



# 大连佳显电子有限公司

## Dalian Good Display Co.,Ltd.

### PRODUCT SPECIFICATIONS

MODEL NUMBE: GDC02693

CUSTOMER: \_\_\_\_\_

CUSTOMER P/N: \_\_\_\_\_

CUSTOMER'S APPROVAL

APPROVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

REVISE DATE: 2021-04-15

PREPARED BY : 温馨

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APPROVED BY : 刘玉宝

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<http://www.good-display.com>



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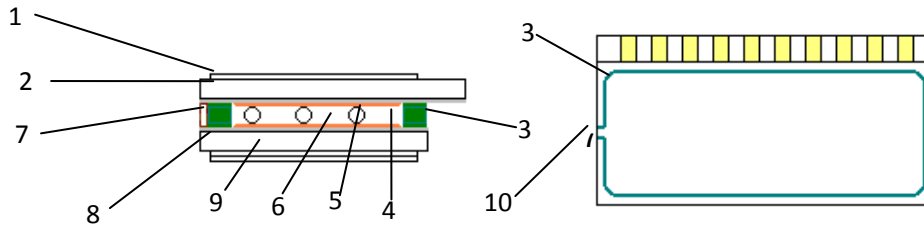
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### Part Two Basic structure of GD's LCD



Component	Material	Component	Material
1	Polarizer PVA, iodine or dye	7	Conductive dot Silver paste or gold paste
2	Front glass Soda lime with SiO <sub>2</sub> barrier and ITO layer	8	Rear glass Soda lime with SiO <sub>2</sub> barrier and ITO layer
3	Sealant Epoxy resin	9	Polarizer PVA, iodine or dye
4	Liquid crystal Liquid crystal fluid	10	End seal UV epoxy
5	Spacer Acrylic resin		
6	PI Polyimide		

### Part Three Electro-optical Characteristics

#### 1. FEATURES

Display mode	TN , POSITIVE / REFLECTIVE
Color	Black/White
Driving method	3.0V 、 1/4Duty 、 1/3Bias
Viewing Direction	6:00'clock

#### 2. Absolute Maximum Ratings

Item	Range	Unit	Condition
Operating Temp.	-20 ~ 70	°C	-----
Storage Temp.	-30 ~ 80	°C	Ref Part Five
AC Voltage	10	Vrms	1 hr
DC Voltage	3.0	V	100 hrs
Residual DC	200	mV	-----



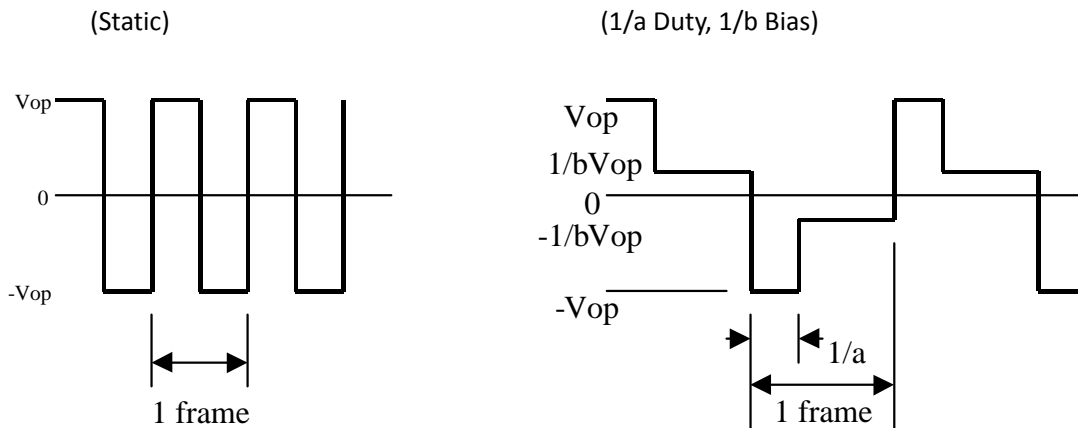
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### 3. Electro-Optical Characteristics

Item	Temp	Unit	Standard Value			Note
			Min	Typ	Max	
Operating Voltage	25°C	V	2.8	3.0	3.2	
	0°C					
Frame Frequency	25°C	Hz	32	64	128	(1)
Response Time	25°C	msec	-----	120	200	(2)
	25°C		-----	140	220	
Dissipation Current	25°C	$\mu\text{A}/\text{cm}^2$	-----	-----	5	(3)
Contrast Ratio ( $\theta = 30^\circ$ )	25°C	-----	4	6	8	(4)
Viewing Angle	12H $\phi 180^\circ$			15°		(5)
	6H $\psi = 0^\circ$			45°		
	3H $\psi = 90^\circ$			45°		
	9H $\psi = 270^\circ$			45°		

#### Note 1. Driving Waveform





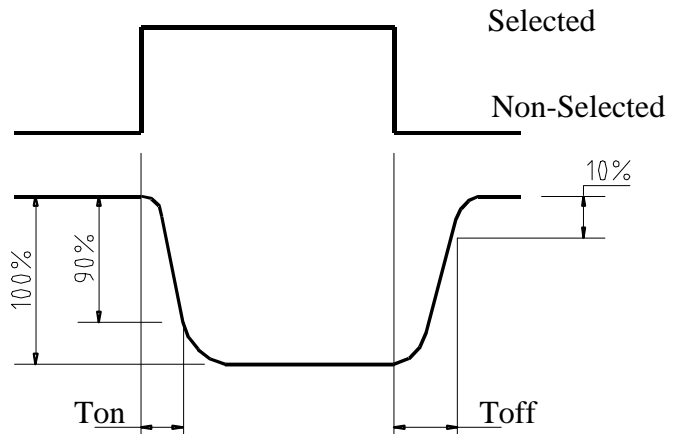
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### Note 2. Response Time

Ton: Turn on time

Toff: Turn off time



Measuring Condition:

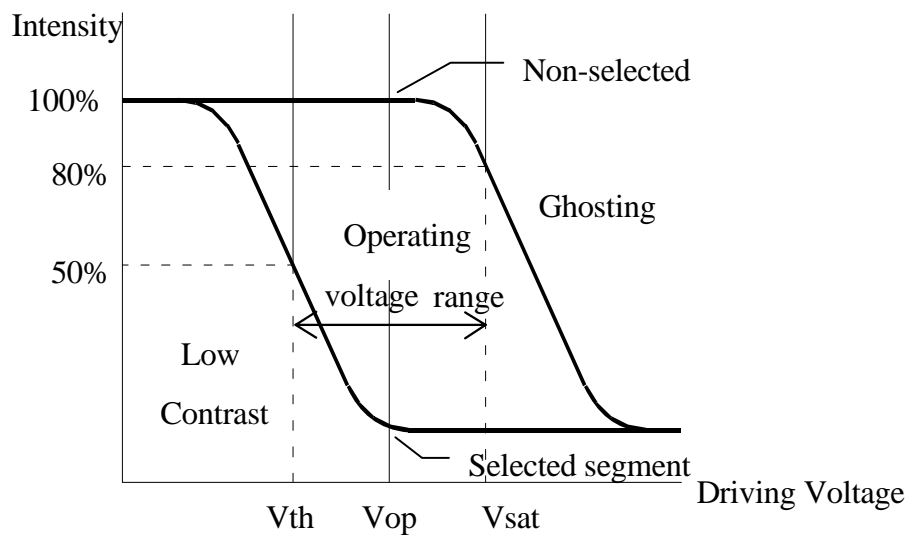
1. Driving Voltage: Same as Vop.
2. Driving Frequency: Same as Frame Frequency.

### Note 3. Contrast Ratio Definition

Positive mode: n = 1

Negative mode: n = -1

$$\text{Contrast Ratio} = \left\{ \frac{\text{Non-selected segment intensity}}{\text{Selected segment intensity}} \right\}^n$$





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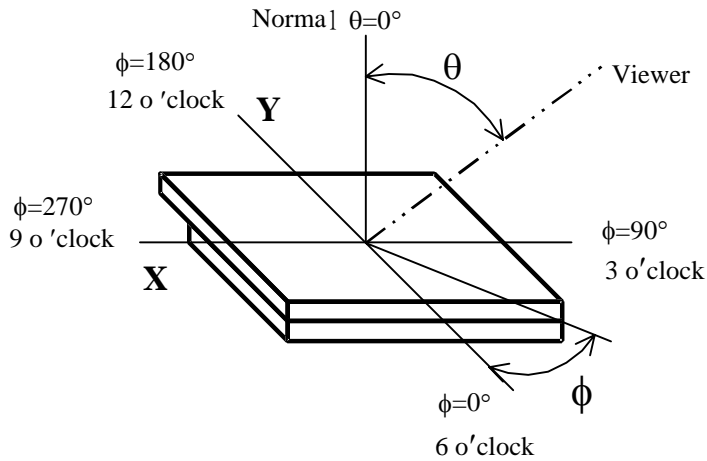
### Note 4. Viewing Angle

$\theta$ : Angle between Viewer Direction and Normal.

$$(-90^\circ \leq \theta \leq 90^\circ)$$

$\phi$ : Angle between Projection of Viewer Direction to X-Y plane and Y axis.

$$(0^\circ \leq \phi \leq 360^\circ)$$



#### Measuring Condition

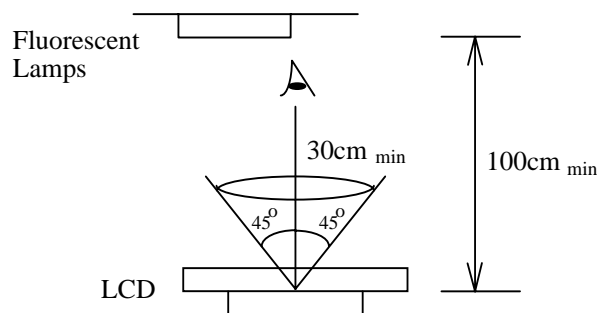
1. Driving Voltage: Same as  $V_{op}$ .
2. Driving Frequency: Same as Frame Frequency.



### Part Four General LCD Inspection Standard

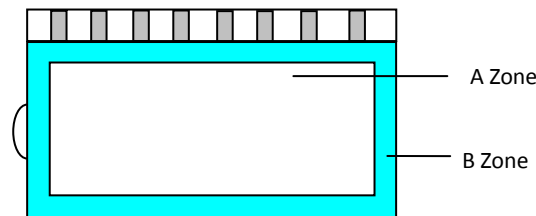
#### 1. Inspection Condition

- 1.1 The inspection shall be performed by using 20W x 2 fluorescent lamps . Distance between LCD and fluorescent lamps should be 100 cm or more. Distance between LCD and inspector eyes should be 30 cm or more.



- 1.2 For transmissive displays a reflector (e.g. a white card) shall be placed behind the display.
- 1.3 Viewing direction for inspection is  $45^\circ$  from vertical against LCD.
- 1.4 Inspection time per LCD 10 second.

#### 2. Definition of Zone



A Zone: Active display area (minimum viewing area).

B Zone: Non-active display area (outside viewing area).

##### 2.1 Operation Manner

- 2.1.1 As a general rule, when there is no trouble for quality and assembly in customer's product, any visual defect outside the viewing area are permissible.
- 2.1.2 Items which cannot be described by writing shall be set up the limit sample. The limit sample has a highest priority.

The limit sample shall be set up under discussion when a problem occurs.



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### 3. AQL Inspection Standard

3.1 Inspection level: Level II, Single Sampling.

Rank	Item		Criterion	AQL		
Major	1. Display state	1. Segment short circuit . 2. Open circuit (missing segment) 3. Contrast defect (dim, ghosting)	1	0.65		
		4. Segment defect ( Pin hole, etc. )	6			
	2. Dimension	5. Leakage	/	Ac:0 Re:1		
		6. No display, polarizers reverse applied				
	2. Dimension	1. Dimension out of specification ( incl. PIN )	2	0.65		
Minor	1. Non-display state	1. Spot, foreign material, line defect 2. Rainbow, background color	3, 4, 5	1.5		
	2. Polarizer	1. Scratch 2. Bubble 3. Foreign material	3, 4, 7			
		4. Poor fixed position	8			
		3. Glass substrate	1. Chipped		9	
	2. Protruded, burred		10			
	4. * PIN	1. Positioning 2. Epoxy coverage	11			
	5. *Silk screen	1. Positioning 2. Color	12			
		3. Semblance defect ( Refer spot.line standards )	3, 4			
	Total				1.5	

Note: \* is not including.

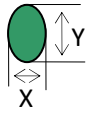
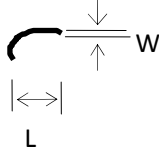
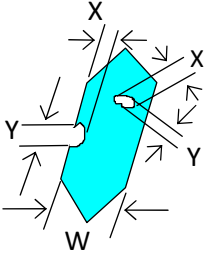




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### 4. Inspection Items and Standards

No	Item	Criterion																	
1	Segment short, missing	Not exist																	
	Contrast defect	Refer to approved sample																	
2	Outside defect、 Positioning Color	Not exceed tolerance Refer to approved sample																	
3	Point defect, Black spot, dust (incl. Polarizer)  $\phi = (X+Y)/2$	<div style="display: flex; align-items: center;">  <table border="1" style="border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Point Size</th> <th>Acceptable Qty.</th> </tr> </thead> <tbody> <tr> <td><math>\phi \leq 0.10</math></td> <td>Disregard</td> </tr> <tr> <td><math>0.10 &lt; \phi \leq 0.20</math></td> <td>3</td> </tr> <tr> <td><math>0.20 &lt; \phi \leq 0.25</math></td> <td>2</td> </tr> <tr> <td><math>\phi &gt; 0.25</math></td> <td>0</td> </tr> </tbody> </table> </div> <p style="text-align: right; margin-top: 5px;">Unit: mm</p>	Point Size	Acceptable Qty.	$\phi \leq 0.10$	Disregard	$0.10 < \phi \leq 0.20$	3	$0.20 < \phi \leq 0.25$	2	$\phi > 0.25$	0							
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4	Line defect	<div style="display: flex; align-items: center;">  <table border="1" style="border-collapse: collapse; text-align: center;"> <thead> <tr> <th colspan="2">Line</th> <th>Acceptable Qty.</th> </tr> <tr> <th>L</th> <th>W</th> <th></th> </tr> </thead> <tbody> <tr> <td>---</td> <td><math>0.015 \geq W</math></td> <td>Disregard</td> </tr> <tr> <td><math>3.0 \geq L</math></td> <td><math>0.03 \geq W</math></td> <td rowspan="2">2</td> </tr> <tr> <td><math>2.5 \geq L</math></td> <td><math>0.05 \geq W</math></td> </tr> <tr> <td>---</td> <td><math>0.05 &lt; W</math></td> <td>Applied as point defect</td> </tr> </tbody> </table> </div> <p style="text-align: right; margin-top: 5px;">Unit: mm</p>	Line		Acceptable Qty.	L	W		---	$0.015 \geq W$	Disregard	$3.0 \geq L$	$0.03 \geq W$	2	$2.5 \geq L$	$0.05 \geq W$	---	$0.05 < W$	Applied as point defect
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$2.5 \geq L$	$0.05 \geq W$																		
---	$0.05 < W$	Applied as point defect																	
5	Rainbow	Not more than two color changes across the viewing area. Background color should refer to approved sample .																	
6	Segment pattern W = Segment width  $\phi = (X+Y)/2$	<p>1. Pin hole</p> <p style="text-align: center;"><math>\phi &lt; 0.10\text{mm}</math> is acceptable.</p> <div style="display: flex; align-items: center;">  <table border="1" style="border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Width</th> <th>Acceptable of defect</th> </tr> </thead> <tbody> <tr> <td><math>W &lt; 0.4</math></td> <td><math>\phi \leq 1/2W</math> and, <math>\phi \leq 0.20</math></td> </tr> <tr> <td><math>W \geq 0.4</math></td> <td><math>\phi \leq 1/3W</math> and, <math>\phi \leq 0.25</math></td> </tr> </tbody> </table> </div> <p style="text-align: right; margin-top: 5px;">Unit: mm</p>	Width	Acceptable of defect	$W < 0.4$	$\phi \leq 1/2W$ and, $\phi \leq 0.20$	$W \geq 0.4$	$\phi \leq 1/3W$ and, $\phi \leq 0.25$											
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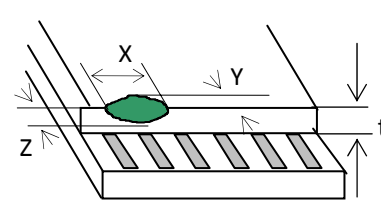
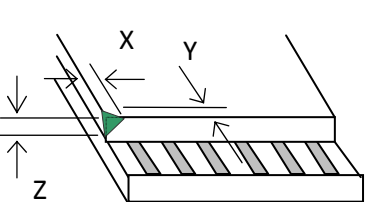
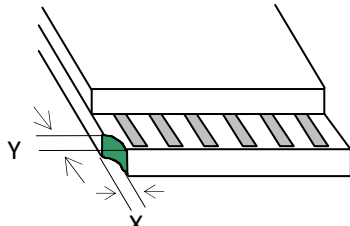
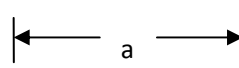
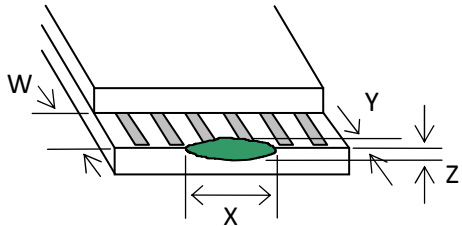
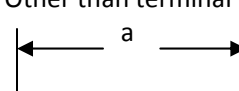
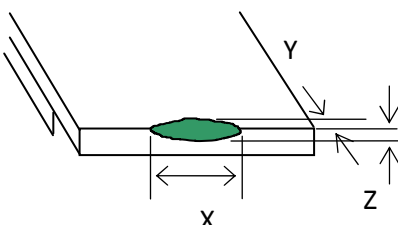


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No	Item	Criterion										
6		<p>2. Segment width acceptable.</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <math> A - B  &lt; 0.20;</math>  <math>C \leq 1/3A</math> 或 <math>1/3D</math> </div> <div style="text-align: center;"> <math>D \leq 0.2</math>  <math>E \leq 0.15</math> </div> </div> <div style="text-align: center; margin: 10px 0;"> </div> <p>3. Dot pattern</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> </div> <table border="1" style="border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Size</th> <th>Acceptable Qty.</th> </tr> </thead> <tbody> <tr> <td><math>\phi \leq 0.1</math></td> <td>Disregard</td> </tr> <tr> <td><math>0.10 &lt; \phi \leq 0.20</math></td> <td>2</td> </tr> <tr> <td><math>0.2 &lt; \phi \leq 0.25</math></td> <td>2</td> </tr> <tr> <td><math>\phi &gt; 0.25</math></td> <td>0</td> </tr> </tbody> </table> </div> <p style="text-align: center;">C: Shall not touch other dot(s).</p> <p style="text-align: center;">Unit: mm</p>	Size	Acceptable Qty.	$\phi \leq 0.1$	Disregard	$0.10 < \phi \leq 0.20$	2	$0.2 < \phi \leq 0.25$	2	$\phi > 0.25$	0
Size	Acceptable Qty.											
$\phi \leq 0.1$	Disregard											
$0.10 < \phi \leq 0.20$	2											
$0.2 < \phi \leq 0.25$	2											
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7	Polarizer air bubble	<table border="1" style="border-collapse: collapse; text-align: center; margin: 0 auto;"> <thead> <tr> <th>Size</th> <th>Acceptable Qty.</th> </tr> </thead> <tbody> <tr> <td><math>\phi &lt; 0.15</math> or B Zone</td> <td>Disregard</td> </tr> <tr> <td><math>0.15 &lt; \phi \leq 0.50</math></td> <td>3</td> </tr> <tr> <td><math>0.50 &lt; \phi</math></td> <td>0</td> </tr> </tbody> </table> <p style="text-align: center;">Unit: mm</p>	Size	Acceptable Qty.	$\phi < 0.15$ or B Zone	Disregard	$0.15 < \phi \leq 0.50$	3	$0.50 < \phi$	0		
Size	Acceptable Qty.											
$\phi < 0.15$ or B Zone	Disregard											
$0.15 < \phi \leq 0.50$	3											
$0.50 < \phi$	0											
8	Polarizer mis-placement	Polarizer should neither extends to glass edge nor extends into seal.										

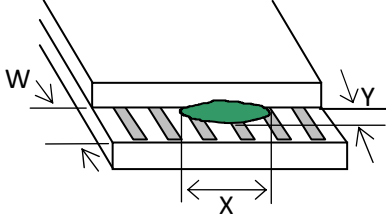
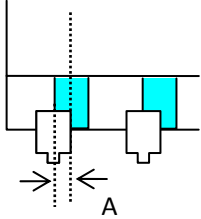
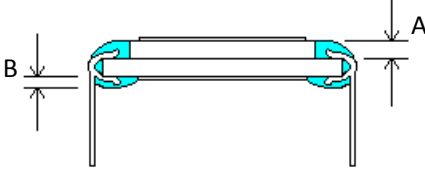


No	Item	Criterion																														
9	<p><b>Chip</b></p> <p>Remark:</p> <p>X: Length direction</p> <p>Y: Short direction</p> <p>Z: Thickness direction</p> <p>t: Glass thickness</p> <p>a: Length direction</p> <p>W: Terminal Width</p> <p>F: seal width</p>	<p>1. ITO terminal</p> <div style="display: flex; align-items: center;">  <table border="1" style="margin-left: 20px;"> <caption>Acceptable criterion</caption> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><math>\leq 7.0</math></td> <td style="text-align: center;"><math>\leq</math> inside soundary line of sealing area</td> <td style="text-align: center;"><math>\leq t</math></td> </tr> </tbody> </table> </div> <p>2. Corner</p> <div style="display: flex; align-items: center;">  <table border="1" style="margin-left: 20px;"> <caption>Acceptable criterion</caption> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><math>\leq 2</math></td> <td style="text-align: center;">Shall not reach to <math>2F/3</math></td> <td style="text-align: center;"><math>\leq t</math></td> </tr> </tbody> </table> </div> <div style="display: flex; align-items: center; margin-top: 20px;">  <table border="1" style="margin-left: 20px;"> <caption>Acceptable criterion</caption> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><math>\leq 2</math></td> <td style="text-align: center;">① shall not reach to ITO ② <math>Y \times X = S \leq 2.0 \times 7.0</math></td> <td style="text-align: center;"><math>\leq t</math></td> </tr> </tbody> </table> </div> <p>3. On terminal</p> <div style="display: flex; align-items: center; margin-bottom: 20px;">  </div> <div style="display: flex; align-items: center;">  <table border="1" style="margin-left: 20px;"> <caption>Acceptable criterion</caption> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><math>\leq a/8</math></td> <td style="text-align: center;"><math>\leq w/3</math></td> <td style="text-align: center;"><math>\leq t</math></td> </tr> </tbody> </table> </div> <p>4. Other than terminal</p> <div style="display: flex; align-items: center; margin-bottom: 20px;">  </div> <div style="display: flex; align-items: center;">  <table border="1" style="margin-left: 20px;"> <caption>Acceptable criterion</caption> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><math>\leq a/8</math></td> <td style="text-align: center;"><math>\leq W</math></td> <td style="text-align: center;"><math>\leq t</math></td> </tr> </tbody> </table> </div>	X	Y	Z	$\leq 7.0$	$\leq$ inside soundary line of sealing area	$\leq t$	X	Y	Z	$\leq 2$	Shall not reach to $2F/3$	$\leq t$	X	Y	Z	$\leq 2$	① shall not reach to ITO ② $Y \times X = S \leq 2.0 \times 7.0$	$\leq t$	X	Y	Z	$\leq a/8$	$\leq w/3$	$\leq t$	X	Y	Z	$\leq a/8$	$\leq W$	$\leq t$
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No	Item	Criterion
10	Protruded W: Terminal Width	 <p style="text-align: right;">Acceptable criteria: <math>Y \leq 1/4W</math></p>
11	*Pin	<p>1. Positioning</p>  <p style="text-align: right;"><math>A &lt; 0.3\text{mm}</math></p> <p>2 Epoxy coverage</p>  <p>A、 B Epoxy Maximum height shall extend above front rear polarizer surface</p> <p>3. No stain, rust nor discoloration of the insulating portion shall be allowed.</p>
12	Total no. of acceptable defect	<p>A. Zone</p> <p>Maximum 4 non-conformities per one unit.</p> <p>Defect distance: each point to be separated over 5mm</p> <p>B. Zone</p> <p>It is acceptable when it is no trouble for quality and assembly in customer's end product.</p>



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### Part Five Reliability

1. Under normal operating and storage conditions a lifetime of 50,000 hours is expected.
2. Reliability test condition:

Item	Condition	Time(hrs)	Assessment
High temp. storage	+60°C	48	No abnormalities in functions and appearance
Low temp. storage	-10°C	48	
High temp static drive	+60°C	24	
Low temp static drive	-10°C	24	
Humidity	40°C / 70%RH	96	
Change of temperature	- 10°C ← 25°C → +60°C (60 min ← 5 min → 60min)	10 cycles	

3. Recovery time should be 4 hours minimum.

### Part Six The packing way

Using single chip packaging independently.\

### Part Seven Caution for use

Pay attention to following points to ensure effective and correct use of KINGCHAMP's lcd..

- o Take utmost care when handling as these products are made of glass. Any strong mechanical impact due to falling, dropping etc. may cause damage(breakage or cracking).
- o Polarizer is made of soft material and is easily damaged, take utmost care when handling. The protective film attached is to prevent scratch and protect against dirt, it is recommended that this film should be kept sealing before use. (Note: All front polarizer and transfective type rear polarizer is sealed with protective film.)
- o Clean polarize with a soft cloth.
- o Do not touch the connection terminals of the display with bare hand, it will cause disconnection or defective insulation of terminals

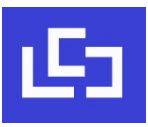


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- o Since applied DC voltage causes electro-chemical reactions which deteriorate the display, the applied pulse waveform should be a symmetric waveform such the no DC component remains. Be sure to use the specified operating voltage.
- o Avoid use or extended storage at high temperature and high humidity. For extended storage, select a storage area where the temperature is  $20 \pm 8^{\circ}\text{C}$  and the relative humidity is less than 65%
- o Do not expose the display to the direct sunlight or UV light.
- o Be careful not to touch or swallow liquid crystal that might leak from a damaged cell. Any liquid crystal adheres to skin or clothes, wash it off immediately with soap and water. Anyway, the liquid crystal is not toxic.

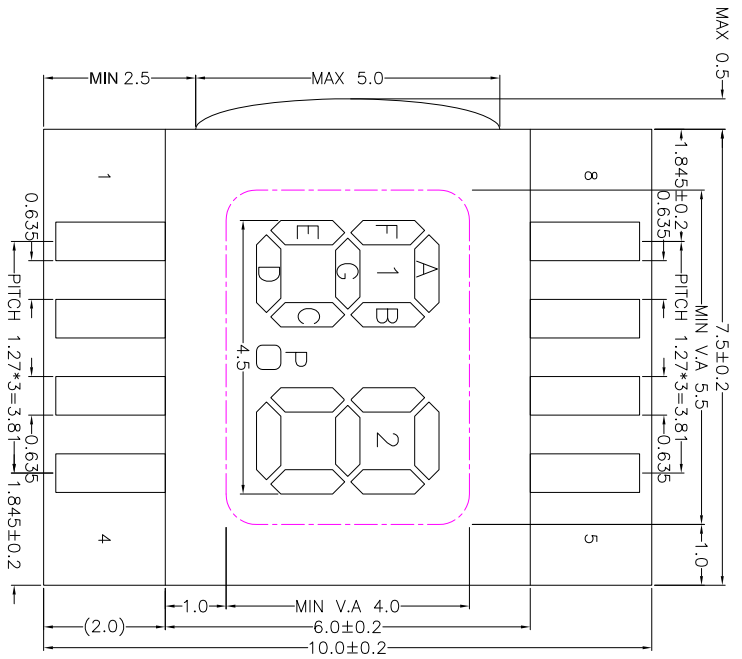


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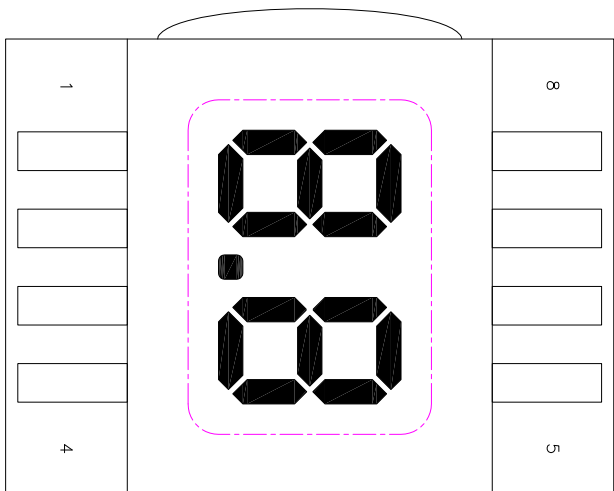
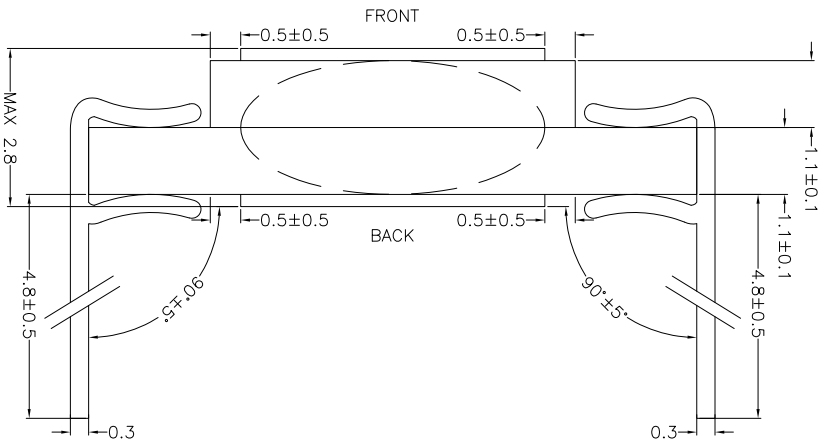
### Part Eight Drawing

reason



VIEWING DIRECTION

PIN	1	2	3	4	5	6	7	8
COM1	1F	1A	2F	2A				COM1
COM2	1G	1B	2G	2B				COM2
COM3	1E	1C	2E	2C		COM3		
COM4		1D	P	2D	COM4			



## 全显示效果图

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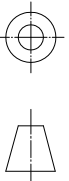
DESIGNED BY:  
DJH

GDC02693

VERSION: 1.0

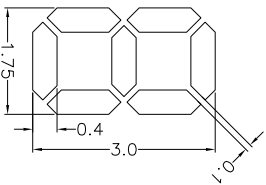
NO. 1 OF 3

CHECKED BY:



UNIT: mm

DATE: 2014-03-11



NOTES:

1. DISPLAY TYPE: TN
2. LCD OPERATING VOLTAGE: 3.0V
3. OPERATING TEMPERATURE: -20°C~70°C
4. STORAGE TEMPERATURE: -30°C~80°C
5. DRIVE MODE: 1/4D, 1/2B
6. VIEWING DIRECTION: 6:00
7. POLARIZER TYPE: REFLECTIVE, POSITIVE
8. CONNECTOR: PIN
9. CUSTOMER NO: ---
10. Unspecified tolerance is ±0.2mm
11. LCM NO: ---