

LCD&LCM
SPECIFICATION
液晶显示屏产品使用说明书

MODULE NO.

T19264C5626A

192x64 图形点阵

COG 工艺

SPI 串口通讯

Designed	Checked	Approved

申 明

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Revision history 修改记录

revision	date	description	remark
A00	2018-9-10	First release	

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1. Feature/显示特性

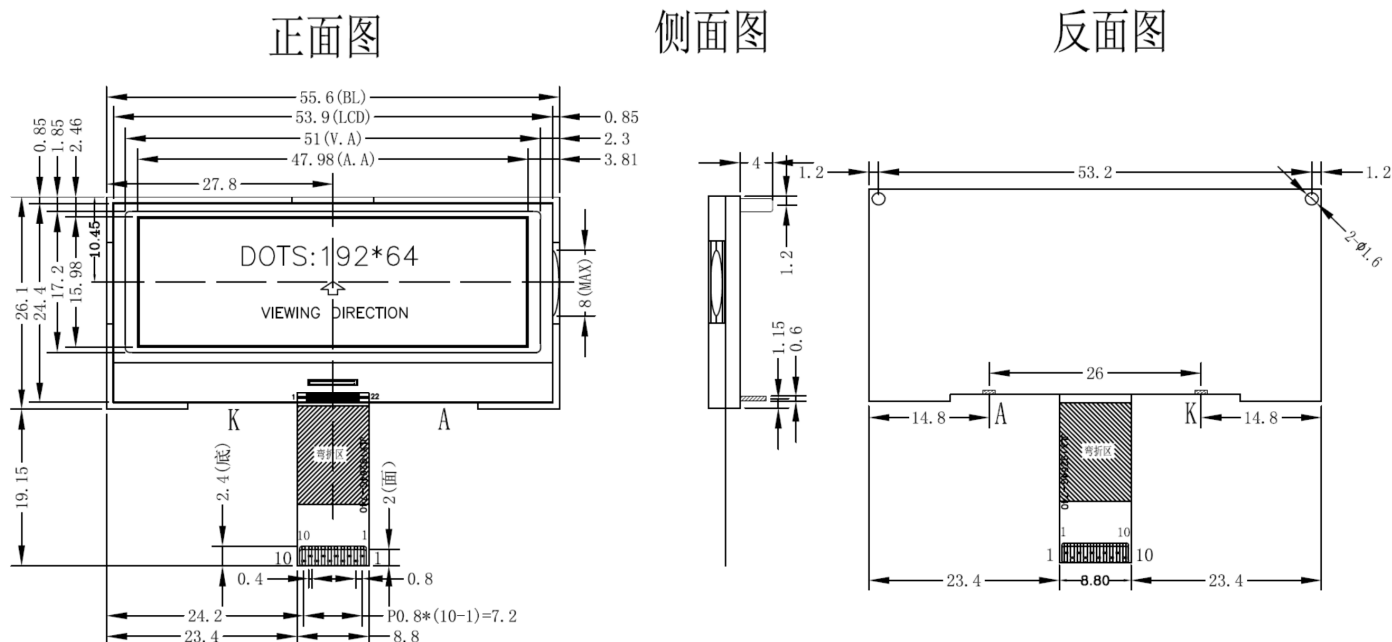
Display resolution/点阵数 : 192(w)*64(h)
 Display mode/显示模式 : FSTN ,Positive, Transflective
 Driving method/驱动方式 : 1/64 Duty , 1/9 Bias
 Viewing direction/视角 : 6:00 o'clock
 Backlight/背光 : LED , White(or Other)
 Built-in controller/控制器 : ST7525
 Operation temp/工作温度 : -20℃~+70℃
 Storage temp/储存温度 : -30℃~+80℃

2. Mechanical Specifications/外形尺寸说明

2.1 尺寸描述

Dimensional outline (W*H*T)/外形尺寸 : 55.6mm*26.1mm*4.0mm
 Viewing area (W*H)/视域尺寸 : 51.0mm*17.2mm
 Active area(W*H)/显示尺寸 : 47.98mm*15.98mm
 Dot pitch (W*H)/点距 : 0.25mm*0.25mm
 Dot size (W*H)/点大小 : 0.23mm*0.23mm
 Weigh/重量 t : Approx

2.2 Outline Dimension 外形尺寸图



引脚定义:

PIN NO.	1	2	3	4	5	6	7	8	9	10
SYMBOL	SDA	SCL(D0)	RST	AO	CS0	VSS	VDD	VO	XVO	VG

3. Block Diagram & Power supply/电路原理图

请参考 PIN 脚描述中有说明, 需接 2 颗电容。

4. Pin description/PIN 脚描述

Pin No.	Pin Name	Function
1	SDA	Serial data write and read input/output pin. 数据
2	SCLK	Serial pixel clock signal input pin. 时钟
3	RST	Reset signal (Low effective) 复位
4	A0	Register select input, H: data; L: command 选择指令或数据
5	CS0	Chip select input pin. 片选
6	VSS	GND. 0V 地
7	VDD	Power Supply. 3.3V 电源
8	V0	Conntet capacitors between "V0" and "XV0" V0与XV0之产j接电容 两颗电容均为1uF/25V无极性电容
9	XV0	
10	VG	Conntet capacitors between "VG" and "VSS" VG与VSS之间接电容
背光	BLA(+)	LED正极, 工作电压3.0V, 工作电流30mA~45mA (需串限流电阻)
	BLK(-)	LED负极, 0V

5. Absolute Maximum Ratings/限定参数

Items	Symbol	MIN.	MAX.	Unit	Condition
Supply Voltage/供电电压	V _{DD}	-0.3	+3.3	V	V _{SS} = 0V
	V _{lcd}	-0.3	+9.0	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	0	40	mA	---
Operating Temp./工作温度	T _{OP}	-20	+70	°C	---
Storage Temp./储存温度	T _{st}	-30	+80	°C	---

6. Electrical Characteristics/电气特性

6.1 ABSOLUTE MAXIMUM RATINGS

In accordance with IEC134 – notes 1, 2 and 3.

Symbol	Parameter	Min.	Max.	Unit
V _{DD}	Logic Supply voltage	-0.3	+4.0	V
V _{DD2}	LCD Generator Supply voltage	-0.3	+4.0	V
V _{DD3}	Analog Circuit Supply voltage	-0.3	+4.0	V
V _{DD2/3} -V _{DD}	Voltage difference between V _{DD} and V _{DD2/3}	--	1.2	V
V _{LCD}	LCD Generated voltage	-0.3	+13.2	V
V _{IN} / V _{OUT}	Any input/output	-0.4	V _{DD} + 0.3	V
T _{OPR}	Operating temperature range	-30	+85	°C
T _{STR}	Storage temperature	-55	+125	°C

Notes

- V_{DD} is based on V_{SS} = 0V
- Stress values listed above may cause permanent damages to the device.

SPECIFICATIONS

DC CHARACTERISTICS

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{DD}	Supply for digital circuit		1.7	1.8~3.3	3.6	V
$V_{DD2/3}$	Supply for bias & pump		2.6	2.7~3.3	3.6	V
V_{LCD}	Charge pump output	$V_{DD2/3} \geq 2.6V, 25^{\circ}C$		4.8~11.5	11.5	V
V_D	LCD data voltage	$V_{DD2/3} \geq 2.6V, 25^{\circ}C$	0.80		1.32	V
V_{IL}	Input logic LOW				$0.1V_{DD}$	V
V_{IH}	Input logic HIGH		$0.9V_{DD}$			V
V_{OL}	Output logic LOW				$0.2V_{DD}$	V
V_{OH}	Output logic HIGH		$0.8V_{DD}$			V
I_{IL}	Input leakage current				1.5	μA
I_{SB}	Standby current	$V_{DD} = V_{DD2/3} = 3.3V, \text{Temp} = 85^{\circ}C$			50	μA
C_{IN}	Input capacitance			5	10	PF
C_{OUT}	Output capacitance			5	10	PF
$R_{O(SEG)}$	SEG output impedance	$V_{LCD} = 9V$		2200	2800	Ω
$R_{O(COM)}$	COM output impedance	$V_{LCD} = 9V$		2200	2800	Ω
F_{FR}	Average Frame Rate	LC[4:3] = 01b	-10%	95	+10%	Hz

POWER CONSUMPTION

$V_{DD} = 2.7V$,
 $V_{LCD} = 8.54V$
Mux Rate = 65,
Temperature = $25^{\circ}C$,

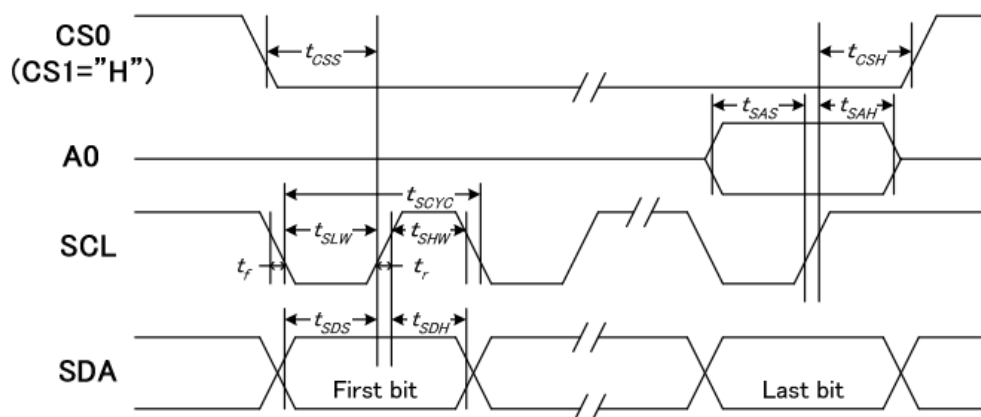
Bias Ratio = 11b,
Frame Rate = 01b,
Bus mode = 6800,
 $C_L = 330nF$,

PM = 73,
PMO = 00H,
 $C_{B0} / C_{B1} = 2.2\mu F$,
All outputs are open circuit.

Display Pattern	Conditions	Typ.	Max.
All-ON	Bus = idle	196	392
All-OFF	Bus = idle	197	394
2-pixel checker	Bus = idle	222	444
-	Bus = idle (standby current)	-	5

6.2 Timing Specifications

SERIAL INTERFACE (4-Line Interface)



(VDD1 = 3.0V, Ta = 25°C)

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Serial clock period	tSCYC tSHW SCL tSLW	-	ns			
SCL "H" pulse width	-					
SCL "L" pulse width	-					
Address setup time	tSAS	-	A0			
Address hold time	tSAH	-				
Data setup time	tSDS SDA tSDH	-				
Data hold time	-					
CS0 setup time	tCSS	-	CS0			
CS0 hold time	tCSH	-				

Note:

1. All timing is specified using 20% and 80% of VDD1 as the standard.
2. The input signal rise and fall time (tr, tf) are specified at 15 ns or less.

Reset timing

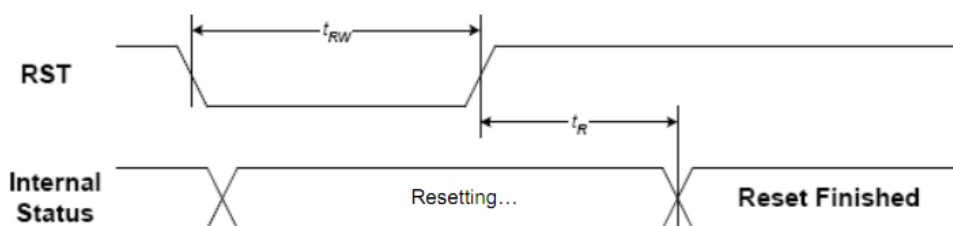


FIGURE 20: Reset Characteristics

(1.7V ≤ VDD ≤ 3.6V, Ta = -30 to +85°C)

Symbol	Signal	Description	Condition	Min.	Max.	Unit
t_{RW}	RST	Reset low pulse width		3	—	μs
t_R	RST, Internal Status	Reset to Internal Status pulse delay		6	—	ms

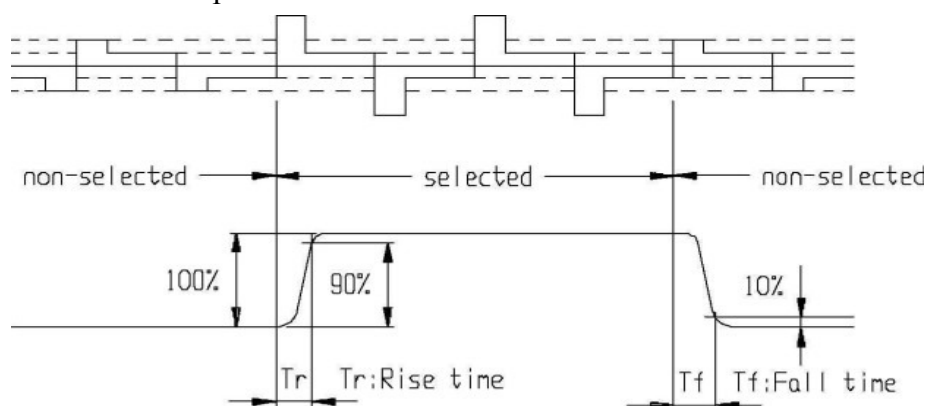
7. Backlight Characteristics/背光特性

Items	Symbol	MIN.	TYP.	MAX.	Unit	Condition
Forward Voltage/电压	Vf	2.8	3.0	3.1	V	If=30mA
Reverse current/电流	Ir	---	30	45	mA	Vr=3V
Peak wave length/波长	λ	---	---	---	nM	If=40mA
Luminance/亮度	Lv	---	---	---	Cd/m ²	If=40mA
Color /颜色	White (白色, 或者其他色)					

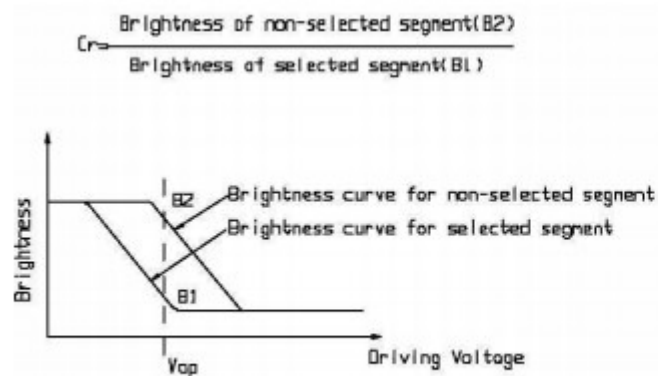
8. Electrical-Optical Characteristics/光学特性

Items	Symbol	Condition	MIN.	TYP.	MAX.	Unit	NOTE
Response time/反应时间	Tr	Ta= 25℃	---	250	---	ms	2
	Tf		---	400	---		
Contrast ratio/对比度	Cr	Ta= 25℃	---	--	---		3
Viewing angle range/视角范围	θ	Cr $\geq$ 2	-40	---	40	degree	

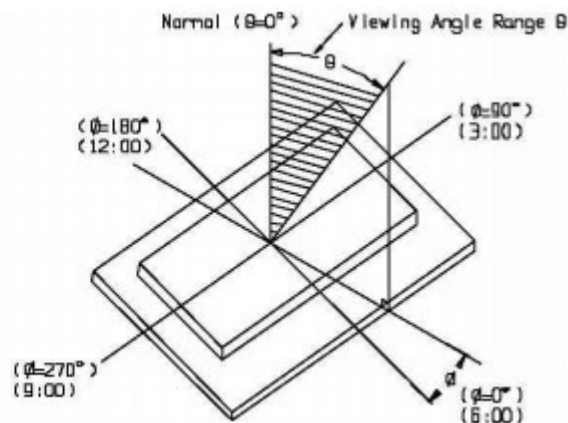
Note 1. Definition of response time



Note2 . Definition of Contrast Ratio 'Cr'



Note 3. Definition of Viewing Angle Range 'θ'



9. Control and display commands/指令描述

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9-1. INSTRUCTION TABLE

Command Table											
INSTRUCTION	A0	R/W (RWR)	COMMAND BYTE								DESCRIPTION
			D7	D6	D5	D4	D3	D2	D1	D0	
Write Data	1	0	D7	D6	D5	D4	D3	D2	D1	D0	Write data to DDRAM
Read Data	1	1	D7	D6	D5	D4	D3	D2	D1	D0	Read data from DDRAM Only for parallel interface and I ² C
Read Status Byte (parallel interface)	0	1	ID0	MX	MY	WA	DE	0	0	0	Read status byte Only for parallel interface
			0	0	0	0	0	0	ID2	ID1	
Set Column Address LSB	0	0	0	0	0	0	CA3	CA2	CA1	CA0	Set column address of RAM
Set Column Address MSB	0	0	0	0	0	1	CA7	CA6	CA5	CA4	
Set Scroll Line	0	0	0	1	SL5	SL4	SL3	SL2	SL1	SL0	Specify line address for the 1 st display line of DDRAM (vertical scrolling)
Set Page Address	0	0	1	0	1	1	PA3	PA2	PA1	PA0	Set page address of RAM
Set Contrast	0	0	1	0	0	0	0	0	0	1	2-byte instruction. Set Vop voltage
			EV7	EV6	EV5	EV4	EV3	EV2	EV1	EV0	
Set Partial Screen Mode	0	0	1	0	0	0	0	1	0	PS	PS=1: Enable partial mode
Set RAM Address Control	0	0	1	0	0	0	1	AC2	AC1	AC0	Set column and page address behavior
Set Frame Rate	0	0	1	0	1	0	0	0	FR1	FR0	Set frame frequency
Set All Pixel ON	0	0	1	0	1	0	0	1	0	AP	Set all display segments on
Set Inverse Display	0	0	1	0	1	0	0	1	1	INV	Set inverse display
Set Display Enable	0	0	1	0	1	0	1	1	1	PD	PD=0: Chip is in power down mode
Scan Direction	0	0	1	1	0	0	0	MY	MX	0	Set COM and SEG scan direction
Software Reset	0	0	1	1	1	0	0	0	1	0	Set software reset
NOP	0	0	1	1	1	0	0	0	1	1	No operation
Set Bias	0	0	1	1	1	0	1	0	BR1	BR0	Set internal bias circuit
Set COM End	0	0	1	1	1	1	0	0	0	1	2-byte instruction. Set display duty
			--	--	CEN5	CEN4	CEN3	CEN2	CEN1	CEN0	
Partial Start Address	0	0	1	1	1	1	0	0	1	0	Set partial start for partial display screen
			--	--	DST5	DST4	DST3	DST2	DST1	DST0	
Partial End Address	0	0	1	1	1	1	0	0	1	1	Set partial end for partial display screen
			--	--	DEN5	DEN4	DEN3	DEN2	DEN1	DEN0	
Test Control	0	0	1	1	1	1	0	0	0	0	Set test command table
			--	--	--	--	--	--	H1	H0	

10. DDRAM 映射表

ST7525 Preliminary

DDRAM Organization

When accessing to RAM, sixteen addressing mode are provided:

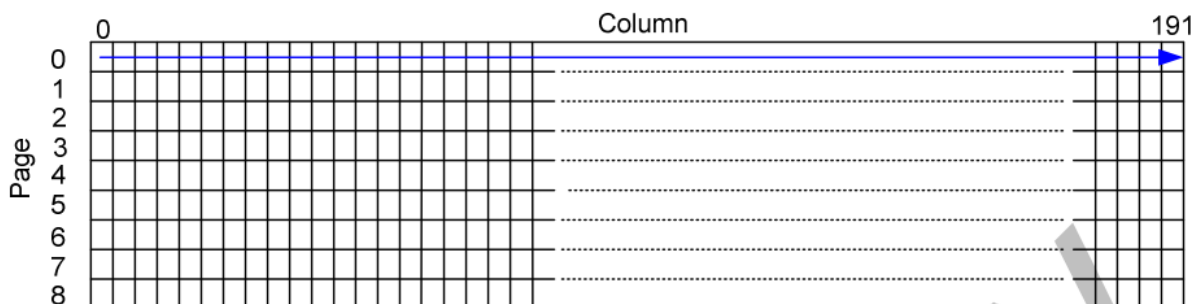


Fig 12. DDRAM Access Mapping (MX=0, AC[2:0]=(0, 0, 0))

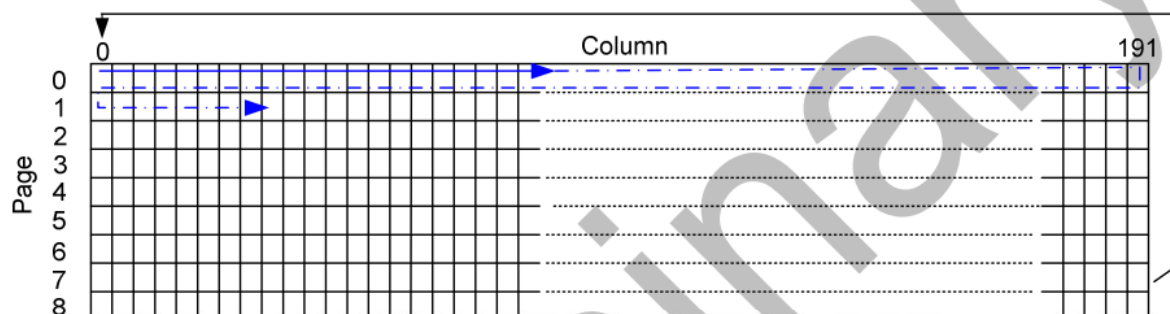


Fig 13. DDRAM Access Mapping (MX=0, AC[2:0]=(0, 0, 1))

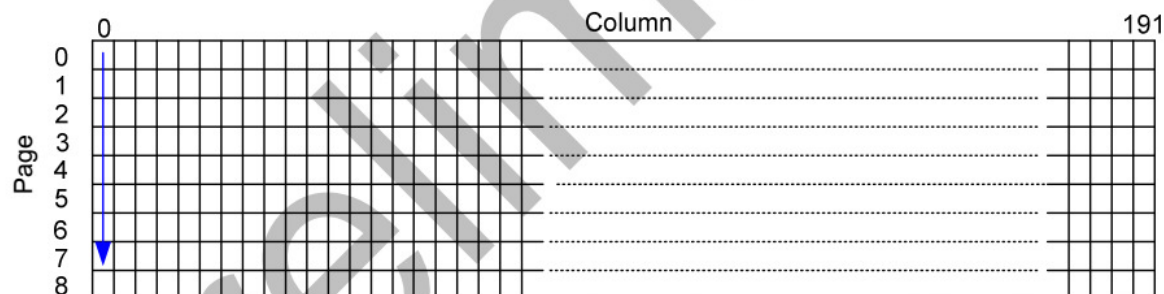


Fig 14. DDRAM Access Mapping (MX=0, AC[2:0]=(0, 1, 0))

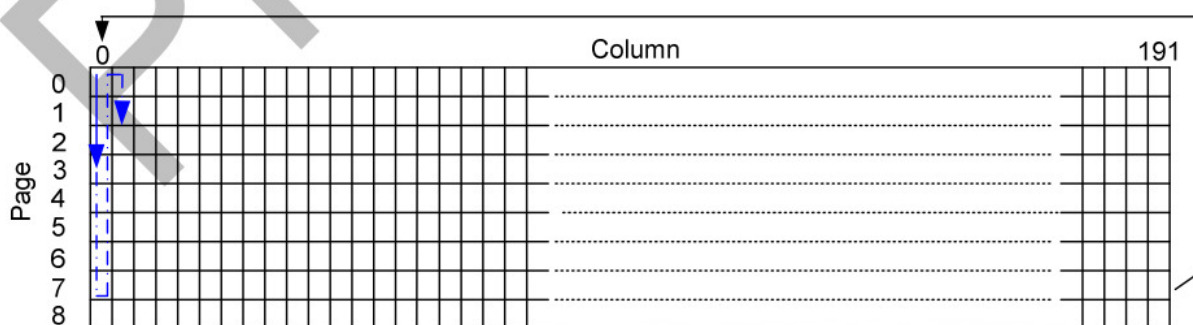
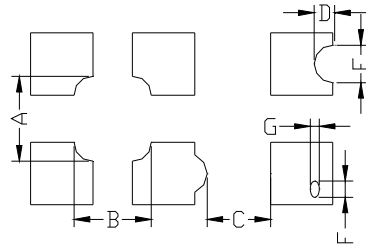


Fig 15. DDRAM Access Mapping (MX=0, AC[2:0]=(0, 1, 1))

12. 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	 $\frac{A+B}{2} \leq 0.28$ $0 < C$ $\frac{D+E}{2} \leq 0.25$ $\frac{F+G}{2} \leq 0.25$ 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

12. 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。