



APPROVAL SHEET

承 认 书

Customer 客户名称	
Part NO. 产品型号	FSD7650B-48-1Z
Product type 产品内容	Mode: Transmissive type .Normally white. TFT LCD Module LCD Module: Graphic 800RGB*480Dot-matrix
Remarks 备注栏	☐ APPROVAL FOR SEPCIFICATIONS ONLY ☒ APPROVAL FOR SEPCIFICATIONS AND SAMPLE
Signature by Customer: 客户确认签章	

LEAGEND LCM R&D CENTER:

Technical Department: 研发部门	Quality Assurance Department 质量保证部门	Approved by:核准
Iijian	LaiYong	Kevin

TEL : 0755-23113466/23113566 FAX : 0755-23118799

Email: fortda@163.com

Http: www.sz-ftd.com

深圳地址：深圳市宝安区西乡街道西乡奋达科技创新园D栋五楼

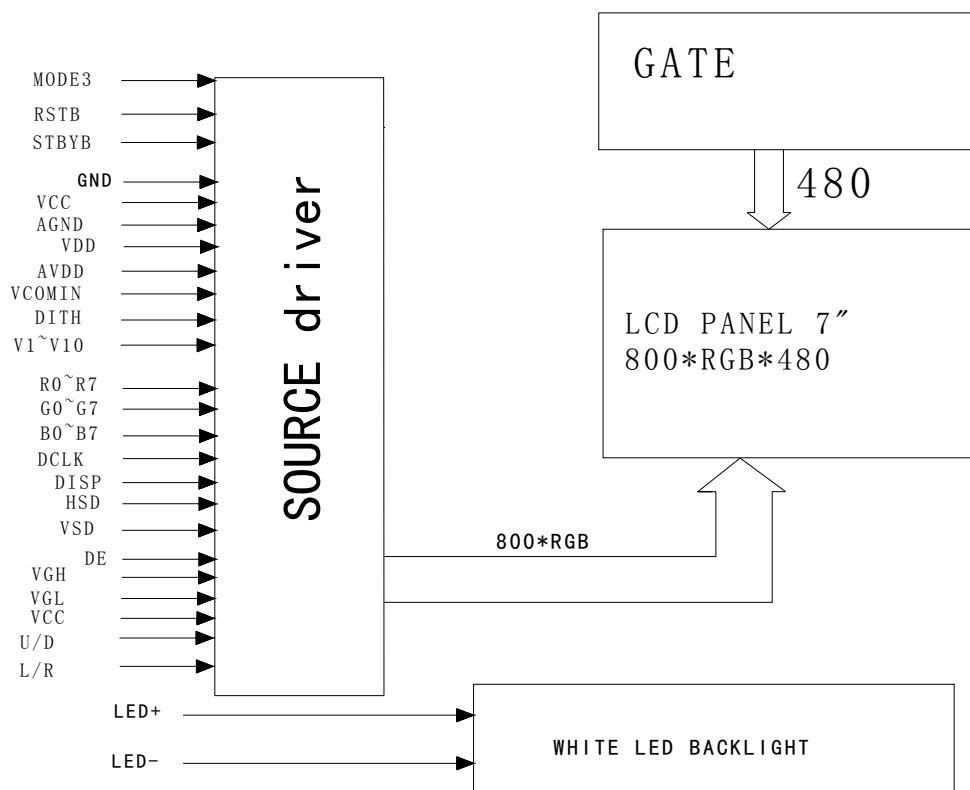
福建地址：福建省龙岩市武平县武平工业园区工业大道16号I栋



1. PHYSICAL DATA

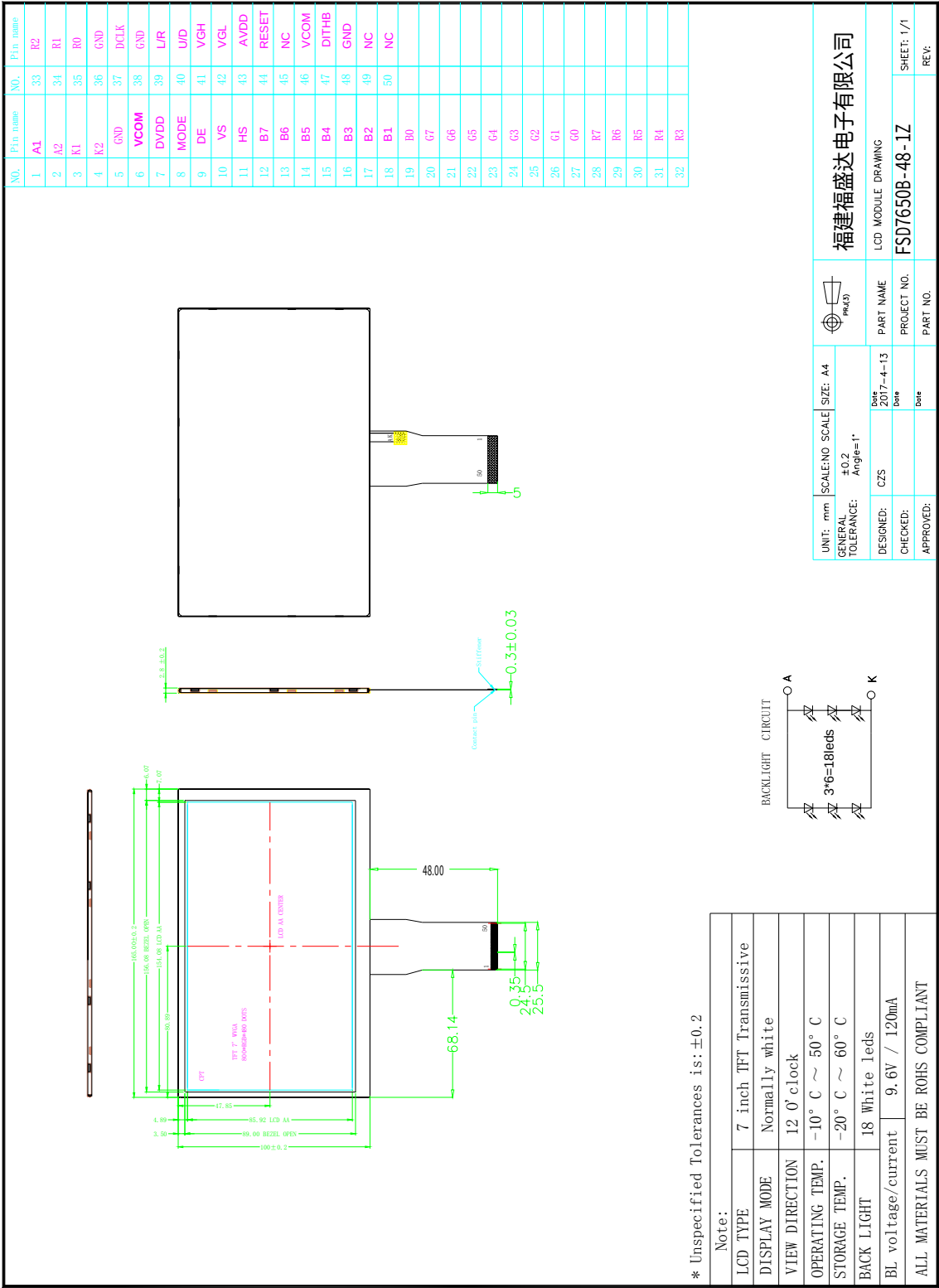
Item	Contents	Unit
LCD type	BOE	---
Viewing direction	12	o'clock
Module size (W×H×T)	165 × 100 × 2.8	mm ³
Active area(W×H)	154.08×85.92	mm ²
Number of dots(W×H)	800(RGB) × 480	dots
Pixel Pitch(W×H))	0.1926(H)×0.179(V)	mm
Colors	16.7M	---
Backlight Type	18 white leds 9.6V/120mA	---
Interface Type	RGB	---

2. BLOCK DIAGRAM





3. Mechanical Dimension





4. Pin Descriptions

Pin No.	Symbol	Functional
1	LED A	LED Anode
2	LED A	LED Anode
3	LED K	LED Cathode
4	LED K	LED Cathode
5	GND	Digital Ground
6	VCOM	For external VCOM DC input
7	DVDD	Digital Power
8	MODE	DE/SYNC mode select MODE=H: DE mode(normally pull high) MODE=L: HSD/VSD mode
9	DE	Data enable signal
10	VSYNC	Vertical sync input.
11	HSYNC	Horizontal sync input
12~19	B7~B0	Blue data Input
20~27	G7~G0	Green data Input
28~35	R7~R0	Red data Input
36	GND	Digital Ground
37	DCLK	Clock input
38	GND	Digital Ground
39	L/R	Source right or left sequence control SHLR=H: right shift, Left → Right SHLR=L: left right, Right → Left
40	U/D	Gate up or down scan control UPDN=H: up shift, Down → Up UPDN=L: down shift, Up → Down
41	VGH	Positive Power for TFT
42	VGL	Negative Power for TFT
43	AVDD	Analog Power
44	RSTB	Global reset pin.Active low to enter reset state Suggest to connecting with an RC reset circuit for stability. Normally pull high. (RC circuit :R=10K Ω , C=1uF)
45	NC	Not connect
46	VCOM	For external VCOM DC input
47	DITHB	Dithering setting
48	GND	Digital Ground
49	NC	Not connect
50	NC	Not connect



5. ABSOLUTE MAXIMUM RATINGS

5.1 Absolute maximum ratings

Parameter	Symbol	Min	Max	Unit
Power supply1	V _{DD}	-0.6	+3.6	V
Power supply2	A _{vdd}	-0.5	+13.85	V
Operating temperature	T _{OPR}	-10	50	°C
Storage temperature	T _{STG}	-20	60	°C

5.2 Typical operation conditions

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	

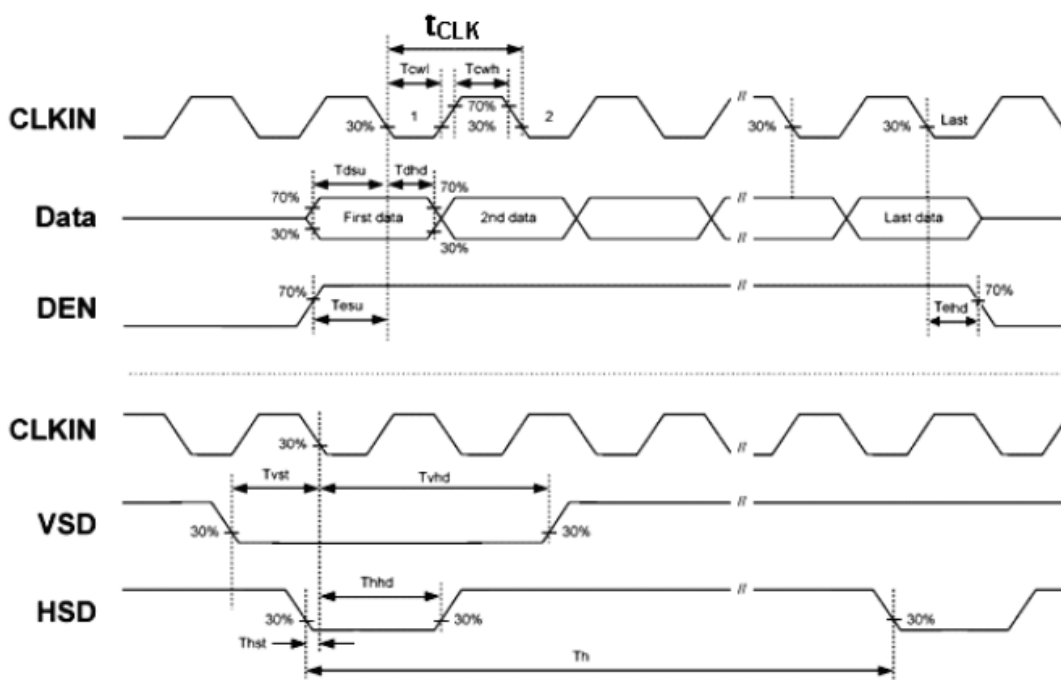
Note1 : Please adjust VCOM to make the flicker level be minimum.



6. Timing Characteristics of input single

Input timing table

	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_{vhd}	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_{dhd}	8	-	-	ns	

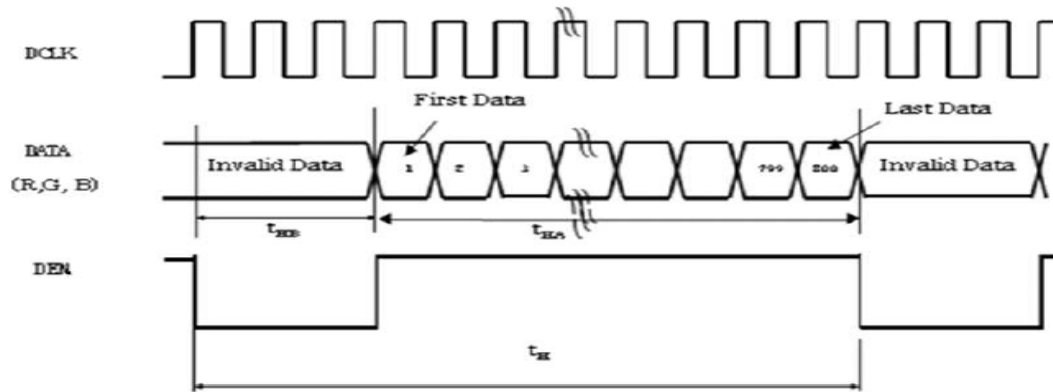




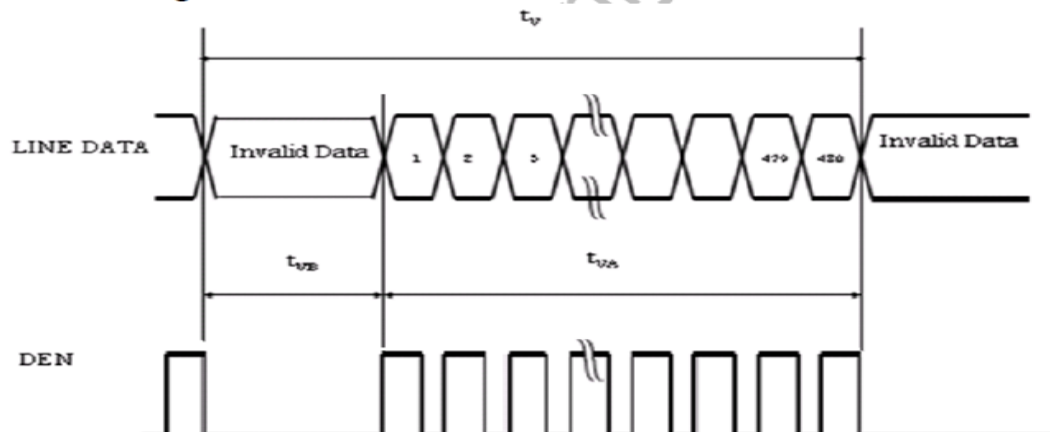
7. Timing sequence(timing chart)

7.1 DE mode

Horizontal timing :



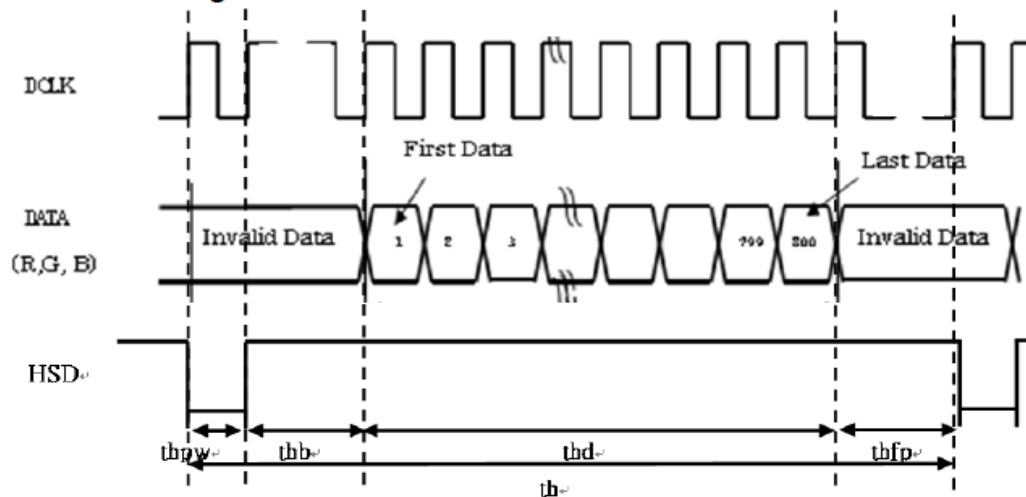
Vertical timing :



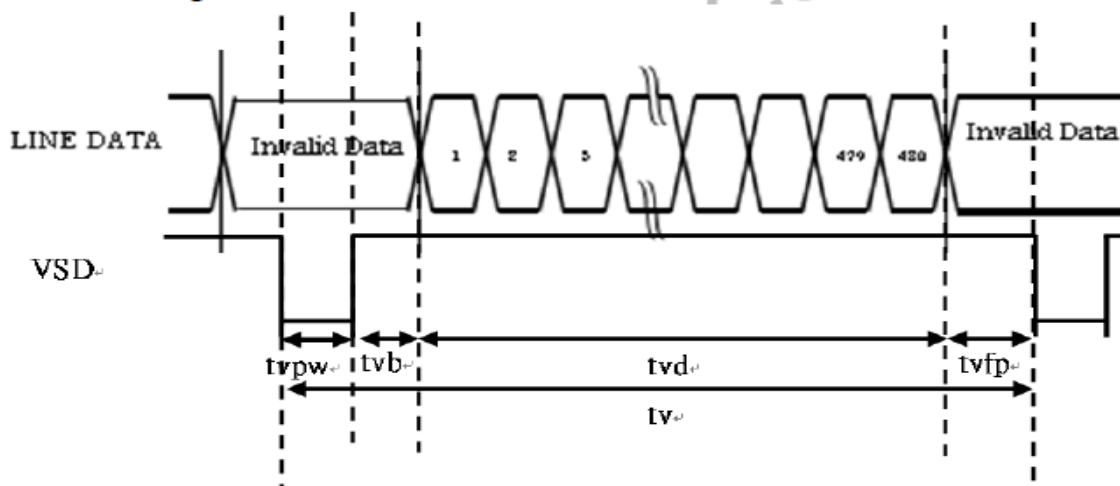


7.2 SYNC mode

Horizontal timing :

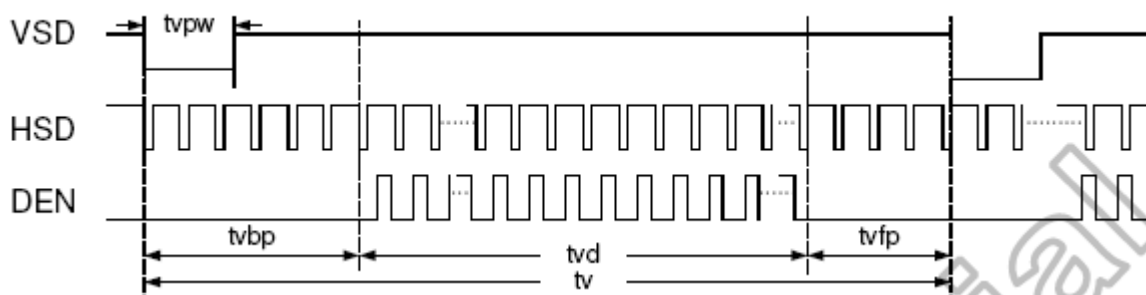


Vertical timing :



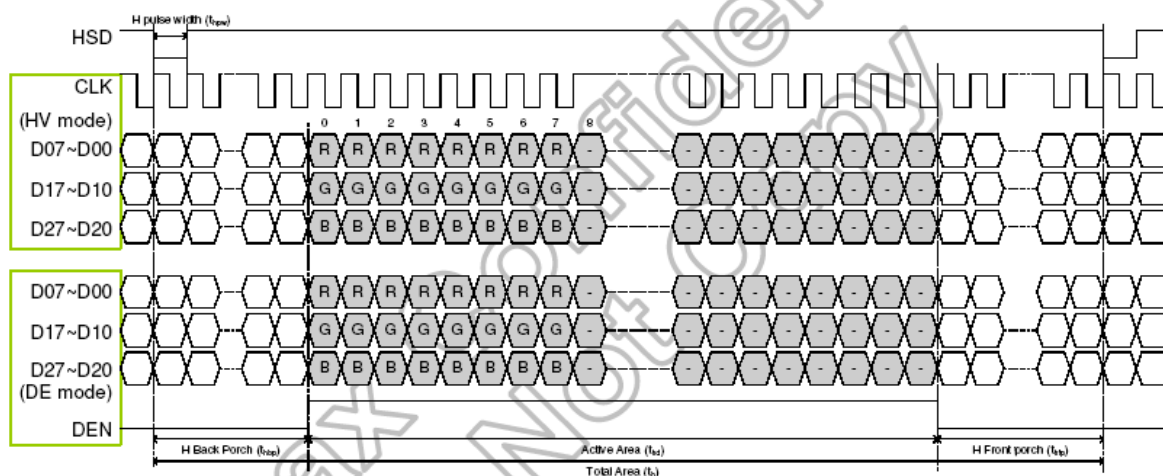
8. Data input format for RGB

Vertical input Timing





Horizontal input Timing



9. Backlight Characteristic

Item	Symbol	Min	Typical	Max	Unit
LED module Forward voltage	V_{LED}	--	9.6	--	V
LED module current	I_{LED}	--	140	--	mA
L/G Surface Luminance ★1	L_s		200		mcd
LCM Surface brightness uniform ★2	L_D	80	--	--	%

★ 1 Test condition is:

(a) Center point on active area.

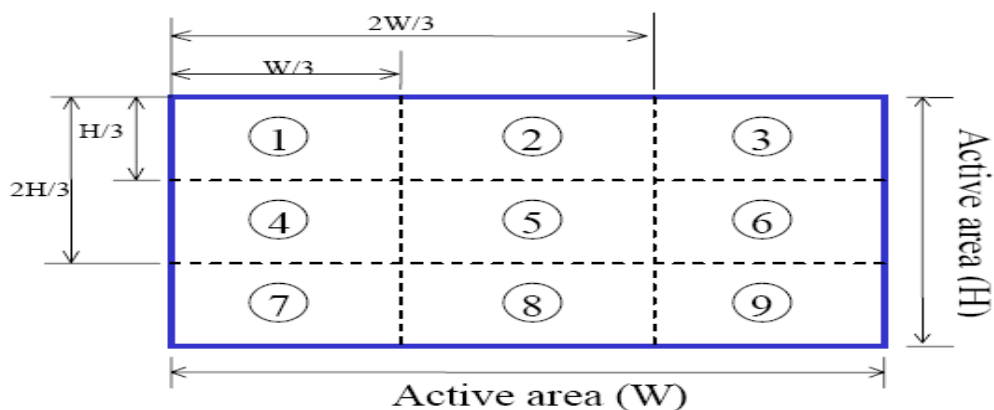
(b)Best Contrast.

★2 Uniform measure condition:

(1)Measure 9 point. Measure location show below;

(2)Uniform=(Min. brightness /Max. brightness)*100%

(3)Best Contrast.





10.Electro-optical Characteristics

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 ≥ 10	120	140	--	°	2
	Vertical	θ		100	120	--	°	2
Color Filter Chromacity	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.

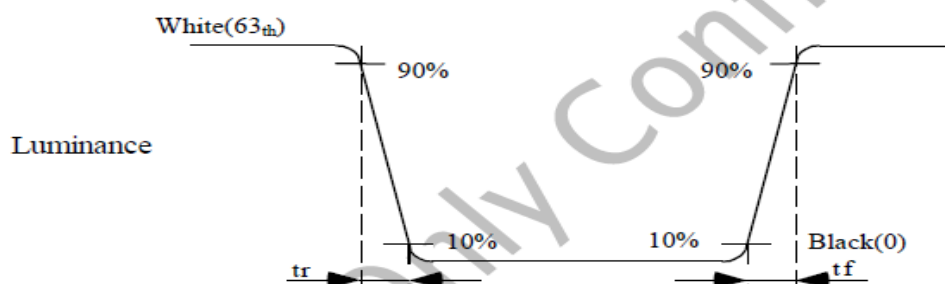


Fig. 6-1 Measuring point

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

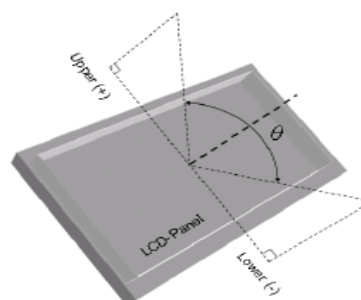
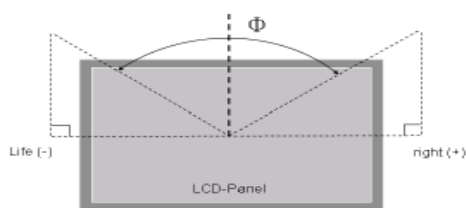


Fig.6-2 Definition of Viewing Angle

Note 3: Under C light



11. Reliability

11.1 Test condition

NO.	ITEM	CONDITION	CRITERION
1	High Temperature Non-Operating Test	60℃*240Hrs	。 No Defect Of Operational Function In Room Temperature Are Allowable
2	Low Temperature Non-Operating Test	-20℃*240Hrs	
3	High Temperature/Humidity Non Operating Test	60℃*90%RH*240Hrs	
4	High Temperature Operating Test	50℃*240Hrs	
5	Low Temperature Operating Test	-10℃*240Hrs	
6	Thermal Shock Test	-10℃ (30Min) ~50℃ (30Min) *10CYCLES	。 IDD of LCM in Pre-and Post-Test Should Follow Specification

11.2 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

11.3 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



12.Precautions for using LCD modules.

12.1 Safety

- (1) Do not swallow any liquid crystal, even if there is no proof that liquid crystal is poisonous.
- (2) If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.
- (3) If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.

12.2 Storage Conditions

- (4) Store the panel or module in a dark place where the temperature is $23 \pm 5^{\circ}\text{C}$ and the humidity is below $45 \pm 20\% \text{RH}$.
- (5) Store in anti-static electricity container.
- (6) Store in clean environment, free from dust, active gas, and solvent.
- (7) Do not place the module near organics solvents or corrosive gases.
- (8) Do not crush, shake, or jolt the module.

12.3 Handling Precautions

- (9) Avoid static electricity, which can damage the CMOS LSI.
- (10) The polarizing plate of the display is very fragile, please handle it very carefully.
- (11) Do not give external shock.
- (12) Do not apply excessive force on the surface.
- (13) Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.
- (14) Do not use ketonic solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.
- (15) Do not operate it above the absolute maximum rating.
- (16) Do not remove the panel or frame from the module.

12.4 Warranty

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