

LCD&LCM
SPECIFICATION
液晶显示屏产品使用说明书

MODULE NO.

————T12864C059A————

128x64 图形点阵
COG 工艺/反射/无背光
8 位并口通讯

Designed	Checked	Approved

revision	date	description	remark
A00	2012-12-28	First release	

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1. Feature/显示特性

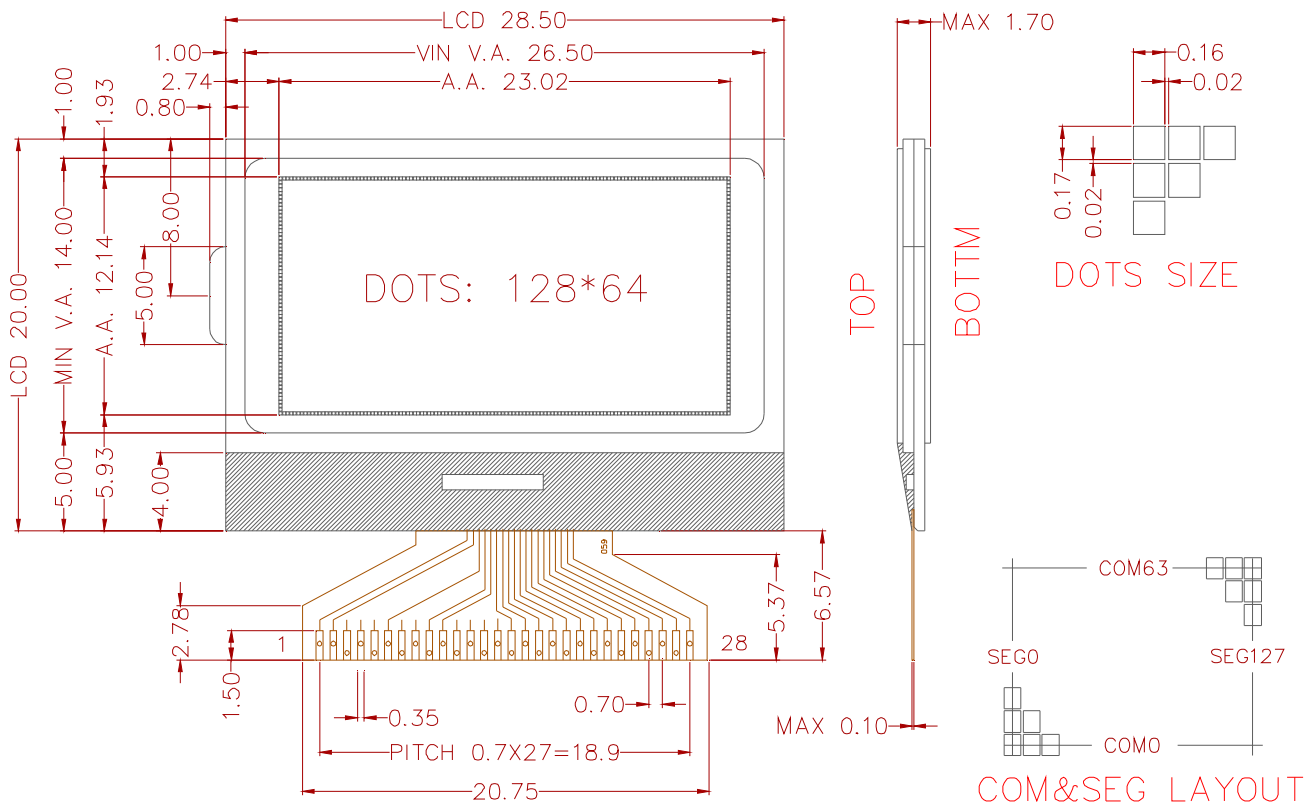
Display resolution/点阵数 : 128(w)*64(h)
 Display mode/显示模式 : FSTN ,Positive, Reflective
 Driving method/驱动方式 : 1/64 Duty , 1/9 Bias
 Viewing direction/视角 : 6:00 o'clock
 Backlight/背光 : LED , White
 Built-in controller/控制器 : ST7567
 Operation temp/工作温度 : 0℃~50℃
 Storage temp/储存温度 : -10℃~60℃

2. Mechanical Specifications/外形尺寸说明

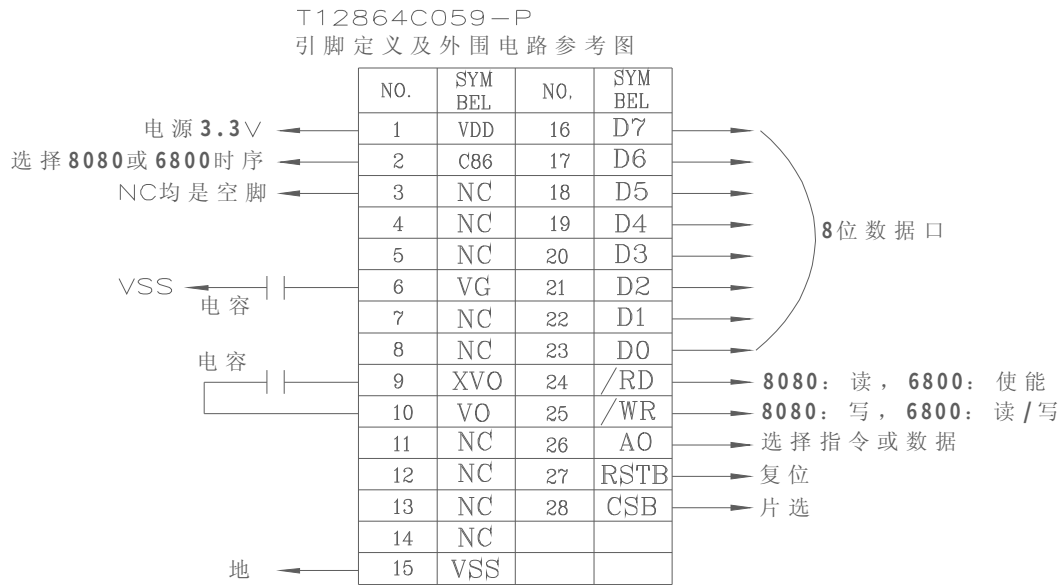
2.1 尺寸描述

Dimensional outline (W*H*T)/外形尺寸 : 28.5mm*20.0mm*1.7mm
 Viewing area (W*H)/视域尺寸 : 26.5mm*14.0mm
 Dot pitch (W*H)/点距 : 0.18mm*0.19mm
 Dot size (W*H)/点大小 : 0.16mm*0.17mm

2.2 Outline Dimension 外形尺寸图



3.Block Diagram & Power supply/电路原理图



电容均采用 1uF/25V 无极性电容，对质量要求比较高！

4. Pin description/PIN 脚描述

Pin No.	Pin Name	Function
1	VDD	Power supply voltage (Positive) 电源 3~3.3V
2	C86	MPU interface selection pin 选择8080或6800时序
3、4、5	NC	空脚
6	VG	升压辅助电路，与 VSS 之间接一颗 0.1 uF ~1.0uF/25V 的无极性电容
7、8	NC	空脚
9	XV0	升压辅助电路，与V0接一颗电容
10	V0	升压辅助电路，与XV0之间接一颗0.1 uF ~1.0uF/25V的无极性电容
11~14	NC	空脚
15	VSS	GND 地
16~23	D7---D0	8bit Date bus 数据
24	/RD	Read (/RD) control signal input. 读
25	/WR	Write (/WR) control signal input. 写
26	A0	Data/Command control 选择指令或数据
27	RSTB	Rester 复位
28	CSB	Chip selection input 片选

5. Absolute Maximum Ratings/限定参数

Items	Symbol	MIN.	MAX.	Unit	Condition
Supply Voltage/供电电压	V _{DD}	-0.3	+3.0	V	V _{SS} = 0V
	V _{lcd}	-0.3	+8.6	V	V _{SS} = 0V
Input Voltage/输入电压	V _{IN}	-0.3	V _{DD} +0.3	V	V _{SS} = 0V
LED forward current/背光电流	I _f			mA	---
Operating Temp./工作温度	T _{OP}	0	+50	°C	---
Storage Temp./储存温度	T _{st}	-10	+60	°C	---

6. Electrical Characteristics/电气特性

6.1 Typical Electrical Characteristics

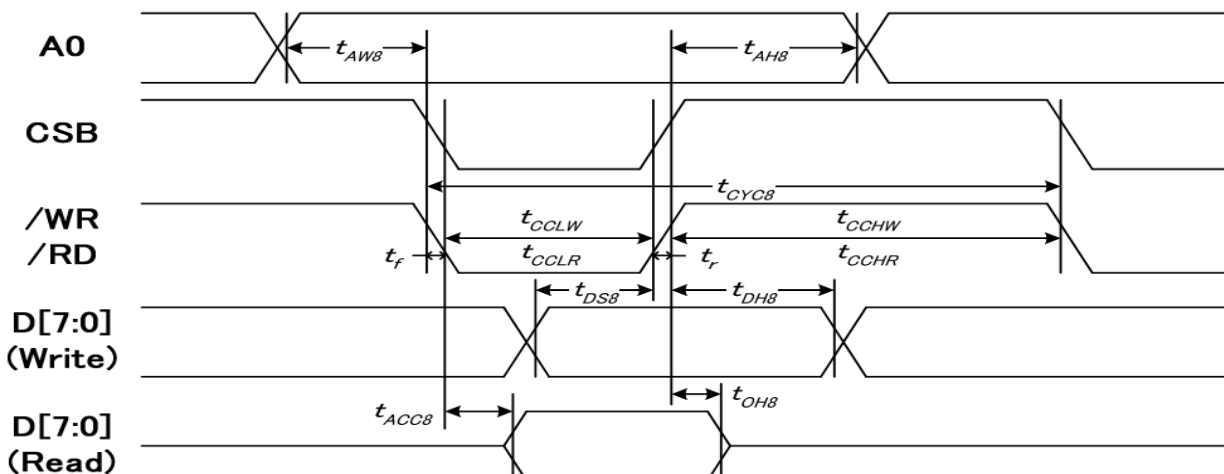
(V_{SS} = 0V, V_{DD} = 3.3V ± 10%, T_{op} = 25°C)

Items	Symbol	MIN.	TYP.	MAX.	Unit	Condition Pin
Operating Voltage/工作电压	V _{DD}	2.7	3.0	3.3	V	VDD
LCD Operating Voltage	V _{op}	-	8.6	-	V	V0
Input High Voltage/输入高电压	V _{IH}	0.8 V _{DD}	-	V _{DD}	V	AO,W/R,RD , D0~D7
Input Low Voltage 输入低电压	V _{IL}	0	-	0.4 V _{DD}	V	
Output High Voltage 输出高电压	V _{OH}	0.7	-	V _{DD}	V	D0~D7
Output Low Voltage 输出低电压	V _{OL}	0	-	0.2	V	D0~D7
Supply Current/供电电流	I _{DD}	---	0.6	8	mA	VDD,VSS

Note 1: There is tolerance in optimum LCD driving voltage during production and it will be within the specified range.

6.2. Timing Specifications

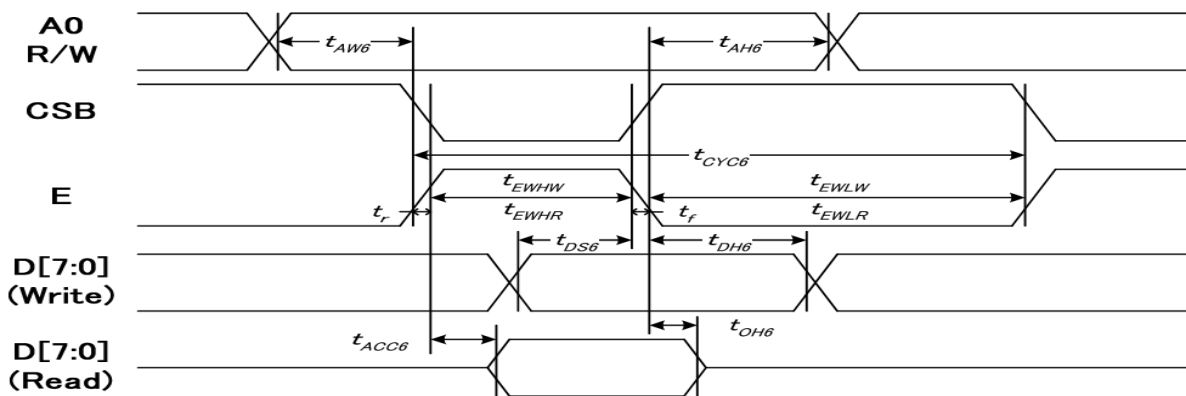
6.2.1. 8080 Mode System Bus Timing (并口 8080 时序)



(VDD1 = 3.3V, Ta = 25°C)

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Address setup time	A0	tAW8		0	—	ns
Address hold time		tAH8		10	—	
System cycle time	/WR	tCYC8		240	—	
/WR L pulse width (WRITE)		tCCLW		80	—	
/WR H pulse width (WRITE)		tCCHW		80	—	
/RD L pulse width (READ)	RD	tCCLR		140	—	
/RD H pulse width (READ)		tCCHR		80	—	
WRITE Data setup time	D[7:0]	tDS8		40	—	
WRITE Data hold time		tDH8		20	—	
READ access time		tACC8	CL = 16 pF	—	70	
READ Output disable time		tOH8	CL = 16 pF	5	50	

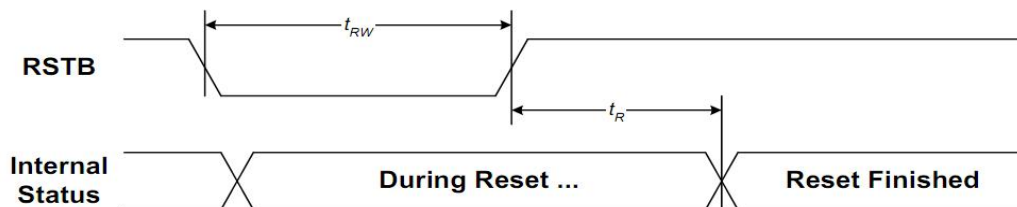
6.2.2 . 6800 Mode System Bus Timing (并口 6800 时序)



(VDD1 = 3.3V, Ta = 25°C)

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Address setup time	A0	tAW6		0	—	ns
Address hold time		tAH6		10	—	
System cycle time	E	tCYC6		240	—	
Enable L pulse width (WRITE)		tEHLW		80	—	
Enable H pulse width (WRITE)		tEHWLW		80	—	
Enable L pulse width (READ)		tEHLR		80	—	
Enable H pulse width (READ)		tEHWHR		140	—	
Write data setup time	D[7:0]	tDS6		40	—	
Write data hold time		tDH6		10	—	
Read data access time		tACC6	CL = 16 pF	—	70	
Read data output disable time		tOH6	CL = 16 pF	5	50	

6.2.3 Reset timing (复位)



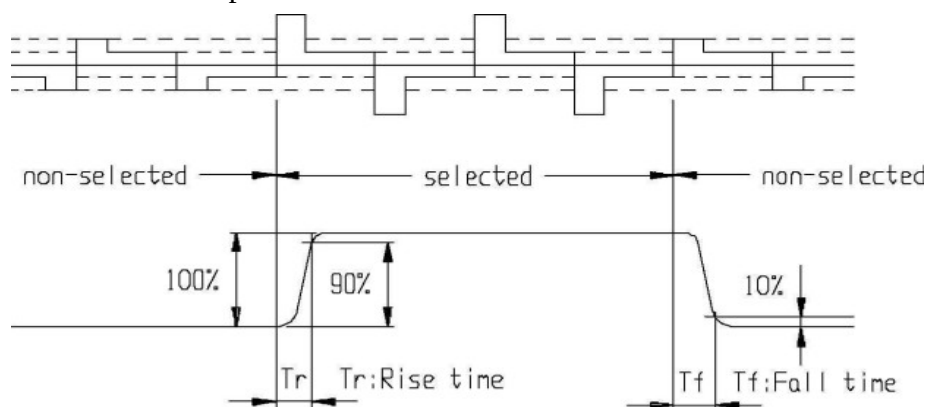
(VDD1 = 3.3V, Ta = 25°C)

Item	Symbol	Condition	Min.	Max.	Unit
Reset time	tR		—	1.0	us
Reset "L" pulse width	tRW		1.0	—	

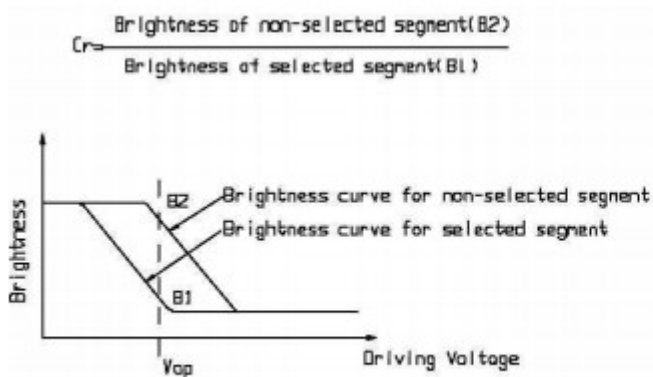
7. Electrical-Optical Characteristics/光学特性

Items	Symbol	Condition	MIN.	TYP.	MAX.	Unit	NOTE
Response time/反应时间	Tr	Ta= 25℃	---	185	---	ms	2
	Tf		---	200	---		
Contrast ratio/对比度	Cr	Ta= 25℃	---	--	---		3
Viewing angle range/视角范围	θ	Cr $\geq$ 2	-40	---	40	degree	

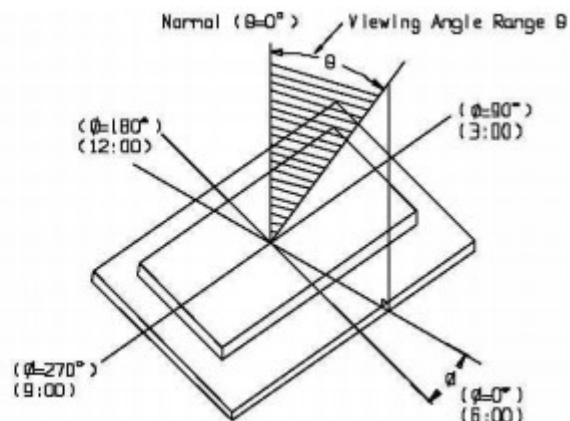
Note 1. Definition of response time



Note2 . Definition of Contrast Ratio 'Cr'



Note 3. Definition of Viewing Angle Range ' θ '



8. Control and display commands/指令描述

INSTRUCTION	A0	R/W (RWR)	COMMAND BYTE								DESCRIPTION
			D7	D6	D5	D4	D3	D2	D1	D0	
(1) Display ON/OFF	0	0	1	0	1	0	1	1	1	D	D=1, display ON D=0, display OFF
(2) Set Start Line	0	0	0	1	S5	S4	S3	S2	S1	S0	Set display start line
(3) Set Page Address	0	0	1	0	1	1	Y3	Y2	Y1	Y0	Set page address
(4) Set Column Address	0	0	0	0	0	1	X7	X6	X5	X4	Set column address (MSB)
	0	0	0	0	0	0	X3	X2	X1	X0	Set column address (LSB)
(5) Read Status	0	1	0	MX	D	RST	0	0	0	0	Read IC Status
(6) Write Data	1	0	D7	D6	D5	D4	D3	D2	D1	D0	Write display data to RAM
(7) Read Data	1	1	D7	D6	D5	D4	D3	D2	D1	D0	Read display data from RAM
(8) SEG Direction	0	0	1	0	1	0	0	0	0	MX	Set scan direction of SEG MX=1, reverse direction MX=0, normal direction
(9) Inverse Display	0	0	1	0	1	0	0	1	1	INV	INV =1, inverse display INV =0, normal display
(10) All Pixel ON	0	0	1	0	1	0	0	1	0	AP	AP=1, set all pixel ON AP=0, normal display
(11) Bias Select	0	0	1	0	1	0	0	0	1	BS	Select bias setting 0=1/9; 1=1/7 (at 1/65 duty)
(12) Read-modify-Write	0	0	1	1	1	0	0	0	0	0	Column address increment: Read:+0 , Write:+1
(13) END	0	0	1	1	1	0	1	1	1	0	Exit Read-modify-Write mode
(14) RESET	0	0	1	1	1	0	0	0	1	0	Software reset
(15) COM Direction	0	0	1	1	0	0	MY	-	-	-	Set output direction of COM MY=1, reverse direction MY=0, normal direction
(16) Power Control	0	0	0	0	1	0	1	VB	VR	VF	Control built-in power circuit ON/OFF
(17) Regulation Ratio	0	0	0	0	1	0	0	RR2	RR1	RR0	Select regulation resistor ratio
(18) Set EV	0	0	1	0	0	0	0	0	0	1	Double command!! Set electronic volume (EV) level
	0	0	0	0	EV5	EV4	EV3	EV2	EV1	EV0	
(19) Set Booster	0	0	1	1	1	1	1	0	0	0	Double command!! Set booster level: BL=0: 4X BL=1: 5X
	0	0	0	0	0	0	0	0	0	BL	
(20) Power Save	0	0	Compound Command								Display OFF + All Pixel ON
(21) NOP	0	0	1	1	1	0	0	0	1	1	No operation
(22) Test	0	0	1	1	1	1	1	1	1	-	Do NOT use. Reserved for testing.

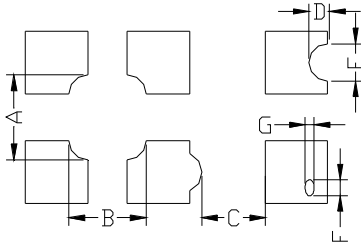
Note: Symbol "-" means this bit can be "H" or "L".

9. DDRAM 映射表

The relation between DDRAM and outputs with different MX or MY setting is shown below.

Page Address				Data	Column Address (Hex)																COM Output Map																PAD No. (COM)																																			
D3	D2	D1	D0		MX=0								MX=1								1/65 Duty				1/49 Duty				1/33 Duty				1/55 Duty																																							
0	0	0	0	D0	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F	MY=0	MY=1	MY=0	MY=1	MY=0	MY=1	MY=0	MY=1	MY=0	MY=1	MY=0	MY=1	MY=0	MY=1	MY=0	MY=1	107																																			
0	0	0	0	D1	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F		COM0	COM63	COM0	COM47	COM0	COM31	COM0	COM53	COM0	COM52	COM0	COM51	COM0	COM50	COM0	COM49	COM0	106																																		
0	0	0	0	D2	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F		COM1	COM62	COM1	COM46	COM1	COM30	COM1	COM54	COM1	COM53	COM1	COM52	COM1	COM51	COM1	COM50	COM1	COM49	COM1	105																																	
0	0	0	0	D3	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F		COM2	COM61	COM2	COM45	COM2	COM29	COM2	COM55	COM2	COM54	COM2	COM53	COM2	COM52	COM2	COM51	COM2	COM50	COM2	104																																		
0	0	0	0	D4	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F		COM3	COM60	COM3	COM44	COM3	COM28	COM3	COM56	COM3	COM55	COM3	COM54	COM3	COM53	COM3	COM52	COM3	COM51	COM3	COM50	COM3	103																																	
0	0	0	0	D5	05	06	07	08	09	0A	0B	0C	0D	0E	0F		COM4	COM59	COM4	COM43	COM4	COM27	COM4	COM57	COM4	COM56	COM4	COM55	COM4	COM54	COM4	COM53	COM4	COM52	COM4	COM51	COM4	COM50	COM4	102																																
0	0	0	0	D6	06	07	08	09	0A	0B	0C	0D	0E	0F		COM5	COM58	COM5	COM42	COM5	COM26	COM5	COM58	COM5	COM57	COM5	COM56	COM5	COM55	COM5	COM54	COM5	COM53	COM5	COM52	COM5	COM51	COM5	COM50	COM5	101																															
0	0	0	0	D7	07	08	09	0A	0B	0C	0D	0E	0F		COM6	COM57	COM6	COM41	COM6	COM25	COM6	COM59	COM6	COM58	COM6	COM57	COM6	COM56	COM6	COM55	COM6	COM54	COM6	COM53	COM6	COM52	COM6	COM51	COM6	COM50	COM6	100																														
0	0	0	1	D0	08	09	0A	0B	0C	0D	0E	0F		COM7	COM56	COM7	COM40	COM7	COM24	COM7	COM60	COM7	COM59	COM7	COM58	COM7	COM57	COM7	COM56	COM7	COM55	COM7	COM54	COM7	COM53	COM7	COM52	COM7	COM51	COM7	COM50	COM7	99																													
0	0	0	1	D1	09	0A	0B	0C	0D	0E	0F		COM8	COM55	COM8	COM39	COM8	COM23	COM8	COM61	COM8	COM60	COM8	COM59	COM8	COM58	COM8	COM57	COM8	COM56	COM8	COM55	COM8	COM54	COM8	COM53	COM8	COM52	COM8	COM51	COM8	COM50	COM8	98																												
0	0	0	1	D2	0A	0B	0C	0D	0E	0F		COM9	COM54	COM9	COM38	COM9	COM22	COM9	COM62	COM9	COM61	COM9	COM60	COM9	COM59	COM9	COM58	COM9	COM57	COM9	COM56	COM9	COM55	COM9	COM54	COM9	COM53	COM9	COM52	COM9	COM51	COM9	COM50	COM9	97																											
0	0	0	1	D3	0B	0C	0D	0E	0F		COM10	COM53	COM10	COM37	COM10	COM21	COM10	COM63	COM10	COM62	COM10	COM61	COM10	COM60	COM10	COM59	COM10	COM58	COM10	COM57	COM10	COM56	COM10	COM55	COM10	COM54	COM10	COM53	COM10	COM52	COM10	COM51	COM10	COM50	COM10	96																										
0	0	0	1	D4	0C	0D	0E	0F		COM11	COM52	COM11	COM36	COM11	COM20	COM11	COM64	COM11	COM63	COM11	COM62	COM11	COM61	COM11	COM60	COM11	COM59	COM11	COM58	COM11	COM57	COM11	COM56	COM11	COM55	COM11	COM54	COM11	COM53	COM11	COM52	COM11	COM51	COM11	COM50	COM11	95																									
0	0	0	1	D5	0D	0E	0F		COM12	COM51	COM12	COM35	COM12	COM19	COM12	COM65	COM12	COM64	COM12	COM63	COM12	COM62	COM12	COM61	COM12	COM60	COM12	COM59	COM12	COM58	COM12	COM57	COM12	COM56	COM12	COM55	COM12	COM54	COM12	COM53	COM12	COM52	COM12	COM51	COM12	COM50	COM12	94																								
0	0	0	1	D6	0E	0F		COM13	COM50	COM13	COM34	COM13	COM18	COM13	COM66	COM13	COM65	COM13	COM64	COM13	COM63	COM13	COM62	COM13	COM61	COM13	COM60	COM13	COM59	COM13	COM58	COM13	COM57	COM13	COM56	COM13	COM55	COM13	COM54	COM13	COM53	COM13	COM52	COM13	COM51	COM13	COM50	COM13	93																							
0	0	0	1	D7	0F		COM14	COM49	COM14	COM33	COM14	COM17	COM14	COM67	COM14	COM66	COM14	COM65	COM14	COM64	COM14	COM63	COM14	COM62	COM14	COM61	COM14	COM60	COM14	COM59	COM14	COM58	COM14	COM57	COM14	COM56	COM14	COM55	COM14	COM54	COM14	COM53	COM14	COM52	COM14	COM51	COM14	COM50	COM14	92																						
0	0	1	0	D0	10		COM15	COM48	COM15	COM32	COM15	COM16	COM15	COM68	COM15	COM67	COM15	COM66	COM15	COM65	COM15	COM64	COM15	COM63	COM15	COM62	COM15	COM61	COM15	COM60	COM15	COM59	COM15	COM58	COM15	COM57	COM15	COM56	COM15	COM55	COM15	COM54	COM15	COM53	COM15	COM52	COM15	COM51	COM15	COM50	COM15	91																				
0	0	1	0	D1	11		COM16	COM47	COM16	COM31	COM16	COM15	COM16	COM69	COM16	COM68	COM16	COM67	COM16	COM66	COM16	COM65	COM16	COM64	COM16	COM63	COM16	COM62	COM16	COM61	COM16	COM60	COM16	COM59	COM16	COM58	COM16	COM57	COM16	COM56	COM16	COM55	COM16	COM54	COM16	COM53	COM16	COM52	COM16	COM51	COM16	COM50	COM16	90																		
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0	0	1	1	D0	18		COM23	COM40	COM23	COM24	COM23	COM22	COM23	COM76	COM23	COM75	COM23	COM74	COM23	COM73	COM23	COM72	COM23	COM71	COM23	COM70	COM23	COM69	COM23	COM68	COM23	COM67	COM23	COM66	COM23	COM65	COM23	COM64	COM23	COM63	COM23	COM62	COM23	COM61	COM23	COM60	COM23	COM59	COM23	COM58	COM23	COM57	COM23	COM56	COM23	COM55	COM23	COM54	COM23	COM53	COM23	COM52	COM23	COM51	COM23	COM50	COM23	83				
0	0	1	1	D1	19		COM24	COM39	COM24	COM23	COM24	COM23	COM24	COM77	COM24	COM76	COM24	COM75	COM24	COM74	COM24	COM73	COM24	COM72	COM24	COM71	COM24	COM70	COM24	COM69	COM24	COM68	COM24	COM67	COM24	COM66	COM24	COM65	COM24	COM64	COM24	COM63	COM24	COM62	COM24	COM61	COM24	COM60	COM24	COM59	COM24	COM58	COM24	COM57	COM24	COM56	COM24	COM55	COM24	COM54	COM24	COM53	COM24	COM52	COM24	COM51	COM24	COM50	COM24	82		
0	0	1	1	D2	1A		COM25	COM38	COM25	COM24	COM25	COM24	COM25	COM78	COM25	COM77	COM25	COM76	COM25	COM75	COM25	COM74	COM25	COM73	COM25	COM72	COM25	COM71	COM25	COM70	COM25	COM69	COM25	COM68	COM25	COM67	COM25	COM66	COM25	COM65	COM25	COM64	COM25	COM63	COM25	COM62	COM25	COM61	COM25	COM60	COM25	COM59	COM25	COM58	COM25	COM57	COM25	COM56	COM25	COM55	COM25	COM54	COM25	COM53	COM25	COM52	COM25	COM51	COM25	COM50	COM25	81
0	0	1	1	D3	1B		COM26	COM37	COM26	COM25	COM26	COM25	COM26	COM79	COM26	COM78	COM26	COM77	COM26	COM76	COM26	COM75	COM26	COM74	COM26	COM73	COM264																																													

10. Inspection Standards/检验标准

Item	Criterion for defects	Defect type
1) Display on inspection/显示效果	(1) Non display (2) Vertical line is deficient (3) Horizontal line is deficient (4) Cross line is deficient	Major
2) Black / White spot/黑点或白点	Size Φ (mm) Acceptable number $\Phi \leq 0.3$ Ignore (note) $0.3 < \Phi \leq 0.45$ 3 $0.45 < \Phi \leq 0.6$ 1 $0.6 < \Phi$ 0	Minor
3) Black / White line/黑线或白线	Length (mm) Width (mm) Acceptable number $L \leq 10$ $W \leq 0.03$ Ignore $5.0 \leq L \leq 10$ $0.03 < W \leq 0.04$ 3 $5.0 \leq L \leq 10$ $0.04 < W \leq 0.05$ 2 $1.0 \leq L \leq 10$ $0.05 < W \leq 0.06$ 2 $1.0 \leq L \leq 10$ $0.06 < W \leq 0.08$ 1 $L \leq 10$ $0.08 < W$ follows 2) point defect Defects separate with each other at an interval of more than 20mm	Minor
4) Display pattern/显示模式	 $\frac{A+B \leq 0.28}{2}$ $0 < C$ $\frac{D+E \leq 0.25}{2}$ $\frac{F+G \leq 0.25}{2}$ Note: 1) Up to 3 damages acceptable 2) Not allowed if there are two or more pinholes every three-fourth inch.	Minor
5) Spot-like contrast irregularity/均匀度	Size Φ (mm) Acceptable Number $\Phi \leq 0.7$ Ignore (note) $0.7 < \Phi \leq 1.0$ 3 $1.0 < \Phi \leq 1.5$ 1 $1.5 < \Phi$ 0 Note: 1) Conformed to limit samples. 2) Intervals of defects are more than 30mm.	Minor
6) Bubbles in polarizer/玻璃内有气泡	Size Φ (mm) Acceptable Number $\Phi \leq 0.4$ Ignore (note) $0.4 < \Phi \leq 0.65$ 2 $0.65 < \Phi \leq 1.2$ 1 $1.2 < \Phi$ 0	Minor
7) Scratches and dent on the polarizer/玻璃刮痕/凹痕	Scratches and dent on the polarizer shall be in the accordance with "2) Black/white spot", and "3) Black/White line".	Minor
8) Stains on the surface of LCD panel/玻璃上有污点	Stains which cannot be removed even when wiped lightly with a soft cloth or similar cleaning.	Minor
9) Rainbow color/杂色	No rainbow color is allowed in the optimum contrast on state within the active area.	Minor
10) Viewing-area encroachment/玻璃边线出现在视域	Polarizer edge or line is visible in the opening viewing area due to polarizer shortness or sealing line.	Minor
11) Bezel appearance/铁筐外观	Rust and deep damages that are visible in the bezel are rejected.	Minor
12) Defect of land surface 表面缺陷	Evident crevices that are visible are rejected.	Minor
13) Parts mounting/部件安装	(1) Failure to mount parts (2) Parts not in the specifications are mounted (3) For example: Polarity is reversed, HSC or TCP falls off.	Minor
14) Part alignment/部件结合度	(1) LSI, IC lead width is more than 50% beyond pad outline. (2) More than 50% of LSI, IC leads is off the pad outline.	Minor
15) Conductive foreign matter (solder ball, solder hips)/杂质 (焊接遗留物)	(1) $0.45 < \Phi$, $N \geq 1$ (2) $0.3 < \Phi \leq 0.45$, $N \geq 1$, Φ : Average diameter of solder ball (unit: mm) (3) $0.5 < L$, $N \geq 1$, L: Average length of solder chip (unit: mm)	Minor
16) Bezel flaw/铁筐缺陷	Bezel claw missing or not bent	Minor
17) Indication on name plate (sampling indication label)/标志	(1) Failure to stamp or label error, or not legible.(all acceptable if legible) (2) The separation is more than 1/3 for indication discoloration, in which the characters can be checked.	Minor

11. Handling precautions 注意事项

1. Refrain from strong mechanical shock and forces to the module. It may cause improper operating or damage to the module.
防止震动和压迫模组，以免造成模组损坏和运行正常。
2. The polarizer used on the display surface is easily scratched and damaged. Extreme care should be taken when handling. When cleaning the display surface, use soft cloth with a solvent recommended : ethyl alcohol , isopropyl or hexane) and wipe gently, do not use the following solvents : water, ketone or aromatics .
模组表面的偏光极易被刮伤和损坏，所以操作是要非常小心。请用蘸有乙醇，丙酮等溶剂的湿软布轻轻擦拭，不要使用水，乙酮等溶剂。
3. Wipe off water or oil drop immediately If you leave drop for a long time, stain and discoloration may occur.
要立即擦拭掉屏幕上的油滴和水滴，否则会出现污点和杂质。
4. Do not touch pads or pins of interface directly with bare hands. When handling the LCD module, put on a soft glover like finger-glover.
不要直接用手去触碰接口处的金属管脚。当操作模组的时候，请配带软指套。
5. Protect the module from static electricity, it may cause damage to CMOS LSI.
模组需要有防静电保护，否则会损坏CMOS LSI。
6. To prevent LCD panels from degradation, do not operate or store them exposed directly to sunlight or high temperature/humidity.
不要直接在太阳,高温或潮湿环境下操作和储存LCD模组，以免影响模组的质量。
7. If the liquid crystal leaks from the panel it should be kept away from the eyes and mouths. In case of contact with skins, wash away thoroughly with soap and water.
若有液晶漏出，务必避免其入眼入口。若沾到皮肤上了，马上用肥皂和水冲洗干净。
8. Soldering should be only performed on the I/O terminals within the temperature of $280 \pm 20^{\circ}\text{C}$ and soldering time should be less than 4 seconds.
要在 $280 \pm 20^{\circ}\text{C}$ 的条件下在I/O终端实现焊接，并且保证焊接时间短于4秒。
9. Supply voltage within the specified voltage limit, the maximum rating, higher voltage cause the shorter LCD life or damaged.
绝对要在指定的电压范围内驱动模组， 因为如果在高于指定电压的情况下驱动模组，会使模组寿命变短
10. Do not input any signals before power is turned on. Do not connect or disconnect the module on the state of Power-ON.
供电之前不要输入任何信号，不要在通电时连接和段开 LCD 模组。