深圳市希恩凯电子有限公司
SHENZHEN CNK ELECTRONIC CO.,LTD.

Product Specification For LCD Module

Model NO.：CNKD0401-14004A1

CUSTOMERITEM NO.: 201-0000012-01

REVISION：A

☐APPROVAL FOR SPECIFICATIONS ONLY

■**APPROVAL FOR SPECIFICATIONS AND SAMPLE**

CUSTOMER：	APPROVED BY：

CNK LCM R&D CENTER		
APPROVED BY	**CHECKED BY**	**PREPARED BY**
DIRECTOR	**MANAGER**	**Engineer**

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2. TABLE OF CONTENTS

3. RECORD OF REVISION

REV	COMMENT	PAGE	DATE
A	Initial Release	1-16	2014/11/3

4. GENERAL SPECIFICATION

ITEM	CONTENTS
Module Size	70.0(W) ×90.0(H) ×14.5（T) mm
Display View Area	51(W) × 51(H) mm
LCD Type	VA/NEGATIVE/TRANSMISSIVE
View Angle	12 O'clock
Driver IC	TCP802
Backlight	WHITE
DC to DC circuit	Build-In
Weight	TBD

LCD DISPLAY COMPARISON TABLE

LCM显示对照表		
TYPE	底色/字色	备注
TN 正显	灰底黑字	
TN 负显	黑底白字	
STN 正显	黄绿底蓝字	
STN 负显	蓝底白字	
FSTN 正显	白底黑字	
FSTN 负显	黑底白字	
PMVA 负显	黑底白字	

5. MAXIMUM ABSOLUTE LIMIT

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
LCD Module Driving Voltage	Vdd	Ta＝25℃	2.9	3.1	3.3	Volt
Operatin Temperature	Top	--	-20℃	-	70℃	℃
Storage Temperature	Tst	--	-30℃	-	+80℃	℃
Humidity	%	--	--	--	90%	
Life Time	--	If=45mA	100,000	--	---	Hour

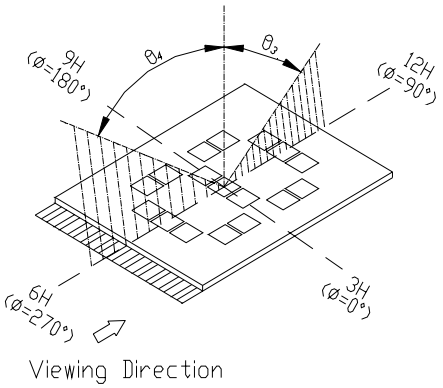
Note: See section 12 for backlight uniformity measurement

6. LCD ELECTRO-OPTICAL CHARACTERISTICS

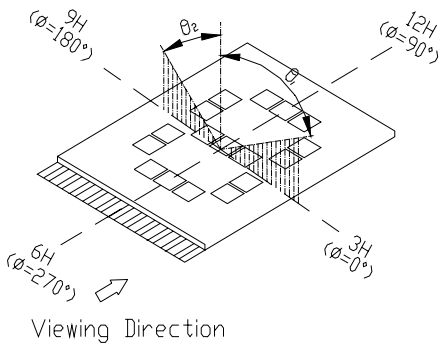
Item		Symbol	Temp(℃)	Rating			Unit	Reference
				Min	Typ	Max		
Recommended Driving Voltage		Vop	50				V	
			25	2.7	3.0	3.3		
			0					
Response Time	Rise Time	Tr	25		180	230	ms	Note4
	Fall Time	Tf	25		180	230		
Frame Frequency		FR	25	70	75	80	Hz	
Viewing angle Cr≧2	Ø=0°	θ_1	25		25		Deg	Note1 Note2
	Ø =180°	θ_2			25			
	Ø =90°	θ_3			35			
	Ø =270°	θ_4			15			
Viewing Direction			12 O'clock					
Contrast Ratio		Cr	25	6	8			Note3

7. OPTICAL CHARACTERISTICS DEFINITION

Note 1. Definition of angle θ1& θ2

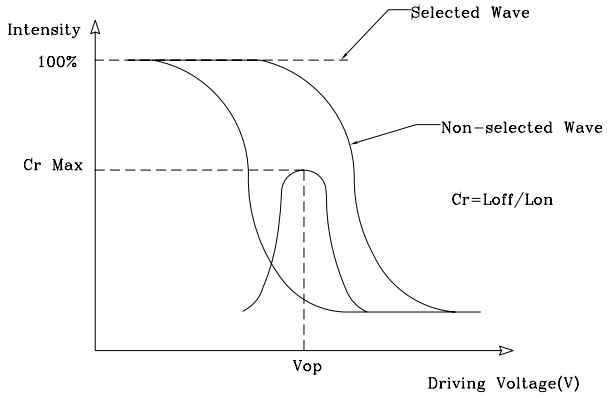


Note 2. Definition of angle θ3& θ4

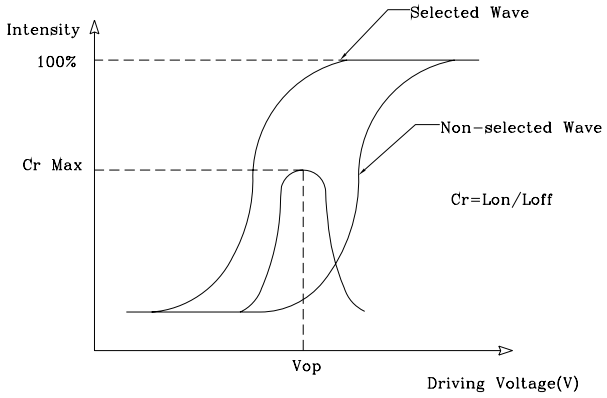


LCD Panel

Note 3. Definition of contrast ratio (Cr2)

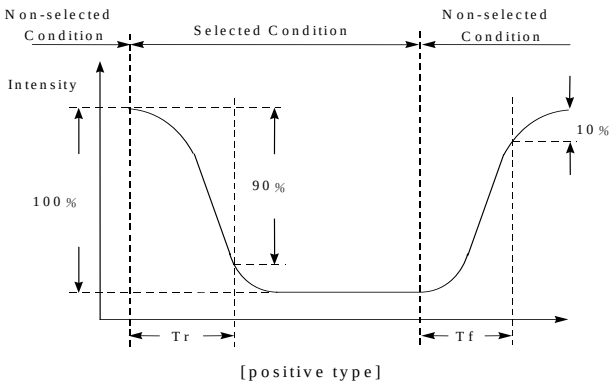


[Positive type]

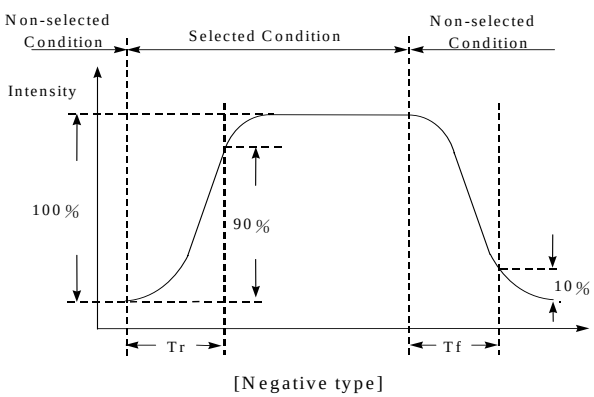


[Negative type]

Note 4. Definition of response time



[positive type]



[Negative type]

8. INTERFACE PIN ASSIGNMENT

NO.	SYMBLE	DESCRIPTION
1	SW2-1	SW2 key-press Terminal
2	SW2-2	
3	VDD	Power supply for Logic (+3.3V)
4	VSS	GND (0V)
5	DIO	Serial data input/output with pull-high resistor
6	CKWB	WRITE clock input with pull-high resistor
7	CKRB	READ clock input with pull-high resistor
8	LED+	Power supply for LED1(current:20mA,reference voltage:3.0V)
9	BL+	Power supply for LED backlight (current:39mA,reference voltage:12.0V)
10	SW1	SW1 key-press Terminal

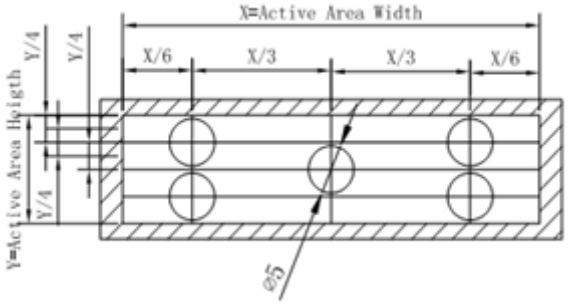
9. BACKLIGHT

BACKLIGHT ELECTRICAL-OPTICAL CHARACTERISTICS
(Unless specified, Ambient temperature Ta=25°C)

PARAMETER	Sym.	Min.	Typ.	Max.	Unit	Test Condition	Reference
Supply Current	I	--	---	90	mA	30mA	
WHITE LED	V	--	2.8	3.1	V	30mA	
Backlight Luminous Intensity	Lv	--	--	--	Cd/m^2	--	Note1
Uniformity	--	75	--	--	%	--	Note1 Note2

NOTE:

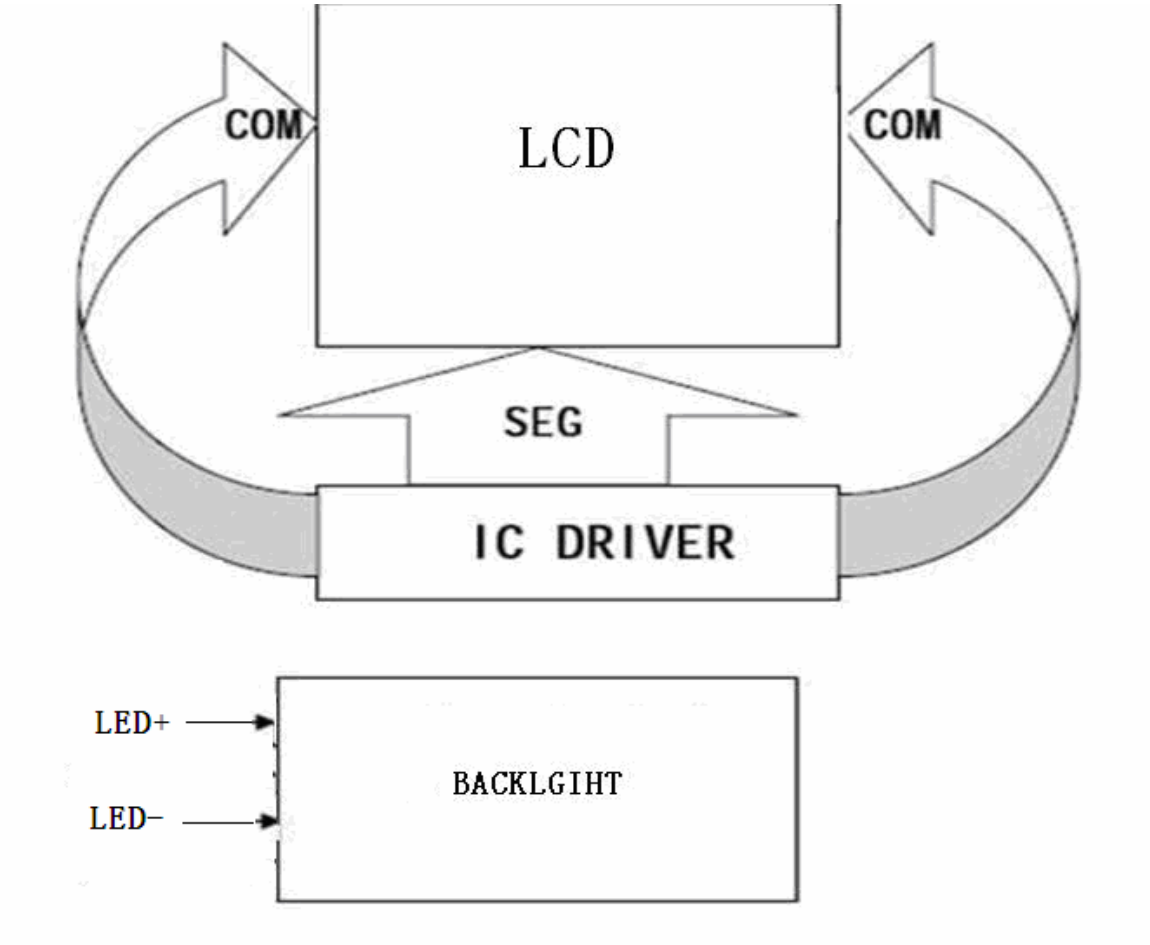
1. **Backlight luminance: The measurement instrument is BM-7 luminance colorimeter. The aperture of colorimeter is ø5mm and the distance between lens and backlight is 50cm. 5 points will be measured and the luminance of backlight is the average value of 5 points.**



measure point on backlight

2. **Backlight Uniformity = (The Luminance min / The Luminance max) x 100%**

10.BLOCK DIAGRAM



11. ELECTRICAL CHARACTERISTICS

Item	Symbol	Condition		Min.	Typ.	Max.	unit
Operating voltage	VDD			2.4	3	5.5	V
Power consumption current	I_{OPR1}	3V	Internal RC oscillator on, LCD on, no load		125	250	uA
		5V			250	500	
Power consumption current	I_{OPR2}	3V	Internal RC oscillator on, LCD off, no load		40	80	uA
		5V			100	200	
Power consumption current	I_{OPR3}	3V	External Crystal oscillator on, LCD on, no load		90	125	uA
		5V			160	250	
stand by current	Ist	3V	System halt, No load, oscillator off, LCD off		1	2	uA
		5V			2	5	
Input low voltage for input pin	V_{IL1}	3V	CKRB/ CKWB/ DIO	0		0.6	V
		5V		0		1.0	
Input high voltage for input pin	V_{IH1}	3V	CKRB/ CKWB/ DIO	2.4		3	V
		5V		4.0		5	
Segment output 'H'	IS_{OH}	3V		-100	-150		uA
		5V		-200	-300		
Segment output 'L'	IS_{OL}	3V		60	120		uA
		5V		120	200		
Common output 'H'	IC_{OH}	3V		-100	-150		uA
		5V		-200	-300		
Common output 'L'	IC_{OL}	3V		200	250		uA
		5V		400	500		

Figure 4. D.C Characteristics

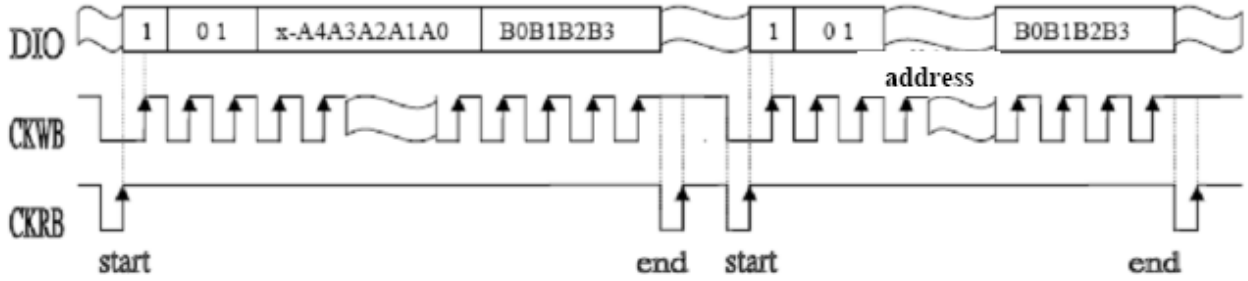
Item	Symbol	Condition	Min.	Typ.	Max.	unit
System clock	f_{SYS}	RC oscillator @3v (256Khz)		256		KHz
LCD frame frequency	F_{LCD1}	1/2 duty		64		HZ
	F_{LCD2}	1/3 duty		86		
	F_{LCD3}	1/4 duty		64		
CKWB(Serial control)	F_{CKWB}	@3V，Clock duty 50%			150	KHz
		@5V，Clock duty 50%			300	
CKRB(Serial control)	F_{CKRB}	@3V，Clock duty 50%			75	KHz
		@5V，Clock duty 50%			150	

Figure 5. A.C Characteristics

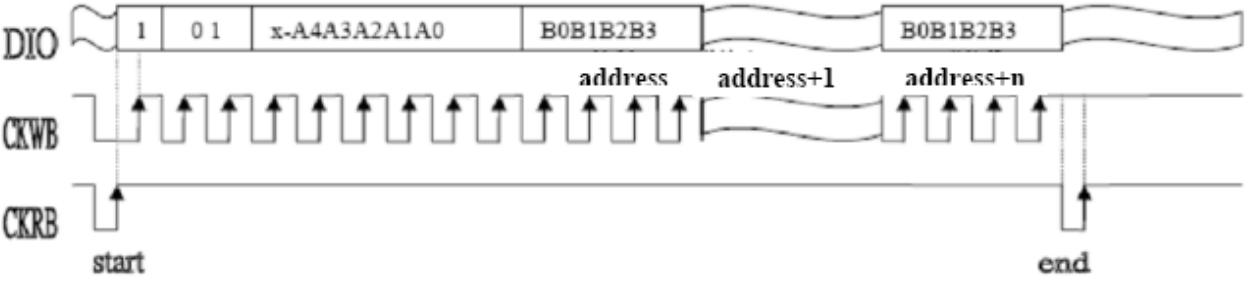
12. TIMING CHARACTERISTICS

Function	Preceding Code	Mode Code	Address Code	Date Code
Write	1	01	x-A4A3A2A1A0	B0B1B2B3

WRITE Mode(Command Code:101)

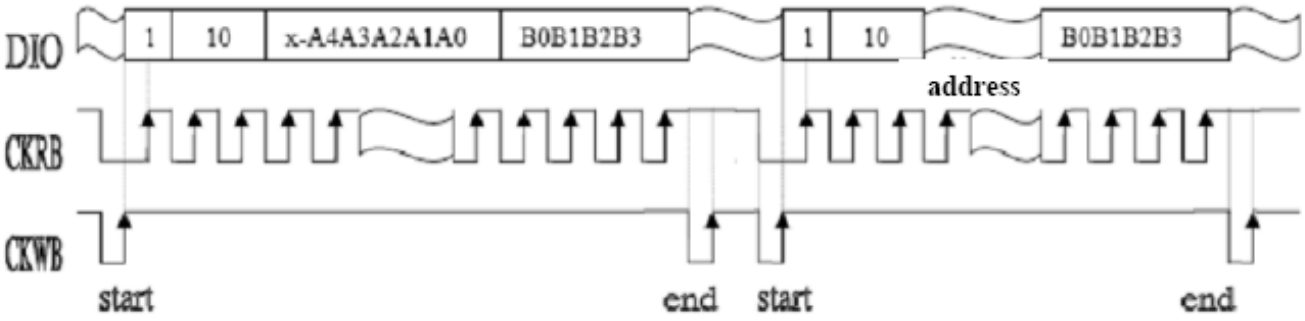


WRITE Mode(Successive Address Writing)

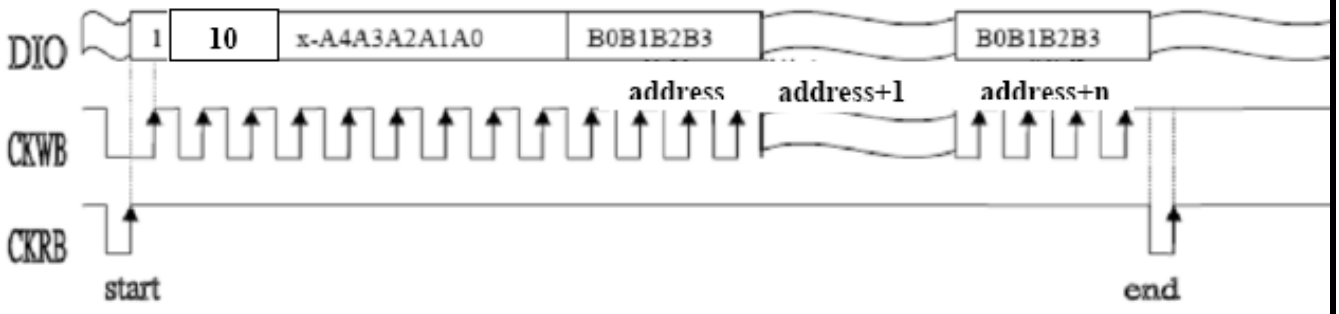


Function	Preceding Code	Mode Code	Address Code	Date Code
Read	1	10	x-A4A3A2A1A0	B0B1B2B3

READ Mode(Command Code:110)

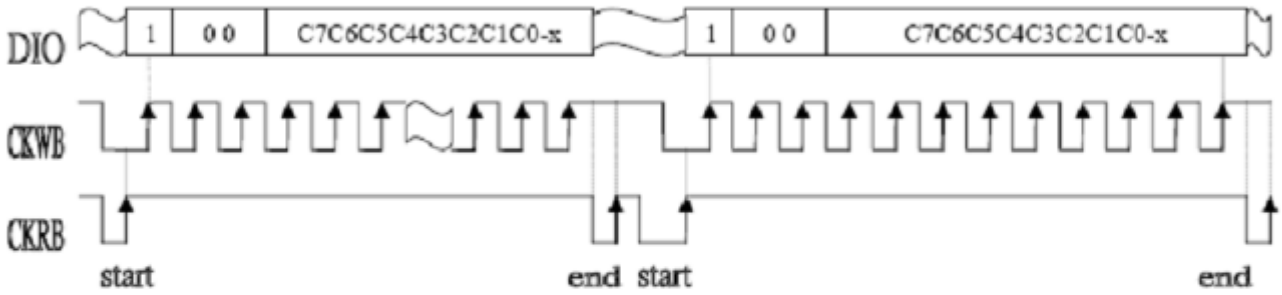


READ Mode(Successive Address Reading)

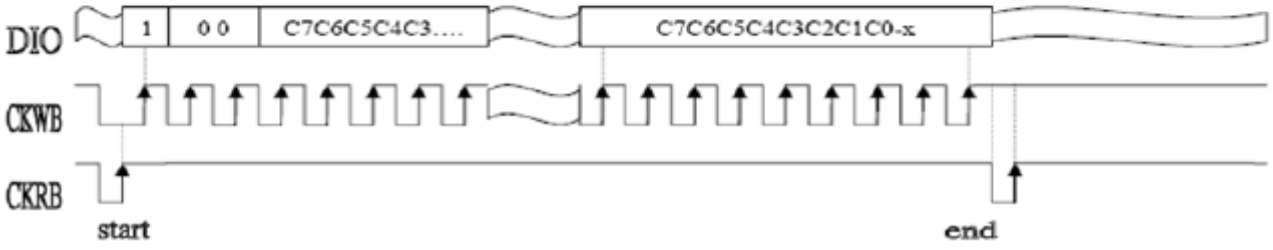


Function	Preceding Code	Mode Code	Control Code
Command	1	00	C7C6C5C4-C3C2C1C0-x

Read-Modify-Write Mode(Command Code:100)



Read-Modify-Write Mode(Successive Address Accessing)



13.FUNCTIONAL DESCRIPTION

Display memory -- RAM

The static display memory (RAM) is organized into 32x4 bits and stores the displayed data. Th contents of the RAM are directly mapped to the contents of the LCD driver.

A4A3A2A1A0	COM0	COM1	COM2	COM3
	Bit0	Bit1	Bit2	Bit3
00_H	SEG0			
01_H	SEG1			
02_H	SEG2			
03_H	SEG3			
04_H	SEG4			
05_H	SEG5			
06_H	SEG6			
07_H	SEG7			
08_H	SEG8			
09_H	SEG9			
$0A_H$	SEG10			
$0B_H$	SEG11			
$0C_H$	SEG12			
$0D_H$	SEG13			
$0E_H$	SEG14			
$0F_H$	SEG15			
10_H	SEG16			
11_H	SEG17			
12_H	SEG18			
13_H	SEG19			
14_H	SEG20			
15_H	SEG21			
16_H	SEG22			
17_H	SEG23			
18_H	SEG24			
19_H	SEG25			
$1A_H$	SEG26			
$1B_H$	SEG27			
$1C_H$	SEG28			
$1D_H$	SEG29			
$1E_H$	SEG30			
$1F_H$	SEG31			

14. RELIABILITY

	No	Test Item	Content of Test	Test Condition
Environment Test	1	High Temperature Storage	Endurance test of high temperature for a long time.	80℃ 96H
	2	Low Temperature Storage	Endurance test of low temperature for a long time.	-20±2℃ 96H
	3	High Temperature Operation	Endurance test of electrical tress (Voltage & Current) and the thermal stress to the element.	70℃ 96H
	4	High Temperature /Hu idity Storage	Endurance Test of high temperature and high humidity for a long time.	45±2℃ 90±2%RH 96H
	5	Thermal shock	Endurance test of low and high temperature cycles.(air to air) -20±2℃ ⟷ 70±2℃ (60min) ⟷ (60min) 1 cycle	-20±2℃/70±2℃ 10 cycle
	6	vibration	Maximum vibration is 2.45m/s2 (0.25 G) during operation and 11.75 m/s2 (1.2 G) during storage. Tested 10-100KHz XYZ directions 1 hour each.	Ambient temperature Ta=25°C
	7	shock	Maximum shock is 29.4 m/s2 (3 G) during operation and 490.0 m/s2 (50 G) during storage. Tested 10 milliseconds in XYZ directions 1 time each.	Ambient temperature Ta=25°C

Note:

1) Condensation is not allowed during low temperature testing.

2) Driving condition for operation test:

Power Supply Current for BackLight(ImA)=15mA

Failure Judgment Criterion

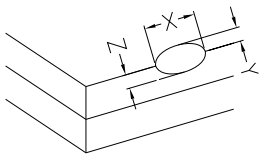
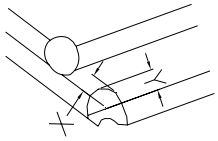
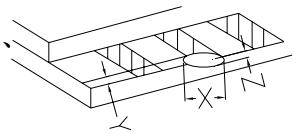
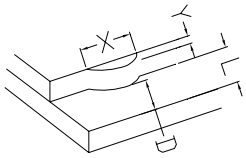
After the above mentioned test (For Environmental Test, after 2 hours in room temperature):

1) There should not be conspicuous failure of display quality and appearance.

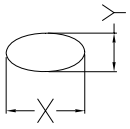
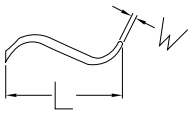
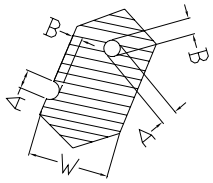
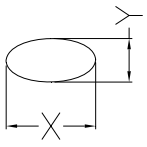
2) Contrast ratio should be greater than or equal to 50% of the initial contrast ratio.

3) Abnormal function is a failure.

15. INSPECTION CRITERIA

<table>
<tr><th>NO</th><th>Item</th><th>Criteria</th><th>AQL</th></tr>
<tr><td>1</td><td>Electrical Testing</td><td>(1) non-display
(2) segment missing
(3) segment short</td><td>0.65</td></tr>
<tr><td>2</td><td>Dimension state</td><td>Dimension out of the specification</td><td>1.00</td></tr>
<tr><td>3</td><td>Glass crack</td><td>Substrate check symbol Definition:
X: Length direction
Y: Short side direction
Z: Thickness direction
T: Glass thickness
K:LCD length
L: Single connector width
(1) General crack
 
<table>
<tr><th>X</th><th>Y</th><th>Z</th></tr>
<tr><td>1/8K≥</td><td>Not over viewing area</td><td>T≥</td></tr>
</table>
(2) Corner
 
<table>
<tr><th>X</th><th>Y</th><th>Z</th></tr>
<tr><td>1/8K≥</td><td>Not over viewing a ea</td><td>No check</td></tr>
</table>
(3) Contact pad crack
 
<table>
<tr><th>X</th><th>Y</th><th>Z</th></tr>
<tr><td>1/8K≥</td><td>1/3L≥</td><td>No chec</td></tr>
</table>
1. Cracks on the contact area cannot exceed 1/2 of the glass thickness.
2. Y not to exceed 1/3 seal width
(4) Substrate protuberance and internal crack
 
D＜2/3L ,Reject
(5) No progressive glass cracks allowed</td><td>2.50</td></tr>
</table>

<table>
<tr><th>NO</th><th>Item</th><th>Criterio</th><th>AQL</th></tr>
<tr><td rowspan="4">4.</td><td rowspan="4">Black spot , white spot (including polarizer)
Ø=(X+Y)/2

unit:mm</td><td>(1) Round type
 
<table>
<tr><th>Size</th><th>Acceptable QTY</th></tr>
<tr><td>Ø≤0. 10</td><td>Accept</td></tr>
<tr><td>0.10＜Ø≤0.20</td><td>2</td></tr>
<tr><td>0.20＜Ø≤0.25</td><td>1</td></tr>
<tr><td>0.25＜Ø</td><td>0</td></tr>
</table></td><td rowspan="4">1.50</td></tr>
<tr><td>(2) Line type
 
<table>
<tr><th>Leng h</th><th>W dth W</th><th>Acceptable QTY</th></tr>
<tr><td>accept</td><td>0.015≥W</td><td>No che k</td></tr>
<tr><td>3.0≥L</td><td>0.050≥W</td><td></td></tr>
<tr><td>2.5≥L</td><td>0.080≥W</td><td></td></tr>
<tr><td></td><td>0.100＜W</td><td>As round type</td></tr>
</table></td></tr>
<tr><td>(3) No more than 2 spots and lines within 3 mm. Maximum combined total of round and line defects is 4.</td></tr>
<tr><td>(4) Scratches criterion is same as that of Round type.</td></tr>
<tr><td>5.</td><td>Pixel deformation</td><td>Symbols:
W: segment width
Ø: average of diameter ＝(A＋B) / 2
(1)Pin hole and deformation
 
<table>
<tr><th>Width</th><th>Acceptable Defect</th></tr>
<tr><td>W＜0.4</td><td>Ø≤0. 20 and Ø≤1/2W</td></tr>
<tr><td>W≥0.4</td><td>Ø≤0. 25 and Ø≤1/3W</td></tr>
</table>
Ø under 0.10mm ,acceptable
（2) Pixel size should be in the range of 95% to 100% of the normal dimension and the gap between pixels should be less than 150% of normal dimension.</td><td>2.5</td></tr>
<tr><td>6.</td><td>Polarizer bubble
Ø=(X+Y)/2</td><td> 
<table>
<tr><th>size Ø</th><th>Acceptable QTY</th></tr>
<tr><td>Ø≤0. 20</td><td>No check</td></tr>
<tr><td>0.20＜Ø≤0.50</td><td>3</td></tr>
<tr><td>0.50＜Ø≤1.00</td><td>2</td></tr>
<tr><td>1.00＜Ø</td><td>0</td></tr>
<tr><td>Total TY</td><td>3</td></tr>
</table></td><td>1.5</td></tr>
<tr><td>7.</td><td>Contrast</td><td>Under normal power supply, uneven contrast is unacceptable.</td><td>2.5</td></tr>
<tr><td>8.</td><td>Rainbow</td><td>Obvious uneven color in LCD viewing area is not allowed.</td><td>2.5</td></tr>
</table>

16. PRECAUTION FOR USE OF LCD MODULE

1. Handling Precautions

1) The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

2) If the display panel is damaged, the liquid crystal substance leaks out ,do not ingest. If the substance contacts skin or clothes, promptly wash off using soap and water.

3) Do not apply excessive force to the display surface or adjoining areas since this may affect the LCD color

4) The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

5) If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

--Isopropyl alcohol

--Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer.

Especially, do not use the following:

--Water

--Ketone

--Aromatic solvents

6) Do not attempt to disassemble or process the LCD module.

2. Assembling Precautions

1) When mounting the LCD module make sure that it is free of twisting, warping, and distortion. Distortion has great influence upon display quality. Also, use an adequately stiff outer case.

2) Please handle the LCD module by its side.

3) NC terminal should be open. Do not connect anything.

4) If the logic circuit power is OFF, do not apply the input signals.

5) To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

·Be sure to ground the body when handling the LCD module.

·Tools required for assembly, such as soldering irons, must be properly grounded.

·To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

·The LCD module is coated with a film to protect the display surface. Exercise care when peeling off this protective film since static electricity may be generated.

6) Be careful handling the glass panel because it has a very sharp edge.

3. Storage Precautions

1) When storing the LCD module, avoid exposure to direct sunlight, to the light of fluorescent lamps, to high temperature or to high humidity. Whenever possible, LCD modules should be stored in the same packaging they were shipped in.
2) Exercise care to minimize corrosion of the electrodes. Corrosion of the electrodes is accelerated by water droplets or by current flow in a high-humidity environment.

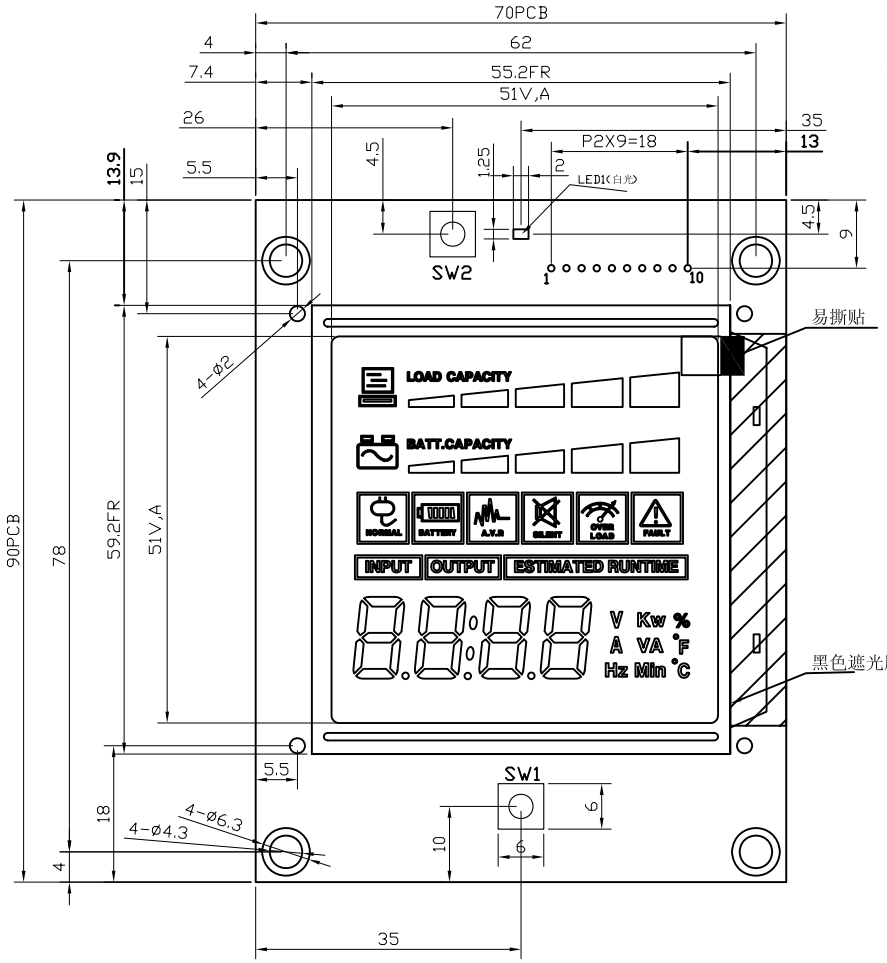
4. Design Precautions

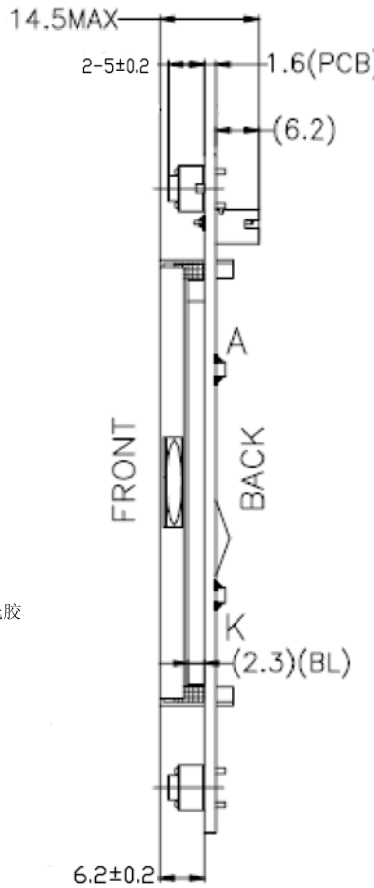
1) The absolute maximum ratings represent the rated value beyond which LCD module can not exceed. When the LCD modules are used in excess of this rated value, their operation characteristics may be adversely affected.
2) To prevent the occurrence of erroneous operation caused by noise, attention must be paid to satisfy V_{IL}, V_{IH} specification values including taking the precaution of using signal cables that are short.
3) The LCD exhibits temperature dependency characteristics. Since recognition of the display becomes difficult when the LCD is used outside its designated operating temperature range, be sure to use the LCD within this range. Also keep in mind that the LCD driving voltage levels necessary for clear displays will vary according to temperature.
4) We recommended that power supply lines (VDD) have over-current protection line. (Fuse etc. Recommend Value:0.5A)
5) Sufficiently reduce electrical noise from peripheral devices.
6) To cope with EMI, take measures basically on outputting side.
7) Assemble LCD module tightly with the application case or PCB.

5. Other considerations

1) Liquid crystal solidifies under low temperature (below the storage temperature range) leading to defective orientation or the generation of air bubbles (black or white). Air bubbles may also be generated if the LCD module is subjected to a strong shock at a low temperature.
2) If the LCD modules have been operating for a long time showing the same display patterns, the display patterns may remain on the screen as ghost images and a slight contrast irregularity may also appear. A normal operating status can be regained by suspending use for some time. It should be noted that this phenomenon does not adversely affect performance reliability.
3) To minimize the performance degradation of the LCD module's resulting from destruction caused by static electricity, etc., exercise care to avoid touching the LCD's electrical connections.
4) LCD voltage adjustment may be necessary to obtain the best contrast on each LCD.
5) Precaution for disposal of LCD module. When disposal of LCD module, ask specialization company of industrial waste which is permitted by the government. When burn up LCD module, obey the law of environmental hygienic.

REV:	DESCRIPTION	BY	DATE
V00			





NO.	SYMBOL
1	SW2-1
2	SW2-2
3	VDD
4	VSS
5	DIO
6	DKWB
7	CKRB
8	LED+
9	BL+
10	SW1+

NOTES

1. ALL DIMENSIONS ARE mm.
2. LCD TYPE: VA NEGATIVE
3. POLARIZER MODE: TRANSMISSIVE.
4. VIEWING DIRECTION: 12.00 O'CLOCK
5. DRIVE METHOD:1/2 DUTY,1/2 BIAS Vop=3.0V,VDD=5.0V
6. OPERATING TEMP. −20°C TO +70°C.
7. STORAGE TEMP. −30°C TO +80°C.
8. CONNECTOR TAPE: ZEBRA
9. DRIVER IC: TCP802
10. BALCK: WHITE

17.LCM DRAWING

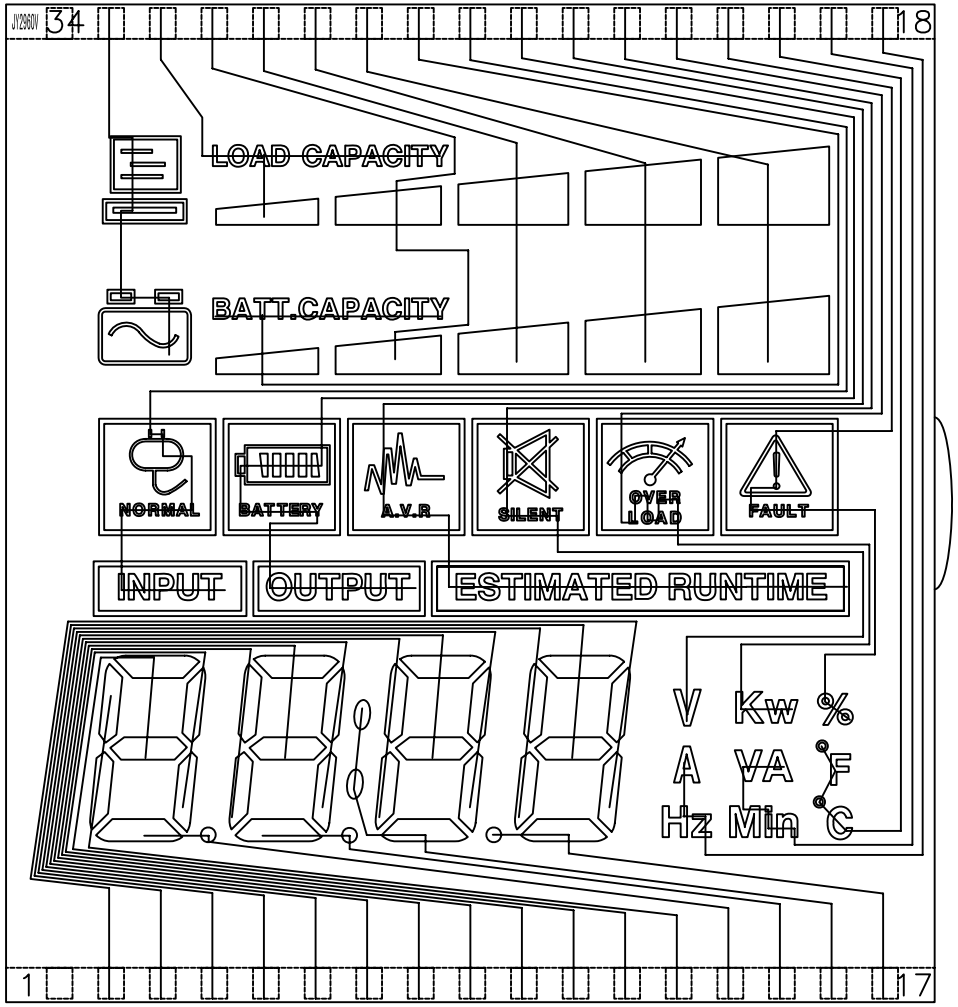
SHEET: 1 of 1

APPROVALS		DATE
DWN	LYY	2014/5/11
CHK		
APP		

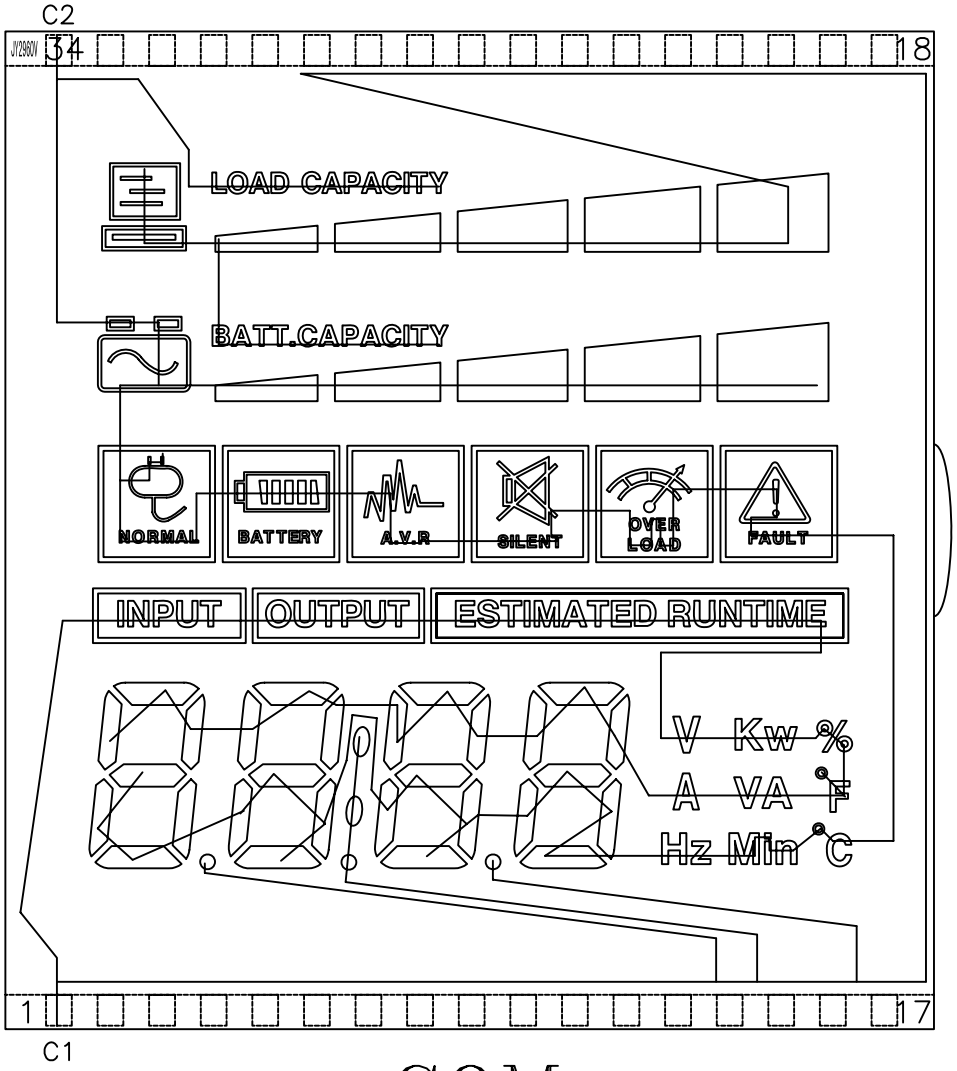
深圳市希恩凯电子有限公司
SHENZHEN CNK ELECTRONIC CO.,LTD.

MODEL NUMBER : CNKD0401-14004A1

SCALE:
GENERAL TOL:± 0.2
UNITS: MM
DO NOT SCALE THIS DRAWING.



SEG



COM

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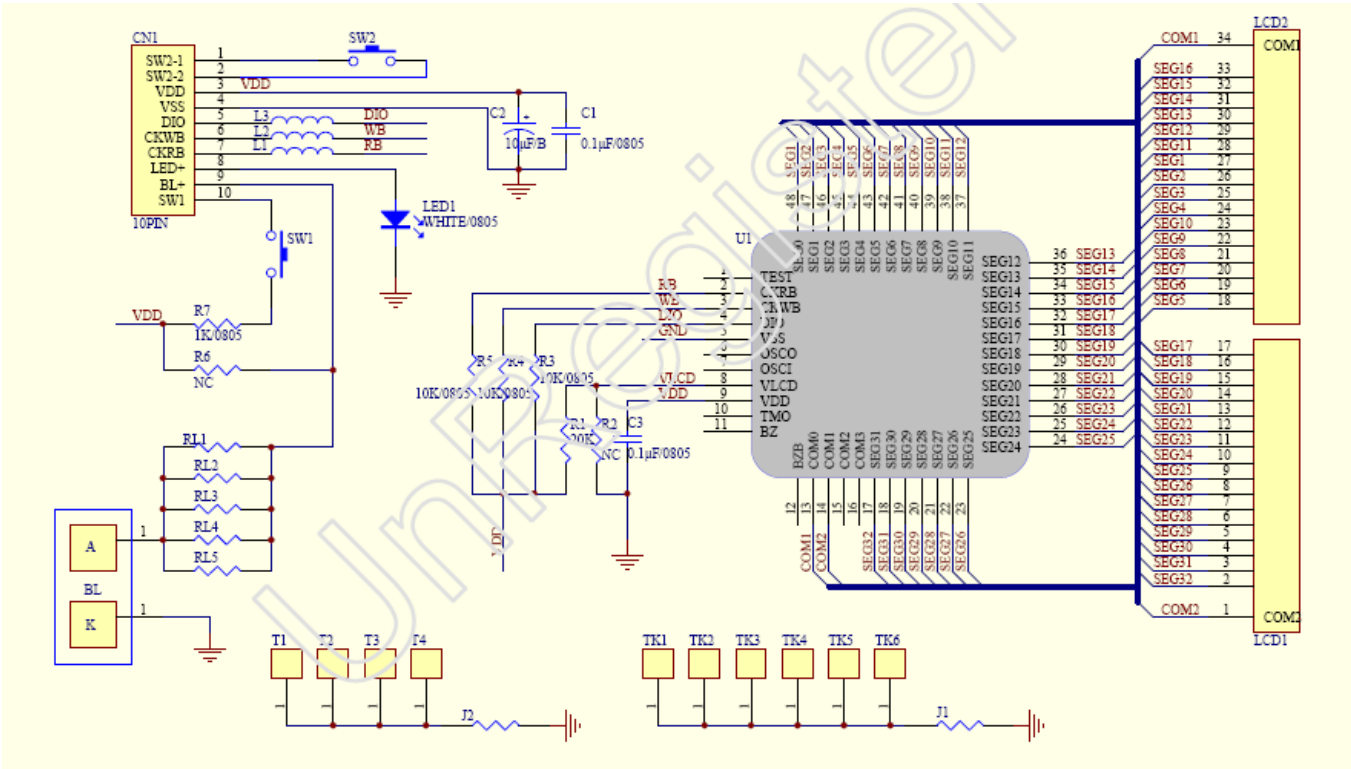
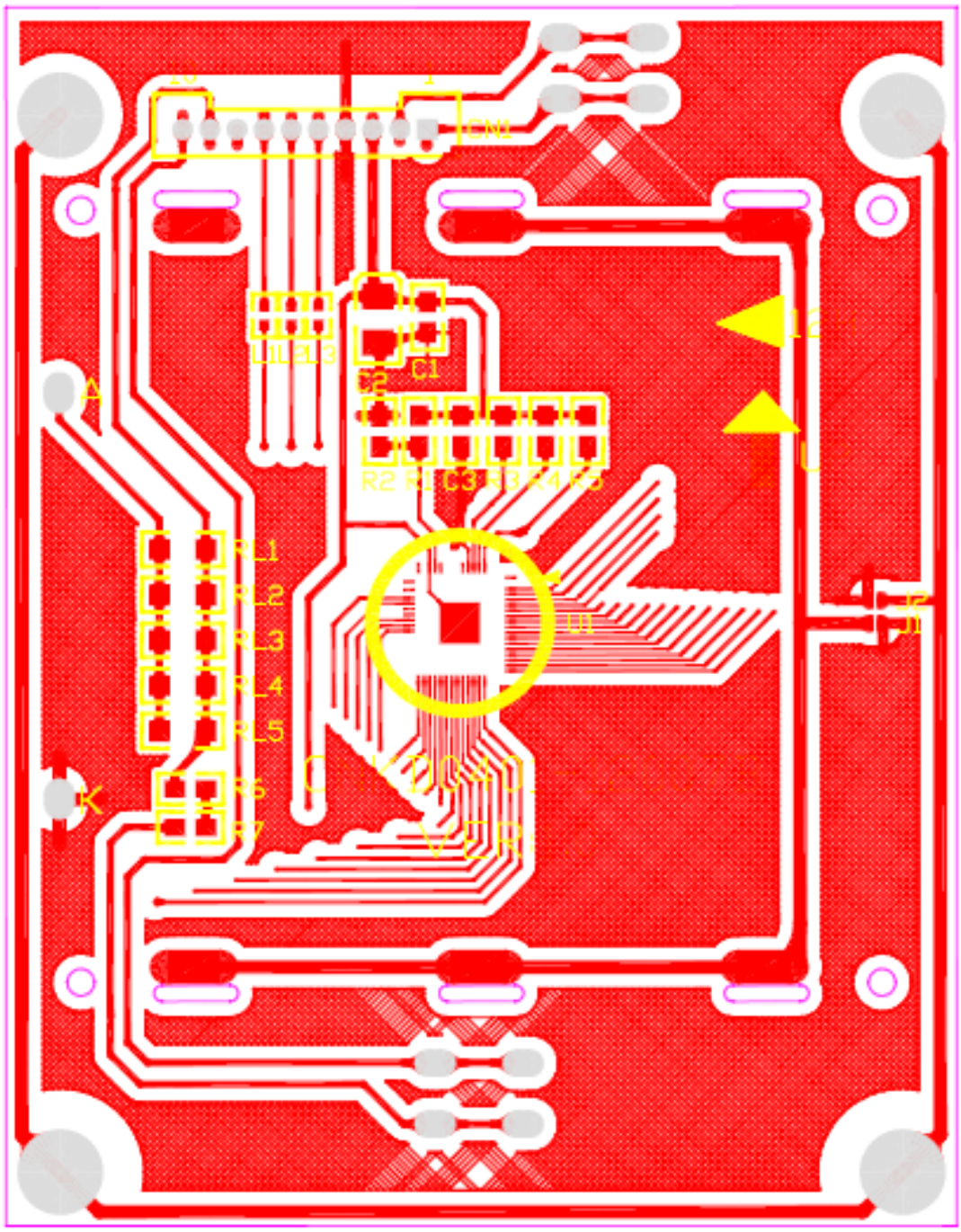
由 Autodesk 教育版产品制作

18.LCM SCHEMATIC

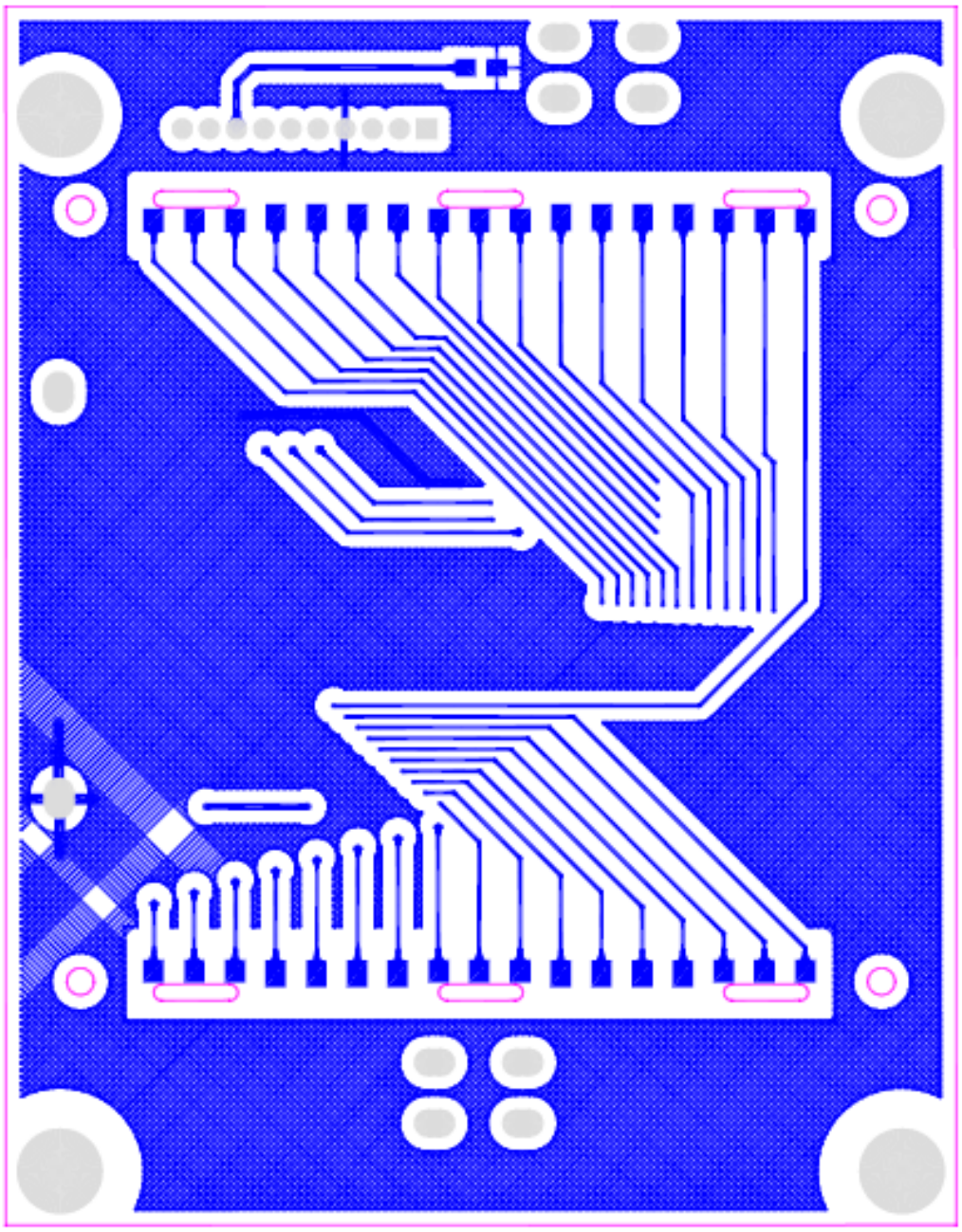


19.PCB Layout

Top Layer

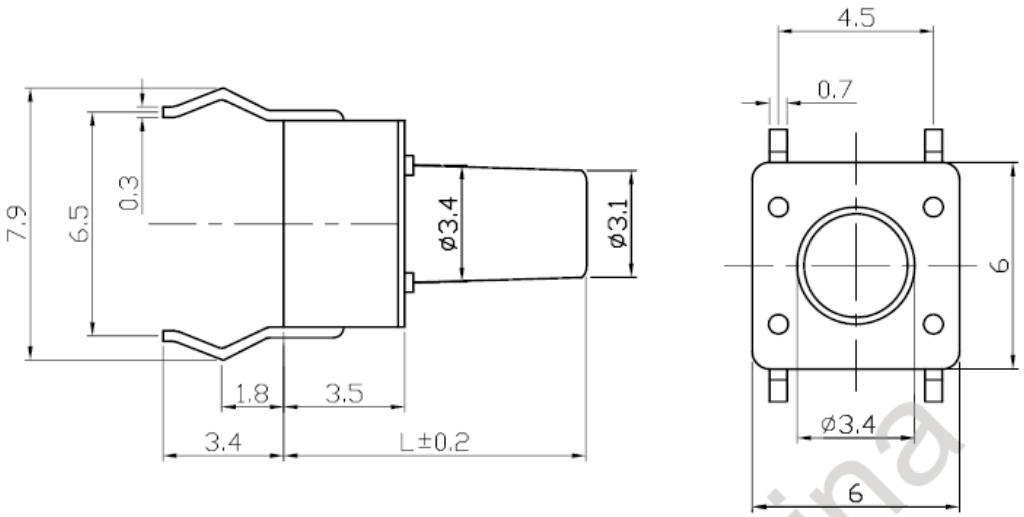


Bottom Layer

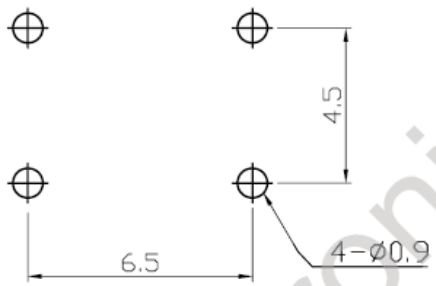


20. Key Parameter

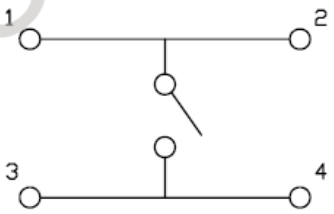
Mechanical Dimensions



Mounting Hole



Circuit Explanation



TOLERANCES UNLESS OTHERWISE SPEC	
BASIC DIMENSIONS	TOLERANCES
UP TO 10	± 0.3
ABOVE 10 TO 30	± 0.5
ABOVE 30 TO 100	± 1.0
ANGULAR DIMENSION	± 5°

1、Rating: DC 12V 50mA
2、Travel:0.25±0.1mm
3、Operating Force:160±50gf
4、Contact Resistance:100mΩMax
5、Insulation resistance: 100MΩ
6、Withstand Voltage: 250VAC 0.5mA
7、Soldering Heat: 230±5℃ 3S±0.5S
8、Life:60,000 cycles

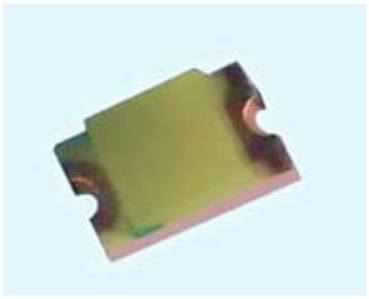
	Mode NO.	Knob(L)
☐	T1102	4.3
■	T1102A	5.0
☐	T1102N	6.0
☐	T1102B	7.0
☐	T1102E	7.5
☐	T1102C	8.0
☐	T1102M	9.0
☐	T1102D	9.5
☐	T1102Y	10.0
☐	T1102Q	11
☐	T1102X	12.0
☐	T1102F	12.5
☐	T1102G	13.0
☐	T1102O	13.5
☐	T1102H	15.0
☐	T1102I	17
☐	T1102J	18
☐	T1102K	20
☐	T1102L	21
☐	T1102U	8.5
☐	T1102R	6.5
☐	T1102W	5.5
☐	T1102Z	19

21 LED1 Parameter

Features:

- TOP view white LED
- Wide viewing angle
- Soldering methods: IR reflow soldering
- Mono-color type.
- Pb-free
- The product itself will remain within RoHS compliant version.

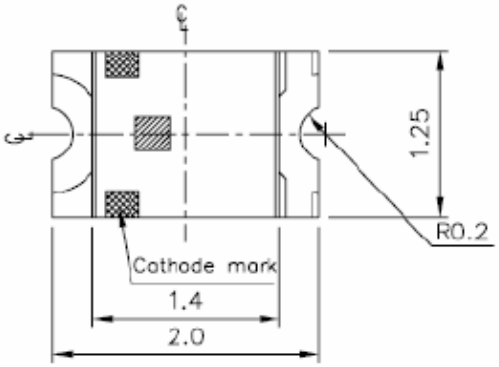
LT0805WH

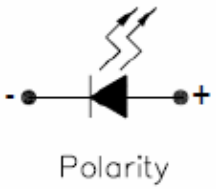


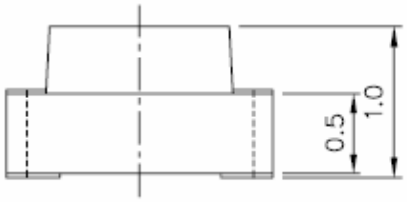
Application

- Flat backlight for LCD, switch and symbol
- Telecommunication: indicator and backlighting in telephone and fax.

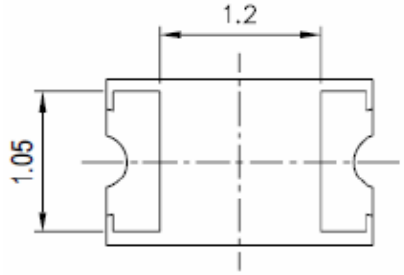
Package Outline Dimensions

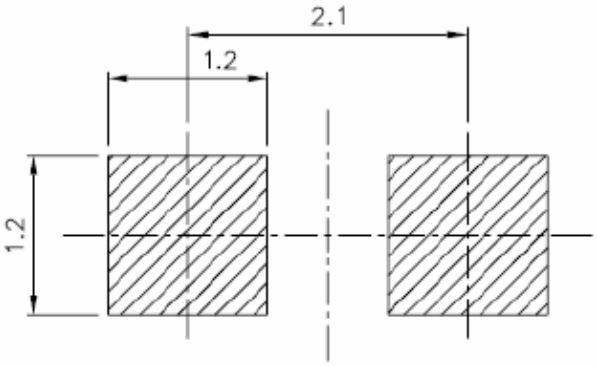






For reflow soldering (Propose)





Absolute Maximum Ratings (Ta=25℃):

Parameter	Symbol	Rating	Unit
Reverse Voltage	V_R	5	V
DC Forward Current	I_F	25	mA
Power Dissipation	Pd	90	mW
Pulse Forward Current (Duty 1/10 @1KHz)	I_{FP}	100	mA
Electrostatic Discharge(HBM)*1	ESD	1500	V
Operating Temperature	T_{opr}	-30 ~ +80	℃
Storage Temperature	T_{stg}	-40 ~ +85	℃
Soldering Temperature	T_{sol}	Reflow Soldering: 260℃ for 10sec. Hand Soldering: 315℃ for 3sec.	

Electro-Optical Characteristics (Ta=25℃)

Parameter	**Symbol**	**Min.**	**Typ.**	**Max.**	Unit	Condition
Luminous Intensity	Iv	400	---	---	mcd	I_F=20mA
Viewing Angle	$2\theta_{1/2}$	---	150	---	deg	I_F=20mA
Forward Voltage	V_F	2.8	---	3.4	V	I_F=20mA
Reverse Current	I_R	---	---	10	μA	V_R=5V

22. LCM MATERIEL LIST

物料名称	用量（pcs）	位置
CNKD0401-14004A1-LCD/VA 负显 12：00/54.0X58.0X2.8	1	
CNKD0401-12007B-PCB/70.0X90.0X1.6/FR4-2 绿油 沉金 V1.0	1	
CNKD0401-12007C-BL/53.6X59.0X2.3/白光， 6 个 LED 灯	1	
CNKD0401-12007A-FR/55.2X59.2X10.3/T0.5 电泳黑	1	
CNKD0401-12007A-ZB/54.0X4.5X2.0/0.1PITCH，YS 透明夹层	2	
按键/6.0x6.0x5/插件式/CNKD0401-12007C	2	SW1,SW2
TCP802/COB	1	U1
100nF 电容/0.1uF 0805 16V	2	C1,C3
10K 电阻/0805/百分五	3	R3,R4,R5
0Ω 电阻 /0805/百分一	1	R1
1K 电阻/1206/百分五	5	RL1-RL5
1K 电阻/0805/百分一	1	R7
LED 灯/0805 贴片 高亮白光/3.0V/CNKD0401-12007C	1	LED1
10PIN 插座/10PIN 插座，白色 2.0 间距/CNKD0401-12007C	1	CN1
10UF 钽电容 /封装:B 型/25V/±20％	1	C2
磁珠/MMZ1608S102AT -TDK （ROHS）/英制：0603，阻抗 1K	3	L1-L3