

SWISSDIS



Swissdis AG
Grasweg 7
CH-4911 Schwarzhäusern

Tel.: +41 62 919 44 00
Fax: +41 62 919 44 01
info@swissdis.ch
www.swissdis.ch



SPECIFICATIONS

SDO12864J-GYY-O6

Swissdis 109256

LCD Module Graphic 128x64 Dots
With LED Backlight yellow-green
With Touch

Version February 2015

INDEX

1. PRECAUTION IN USE OF LCD MODULE	4
2. GENERAL SPECIFICATION	4
2.1 MECHANICAL DIMENSION	4
3. ELECTRICAL CHARACTERISTICS	5
3.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS	5
4. DIMENSIONAL OUTLINES.....	6
5. INTERFACE PIN FUNCTION.....	7
6. BACKLIGHT INFORMATION	9
6.1 SPECIFICATION	9
7. CONTROLLER DATA.....	10
7.1 COMMAND LIST	10
7.2 TIMING CHARACTERISTICS.....	11
7.3 TIMING CHARACTERISTICS (CONTINUED)	錯誤! 尚未定義書籤。
8. OPTICAL CHARACTERISTICS	12
8.1 OPTICAL CHARACTERISTICS.....	12
8.2 DEFINITION OF VIEWING ANGLE AND OPTIMUM VIEWING AREA.....	12
8.3 DEFINITION OF VIEWING ANGLE θ_F AND θ_B	錯誤! 尚未定義書籤。
8.4 DEFINITION OF CONTRAST CR.....	13
8.5 DEFINITION OF RESPONSE TIME	13
9. Touch Panel Information.....	14
10. RELIABILITY	14
10.1 CONTENT OF RELIABILITY TEST.....	15
11. QUALITY ASSURANCE.....	18
11.1 INSPECTION CONDITIONS	16
11.2 INSPECTION PARAMETERS	17
12. NUMBERING SYSTEM	19

MODIFY RECORD

NO.	VER.	DATE	MODIFY REASON	MODIFY CONTENTS
1	A	2014/09/20	New issued	
2	B	2015/2/2	Fix Dimensional Outlines	Page 6
3	C	2015/2/5	Add label type	Page 21

1. Precaution in use of LCD Module

- (1) Avoid applying excessive shocks to the module or making any alterations or modifications to it.
- (2) Don't make extra holes on the printed circuit board, modify its shape or change the components of LCD module.
- (3) Don't disassemble the LCM.
- (4) Don't operate it above the absolute maximum rating.
- (5) Don't drop, bend or twist LCM.
- (6) Soldering: only to the I/O terminals.
- (7) Storage: please storage in anti-static electricity container and clean environment.
- (8) Don't touch the elastomer connector, especially insert a backlight panel (EL or CCFL)

2. General Specification

2.1 Mechanical Dimension

Item	Dimension	Unit
Number of Dots	128 x 64	—
Module dimension (L x W x H)	67.0 x 52.5 x 7.3 (Max)	mm
View area(TP)	61.0 x 41.0	mm
Active area(TP)	59.0 x 39.5	mm
Dot size	0.43 x 0.57	mm
Dot pitch	0.445 x 0.585	mm
LCD TYPE	STN Yellow Green	
Backlight TYPE	LED Yellow Green edge	
Controller IC	UC1601X controller	

3. Electrical Characteristics

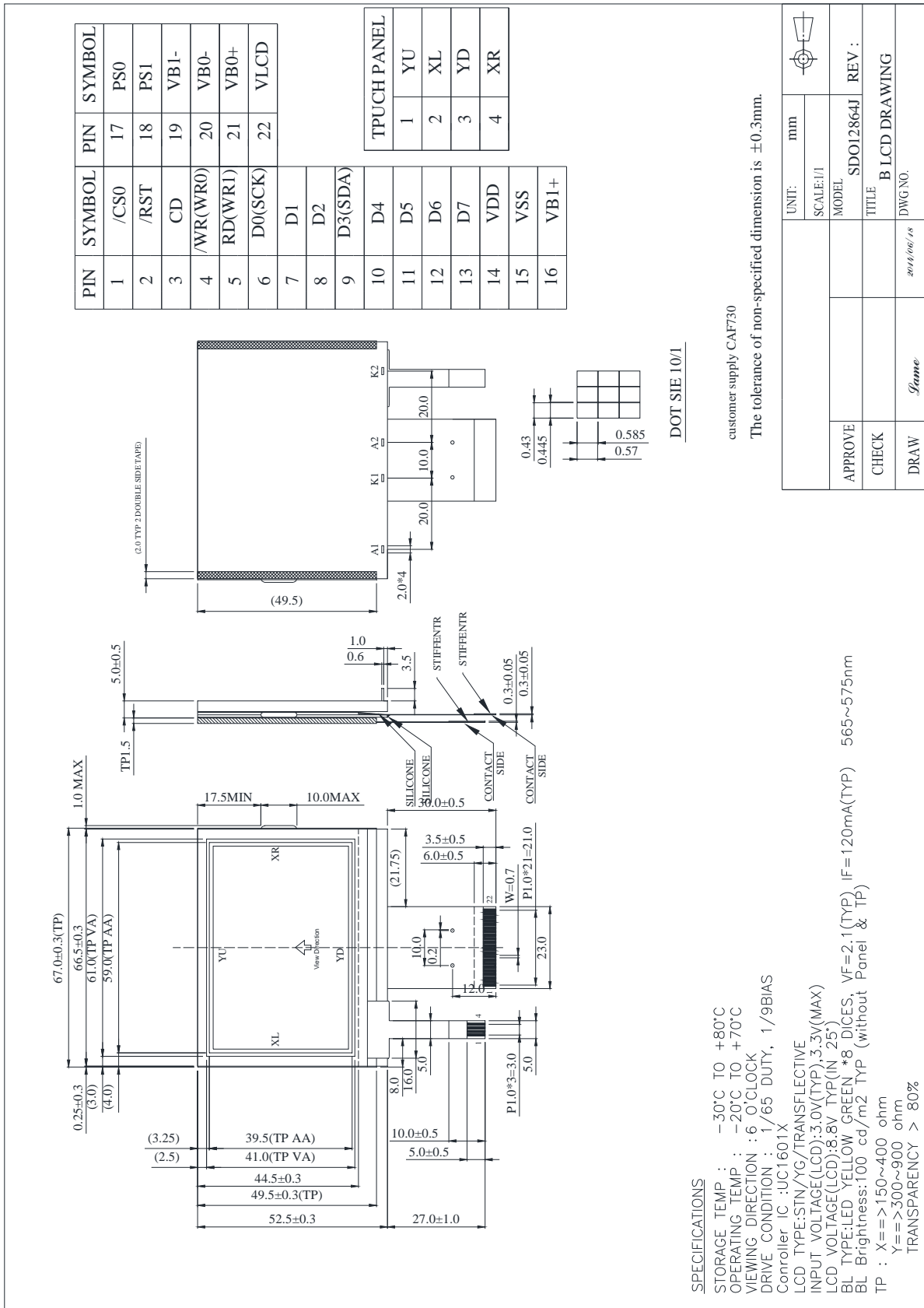
Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Voltage For Logic	Vdd-Vss	—	2.8	3.0	3.3	V
Supply Voltage For LCD *Wide Temp、Type	VLCD	—				-20°C
			8.4	8.8	9.2	25°C
						70°C
Input High Vol.	V _{IH}	—	0.8 V _{dd}	—	V _{dd}	V
Input Low Vol.	V _{IL}	—	V _{ss}	—	0.2 V _{dd}	V
Output High Vol.	V _{OH}	—	0.8 V _{dd}	—	V _{dd}	V
Output Low Vol.	V _{OL}	—	V _{ss}	—	0.2 V _{dd}	V
Supply Current(Logic)	I _{dd}	V _{dd} =3.0V	—	0.8	3.0	mA

3.1 Electrical Absolute Maximum Ratings

(V_{ss}=0V, T_a=25°C)

Item		Symbol	Min	Max	Unit
Supply Voltage (Logic)		V _{dd} - V _{ss}	-0.3	3.6	V
Supply Voltage(LCD driver)		VLCD	-0.3	11.5	V
Wide Temp. Type	Operation Temp.	T _{OP}	-20	70	°C
	Storage Temp.	T _{STG}	-30	80	°C

4. Dimensional Outlines



5. Interface Pin Function

Pin No.	Symbol	Level	Description
1	/CS0	I	Chip select signal. When /CS0="L" and CS1="H", then the chip select becomes active, and data/command I/O is enabled
2	/RST	I	When RST is set to "L", the settings are initialized.
3	CD	I	Register select input pin
4	/WR	I	Read/Write execution control pin
5	/RD	I	Read enable clock input pin
6	D0	I/O	Data BUS
7	D1	I/O	Data BUS
8	D2	I/O	Data BUS
9	D3	I/O	Data BUS
10	D4	I/O	Data BUS
11	D5	I/O	Data BUS
12	D6	I/O	Data BUS
13	D7	I/O	Data BUS
14	VDD	+3.0V	Supply Voltage for logic VDD
15	VSS	0V	Supply Voltage for logic GND
16	VB1+	PER	LCD Bias Voltage
17	PS0	I	Bus mode select

18	PS1	I	Bus mode select
19	VB1-	PWR	LCD Bias Voltage
20	VB0-	PWR	LCD Bias Voltage
21	VB0+	PWR	LCD Bias Voltage
22	VLCD	PWR	Main LCD power supply

TP

Pin No.	Symbol	Level	Description
1	YU	I	Top ITO Film Terminal
2	XL	I	Bottom ITO Film Terminal
3	YD	I	Top ITO Film Terminal
4	XR	I	Bottom ITO Film Terminal

6. Backlight Information

6.1 Specification

LED Yellow Green edge

Parameter	Symbol	Min	Typical	Max	Unit	Test Condition
Supply Current	I _{LED}	112	120	128	mA	V _{LED} =2.1V
Supply Voltage	V	1.8	2.1	2.4	V	—
Reverse Voltage	V _R	—	—	5	V	—
Luminous Intensity	I _V	80	100	—	cd/ m ²	I _{LED} =120mA
Wave Length	λ _p	565	—	575	nm	I _{LED} =120mA
Life Time	—	—	50,000	—	Hr.	I _{LED} ≤ 120mA
Color	Yellow green					

*The brightness is measured without LCD panel

The brightness average lifetime is up 50,000 hours under these conditions:

- (1) The environmental temperatures 25±2°C , 50% RH
- (2) I_f=120 mA , V_f=2.1V
- (3) Continue light ON

7. Controller data

7.1 Command List

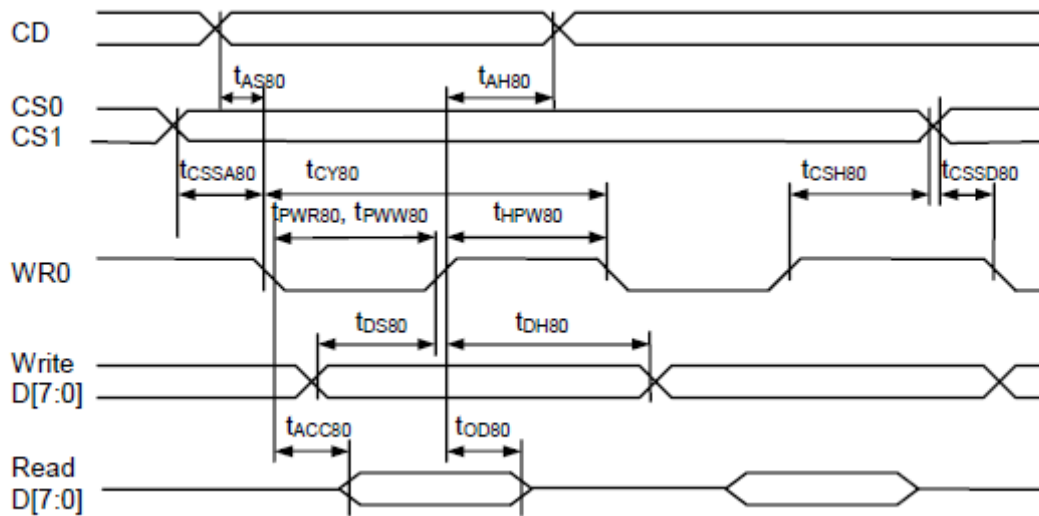
The following is a list of host commands supported by UC1601

C/D: 0: Control, 1: Data
 W/R: 0: Write Cycle, 1: Read Cycle
 # Useful Data bits
 – Don't Care

	Command	C/D	W/R	D7	D6	D5	D4	D3	D2	D1	D0	Action	Default
1	Write Data Byte	1	0	#	#	#	#	#	#	#	#	Write 1 byte	N/A
2	Read Data Byte	1	1	#	#	#	#	#	#	#	#	Read 1 byte	N/A
3	Get Status	0	1	-	MX	MY	RS	WA	DE	–		N/A	
4	Set Column Address LSB	0	0	0	0	0	0	#	#	#	#	Set CA [3:0]	0
	Set Column Address MSB	0	0	0	0	0	1	#	#	#	#	Set CA [7:4]	0
5	Set Multiplexing Rate	0	0	0	0	1	0	0	0	#	#	Set MR [1:0]	11b: 65
6	Set Temp. Compensation	0	0	0	0	1	0	0	1	#	#	Set TC[1:0]	00b: -0.05%/°C
7	Set Panel Loading	0	0	0	0	1	0	1	0	0	#	Set PC[0]	0b: < 15nF
8	Set Pump Control	0	0	0	0	1	0	1	1	#	#	Set PC[2:1]	11b
9	Set Adv. Program Control (double byte command)	0	0	0	0	1	1	0	0	0	R	Set APC[R][7:0], R = 0, or 1	N/A
10	Set Scroll Line	0	0	0	1	#	#	#	#	#	#	Set SL[5:0]	0
11	Set Page Address	0	0	1	0	1	1	#	#	#	#	Set PA[3:0]	0
12	Set V _{BIA3} Potentiometer (double-byte command)	0	0	1	0	0	0	0	0	0	1	Set PM[7:0]	COH
		0	0	#	#	#	#	#	#	#	#		
13	Set RAM Address Control	0	0	1	0	0	0	1	#	#	#	Set AC[2:0]	001b
14	Set Frame Rate	0	0	1	0	1	0	0	0	0	#	Set LC[3]	0b
15	Set All-Pixel-ON	0	0	1	0	1	0	0	1	0	#	Set DC[1]	0
16	Set Inverse Display	0	0	1	0	1	0	0	1	1	#	Set DC[0]	0
17	Set Display Enable	0	0	1	0	1	0	1	1	1	#	Set DC[2]	0
18	Set LCD Mapping Control	0	0	1	1	0	0	0	#	#	0	Set LC[2:1]	0
19	System Reset	0	0	1	1	1	0	0	0	1	0	System Reset	N/A
20	NOP	0	0	1	1	1	0	0	0	1	1	No operation	N/A
21	Set Test Control (double byte command)	0	0	1	1	1	0	0	1	TT		For testing only.	N/A
		0	0	#	#	#	#	#	#	#	#	Do not use.	
22	Set LCD Bias Ratio	0	0	1	1	1	0	1	0	#	#	Set BR[1:0]	11b: 9
23	Reset Cursor Update Mode	0	0	1	1	1	0	1	1	1	0	AC[3]=0, CA=CR	N/A
24	Set Cursor Update Mode	0	0	1	1	1	0	1	1	1	1	AC[3]=1, CR=CA	N/A

* Other than commands listed above, all other bit patterns result in NOP (No Operation).

8080-Series MPU



(2.5V \square $V_{DD} < 3.3V$, $T_a = -30$ to $+85^\circ C$)

Symbol	Signal	Description	Condition	Min.	Max.	Units
t_{AS80}	CD	Address setup time		0	–	nS
t_{AH80}		Address hold time		40	–	nS
t_{CY80}		System cycle time		135	–	nS
t_{PWR80}	WR1	Pulse width (read)		65	–	nS
t_{PWW80}	WR0	Pulse width (write)		65	–	nS
t_{HPW80}	WR0, WR1	High pulse width		65	–	nS
t_{DS80}	D0~D7	Data setup time		30	–	nS
t_{DH80}		Data hold time		20	–	nS
t_{ACC80}		Read access time	$C_L = 100pF$	–	50	nS
t_{OD80}		Output disable time		10	50	nS
t_{CSSA80}	CS1/CS0	Chip select setup time		10		nS
t_{CSSD80}				10		nS
t_{CSH80}				20		nS

8. Optical Characteristics

8.1 OPTICAL CHARACTERISTICS

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
View Angle	$\varphi = 0(\Theta Y1)$	$CR \geq 2$	30	40	—	deg
	$\varphi = 180(\Theta Y2)$	$CR \geq 2$	25	35	—	deg
	$\varphi = 90(\Theta X1)$	$CR \geq 2$	25	35	—	deg
	$\varphi = 270(\Theta X2)$	$CR \geq 2$	25	35	—	deg
Contrast Ratio	CR	—	2	3	—	—
Response Time 25°C	T rise	—		140	300	ms
	T fall	—		80	300	ms

Conditions :

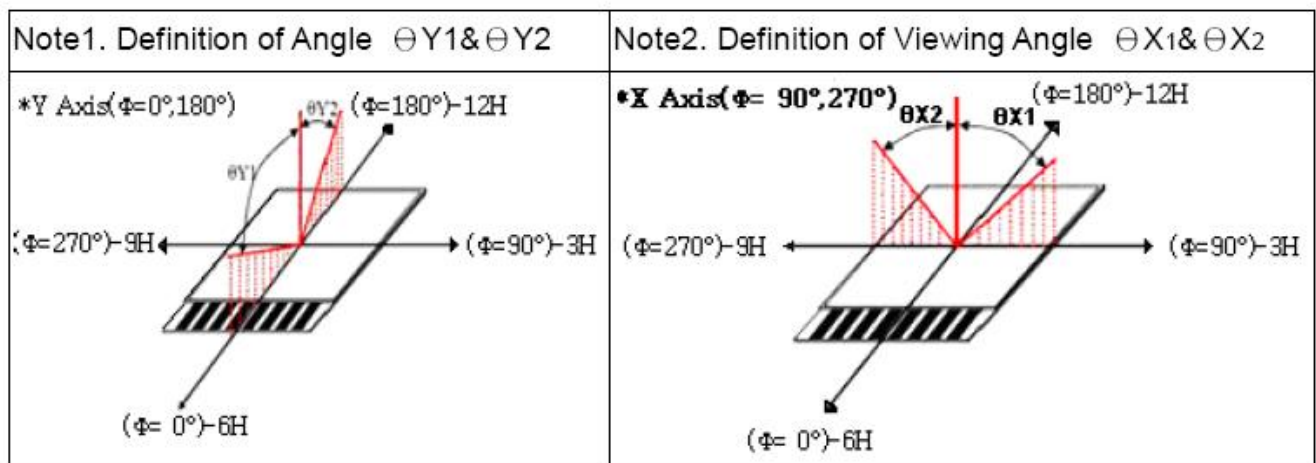
Operating Voltage : Vop

Viewing Angle(θ , φ) : 0° , 0°

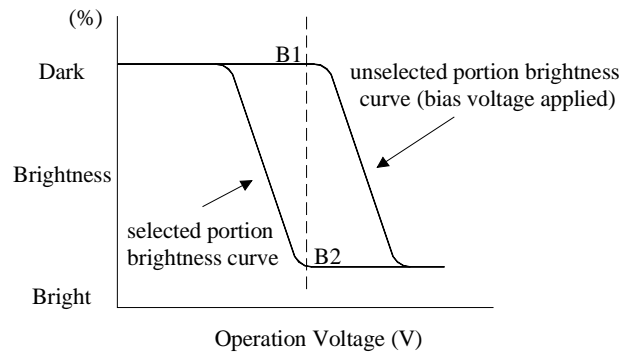
Frame Frequency : 64 HZ

Driving Waveform : 1/N duty , 1/a bias

8.2 Definition of Viewing Angle and Optimum Viewing Area

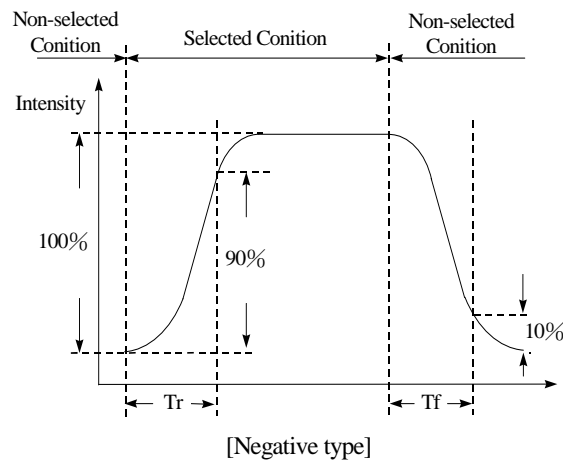


$CR = \text{Brightness of selected dot (B1)} / \text{Brightness of unselected dot (B2)}$



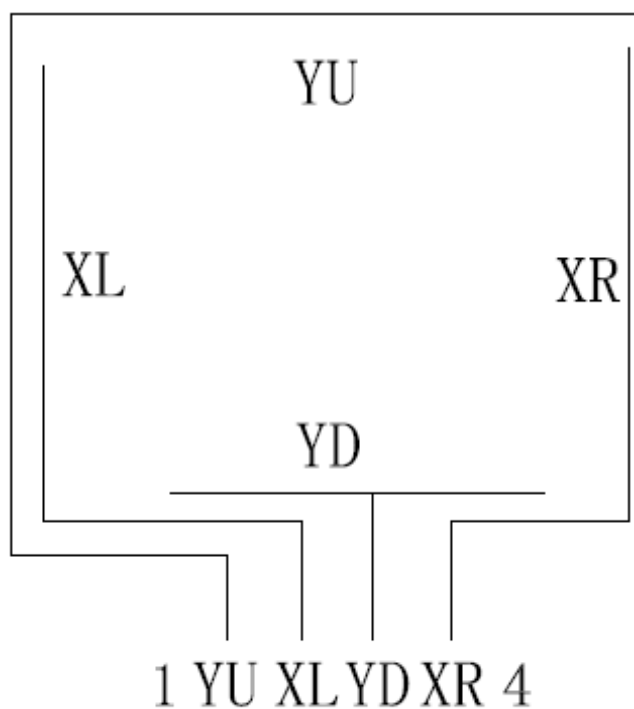
8.4 Definition of Response Time

(Tr , Tf)



9.Touch Panel Information

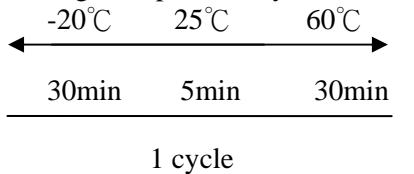
Property	Requirement
Surface treatment	Anti-Glare Hard coating & Anti-Newton Ring
Surface hardness	$\geq 3H$
Approach made	ITO Film+ITO Glass
Light transmission	$\geq 80\%$
Loop resistance X(2, 4)	150~400 Ω
Loop resistance Y(1, 3)	300~900 Ω
Insulation resistance	$\geq 20M \Omega$ (DC 25V)
Linearity	$\leq 1.5\%$
Operating temperature	-20~+70°C
Storage temperature	-30~+80°C
Operating humidity	10~90%RH
Storage humidity	10~90%RH



Circuit Diagram

10. Reliability

10.1 Content of Reliability Test

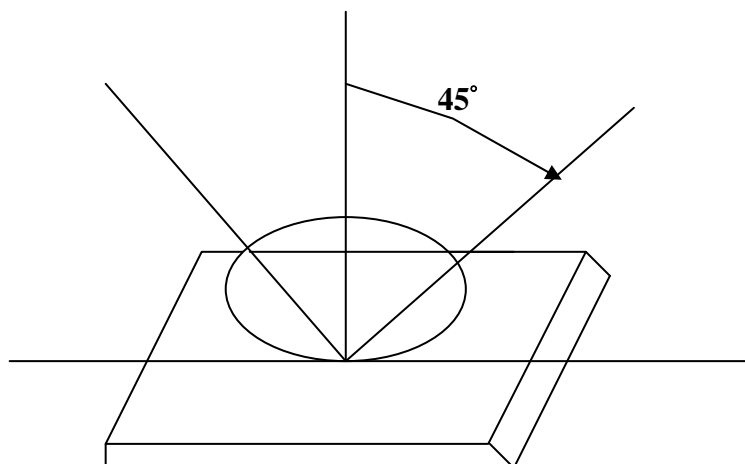
Environmental Test				
No.	Test Item	Content of Test	Test Condition	Applicable Standard
1	High Temperature storage	Endurance test applying the high storage temperature for a long time.	60°C / 96hrs	—
2	Low Temperature storage	Endurance test applying the high storage temperature for a long time.	-20°C 96hrs	—
3	High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	50°C 96hrs	—
4	Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	0°C 96hrs	—
5	High Temperature/Humidity Storage	Endurance test applying the high temperature and high humidity storage for a long time.	60°C,90%RH 96hrs	—
6	High Temperature/Humidity Operation	Endurance test applying the electric stress (Voltage & Current) and temperature / humidity stress to the element for a long time.	40°C,90%RH 96hrs	—
7	Temperature Cycle	Endurance test applying the low and high temperature cycle.  <p style="text-align: center;">1 cycle</p>	-20°C/60°C 10 cycles	—
Mechanical Test				
8	Vibration test	Endurance test applying the vibration during transportation and using.	10~22Hz→1.5mmp-p 22~500Hz→1.5G Total 0.5hrs	—
9	Shock test	Constructional and mechanical endurance test applying the shock during transportation.	50G Half sign wave 11 msdc 3 times of each direction	—
10	Atmospheric pressure test	Endurance test applying the atmospheric pressure during transportation by air.	115mbar 40hrs	—
Others				
11	Static electricity test	Endurance test applying the electric stress to the terminal.	VS=800V,RS=1.5kΩ CS=100pF 1 time	—

***Supply voltage for logic system=3V. Supply voltage for LCD system =Operating voltage at 25°C

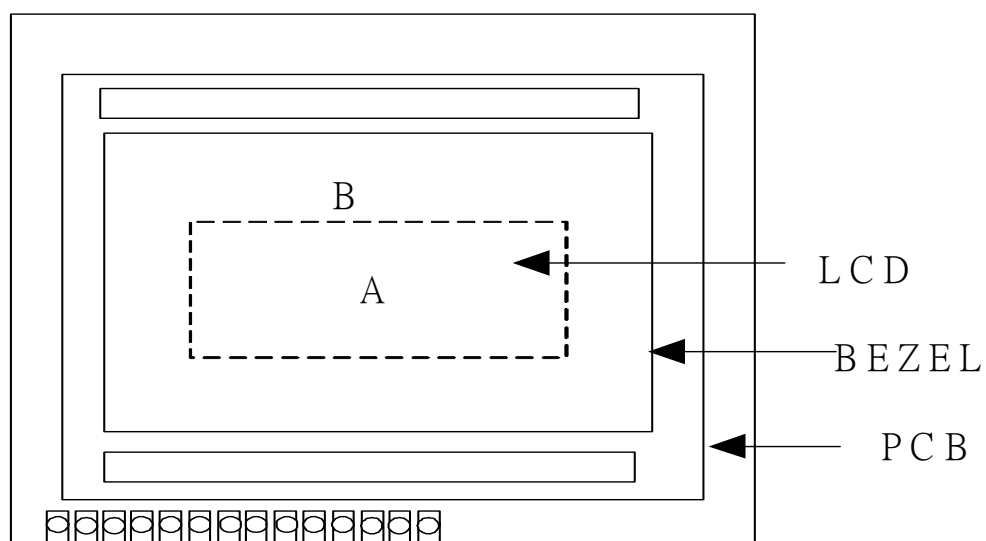
11. Quality Assurance

11.1 Inspection conditions

The LCD shall be inspected under 40W white fluorescent light.



Definition of applicable Zones

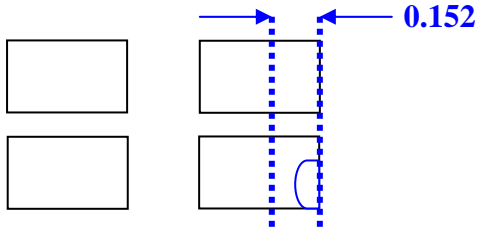
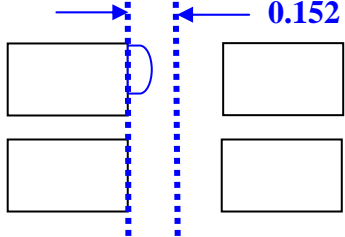
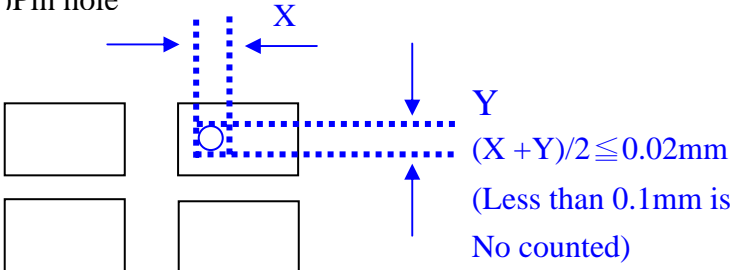
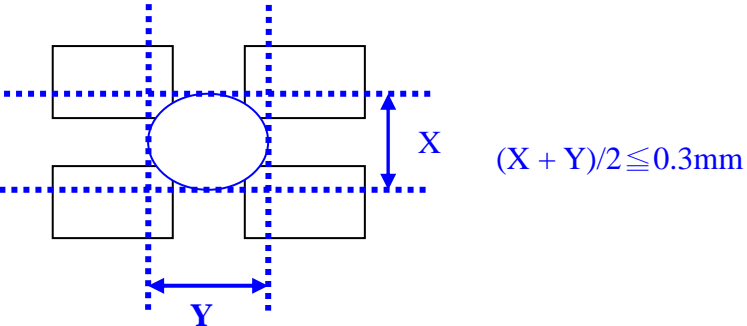


A : Display Area

B : Non-Display Area

11.2 Inspection Parameters

NO.	Parameter	Criteria																												
1	Black or White spots	<table border="1" data-bbox="580 416 1310 745"> <thead> <tr> <th rowspan="2">Zone Dimension</th> <th colspan="2">Acceptable Number</th> <th rowspan="2">Class Of Defects</th> <th rowspan="2">Acceptable Level</th> </tr> <tr> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>$D < 0.15$</td> <td>*</td> <td>*</td> <td rowspan="4">Minor</td> <td rowspan="4">2.5</td> </tr> <tr> <td>$0.15 \leq D \leq 0.2$</td> <td>4</td> <td>4</td> </tr> <tr> <td>$0.2 \leq D \leq 0.25$</td> <td>2</td> <td>2</td> </tr> <tr> <td>$D \leq 0.3$</td> <td>0</td> <td>1</td> </tr> </tbody> </table> <p data-bbox="580 752 1059 786">$D = (\text{Long} + \text{Short})/2$ *: Disregard</p>	Zone Dimension	Acceptable Number		Class Of Defects	Acceptable Level	A	B	$D < 0.15$	*	*	Minor	2.5	$0.15 \leq D \leq 0.2$	4	4	$0.2 \leq D \leq 0.25$	2	2	$D \leq 0.3$	0	1							
Zone Dimension	Acceptable Number			Class Of Defects	Acceptable Level																									
	A	B																												
$D < 0.15$	*	*	Minor	2.5																										
$0.15 \leq D \leq 0.2$	4	4																												
$0.2 \leq D \leq 0.25$	2	2																												
$D \leq 0.3$	0	1																												
2	Scratch, Substances	<table border="1" data-bbox="580 869 1310 1328"> <thead> <tr> <th colspan="2">Zone</th> <th colspan="2">Acceptable Number</th> <th rowspan="2">Class Of Defects</th> <th rowspan="2">Acceptable Level</th> </tr> <tr> <th>X(mm)</th> <th>Y(mm)</th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>*</td> <td>$0.04 \geq W$</td> <td>*</td> <td>*</td> <td rowspan="4">Minor</td> <td rowspan="4">2.5</td> </tr> <tr> <td>$3.0 \geq L$</td> <td>$0.06 \geq W$</td> <td>4</td> <td>4</td> </tr> <tr> <td>$2.0 \geq L$</td> <td>$0.08 \geq W$</td> <td>2</td> <td>3</td> </tr> <tr> <td>—</td> <td>$0.1 < W$</td> <td>0</td> <td>1</td> </tr> </tbody> </table> <p data-bbox="580 1335 1091 1406">X: Length Y: Width *: Disregard Total defects should not exceed 4/module</p>	Zone		Acceptable Number		Class Of Defects	Acceptable Level	X(mm)	Y(mm)	A	B	*	$0.04 \geq W$	*	*	Minor	2.5	$3.0 \geq L$	$0.06 \geq W$	4	4	$2.0 \geq L$	$0.08 \geq W$	2	3	—	$0.1 < W$	0	1
Zone		Acceptable Number		Class Of Defects	Acceptable Level																									
X(mm)	Y(mm)	A	B																											
*	$0.04 \geq W$	*	*	Minor	2.5																									
$3.0 \geq L$	$0.06 \geq W$	4	4																											
$2.0 \geq L$	$0.08 \geq W$	2	3																											
—	$0.1 < W$	0	1																											
3	Air Bubbles (between glass & polarizer)	<table border="1" data-bbox="580 1458 1310 1731"> <thead> <tr> <th rowspan="2">Zone Dimension</th> <th colspan="2">Acceptable Number</th> <th rowspan="2">Class Of Defects</th> <th rowspan="2">Acceptable Level</th> </tr> <tr> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>$D \leq 0.15$</td> <td>*</td> <td>*</td> <td rowspan="3">Minor</td> <td rowspan="3">2.5</td> </tr> <tr> <td>$0.15 < D \leq 0.25$</td> <td>2</td> <td>*</td> </tr> <tr> <td>$0.25 < D$</td> <td>0</td> <td>1</td> </tr> </tbody> </table> <p data-bbox="580 1738 1070 1816">*: Disregard Total defects shall not excess 3/module.</p>	Zone Dimension	Acceptable Number		Class Of Defects	Acceptable Level	A	B	$D \leq 0.15$	*	*	Minor	2.5	$0.15 < D \leq 0.25$	2	*	$0.25 < D$	0	1										
Zone Dimension	Acceptable Number			Class Of Defects	Acceptable Level																									
	A	B																												
$D \leq 0.15$	*	*	Minor	2.5																										
$0.15 < D \leq 0.25$	2	*																												
$0.25 < D$	0	1																												

4.	Uniformity	<p>(1) Pixel shape (with Dent)</p>  <p>(2) Pixel shape (with Projection)</p>  <p>(3) Pin hole</p>  <p>(4) Deformation</p>  <p>Total acceptable number: 1/pixel ;.5/cell</p>
----	------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

12. Numbering system**SD O 12864 J - G Y Y - 06**

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

1. Brand Name

SD	
----	--

2. Display Type

C	Character Type
G	Graphic Type
O	COG
S	Segment Type

3. Number of Pixels

Character Module	Characters per line × Lines
Graphic Module	Row Dots × Column Dots

4. Series number

1-9	Series Number
-----	---------------

5 LCD Polarize

	Normal Temperature		Wide Temperature	
	6:00	12:00	6:00	12:00
Reflective	A	B	C	D
Transflective	E	F	G	H
Transmissive	I	J	K	L

6 LCD Mode:

	TN	STN		FSTN	DFSTN
Positive	P	G	Gray	F	
		Y	Yellow/Green		
Negative	N	B	Blue	W	D

7. Backlight

None	N	None
EL	I	White
	U	Blue Green
LED	A	Amber
	B	Blue
	E	Yellow/Green, edge
	G	Green
	R	Red
	W	White
	Y	Yellow/Green
CCFL	C	White

8. IC font Character

Cyrillic/English	CC
Japanese/English	JC
European/English	RC , EC

8. Graphic

X	Without Negative Voltage
V	Negative Voltage
T	Temperature Compensation
B	Chinese BIG 5
G	Chinese GB

9. Special code

--

13.Label type

Swissdis AG

109256

SDO12864J-GYY-O6

"QC-06 OK 150205-1K" > QC number and datacode