SPECIFICATION
FOR
LCD MODULE

Customer : _____

Product Model: YH070BS5002-V02

Sample code: T7S150B-B23

Designed by	Checked by	Approved by

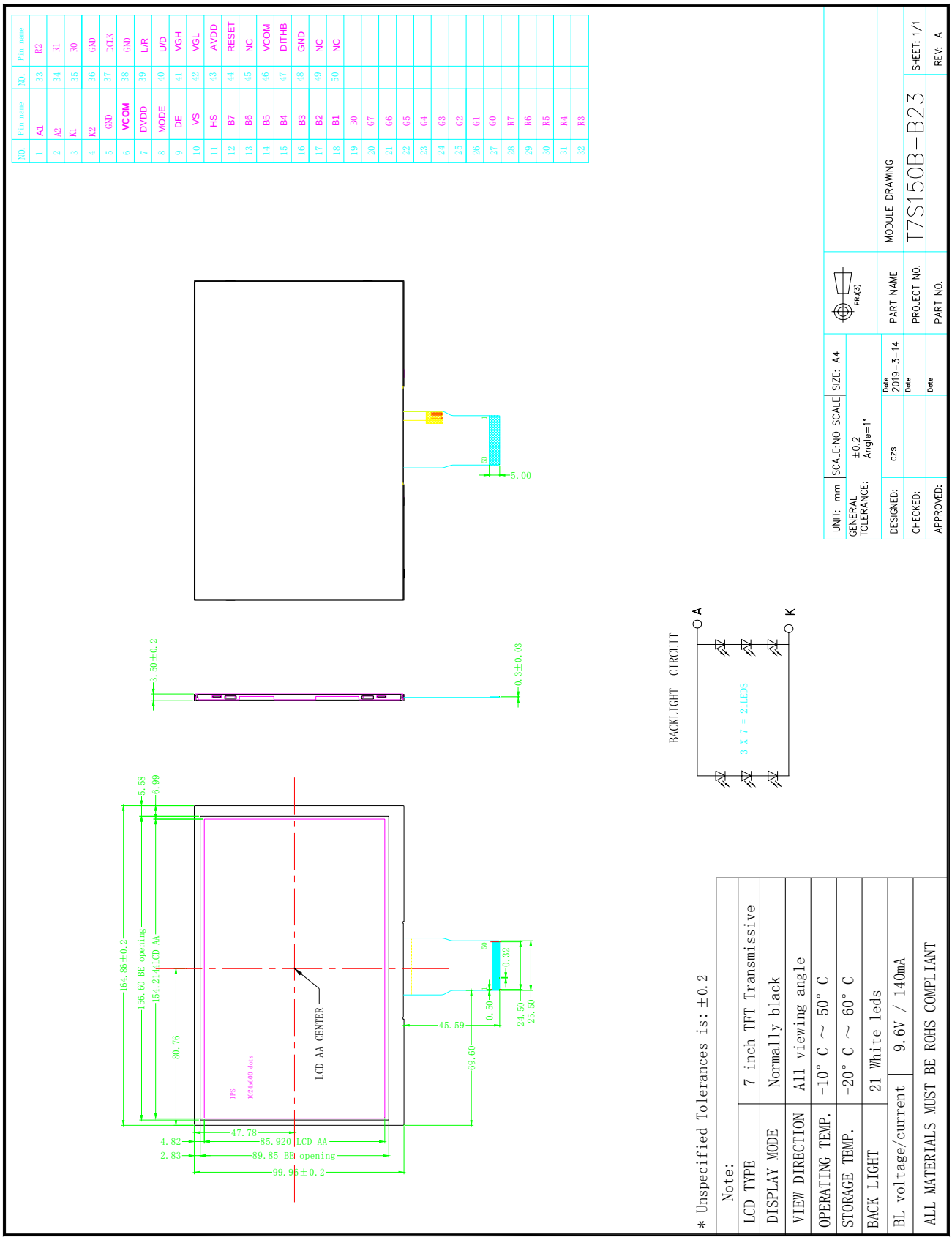
Final Approval by Customer

☐ **LCM Machinery OK** Checked By _____ ☐ **LCM Display OK** Checked By _____	☐ **LCM OK** ☐ **NG，Problem survey:** Approved By _____

1. PHYSICAL DATA

Item	Contents	Unit
LCD type	TFT TRANSMISSIVE	---
Viewing direction	All	o'clock
Module size (W×H×T)	165 × 100 × 3.5	mm^3
Active area(W×H)	154.2144×85.92	mm^2
Number of dots(W×H)	1024(RGB) × 600	dots
Pixel Pitch(W×H))	0.1506×0.1432	mm
Driver IC	HX8282-A11	---
Colors	16.7M	---
Backlight Type	21 white leds 9.6V 140mA	---
Interface Type	RGB	---

2. Mechanical Dimension



3. 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.Negative polarity
11	HSYNC	Horizontal sync input.Negative polarity
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=10KΩ， 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

4. OPERATION SPECIFICATION

4.1 Absolute maximum ratings

Parameter	Symbol	Min	Max	Unit
Power supply1	V_{DD}	-0.5	+3.96	V
Power supply2	Avdd	-0.5	+13.8	V
Operating temperature	T_{OPR}	-10	50	℃
Storage temperature	T_{STG}	-20	60	℃

4.2 Input voltage

VGH	18V
VGL	-6V
AVDD	9.6V
VCOM	3.2V +/-0.1

Note: Please adjust Vcom to make the flicker level be minimum

5. DC ELECTRICAL CHARACTERISTICS

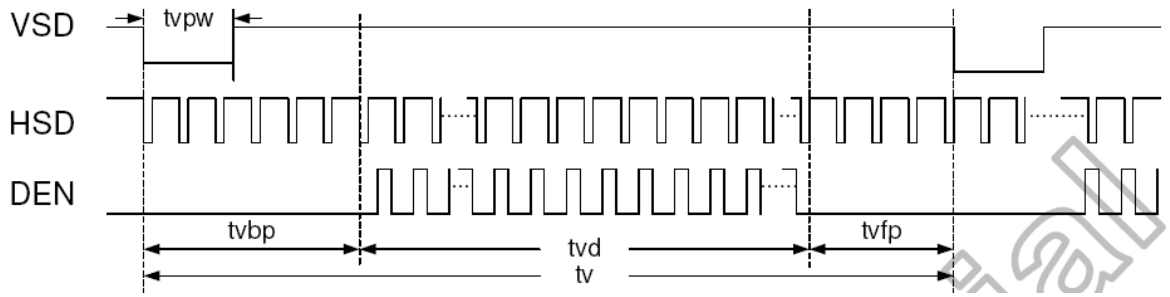
Parameter	Symbol	Spec.			Unit	Condition
		Min.	Typ.	Max.		
Power supply voltage	VDD	2.3	-	3.6	V	-
Power supply voltage	AVDD	6.5	-	13.5	V	-
Power supply voltage	AVDDL	6.5	-	13.5	V	Full range application
		4	-	6.75	V	Half AVDD application
Power supply voltage	AGNDH	0			V	Full range application
		4	-	6.75	V	Half AVDD application
Low level input voltage	V_{IL}	0	-	0.3VDD	V	For digital circuit
High level input voltage	V_{IH}	0.7VDD	-	VDD	V	For digital circuit
Output low voltage	V_{OL}	-	-	GND+0.4	V	I_{OL}=400μA
Output high voltage	V_{OH}	VDD-0.4	-	-	V	I_{OH}=-400μA
Pull low/high resistance	R_i	200	250	300	kΩ	For the digital input pin @VDD=3.3V
Input leakage current	Ii	-	-	±1	uA	For digital circuit
Digital Operation current	Idd	-	12	20	mA	Fclk=50MHz, LD=48KHz,VDD=3.3V, No load
Digital stand-by current	Ist1	-	10	50	μA	Clock & all functions are stopped
Analog Operating current	Idda	-	8	10	mA	No load, Fclk=50MHz,LD=48KHz @ AVDD=10V, V1=8V, V14=0.4V
Analog Stand-by current	Ist2	-	10	50	μA	No load, clock & all functions are stopped
Input level of V1~V7	Vref1	0.4AVDD	-	AVDD-0.1	V	Gamma correction voltage input
Input level of V8~V14	Vref2	0.1	-	0.6AVDD	V	Gamma correction voltage input
Output Voltage deviation	Vod1	-	±20	±35	mV	Vo=AGND+0.1V~AGND+0.5V & Vo=AVDD-0.5V~AVDD-0.1V
Output Voltage deviation	Vod2	-	±15	±20	mV	Vo=AGND+0.5V~AVDD-0.5V
Output Voltage Offset between Chips	Voc	-	-	±20	mV	Vo=AGND+0.5V~AVDD-0.5V
Dynamic Range of Output	Vdr	0.1	-	AVDD-0.1	V	SO1~SO1200
Sinking Current of Outputs	IOLy	80	-	-	μA	SO1~SO1200; Vo=0.1V vs. 1.0V, AVDD=13.5V
Driving Current of Outputs	IOHy	80	-	-	μA	SO1~SO1200 ;Vo=0.1V vs. 12.5V, AVDD=13.5V
Resistance of Gamma Table	Rg	0.7*Rn	1.0*Rn	1.3*Rn	Ω	Rn: Internal gamma resistor

6. AC ELECTRICAL CHARACTERISTICS

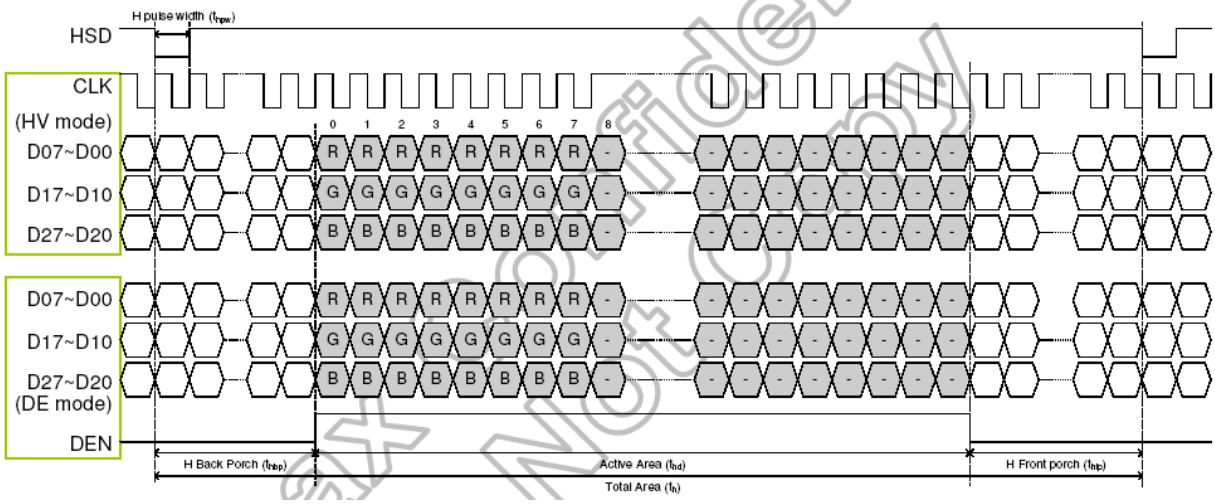
Parameter	Symbol	Spec.			Unit	Condition
		Min.	Typ.	Max.		
VDD Power On Slew rate	T_{POR}	-	-	20	ms	From 0V to 90% VDD
RSTB pulse width	T_{Rst}	50	-	-	µs	DCLK=65MHz
DCLK cycle time	T_{cph}	14	-	-	ns	-
DCLK pulse duty	T_{cwh}	40	50	60	%	-
VSD setup time	T_{vst}	5	-	-	ns	-
VSD hold time	T_{vhd}	5	-	-	ns	-
HSD setup time	T_{hst}	5	-	-	ns	-
HSD hold time	T_{hhd}	5	-	-	ns	-
Data set-up time	T_{dsu}	5	-	-	ns	D0[7:0], D1[7:0], D2[7:0] to DCLK
Data hold time	T_{dhd}	5	-	-	ns	D0[7:0], D1[7:0], D2[7:0] to DCLK
DE setup time	T_{esu}	5	-	-	ns	-
DE hold time	T_{ehd}	5	-	-	ns	-
Output stable time	T_{sst}	-	-	6	µs	10% to 90% target voltage. CL=90pF, R=10K ohm (Cascade)
				3		Dual gate

7. Data input format

Vertical input timing



Horizontal timing



- **DE mode**

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK Frequency	fclk	40.8	51.2	67.2	MHz
Horizontal Display Area	thd		1024		DCLK
HSD Period	th	1114	1344	1400	DCLK
HSD Blanking	thb+ thfp	90	320	376	DCLK
Vertical Display Area	tvd		600		T_H
VSD Period	tvbp	610	635	800	T_H
VSD Blanking	tvbp+ tvfp	10	35	200	T_H

- **HV mode**

Horizontal timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK Frequency	fclk	44.9	51.2	63	MHz
Horizontal Display Area	thd		1024		DCLK
HSD Period	th	1200	1344	1400	DCLK
HSD Pulse Width	thpw	1	-	140	DCLK
HSD Back Porch	thbp		160		DCLK
HSD Front Porch	thfp	16	160	216	DCLK

Vertical Timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Vertical Display Area	tvd		600		T_H
VSD Period	tv	624	635	750	T_H
VSD Pulse Width	tvpw	1	-	20	T_H
VSD Back Porch	tvbp		23		T_H
VSD Front Porch	tvfp	1	12	127	T_H

8. Backlight Characteristic

Item	Symbol	Min	Typical	Max	Unit
LED module Forward voltage	**V_{LED}**	**--**	**9.3**	**9.6**	**V**
LED module current	**I_{LED}**	**--**	**140**	**--**	**mA**
LCM Surface Luminance ★1	**L_S**	**--**	**TBD**	**--**	mcd
LCM Surface brightness uniform ★2	**L_D**	**80**	**--**	**--**	%

★ 1 Test condition is:

(a) Center point on active area.

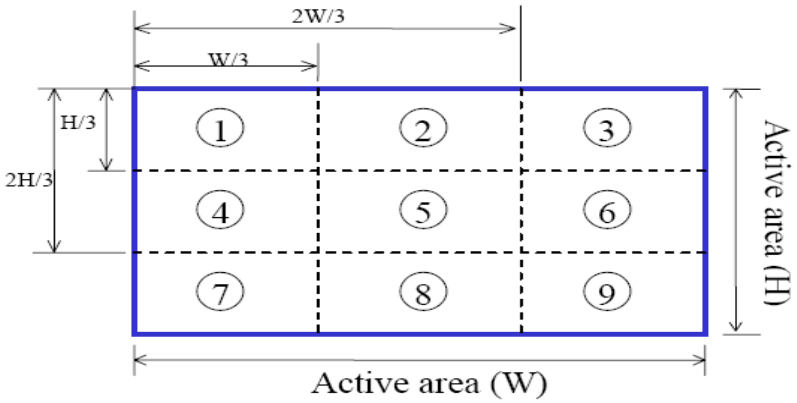
(b)Best Contrast.

★2 Uniform measure condition:

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

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

(3)Best Contrast.



9. Electro-optical Characteristics

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing angle range	Hor.	ϕ3	CR≥10	80	85		Deg.	
		ϕ9		80	85		Deg.	
	Ver.	θ12		80	85		Deg.	
		θ6		80	85		Deg.	
Color gamut(C light)					50		%	
Luminance Contrast ratio		T(%)	ϕ0°	600	800			
Response Time		TRT	Temp=25° C		25	40	ms	

10. Reliability

10.1 Mtbf

The LCD module shall be designed to meet a minimum MTBF value of 50000 hours with normal

10.2 Test condition

NO.	ITEM	CONDITION	CRITERION
1	High Temperature Non-Operating Test	60℃*120Hrs	No Defect Of Operational Function In Room Temperature Are Allowable
2	Low Temperature Non-Operating Test	-20℃*120Hrs	
3	High Temperature/Humidity Non Operating Test	60℃*75%RH*120Hrs	
4	High Temperature Operating Test	50℃*120Hrs	
5	Low Temperature Operating Test	-10℃*120Hrs	
6	Thermal Shock Test	-10 ℃ (30Min) - 50 ℃ (30Min) *10CYCLES	

Notes:

1. Judgments should be made after exposure in room temperature for two hours.
2. The distill water is used for the high temperature/humidity test.
3. The sample above is individually for every reliability tests condition.

11. Inspection standards

1.AQL(Acceptable Quality Level

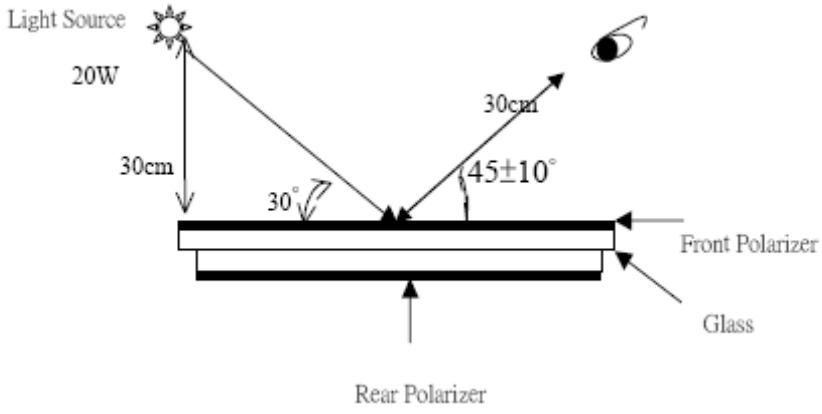
AQL of major and minor defect.

	MAJOR DEFECT	MINOR DEFECT
AQL	0.65	1.5

2. Basic conditions for inspection

The LCM face to us, in normal environment, the lux is 1000 ±200.(Darkroom's lux: 100 ±50),About an angle of incidence 30,a distance of 30 cm with an angle of 45 degree to check the products without uncovering the film!

(As shown below)



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±5℃and the humidity is below 45±20%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.

12.3Handling Precautions

(9)Avoid static electricity, which can damage the CMOS LSI.
(10)The polarizing plate of the display is very fragile, please handle if 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 ketonics 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.