

客户名称(CUSTOMER) : \_\_\_\_\_

型号名称(LCM CODE (Ver.)) : **ST024C6C-KB0 (Ver: 0)**

描述(Description) : 2.4" a-Si TFT 液晶显示屏

<p>客户确认: <b>CUSTOMER APPROVED:</b></p>	
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APPROVED BY	CHECK BY	PREPARED BY

**RECORDS OF REVISION**

Date	Rev.	Description	Note	Page
2009/06/27	0	New sample		

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## 1. SPECIFICATIONS

### 1.1 Features

Item	Standard Value
Display Type	240(R+G+B) * 320 Dots
LCD Type	a-Si TFT, Positive, Transmissive
Viewing Direction	6 O'clock
Backlight	4LED White Color
Interface	8080 MPU 8bit or 16bit interface
Controller/driver IC	ILI9328

### 1.2 Mechanical Specifications

Item	Standard Value	Unit
Outline Dimension	60.26 (L) x 42.72(W) x 2.40MAX(T)	mm
Active Area	48.96 (L) x 36.72(W)	mm
Pixel pitch	0.153 (L) x 0.153 (W)	mm

Note : For detailed information please refer to LCM drawing

### 1.3 Absolute Maximum Ratings

Item	Symbol	Condition	Min.	Max.	Unit
Power Supply Voltage	V <sub>DD</sub>	-	-0.3	4.6	V
LCD Driver Supply Voltage	V <sub>GH-VSS</sub>	-	-0.3	18.5	V
Input voltage	V <sub>in</sub>		-0.3	4.6	V
Operating Temperature	T <sub>OP</sub>	-	-20	+70	°C
Storage Temperature.	T <sub>ST</sub>	-	-30	+80	°C
Storage Humidity	H <sub>D</sub>	T <sub>a</sub> < 40 °C	-	90	%RH

## 1.4 DC Electrical Characteristics

 $V_{DD} = 2.4\sim 3.3V$ ,  $V_{SS} = 0V$ ,  $T_a = 25^\circ C$ 

Item	Symbol	Condition	Min.	Type	Max.	Unit
Logic Supply Voltage	$V_{DD}$	-	2.4	2.8	3.3	V
“H” Input Voltage	$V_{IH}$	-	$0.8 V_{DD}$	-	$V_{DD}$	V
“L” Input Voltage	$V_{IL}$	-	$V_{SS}$	-	$0.2 V_{DD}$	V
“H” Output Voltage	$V_{OH}$	-	$0.8V_{DD}$	-	$V_{DD}$	V
“L” Output Voltage	$V_{OL}$	-	$V_{SS}$	-	$0.2 V_{DD}$	V
Supply Current	$I_{DD}$	$V_{DD} = 2.8V$	-	4	6	mA

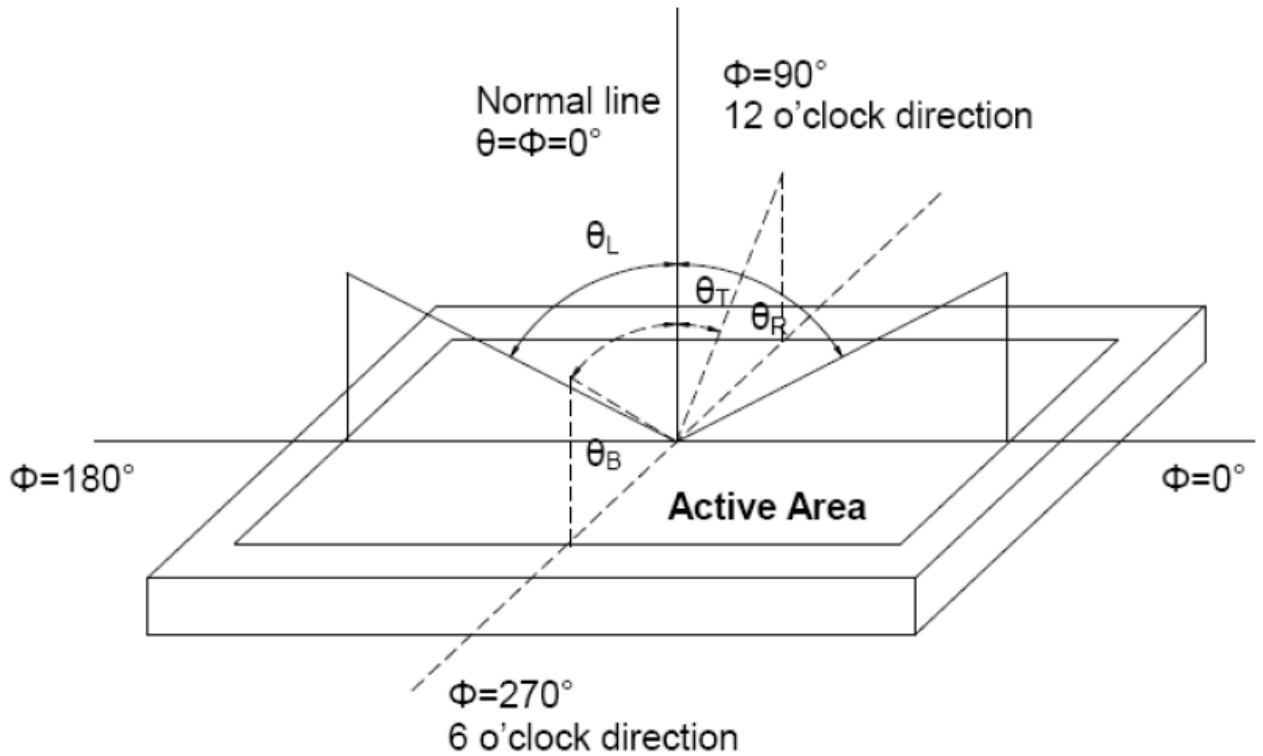
## 1.5 Optical Characteristics

 $T_a = 25^\circ C$ 

Item	Symbol	Conditions	Min.	Typ.	Max.	Reference
View Angle	$\theta T$	$C \geq 10, \phi = 0^\circ$	35	40	--	Note 2
	$\theta B$		15	20	--	Note 2
	$\theta L$		40	45	--	Note 2
	$\theta R$		40	45		Note 2
Contrast Ratio	C	$\theta = 0^\circ, \phi = 0^\circ$	200	350	-	--
Response Time	Ton	25°C	-	25ms	40 ms	Note 4
	Toff		-			
Luminance	B	$\theta = 0^\circ \phi = 0^\circ$	-	180	-	cd/m <sup>2</sup>

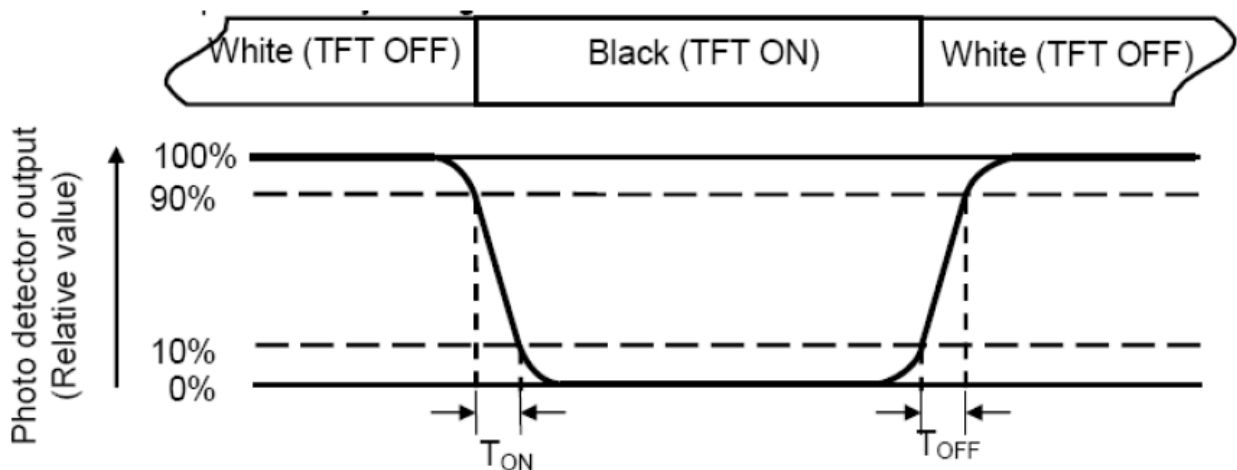
Note 2: Definition of viewing angle range and measurement system.

viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80).



Note 4: Definition of Response time

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time ( $T_{ON}$ ) is the time between photo detector output intensity changed from 90% to 10%. And fall time ( $T_{OFF}$ ) is the time between photo detector output intensity changed from 10% to 90%.



## 1.6 Backlight & LED Characteristics

### Maximum Ratings

Item	Symbol	Conditions	Min.	Max.	Unit
Forward Current	IF	Ta =25℃	-	20 (1 LED)	mA
Reverse Voltage	VR	Ta =25℃	-	5	V
Power Dissipation	PO	Ta =25℃	-	320	mW
Operating Temperature	T <sub>OP</sub>	-	-20	70	℃
Storage Temperature	T <sub>ST</sub>	-	-30	80	℃
Solder Temp. for 3 Seconds	-	-	-	260	℃

### Electrical / Optical Characteristics

VSS = 0V, Ta =25℃

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Forward Voltage	VF	IF= 15mA*4	2.8	3.3	3.5	V
Reverse Current	IR	VR= 5V	-	-	50	uA
Average Brightness (without LCD)	IV	IF= 15mA*4	3000	3300	-	cd/m <sup>2</sup>
CIE Color Coordinate (without LCD)	X	IF= 15mA*4	0.283	-	0.330	—
	Y		0.276	-	0.328	
Color	WHITE					

\*1 This value will be changed while mass production.





## 2.2 Interface Pin Description

NO	SYMBOL	FUNCTION
1	GND	<b>GROUND</b>
2	Y-(NC)	NOT CONNECTOR
3	X-(NC)	NOT CONNECTOR
4	Y+(NC)	NOT CONNECTOR
5	X+(NC)	NOT CONNECTOR
6	GND	GROUND
7	IM0	IM0=0: Select 16-bit interface,DB17~DB10,DB8~DB1 IM0=1: Select 8-bit interface,DB17~DB10
8	IM3(NC)	NOT CONNECTOR
9~10	NC	NOT CONNECTOR
11	LCD_ID	The voltage is 2.545V
12	RESET	Chip reset signal ("L" →Active)
13	D9(NC)	NOT CONNECTOR
14	D0(NC)	NOT CONNECTOR
15~22	D17~D10	DATA BUS
23~30	D8~D1	DATA BUS
31	RD	Read signal ("L" →Active)
32	WR	Write signal ("L" →Active)
33	RS	Data / Command select signal("L"→ register index; "H"→data)
34	CS	Chip select signal ("L" →Active)
35	GND	GROUND
36	IOVCC	Power supply for interface pin
37~38	VCC	Power supply
39	LEDK4	BACK LIGHT K4-
40	LEDK3	BACK LIGHT K3-
41	LEDK2	BACK LIGHT K2-
42	LEDK1	BACK LIGHT K1-
43	LEDA	BACK LIGHT A+
44	GND	GROUND

### **2.3 Timing Characteristics**

Please refer to ILI9328 DATASHEET.

### **2.4 Display Command**

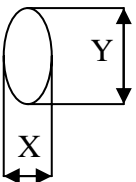
Please refer to ILI9328 DATASHEET.

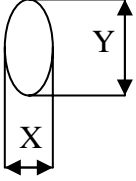
## **3. INSPECTION SPECIFICATIONN**

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**MODULE NO.: ST024C6C-KB0(Rev:0)**

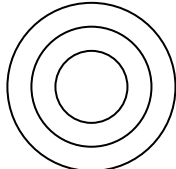
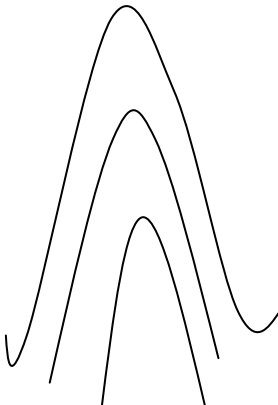
NO.	项目 Item	经验标准 Inspection Standard	判断 Result	备注 Note
1	整体功能 All functional defects	1) 不显示 No display 2) 显示异常 Display abnormally 3) 缺划 (横或竖, 横&竖) Missing vertical, horizontal segment 4) 短路 Short circuit 5) 背光不亮或闪烁 Backlight no lighting, flickering and abnormal lighting.	不允许 Reject	
2	缺失 Missing	少成分 Missing component	不允许 Reject	
3	外观尺寸 Outline dimension	同 CD 图 Overall outline dimension beyond the drawing is not allowed		

NO.	项目 Item	检验标准 Inspection Standard	备注 Note																			
4	清楚的黑白点 Clear Spots	$\phi = (X+Y) / 2$  <p>A: AA 区 (显示区) B: VA 区 (可视区) C: 可视区以外(Out of VA)</p> <table border="1" data-bbox="459 1415 1054 1807"> <thead> <tr> <th rowspan="2">区域 Zone 尺寸 Size</th> <th colspan="3">接受个数 Acceptable Quantity</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td><math>\phi \leq 0.1\text{mm}</math></td> <td colspan="3">Ignore</td> </tr> <tr> <td><math>0.1\text{mm} &lt; \phi \leq 0.2\text{mm}</math></td> <td>3</td> <td colspan="2" rowspan="3">Ignore</td> </tr> <tr> <td><math>0.2\text{mm} &lt; \phi \leq 0.25\text{mm}</math></td> <td>2</td> </tr> <tr> <td><math>\phi &gt; 0.25\text{mm}</math></td> <td>0</td> </tr> </tbody> </table>	区域 Zone 尺寸 Size	接受个数 Acceptable Quantity			A	B	C	$\phi \leq 0.1\text{mm}$	Ignore			$0.1\text{mm} < \phi \leq 0.2\text{mm}$	3	Ignore		$0.2\text{mm} < \phi \leq 0.25\text{mm}$	2	$\phi > 0.25\text{mm}$	0	
区域 Zone 尺寸 Size	接受个数 Acceptable Quantity																					
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NO.	项目 Item	检验标准 Inspection Standard	备注 Note																												
5	不明显的黑白点 Dim Spots	$\phi = (X+Y) / 2$  <p>A: AA 区 (显示区) B: VA 区 (可视区) C: 可视区以外(Out of V.A.)</p> <table border="1" data-bbox="459 663 1051 1003"> <thead> <tr> <th rowspan="2">区域 Zone 尺寸 Size</th> <th colspan="3">接受个数 Acceptable Quantit</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td><math>\phi \leq 0.3\text{mm}</math></td> <td colspan="3">Ignore</td> </tr> <tr> <td><math>0.3\text{mm} &lt; \phi \leq 0.6\text{mm}</math></td> <td colspan="2">2</td> <td rowspan="2">Ignore</td> </tr> <tr> <td><math>\phi &gt; 0.6\text{mm}</math></td> <td colspan="2">0</td> </tr> </tbody> </table>	区域 Zone 尺寸 Size	接受个数 Acceptable Quantit			A	B	C	$\phi \leq 0.3\text{mm}$	Ignore			$0.3\text{mm} < \phi \leq 0.6\text{mm}$	2		Ignore	$\phi > 0.6\text{mm}$	0												
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6	线不良 Line defect	<table border="1" data-bbox="459 1055 1254 1444"> <thead> <tr> <th colspan="2">尺寸 Size (mm)</th> <th colspan="3">接受个数 Acceptable Quantity</th> </tr> <tr> <th>L (Length)</th> <th>W (width)</th> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>Ignore</td> <td><math>W \leq 0.03</math></td> <td colspan="3">Ignore</td> </tr> <tr> <td><math>L &lt; 5.0</math></td> <td><math>0.03 &lt; W \leq 0.05</math></td> <td colspan="2">2</td> <td rowspan="2">Ignore</td> </tr> <tr> <td></td> <td><math>0.05 &lt; W</math></td> <td colspan="3">以脏污论 Define as spot defect</td> </tr> </tbody> </table>	尺寸 Size (mm)		接受个数 Acceptable Quantity			L (Length)	W (width)	A	B	C	Ignore	$W \leq 0.03$	Ignore			$L < 5.0$	$0.03 < W \leq 0.05$	2		Ignore		$0.05 < W$	以脏污论 Define as spot defect						
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7	偏光片刮伤 Polarizer Scratch	<table border="1" data-bbox="459 1496 1254 1794"> <thead> <tr> <th colspan="2">尺寸 Size (mm)</th> <th colspan="3">Acceptable Quantity</th> </tr> <tr> <th>L (Length)</th> <th>W (width)</th> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>Ignore</td> <td><math>W \leq 0.03</math></td> <td colspan="3">Ignore</td> </tr> <tr> <td><math>L \leq 10</math></td> <td><math>0.03 &lt; W \leq 0.05</math></td> <td colspan="2">2</td> <td rowspan="3">Ignore</td> </tr> <tr> <td><math>L &lt; 5.0</math></td> <td><math>0.05 &lt; W \leq 0.08</math></td> <td colspan="2">1</td> </tr> <tr> <td></td> <td><math>0.08 &lt; W</math></td> <td colspan="2">0</td> </tr> </tbody> </table>	尺寸 Size (mm)		Acceptable Quantity			L (Length)	W (width)	A	B	C	Ignore	$W \leq 0.03$	Ignore			$L \leq 10$	$0.03 < W \leq 0.05$	2		Ignore	$L < 5.0$	$0.05 < W \leq 0.08$	1			$0.08 < W$	0		
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$L < 5.0$	$0.05 < W \leq 0.08$	1																													
	$0.08 < W$	0																													

8	偏光片与玻璃间气泡 Polarize Air bubble	区域 Zone		接受个数 Acceptable Quantity		
		尺寸 Size		A	B	C
		$\phi \leq 0.2\text{mm}$		Ignore		
		$0.2\text{mm} < \phi \leq 0.3\text{mm}$		2		
		$0.3\text{mm} < \phi \leq 0.5\text{mm}$		1		
$\phi > 0.5\text{mm}$		0			Ignore	

牛顿环/干涉纹 Newton Ring

NO.	项目 Item	检验标准 Inspection Standard	备注 Note
9	规则 Inerratic	<p>1. 在整个触摸屏检查区域内（可视区）超过 1/3 范围，不可；When Newton ring dimension is more than 1/3 of sample dimension, it is regarded as a defect.</p> <p>2. 直径<math>\leq 5\text{mm}</math>，且在整个触摸屏检查区（可视区）域小于 1/3 范围，不影响透过率及失真；不计 When Newton ring dimension is less than 1/3 of sample dimension is not affect font effect and line distortion under a ceiling fluorescent light, it is acceptable.</p>	
10	不规则 Atactic	<p>1. 在照明环境下牛顿环有影响清晰度和透过率，失真；不可。As long as Newton ring affects font effect and line distortion under a ceiling fluorescent light, it is regarded as a defect.</p> <p>在整个触摸屏检查区域（可视区）内，超过 1/2，不可。<math>\phi \leq 10\text{mm}</math>；不计。When <math>\phi \leq 10\text{mm}</math>, it is acceptable</p>	

## 4. PRECAUTION RELATING PRODUCT HANDLING

### 4.1 SAFETY

- 4.1.1 If the LCD panel breaks , be careful not to get the liquid crystal to touch your skin.
- 4.1.2 If the liquid crystal touches your skin or clothes , please wash it off immediately by using soap and water.

### 4.2 HANDLING

- 4.2.1 Avoid any strong mechanical shock which can break the glass.
- 4.2.2 Avoid static electricity which can damage the CMOS LSI—When working with the module, be sure to ground your body and any electrical equipment you may be using.
- 4.2.3 Do not remove the panel or frame from the module.
- 4.2.4 The polarizing plate of the display is very fragile. So , please handle it very carefully, Do not touch, push or rub the exposed polarizing with anything harder than an HB pencil lead (glass , tweezers , etc.)
- 4.2.5 Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the Surface of plate.
- 4.2.6 Do not touch the display area with bare hands , this will stain the display area.
- 4.2.7 Do not use ketonic solvent & aromatic solvent. Use with a soft cloth soaked with A cleaning naphtha solvent.
- 4.2.8 To control temperature and time of soldering is  $280 \pm 10^{\circ}\text{C}$  and 3-5 sec.
- 4.2.9 To avoid liquid (include organic solvent) stained on LCM.

### 4.3 STORAGE

- 4.3.1 Store the panel or module in a dark place where the temperature is  $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$  and the humidity is below 65% RH.
- 4.3.2 Do not place the module near organics solvents or corrosive gases.
- 4.3.3 Do not crush, shake , or jolt the module.