB} + t_{HPW} = 46DCLK$ is fixed
	Horizontal Back Porch	t_{HB}	-	16	-	t_{CLK}	
	Horizontal Front Porch	t_{HFP}	180	210	240	t_{CLK}	
	Horizontal Valid	t_{HD}	800			t_{CLK}	
	Vertical Period	t_V	515	525	535	t_H	
	Vertical Pulse Width	t_{VPW}	-	13	-	t_H	$t_{VPW} + t_{VB} = 23t_H$ is fixed
	Vertical Back Porch	t_{VB}	-	10	-	t_H	
	Vertical Front Porch	t_{VFP}	12	22	32	t_H	
	Vertical Valid	t_{VD}	480			t_H	
DATA	Setup Time	T_{dsu}	8	-	-	ns	
	Hold Time	T_{dhhd}	8	-	-	ns	

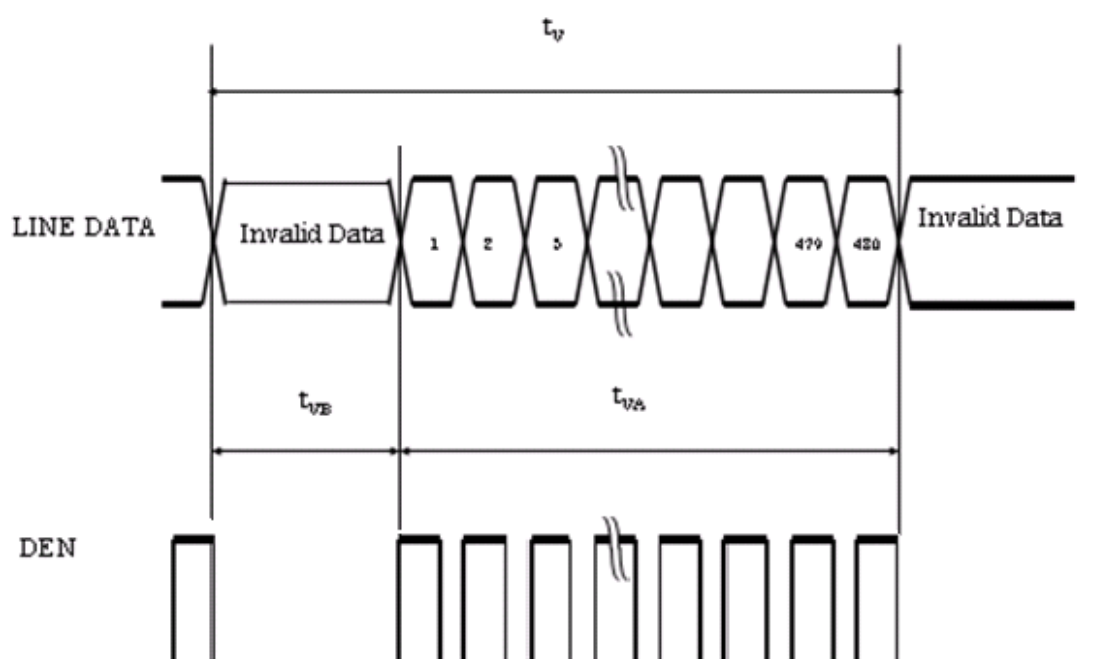


DE mode

Horizontal timing :

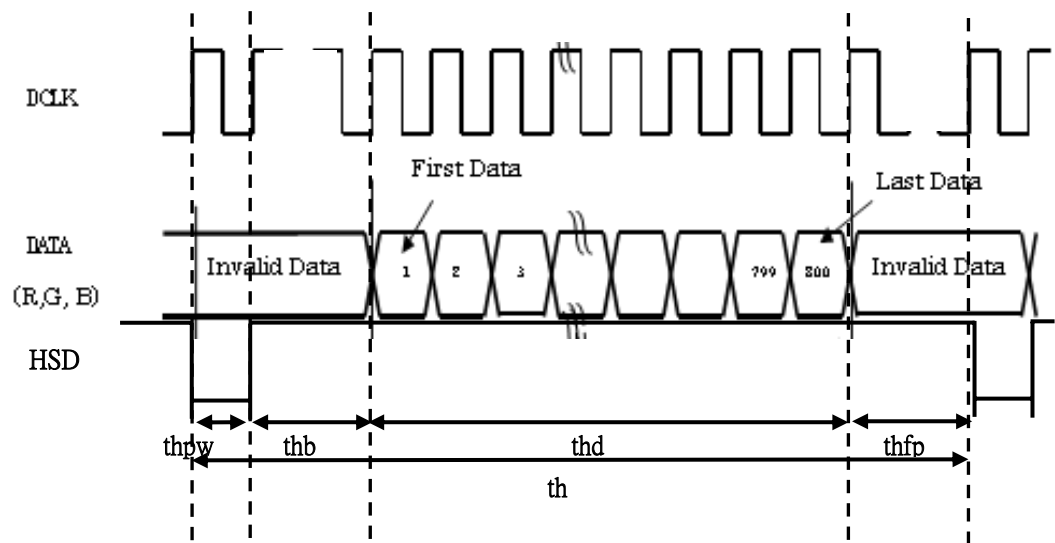


Vertical timing :

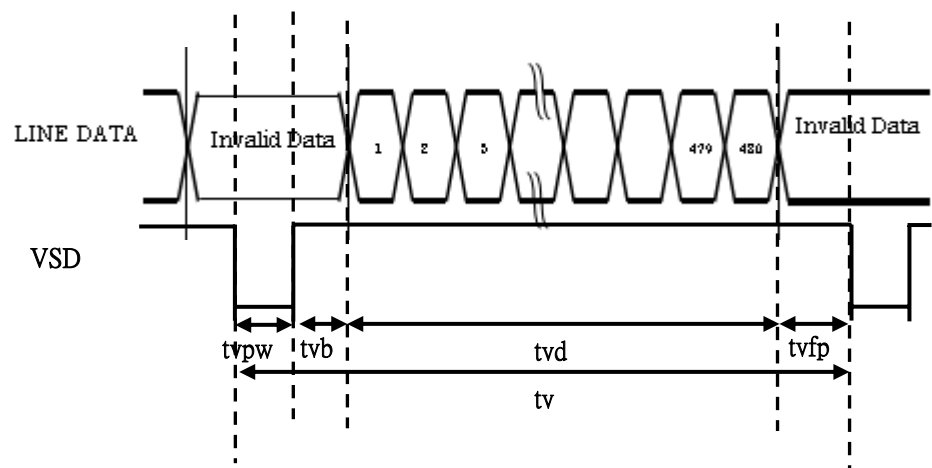


SYNC mode

Horizontal timing :



Vertical timing :



4. INTERFACE CONNECTION:

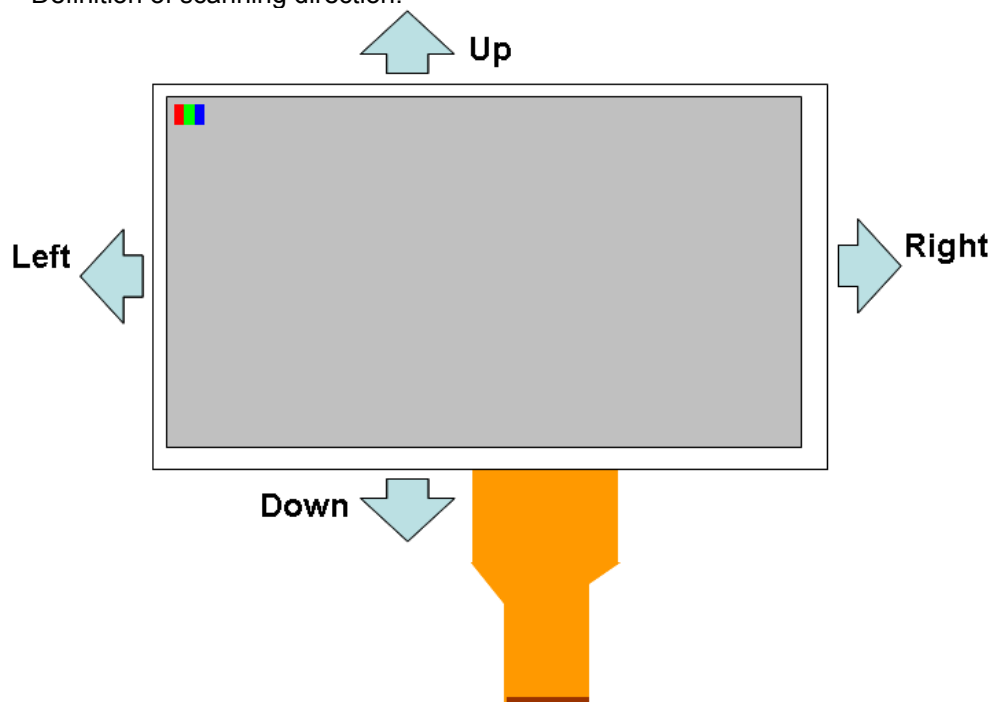
Pin No	Symbol	I/O	Function
1	V _{LED-}	P	Power for LED backlight cathode
2	V _{LED+}	P	Power for LED backlight anode
3	GND	P	Power ground
4	V _{DD}	P	Power voltage
5	R0	I	Red data (LSB)
6	R1	I	Red data
7	R2	I	Red data
8	R3	I	Red data
9	R4	I	Red data
10	R5	I	Red data
11	R6	I	Red data
12	R7	I	Red data (MSB)
13	G0	I	Green data (LSB)
14	G1	I	Green data
15	G2	I	Green data
16	G3	I	Green data
17	G4	I	Green data
18	G5	I	Green data
19	G6	I	Green data
20	G7	I	Green data (MSB)
21	B0	I	Blue data (LSB)
22	B1	I	Blue data
23	B2	I	Blue data
24	B3	I	Blue data
25	B4	I	Blue data
26	B5	I	Blue data
27	B6	I	Blue data
28	B7	I	Blue data (MSB)
29	GND	P	Power ground
30	DCLK	I	Pixel clock
31	NC	-	No connect
32	HSYNC	I	Horizontal sync signal
33	VSYNC	I	Vertical sync signal
34	DE	I	Data enable
35	NC	-	No connect
36	GND	P	Power ground
37	X _R	I/O	Right electrode - differential analog
38	Y _B	I/O	Bottom electrode - differential analog
39	X _L	I/O	Left electrode - differential analog
40	Y _T	I/O	Top electrode - differential analog

I/O: I: input, O: output, P: power

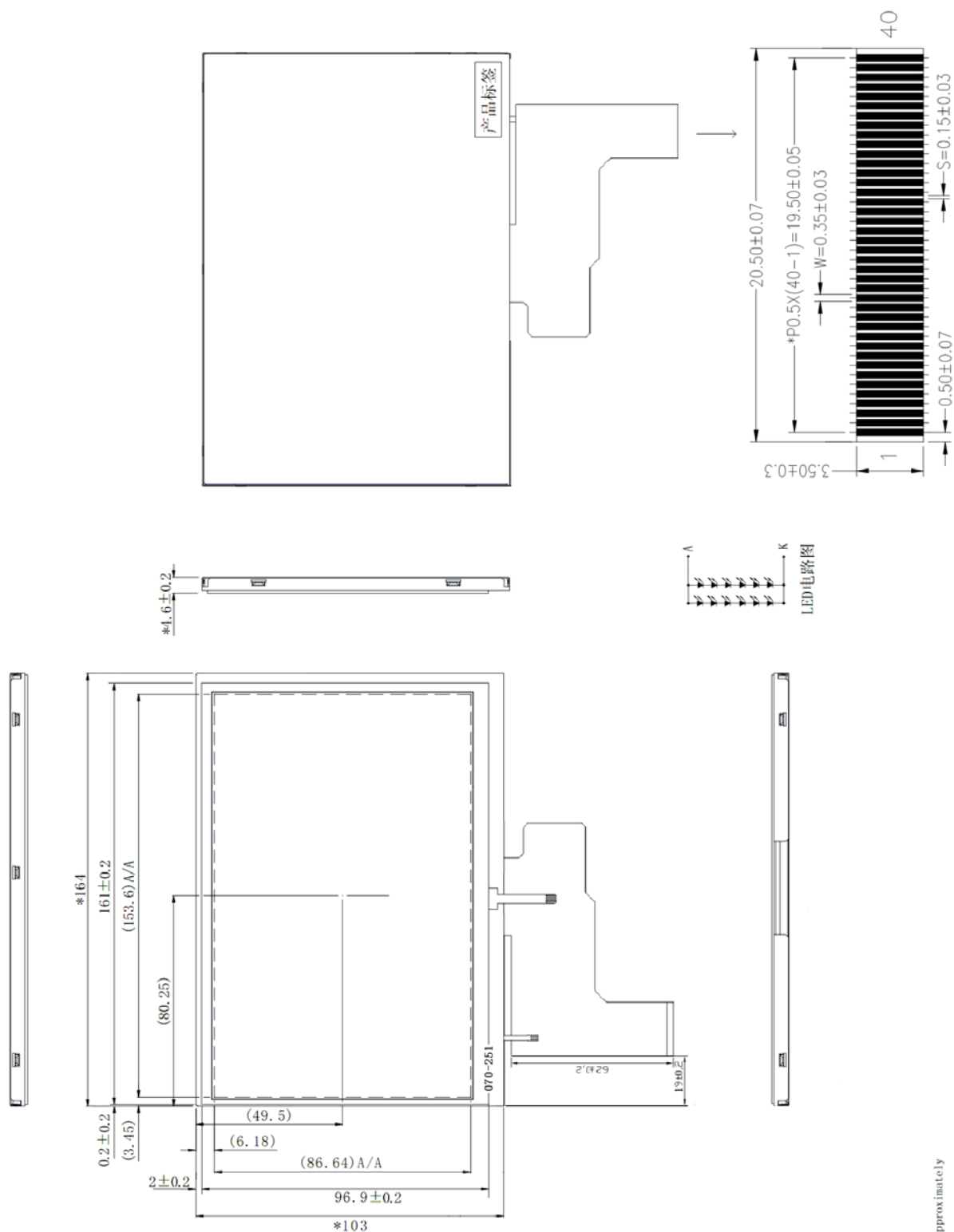
【Note1】 SHLR : left or right setting
UPDN : up or down setting

SHLR	UPDN	Data shifting
DVDD	GND	Left→Right , Up→Down(default)
GND	GND	Right→Left , Up→Down
DVDD	DVDD	Left→Right , Down→Up
GND	DVDD	Right→Left , Down→Up

Definition of scanning direction.



5. MECHANICAL DIMENSION



- Notes:
1. Unit: mm
 2. Do not scale drawing.
 3. All radii without dimension R0.2
 4. Luminous intensity (9 AVG): 200cd/m² (Min); 250cd/m² (Typ); 5. Uniformity: 75% (Min)
 6. The color coordinates: VF: 9V (Min); 9.9V (Typ); 10.5V (Max); IF: 140mA (Fix)
 7. Δ Modification rev. number
 8. draft angle 1.0°
 9. General Tolerance: ± 0.2
 10. Mark mold cavity identification in recess approximately where indicated.
 11. "*" For important dimension; () for reference dimension
 12. Rolls must be complied. (Use Lead-free process)

	MIN	TYP	MAX
X	0.30	0.32	0.34
Y	0.32	0.34	0.36

6. OPTICAL CHARACTERISTICS

(Use CPT LED backlight)

Ta=25°C

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Panel Transmittance		T	—	4.8	5.1	--	%	
Response Time		Tr +Tf	Point-5	--	25	35	ms	1
Viewing Angle	Horizontal	ϕ	Point-5 CR $\geq$ 10	120	140	--	°	2
	Vertical	θ		100	120	--	°	2
Color Filter Chromaticity	White	x	$\theta = \phi = 0^\circ$	0.273	0.313	0.353		3
		y		0.289	0.329	0.369		3
	Red	x	$\theta = \phi = 0^\circ$	(0.562)	(0.602)	(0.642)		3
		y		(0.297)	(0.337)	(0.377)		3
	Green	x	$\theta = \phi = 0^\circ$	(0.309)	(0.349)	(0.389)		3
		y		(0.547)	(0.587)	(0.627)		3
	Blue	x	$\theta = \phi = 0^\circ$	(0.123)	(0.163)	(0.203)		3
		y		(0.074)	(0.114)	(0.154)		3

Note 1: Definition of Response Time.(White-Black)

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

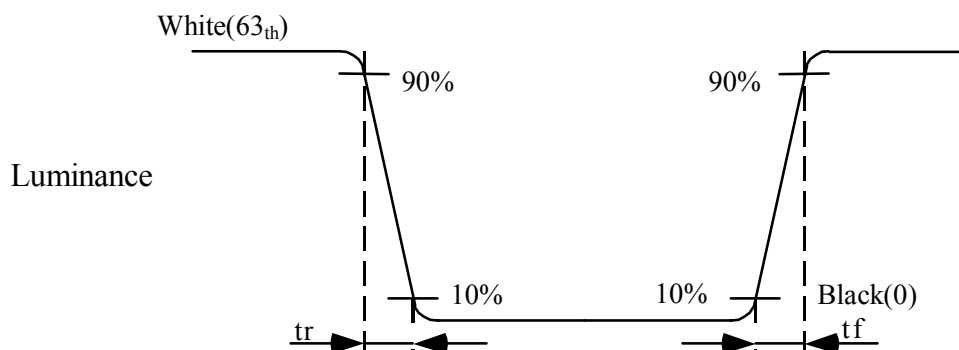


Fig. 6-1 Measuring point

Note 2: Definition of Viewing Angle(θ, ψ)

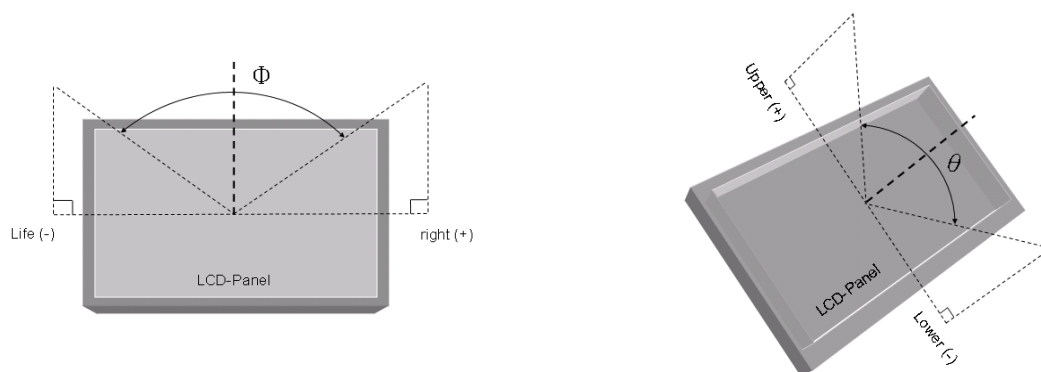


Fig.6-2 Definition of Viewing Angle

Note 3: Under C light

7. RELIABILITY TEST

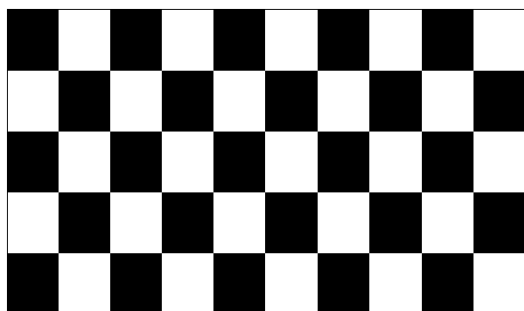
(These tests are conducted with CPT backlight.)

7.1 Temperature and Humidity

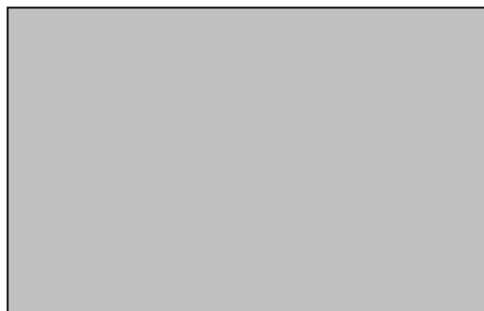
TEST ITEMS	CONDITIONS	NOTE
High Temperature Operation	70℃ ; 240hrs	
High Temperature Storage	80℃ ; 240hrs	
High Temperature High Humidity Operation	60℃ ; 90%RH ; 240hrs (No condensation)	
Low Temperature Operation	-20℃ ; 240hrs	
Low Temperature Storage	-30℃ ; 240hrs	
Thermal Shock	-30℃ (0.5hr) ~ 80℃ (0.5hr) ; 200 Cycles	Non-Operating
Image Sticking	25℃ ; 4hrs	1

Note 1: Condition of Image Sticking test : 25℃±2℃

Operation with test pattern sustained for 4 hrs, then change to gray pattern immediately.
After 5 mins, the mura must be disappeared completely .



(a) Test Pattern (chess board Pattern)



(b) Gray Pattern

7.2 Shock and Vibration

ITEMS	CONDITIONS
Shock (Non-Operation)	● Shock level : 980m/s²(equal to 100G). ● Waveform : 1/2 Sine wave,6msec ● ±X , ±Y , ±Z , each axis 1 times
Vibration (Non-Operation)	● Frequency range : 8~33.3Hz ● Stoke : 1.3 mm ● Vibration : sinusoidal wave, perpendicular axis (both x, z axis:2Hrs, y axis 4Hrs). ● Sweep : 2.9G, 33.3 Hz -400 Hz ● Cycle : 15 min

7.3 Electrostatic Discharge

TEST ITEM	CONDITIONS	NOTE
ESD	150pF , 330Ω , ±8kV&±15kV air& contact test	1
	200pF , 0Ω , ±200V contact test	2

Note: Measure point :

1. LCD glass and metal bezel
2. IF connector pins

7.4 Judgment Standard

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

Pass: Normal display image with no obvious non-uniformity and no line defect.

Partial transformation of the module parts should be ignored.

Fail: No display image, obvious non-uniformity, or line defects.