Display Elektronik GmbH

DATA SHEET

LCD MODULE

DEM 08201 SGH-LY

Product Specification ***Ver.: 5***

15.06.2020

GENERAL SPECIFICATION

MODULE NO. :

DEM 08201 SGH-LY

CUSTOMER P/N:

Version No.	Change Description	Date
0	First Issue	26.10.2009
1	Change IC (AIP31066L-001)	16.08.2017
1.1.0	Original Version	24.03.2020
1.1.1	Change Production Line and Driver IC	26.03.2020
2	Change “BACKLIGHT ELECTRICAL/OPTICAL SPECIFICATION” and update “PCB DRAWING”	13.04.2020
3	Update PCB drawing and description on Page 7	21.04.2020
4	Update PCB drawing and description on Page 7	27.04.2020
5	Change the pin hole to 1.0mm from 0.8mm in the drawing on page 5	15.06.2020

PREPARED BY: HP DATE: 15.06.2020

APPROVED BY: MHI DATE: 15.06.2020

CONTENTS

1. FUNCTIONS & FEATURES

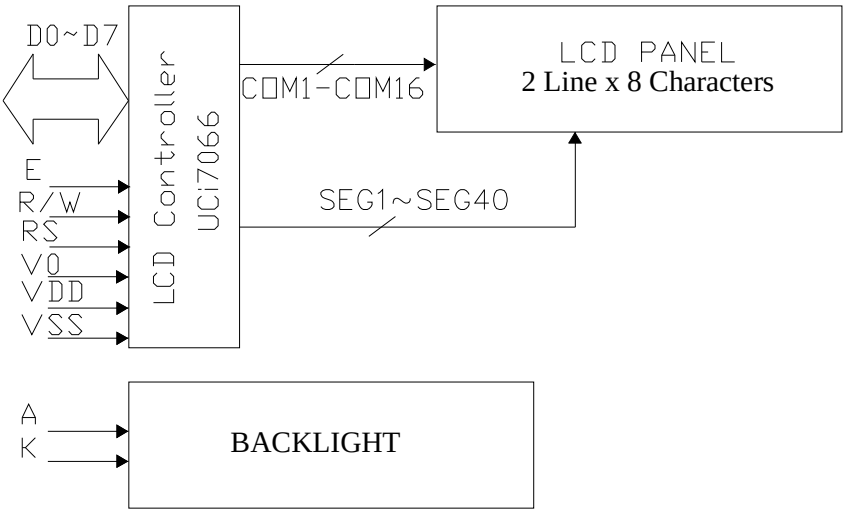
Module Model	LCD Type	Remark
DEM 08201 SGH-LY	STN Gray Transflective Positive Mode	---

- Viewing Direction : 6 O'clock
- Driving Scheme : 1/16 Duty Cycle, 1/5 Bias
- Power Supply Voltage : 5.0V
- V_{LCD} Adjustable For Best Contrast(V_{DD}-V_0) : 4.0V
- Backlight Color : Yellow-Green
- Display Contents : 8 x 2 Characters (5 x 8 dots)
- Internal Memory : CGROM (13,200 bits)
  : CGRAM (64 byte)
  : DDRAM (80 * 8 bits for Digits)
- RoHS Compliant

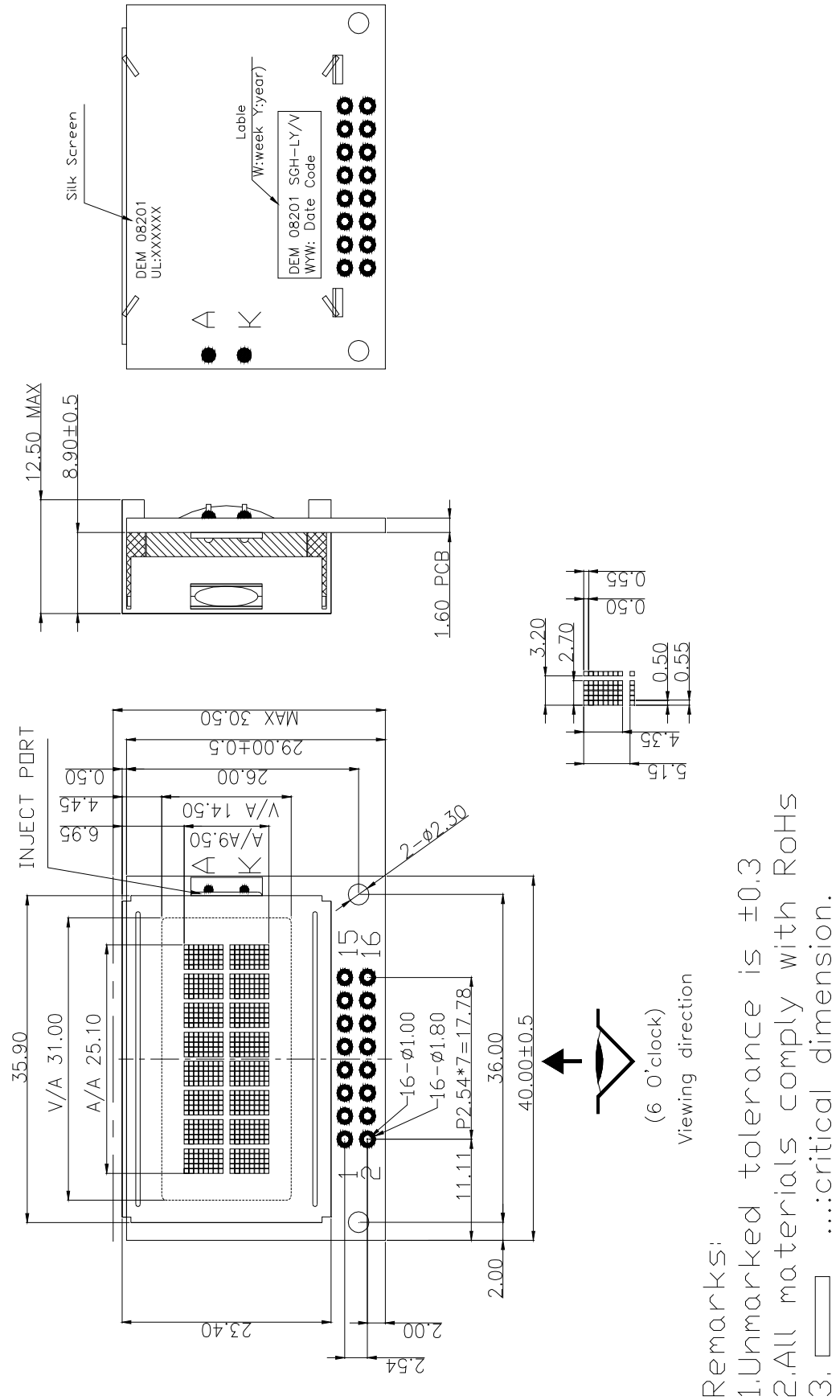
2. MECHANICAL SPECIFICATIONS

- Module Size : 40.00 x 29.00(30.50) x 12.50(max)mm
- Character Pitch : 3.20 x 5.15 mm
- Character Size : 2.70 x 4.35 mm
- Character Font : 5 x 8 dots
- Dot Size : 0.50 x 0.50 mm
- Dot Pitch : 0.55 x 0.55 mm

3. BLOCK DIAGRAM



4. EXTERNAL DIMENSIONS (Unit: mm)

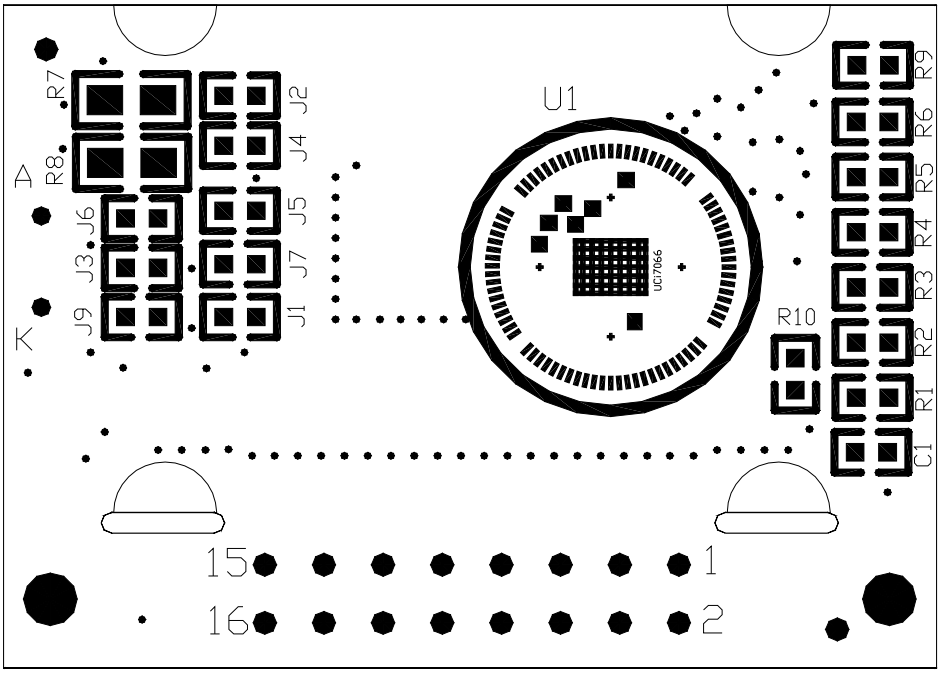


5. PIN ASSIGNMENT

<table>
<tr><th>Pin No.</th><th>Symbol</th><th>Function</th></tr>
<tr><td>1</td><td>R/W</td><td>Read or Write selection.
L: Write H: Read
<table>
<tr><th>RS</th><th>R/W</th><th>Operation</th></tr>
<tr><td>L</td><td>L</td><td>Instruction Write (MPU writes instruction code into IR)</td></tr>
<tr><td>L</td><td>H</td><td>DB7: Read Busy Flag, DB6~DB0: Address Counter</td></tr>
<tr><td>H</td><td>L</td><td>Data Write (MPU writes data into DR)</td></tr>
<tr><td>H</td><td>H</td><td>Data Read (MPU reads data from DR)</td></tr>
</table></td></tr>
<tr><td>2</td><td>E</td><td>Starts Data-Read or Data-Write</td></tr>
<tr><td>3</td><td>RS</td><td>Register selection.
L: (for write) Instruction register Busy flag
(for read) Address Counter
H: (for write and read) Data register</td></tr>
<tr><td>4</td><td>V0</td><td>Power supply for LCD driver</td></tr>
<tr><td>5</td><td>VDD</td><td>Power supply for Logic(+5V)</td></tr>
<tr><td>6</td><td>VSS</td><td>Power GND(0V)</td></tr>
<tr><td>7</td><td>LEDA</td><td>Anode of Backlight</td></tr>
<tr><td>8</td><td>LEDK</td><td>Cathode of Backlight</td></tr>
<tr><td>9</td><td>DB0</td><td rowspan="8">Bi-directional tri-state data bus pins.

Used for data transfer and receive between the MPU and the UCi7066c.
DB7 can be used as a busy flag. DB3~DB0 are not used during 4-bit operation.
<table>
<tr><th>MODE</th><th>SERMODE</th><th>DB7</th><th>DB6</th><th>DB5</th><th>DB4</th><th>DB3</th><th>DB2</th><th>DB1</th><th>DB0</th></tr>
<tr><td>6800 - 4bit</td><td>L</td><td>D3</td><td>D2</td><td>D1</td><td>D0</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>6800 - 8bit</td><td>L</td><td>D7</td><td>D6</td><td>D5</td><td>D4</td><td>D3</td><td>D2</td><td>D1</td><td>D0</td></tr>
</table>
In original design, only one chip select I/O, specified in DB[2].</td></tr>
<tr><td>10</td><td>DB7</td></tr>
<tr><td>11</td><td>DB1</td></tr>
<tr><td>12</td><td>DB6</td></tr>
<tr><td>13</td><td>DB2</td></tr>
<tr><td>14</td><td>DB5</td></tr>
<tr><td>15</td><td>DB3</td></tr>
<tr><td>16</td><td>DB4</td></tr>
</table>

6. PCB DRAWING AND DESCRIPTION



6.1 DESCRIPTION:

6-1-1**.**The polarity of the pin 7 and the pin 8:

LED Polarity(1)	
7 Pin	8 Pin
Anode	Cathode
J3=J5=open J2=J4=closed	

LED Polarity(2)	
7 Pin	8 Pin
Cathode	Anode
J3=J5= closed J2=J4= open	

※Note: In application module, J3=J5= open and J2=J4=Closed

6-1-2. The metal-bezel is set be on ground when the J1 is closed

※Note: In application module, J1= closed

6-1-3. The LED resistor on board are used when J6 is open.

※Note: In application module, J6=open

6-1-4.The R7 and the R8 are the LED resistor.

※Note: In application module, R7 =(15) Ohm, R8=open

6-1-5. The mounting holes are set on ground when J7 is closed..

※Note: In application module, J7=closed

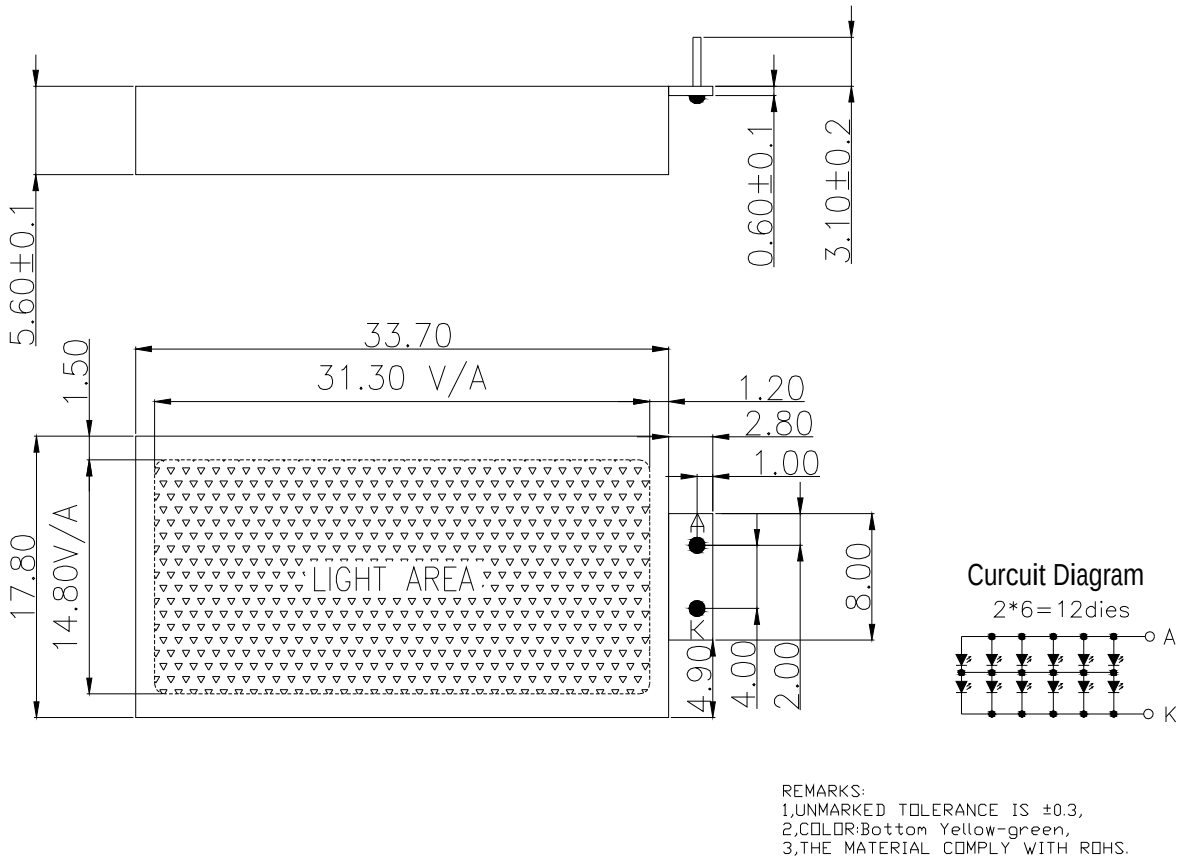
6-1-6. The LEDK is set be on ground when the J9 is closed

※Note: In application module, J9= open

7. BACKLIGHT ELECTRICAL/OPTICAL SPECIFICATION

Electrical-Optical Characteristics (Ta = 25° C)

Item	Symbol	MIN.	TYP.	MAX.	Unit	Condition
Forward Voltage	Vf	3.8	4.0	4.3	V	If= 60 mA
Dominant Wave Length	λD	569	572	575	nm	
Uniformity	Avg	65	75		%	
Luminance	Lv	160	240		cd/m²	



REMARKS:
1,UNMARKED TOLERANCE IS ±0.3,
2,COLOR:Bottom Yellow-green,
3,THE MATERIAL COMPLY WITH ROHS.

8. MAXIMUM ABSOLUTE POWER RATINGS (Ta=-25℃)

Item	Symbol	Standard value	Unit
Power Supply Voltage (1)	V_{DD}	-0.3~+7.0	V
Power Supply Voltage (2)	V_{LCD}	V_{DD}-15.0~V_{DD}+0.3	V
Input Voltage	V_{IN}	-0.3~V_{DD}+0.3	V
Operating Temperature	Topr	-20~+70	°C
Storage Temperature	Tstg	-30~+80	°C

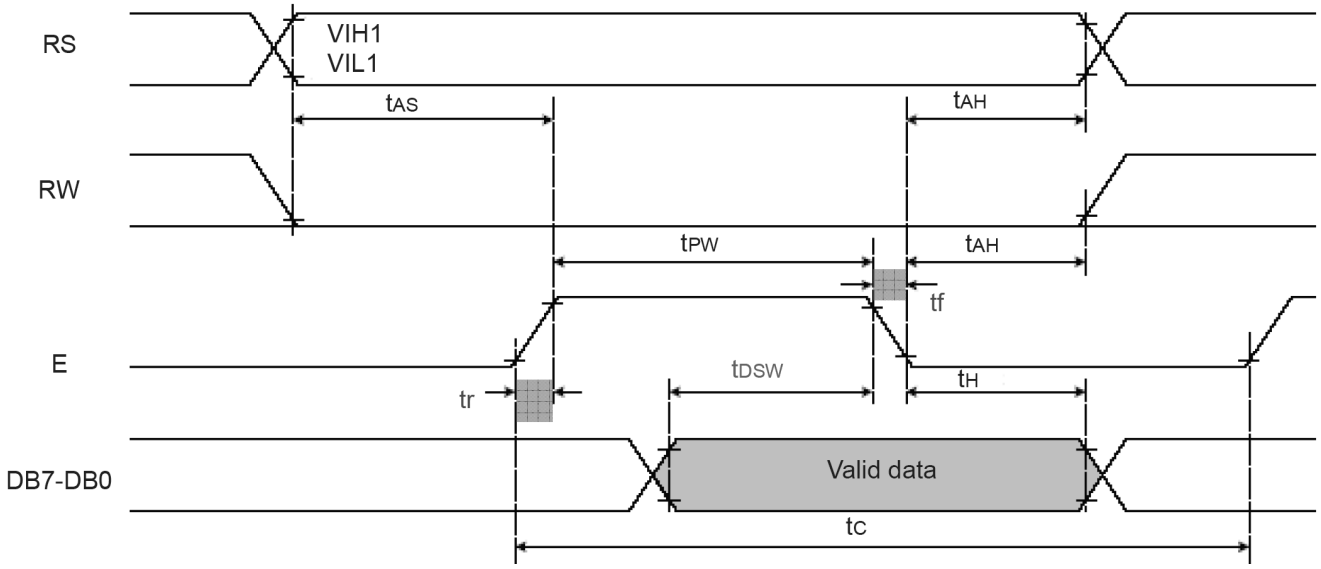
9. ELECTRICAL CHARACTERISTICS

9-1 DC Characteristics(VDD=4.5V~5.5V)

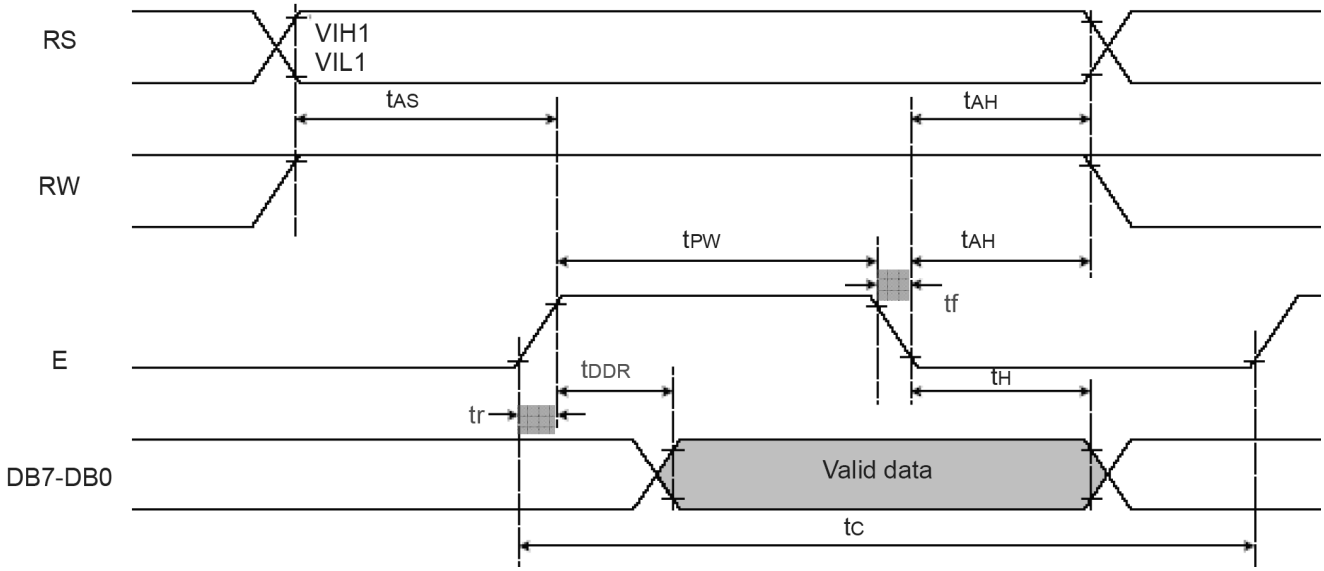
Item	Symbol	Standard Value			Test Condition	Unit
		MIN	TYP	MAX		
Operating Voltage	VDD	4.7	5	5.3	-------	V
Supply Current	IDD	----	TBD	----	VDD=5V,fosc=270kHz	mA
LCD Driving Voltage	VLCD(VDD-V0)	4.4	4.6	4.9	Ta = -20°C	V
		3.8	4.0	4.3	Ta = 25°C	
		3.4	3.6	3.8	Ta = 70°C	

9-2 AC Characteristics (VDD=4.5V~5.5V)

9-2-1 6800 mode



(6800 Write data to UCi7066c)



(6800 Read data from UCi7066c)

T_A = 25°C, Vcc=4.5V~5V

Symbol	Characteristic	Test Condition	Min.	Typ.	Max.	Unit
Internal Clock Operation						
fosc	OSC Frequency	R=91KΩ	190	270	350	KHz
External Clock Operation						
f_{EX}	External Frequency	--	125	270	410	KHz
	Duty Cycle	--	45	50	55	%
t_R, t_F	Rising/Falling Time	--	--	--	0.2	uS
Write Mode (MPU writes data to UCi7066)						
tc	Enable Cycle Time	Pin E	1200	--	--	nS
tpw	Enable Pulse Width	Pin E	140	--	--	nS
t_R, t_F	Rising/Falling Time	Pin E	--	--	25	nS
t_{AS}	Address Setup Time	Pin: RS, RW, E	0	--	--	nS
t_{AH}	Address Hold Time	Pin: RS, RW, E	10	--	--	nS
t_{DSW}	Data Setup Time	Pin: DB7~DB0	40	--	--	nS
t_H	Data Hold Time	Pin: DB7~DB0	10	--	--	nS
Read Mode (MPU reads data from UCi7066)						
tc	Enable Cycle Time	Pin E	1200	--	--	nS
tpw	Enable Pulse Width	Pin E	140	--	--	nS
t_R, t_F	Rising/Falling Time	Pin E	--	--	25	nS
t_{AS}	Address Setup Time	Pin: RS, RW, E	0	--	--	nS
t_{AH}	Address Hold Time	Pin: RS, RW, E	10	--	--	nS
t_{DDR}	Data Setup Time	Pin: DB7~DB0	--	--	100	nS
t_H	Data Hold Time	Pin: DB7~DB0	10	--	--	nS

10. CONTROL AND DISPLAY COMMAND

The following is a list of host commands supported by UCi7066
R/S: 0: Control, 1: Data W/R: 0: Write Cycle, 1: Read Cycle D7-D0: –: Don't Care

#	Command	RS	R/W	D7	D6	D5	D4	D3	D2	D1	D0	Action
1	Clear Display	0	0	0	0	0	0	0	0	0	1	Clear the screen
2	Return Home	0	0	0	0	0	0	0	0	1	–	Move cursor to HOME
3	Set Entry Mode	0	0	0	0	0	0	0	1	I/D	S	I/D: Left / Right S: Shift OFF/ON
4	Display ON/OFF	0	0	0	0	0	0	1	D	C	B	D: Display OFF / ON C: Cursor OFF / ON B: Blink OFF / ON
5	Cursor or Display Shift	0	0	0	0	0	1	S/C	R/L	–	–	S/C: Screen / Cursor R/L Right / Left
6	Set Function	0	0	0	0	1	DL	N	F	–	–	DL: 4-bit / 8-bit, N: 1-line / 2-line F: 5x8 / 5x11
7	Set CGRAM address	0	0	0	1	AC5	AC4	AC3	AC2	AC1	AC0	
8	Set DDRAM address	0	0	1	AC12	AC11	AC10	AC9	AC8	AC7	AC6	
9	Read Busy Flag and address	0	1	BF	AC19	AC18	AC17	AC16	AC15	AC14	AC13	
10	Write data to RAM	1	0	D7	D6	D5	D4	D3	D2	D1	D0	Write data to RAM
11	Read data from RAM	1	1	D7	D6	D5	D4	D3	D2	D1	D0	Read data from RAM

Note:

Ensure that UCi7066 is not in the BUSY state (BF = 0) before sending an instruction from the MPU to the UCi7066. If an instruction

is sent without checking the busy flag, the time between the first instruction and next instruction will take much longer than the instruction time itself.

11. STANDARD CHARACTER PATTERN (UCi7066c-01)

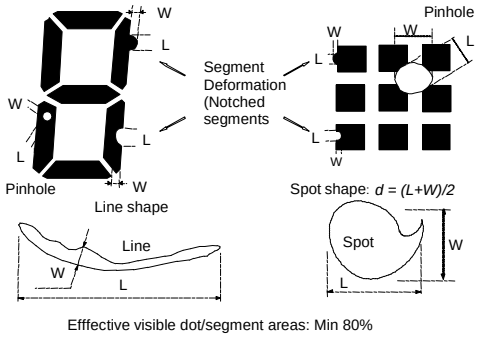
Upper(4bit) / Lower(4bit)	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	10010	1011	1100	1101	1110	1111
0000	CG RAM (1)															
0001	(2)															
0010	(3)															
0011	(4)															
0100	(5)															
0101	(6)															
0110	(7)															
0111	(8)															
1000	(1)															
1001	(2)															
1010	(3)															
1011	(4)															
1100	(5)															
1101	(6)															
1110	(7)															
1111	(8)															

12. QUALITY DESCRIPTION

DEFECT SPECIFICATION:

Specific type-related items are covered in this sheet.

a: Table for Cosmetic defects
(Note: nc = not counted).
Sizes and number of defects
(Max. Qty)



Efffective visible dot/segment areas: Min 80%

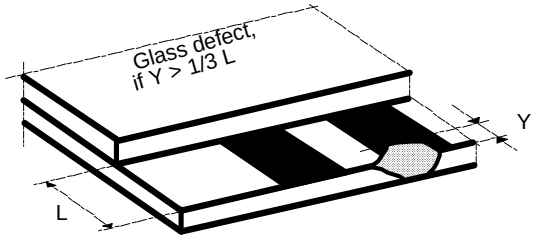
Defect Type	Max. defect size [µm] d or L W	Max. Quantity.
Black or White Spots	d ≤ 100	nc
	100< d ≤ 200	5
Black or White Lines	-- W ≤ 10	nc
	L ≤ 5000 W ≤ 30	3
	L ≤ 2000 W ≤ 50	2
Pinhole	d ≤ 100 100< d ≤ 200	nc 1/segment
(Total defects)		(5)
Segment Deformation	W ≤ 100	nc
Bubble (e.g. under pola)	d ≤ 150	nc
	200< d ≤ 400	3
	400< d ≤ 600	1

Examples/Shapes

b: Glass defects

b1:Glass defects at contact ledge

b2:Glass chipping in other areas shall not be in conflict



with the product's function.

13. MODULE ACCEPT QUALITY LEVEL (AQL)

Inspection Plan: ANSI Z-1.4, Normal Inspection Level II, Single Sampling Plan

14. RELIABILITY TEST

Operating life time: Longer than 50000 hours

(at room temperature without direct irradiation of sunlight)

Reliability characteristics shall meet following requirements.

TEMPERATURE TESTS	NORMAL GRADE
High Temperature Storage	+80℃ x 96hrs
Low Temperature Storage	-30℃x 96hrs
High Temperature Operation	+70℃ x 96hrs
Low Temperature Operation	-20℃ x 96hrs
High Temperature, High Humidity	+60℃ ,95%RH x 96hrs
Thermal Shock	-20℃ x30min. 10s ↓ 5Cycles +70℃ x 30min.
Vibration Test	Frequency x Swing x Time 40Hz x 4mm x 4hrs
Drop Test	Drop height x Times 1.0m x 6times

15. LCD MODULES HANDLING PRECAUTIONS

- Please remove the protection foil of polarizer before using.
- The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

- If the display panel is damaged and the liquid crystal substance inside it leaks out, do not get any in your mouth. If the substance come into contact with your skin or clothes promptly wash it off using soap and water.

- Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

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

- 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.

- Storage precautions
  When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps. Keep the modules in bags designed to prevent static electricity charging under low temperature / normal humidity conditions (avoid high temperature / high humidity and low temperatures below 0℃).Whenever possible, the LCD modules should be stored in the same conditions in which they were shipped from our company.

16. OTHERS

- Liquid crystals solidify at low temperature (below the storage temperature range) leading to defective orientation of liquid crystal or the generation of air bubbles (black or white). Air bubbles may also be generated if the module is subjected to a strong shock at a low temperature.

- If the LCD modules have been operating for a long time showing the same display patterns may remain on the screen as ghost images and a slight contrast irregularity may also appear. Abnormal operating status can be resumed to be normal condition by suspending use for some time. It should be noted that this phenomena does not adversely affect performance reliability.

- To minimize the performance degradation of the LCD modules resulting from caused by static electricity, etc. exercise care to avoid holding the following sections when handling the modules:
  - Exposed area of the printed circuit board
  - Terminal electrode sections