SPECIFICATIONS FOR LCD MODULE

CUSTOMER	
MODEL	**SCC0051-V01**
CUSTOMER APPROVED	

APPROVED BY	CHECKED BY	ORGANIZED BY
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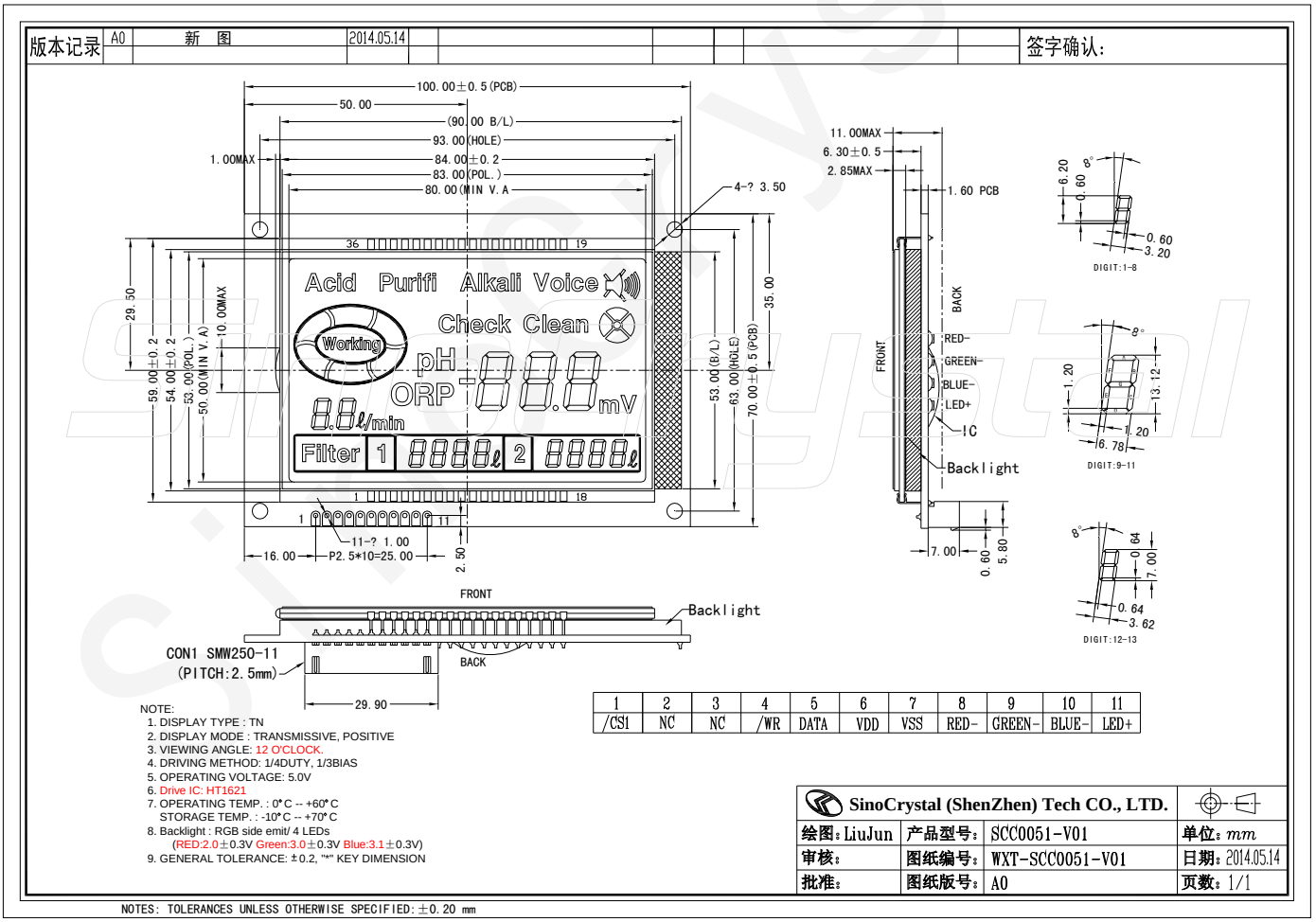
Specification Revision History

Version	Content	Date
A0	First Issue	2014-10-16

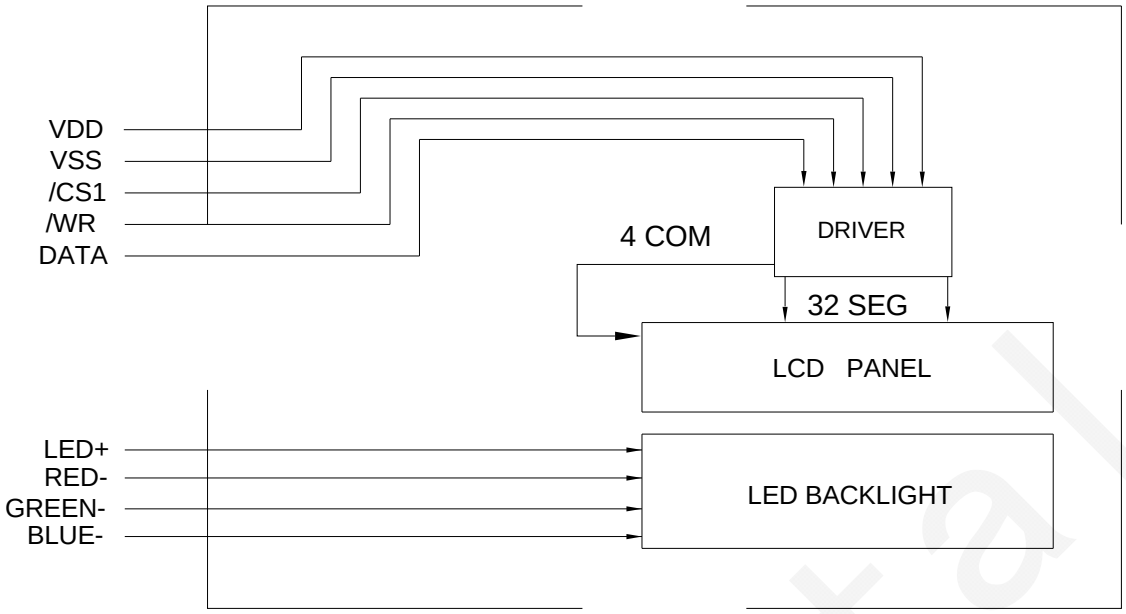
1. PHYSICAL DATA

ITEM	STANDARD VALUE	UNIT
NUMBER OF GRAPHIC	SEGMENT	Mm
MODULE DIMENSION	100.0×59.0×11.0(MAX)	Mm
VIEWING AREA	80.0×50.0	Mm
DOT SIZE	-	Mm
DOT PITCH	-	Mm
LCD TYPE	TN/ POSITIVE/TRANSMISSIVE	
DUTY	1/4	
VIEWING DIRECTION	12:00	o'clock
BACK LIGHT TYPE	SIDE LIT LED	
BACK LIGHT COLOR	RGB	
APPROX. WEIGHT	TBD	G

2. EXTERNAL DIMENSIONS



3. BLOCK DIAGRAM

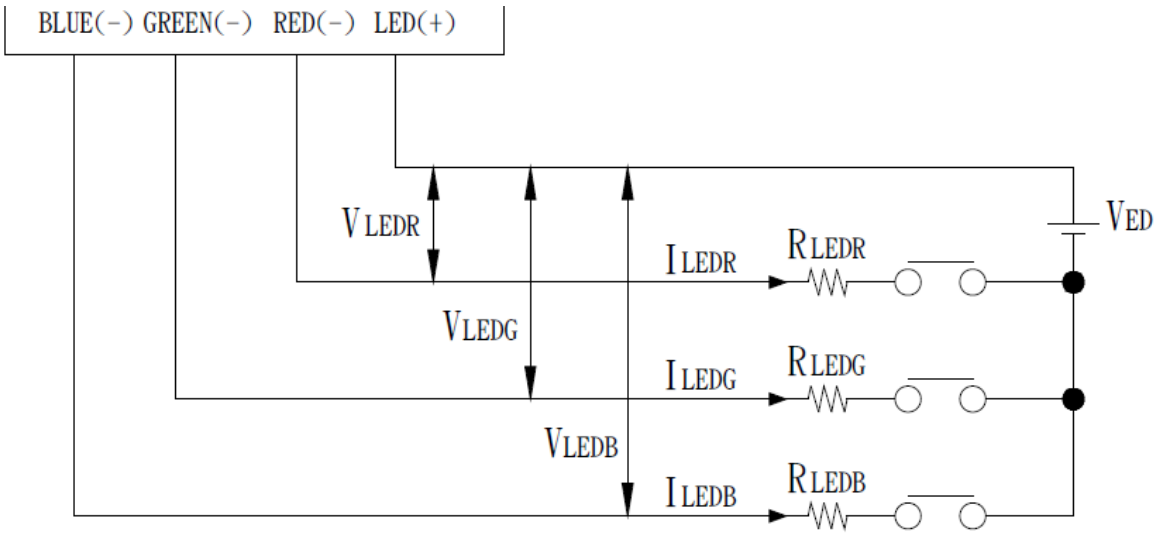


4. Backlight

LED BACKLIGHT COLOR ---------- RED (λ= 625±10 nm)

GREEN(λ= 525±10 nm)

BLUE (λ= 470±10 nm)



V_{LCD} – Vss: LCD DRIVING VOLTAGE

VR: 10KΩ ~ 20KΩ

$R_{LEDR} \geqq ((V_{ED} - V_{LEDR}) / I_{LEDR})$, $I_{LEDR} \leqq 80$ mA

$R_{LEDG} \geqq ((V_{ED} - V_{LEDG}) / I_{LEDG})$, $I_{LEDG} \leqq 80$ mA

$R_{LEDB} \geqq ((V_{ED} - V_{LEDB}) / I_{LEDB})$, $I_{LEDB} \leqq 80$ mA

5. INTERFACE PIN CONNECTIONS

Pin No.	Symbol	Level	Description
1	/CS1	H/L	Chip selection input
2	NC	-	No used
3	NC	-	No used
4	/WR	H/L	Write clock input
5	DATA	H/L	Serial data input/output
6	VDD	-	Supply voltage for logic
7	VSS	-	Ground
8	LED+	--	Backlight anode
9	RED-		Backlight cathode
10	GREEN-		Backlight cathode
11	BLUE-	--	Backlight cathode

6. ABSOLUTE MAXIMUM RATINGS

(1) Electrical Absolute Ratings

Item	Symbol	Min.	Max.	Unit	Note
Power Supply for Logic	VDD		5.2	Volt	Note 1
Power Supply for LCD	V_{LCD}		5.0	Volt	
Input Voltage	V_I	0	V_{CC}	Volt	
Current for LED backlight	I_{LED}		80*3	mA	

Note 1: Operator should be grounded during handling LCM

（2）Environmental Absolute Maximum Ratings

Item	Normal Temperature				Wide Temperature			
	Operating		Storage		Operating		Storage	
	Min.	Max,	Min.	Max,	Min.	Max,	Min.	Max,
Ambient Temperature	0℃	+50℃	-10℃	+60℃	-20℃	+70℃	-30℃	+80℃
Humidity(without condensation)	Note 2,4		Note 3,5		Note 4,5		Note 4,6	

Note 2 Ta≦50℃: 80% RH max

Ta>50℃: Absolute humidity must be lower than the humidity of 85%RH at 50℃

Note 3 Ta at -20℃ will be<48hrs at 70℃will be <120hrs when humidity is higher than 75%.

Note 4 Background color changes slightly depending on ambient temperature. This phenomenon is reversible.

Note 5 Ta≦70℃: 75RH max

Ta>70℃: absolute humidity must be lower than the humidity of 75%RH at 70℃

Note 6 Ta at -20℃ will be <48hrs, at 80℃will be <120hrs when humidity is higher than 75%.

7. ELECTRICAL CHARACTERISTICS

DC Characteristics

(VSS=0V,VDD=3.3V, Ta=25℃)

Item	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Power Supply for Logic	VDD		-	5.0	-	Volt
Input Voltage	V_{IH}		4.0	-	5.0	Volt
	V_{IL}		0	-	1.0	Volt
LCM Recommend LCD Module Driving Voltage	V_{LCD}	T_a=0℃	-	5.2	-	Volt
		T_a=25℃	-	5.0	-	
		T_a=50℃	-	4.8	-	
Power Supply Current for LCM	I_{DD}(BL OFF)	-	-	-	0.5	mA
	I_{DD}(BL ON)	-	-	-	80*3	
Power Supply for LED Backlight	V_{BLA}- V_{BLK}	Ta=25℃	-	-	5.0	V

AC Characteristics

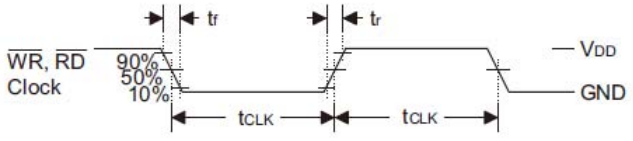


Figure 1

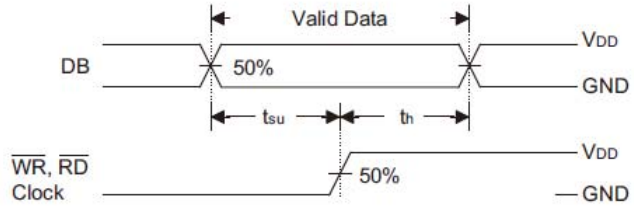


Figure 2

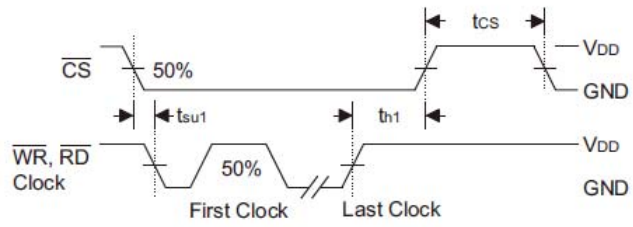


Figure 3

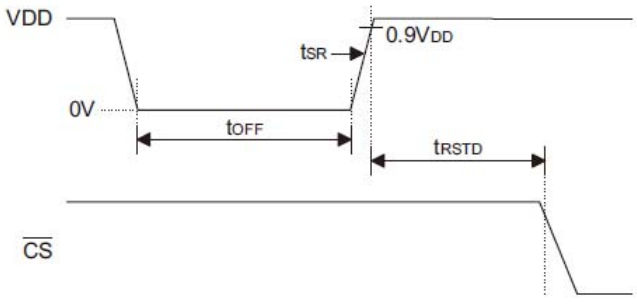


Figure 4 Power-on Reset Timing

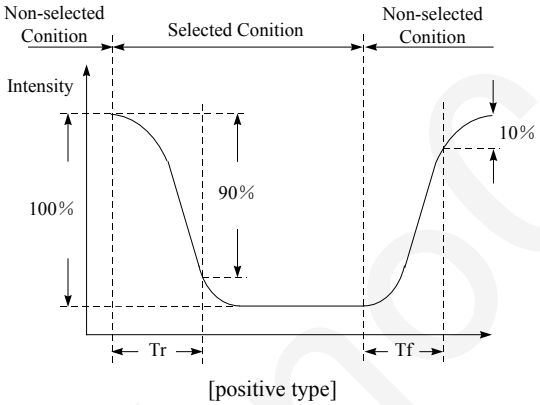
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{DD}	Conditions				
f_{SYS1}	System Clock	3V	On-chip RC oscillator	192	256	320	kHz
f_{SYS2}	System Clock	—	Crystal oscillator	—	32768	—	Hz
f_{SYS3}	System Clock	—	External clock source	—	256	—	kHz
f_{LCD}	LCD Clock	—	On-chip RC oscillator	—	f_{SYS1}/1024	—	Hz
		—	Crystal oscillator	—	f_{SYS2}/128	—	Hz
		—	External clock source	—	f_{SYS3}/1024	—	Hz
t_{COM}	LCD Common Period	—	n: Number of COM	—	n/f_{LCD}	—	s
f_{CLK1}	Serial Data Clock ($\overline{WR}$ pin)	3V	Duty cycle 50%	4	—	150	kHz
		5V		4	—	300	kHz
f_{CLK2}	Serial Data Clock ($\overline{RD}$ pin)	3V	Duty cycle 50%	—	—	75	kHz
		5V		—	—	150	kHz
f_{TONE}	Tone Frequency (2kHz)	3V	On-chip RC oscillator	1.5	2.0	2.5	kHz
	Tone Frequency (4kHz)			3.0	4.0	5.0	kHz
t_{CS}	Serial Interface Reset Pulse Width (Figure 3)	—	$\overline{CS}$	250	300	—	ns
t_{CLK}	$\overline{WR}$, $\overline{RD}$ Input Pulse Width (Figure 1)	3V	Write mode	3.34	—	125	µs
			Read mode	6.67	—	—	
		5V	Write mode	1.67	—	125	µs
			Read mode	3.34	—	—	
t_r, t_f	Rise/Fall Time Serial Data Clock Width (Figure 1)	—	—	—	120	160	ns
t_{su}	Setup Time for DATA to $\overline{WR}$, $\overline{RD}$ Clock Width (Figure 2)	—	—	60	120	—	ns
t_h	Hold Time for DATA to $\overline{WR}$, $\overline{RD}$ Clock Width (Figure 2)	—	—	250	300	—	ns
t_{su1}	Setup Time for $\overline{CS}$ to $\overline{WR}$, $\overline{RD}$ Clock Width (Figure 3)	—	—	500	600	—	ns
t_{h1}	Hold Time for $\overline{CS}$ to $\overline{WR}$, $\overline{RD}$ Clock Width (Figure 3)	—	—	250	300	—	ns
t_{OFF}	V_{DD} OFF Times (Figure 4)	—	V_{DD} drop down to 0V	20	—	—	ms
t_{SR}	V_{DD} Rising Slew Rate (Figure 4)	—	—	0.05	—	—	V/ms
t_{RSTD}	Delay Time after Reset (Figure 4)	—	—	1	—	—	ms

Note: 1. If the conditions of Power-on Reset timing are not satisfied in power On/Off sequence, the internal Power-on Reset (POR) circuit will not operate normally.
2. If the VDD drops below the minimum voltage of operating voltage spec. during operating, the conditions of Power-on Reset timing must be satisfied also. That is, the VDD must drop to 0V and keep at 0V for 20ms (min.) before rising to the normal operating voltage.

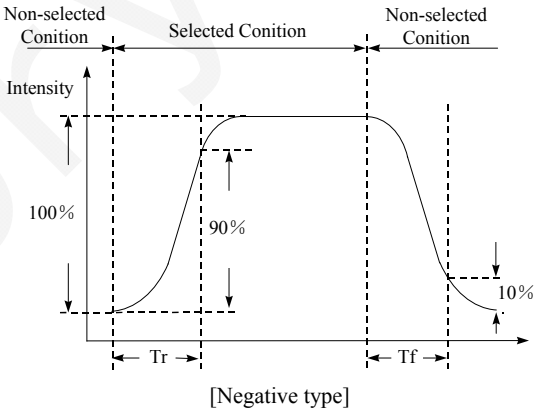
8. ELECTRO-OPTICAL CHARACTERISTICS

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	note
Viewing angle range	θ_f (12 o'clock)	When Cr≧1.4	---	40	---	Degree	Note 2 Note 3 Note 4
	θ_b (6 o'clock)		---	10	---		
	θ_l (9 o'clock)		---	20	---		
	θ_r (3 o'clock)		---	20	---		
Rise Time	T_r	V_{LCD}=5.0V Ta=25℃		150		mS	Note 1
Fall Time	T_f			250			
Contrast	Cr		---	3.0	---		
BRIGHTNESS	WHITE	If=240mA	15	----	---	cd/m^2	
	RED	If=80mA	10	---	---		
	GREEN	If=80mA	15	---	---		
	BLUE	If=80mA	10	---	---		

[Note 1] Definition of Response Time (Tr, Tf)



[positive type]



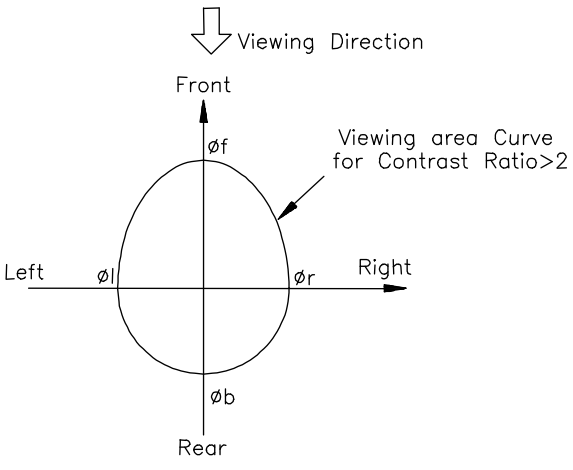
[Negative type]

Conditions:

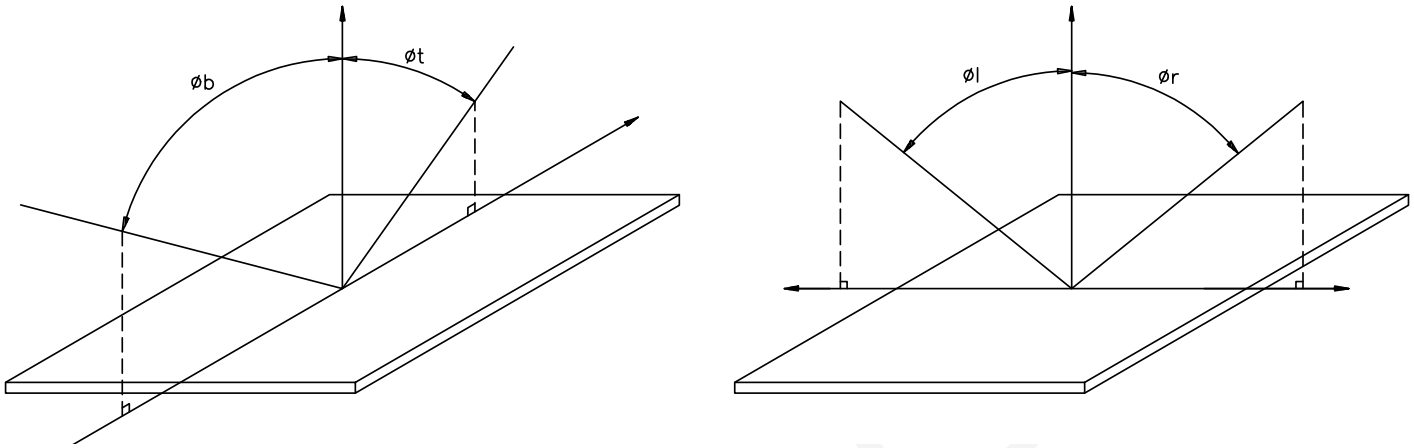
Operating Voltage : Vop — Viewing Angle(θ , φ): 0° , 0°

Frame Frequency : 64 Hz — Driving Wave form : 1/N duty, 1/a bias

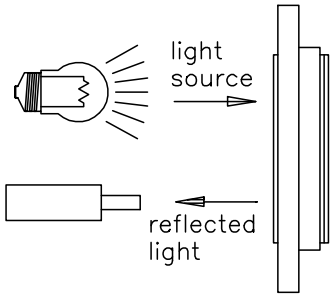
[Note 2] Definition of Viewing Direction



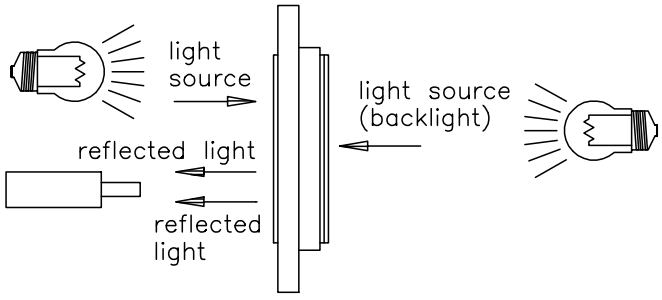
[Note 3] Definition of viewing angle



[Note 4] Description of Measuring Equipment



Reflective type



Transflective type

9. OPERATING PRINCIPLES & METHODS

Command Table

Name	ID	Command Code	D/C	Function	Def.
READ	1 1 0	A5A4A3A2A1A0D0D1D2D3	D	Read data from the RAM	
WRITE	1 0 1	A5A4A3A2A1A0D0D1D2D3	D	Write data to the RAM	
READ-MODIFY-WRITE	1 0 1	A5A4A3A2A1A0D0D1D2D3	D	READ and WRITE to the RAM	
SYS DIS	1 0 0	0000-0000-X	C	Turn off both system oscillator and LCD bias generator	Yes
SYS EN	1 0 0	0000-0001-X	C	Turn on system oscillator	
LCD OFF	1 0 0	0000-0010-X	C	Turn off LCD bias generator	Yes
LCD ON	1 0 0	0000-0011-X	C	Turn on LCD bias generator	
TIMER DIS	1 0 0	0000-0100-X	C	Disable time base output	
WDT DIS	1 0 0	0000-0101-X	C	Disable WDT time-out flag output	
TIMER EN	1 0 0	0000-0110-X	C	Enable time base output	
WDT EN	1 0 0	0000-0111-X	C	Enable WDT time-out flag output	

Name	ID	Command Code	D/C	Function	Def.
TONE OFF	**1 0 0**	0000-1000-X	C	Turn off tone outputs	Yes
TONE ON	**1 0 0**	0000-1001-X	C	Turn on tone outputs	
CLR TIMER	**1 0 0**	0000-11XX-X	C	Clear the contents of time base generator	
CLR WDT	**1 0 0**	0000-111X-X	C	Clear the contents of WDT stage	
XTAL 32K	**1 0 0**	0001-01XX-X	C	System clock source, crystal oscillator	
RC 256K	**1 0 0**	0001-10XX-X	C	System clock source, on-chip RC oscillator	Yes
EXT 256K	**1 0 0**	0001-11XX-X	C	System clock source, external clock source	
BIAS 1/2	**1 0 0**	0010-abX0-X	C	LCD 1/2 bias option ab=00: 2 commons option ab=01: 3 commons option ab=10: 4 commons option	
BIAS 1/3	**1 0 0**	0010-abX1-X	C	LCD 1/3 bias option ab=00: 2 commons option ab=01: 3 commons option ab=10: 4 commons option	
TONE 4K	**1 0 0**	010X-XXXX-X	C	Tone frequency, 4kHz	
TONE 2K	**1 0 0**	011X-XXXX-X	C	Tone frequency, 2kHz	
$\overline{\text{IRQ}}$ DIS	**1 0 0**	100X-0XXX-X	C	Disable $\overline{\text{IRQ}}$ output	Yes
$\overline{\text{IRQ}}$ EN	**1 0 0**	100X-1XXX-X	C	Enable $\overline{\text{IRQ}}$ output	
F1	**1 0 0**	101X-X000-X	C	Time base/WDT clock output:1Hz The WDT time-out flag after: 4s	
F2	**1 0 0**	101X-X001-X	C	Time base/WDT clock output:2Hz The WDT time-out flag after: 2s	
F4	**1 0 0**	101X-X010-X	C	Time base/WDT clock output:4Hz The WDT time-out flag after: 1s	
F8	**1 0 0**	101X-X011-X	C	Time base/WDT clock output:8Hz The WDT time-out flag after: 1/2s	
F16	**1 0 0**	101X-X100-X	C	Time base/WDT clock output:16Hz The WDT time-out flag after: 1/4s	
F32	**1 0 0**	101X-X101-X	C	Time base/WDT clock output:32Hz The WDT time-out flag after: 1/8s	
F64	**1 0 0**	101X-X110-X	C	Time base/WDT clock output:64Hz The WDT time-out flag after: 1/16s	
F128	**1 0 0**	101X-X111-X	C	Time base/WDT clock output:128Hz The WDT time-out flag after: 1/32s	Yes
TEST	**1 0 0**	1110-0000-X	C	Test mode, user don't use.	
NORMAL	**1 0 0**	1110-0011-X	C	Normal mode	Yes

Note: X : Don't care

A5~A0 : RAM addresses

D3~D0 : RAM data

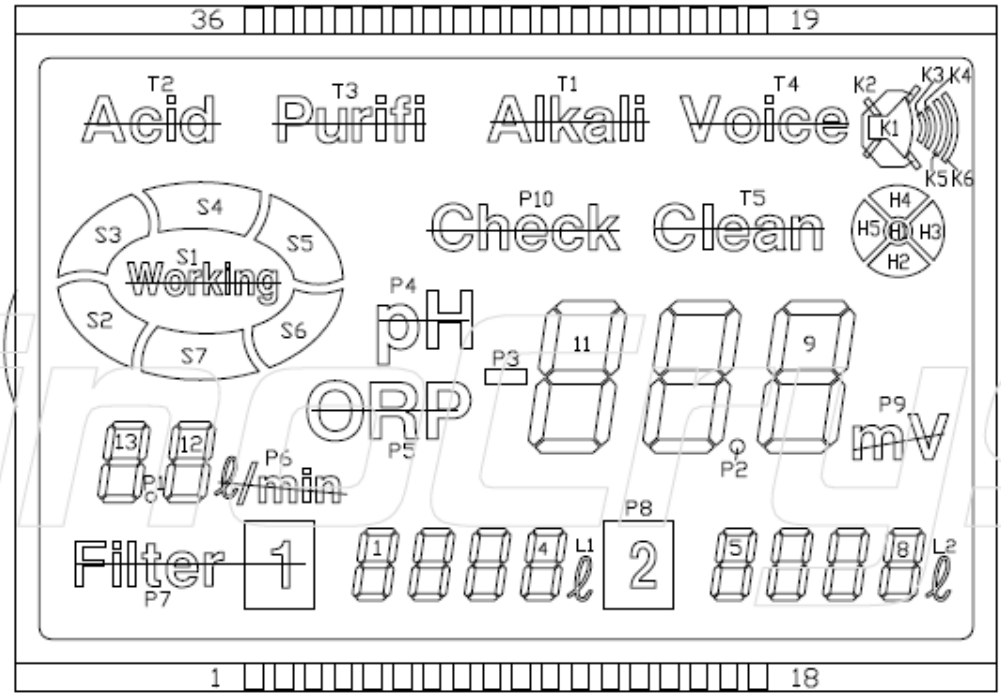
D/C : Data/command mode

Def. : Power on reset default

All the bold forms, namely **1 1 0**, **1 0 1**, and **1 0 0**, are mode commands. Of these, **1 0 0** indicates the command mode ID. If successive commands have been issued, the command mode ID except for the first command will be omitted. The source of the tone frequency and of the time base/WDT clock frequency can be derived from an on-chip 256kHz RC oscillator, a 32.768kHz crystal oscillator, or an external 256kHz clock. Calculation of the frequency is based on the system frequency sources as stated above. It is recommended that the host controller should initialize the HT1621 after power on reset, for power on reset may fail, which in turn leads to the malfunctioning of the HT1621.

NOTE: For more detail information, please refer to the HT1621's specification.

10. Display Data RAM (DDRAM)



PAD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
COM1	1E	1D	2E	2D	3E	3D	4E	4D	5E	5D	6E	6D	7E	7D	8E	8D	H3	K4
COM2	1G	1C	2G	2C	3G	3C	4G	4C	5G	5C	6G	6C	7G	7C	8G	8C	K5	K3
COM3	1F	1B	2F	2B	3F	3B	4F	4B	5F	5B	6F	6B	7F	7B	8F	8B	P10	K2
COM4	P7	1A	S7	2A	S6	3A	L1	4A	P8	5A	P5	6A	P4	7A	L2	8A	K6	K1
PAD	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
COM1	H2	P9	T1	9A	9F	10A	10F	11A	11F	S2	12A	12F	13A	13F	COM1			
COM2	H1	H5	T2	9B	9G	10B	10G	11B	11G	S3	12B	12G	13B	13G		COM2		
COM3	H4	T5	T3	9C	9E	10C	10E	11C	11E	S4	12C	12E	13C	13E			COM3	
COM4	T4	/	/	9D	P2	10D	S5	11D	P3	S1	12D	P6	13D	P1				COM4

11. RELIABILITY

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.	80 °C 200 hrs	------
2	Low temperature storage	Endurance test applying the low storage temperature for a long time.	-30 °C 200 hrs	------
3	High temperature operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	70 °C 200 hrs	------
4	Low temperature operation	Endurance test applying the electric stress under low temperature for a long time.	-20 °C 200 hrs	------
5	High temperature / Humidity storage	Endurance test applying the high temperature and high humidity storage for a long time.	70 °C , 90 %RH 96 hrs	MIL-202E-103B JIS-C5023
6	High temperature / Humidity operation	Endurance test applying the electric stress (Voltage & Current) and temperature / humidity stress to the element for a long time.	50 °C , 90 %RH 96 hrs	MIL-202E-103B JIS-C5023
7	Temperature cycle	Endurance test applying the low and high temperature cycle. -10°C ⇌ 25°C ⇌ 60°C 30min 5min 30min 1 cycle	-10°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	MIL-202E-201A JIS-C5025 JIS-C7022-A-10
9	Shock test	Constructional and mechanical endurance test applying the shock during transportation.	50G half sign wave 11 msedc 3 times of each direction	MIL-202E-213B
10	Atmospheric pressure test	Endurance test applying the atmospheric pressure during transportation by air.	115 mbar 40 hrs	MIL-202E-105C
Others				
11	Static electricity test	Endurance test applying the electric stress to the terminal.	VS=800V , RS=1.5 kΩ CS=100 pF 10 time	MIL-883B-3015.1

Inspection after test: Inspection after 2～4 hours storage at room temperature ,the sample shall be free from defects:

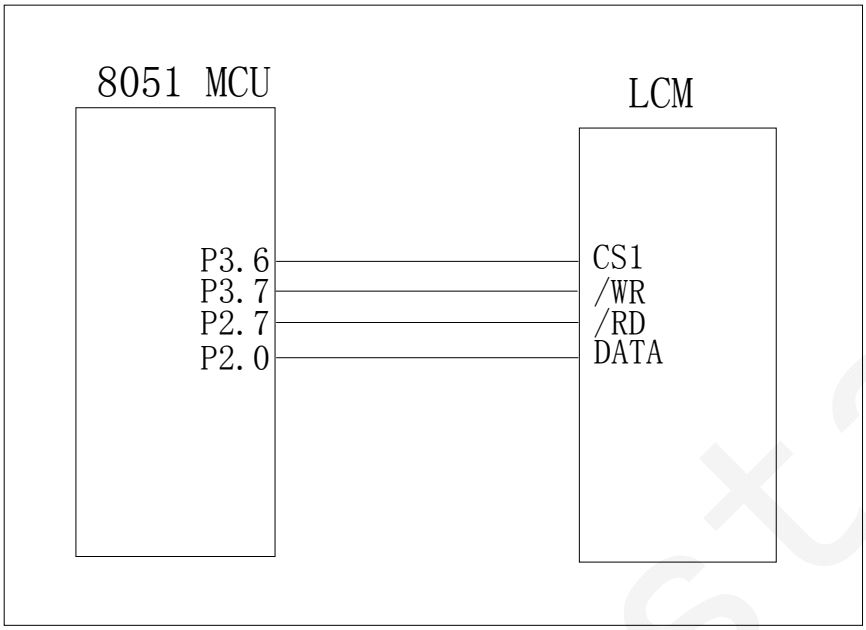
1. Air bubble in the LCD.
2. Sealleak
3. Non-display.
4. Missing segments.
5. Glass crack.
6. Current Idd is twice higher than initial value.

12. QUALITY GUARANTEE

No	Item	Criteria
1	inclusions (black spot, white spot, dust)	(1)round type diameter mm(a*) no of defect* a≦0.20 neglect 0.20＜a≦0.35 5max 0.35＜a none (2)linear type length mm(l) width mm(W) no. of defect na W≦0.03 neglect l≦3 0.03＜W≦0.08 6 3＜l 0.08＜W none
2	scratch	1.scratch on protective film is permitted. 2.scratch on polarizer shall be as follow: (1)round type diameter mm(a*) no of defect a≦0.15 neglect 0.15＜a≦0.20 2 max 0.20＜a none (2)linear type be judged bye 1.-(2) linear type
3	dent	diameter ＜ 1.5mm
4	bubble	not exceeding 0.5mm average diameter is acceptable between glass and polarizing film
5	pin hole	(a+b)/2 ≦ 0.15mm maximum number: ignored 0.15＜(a+b)/2≦0.20mm maximum number:10
6	dot width	design width ±15%
7	dot defect	(a+b)/2≦0.20mm maximum number: ignored 0.20＜(a+b)/2≦0.30mm maximum number:5 x=width
8	contrast irregularity(spot)	diameter spec no of defect a≦0.50mm neglect 0.50＜a≦0.75 5 0.75＜a≦1.00 3 1.00＜a none
9	color tone and uniformity	obvious uneven color is not permitted

13. EXAMPLE

1) Application Ciuruit



14. USING LCD MODULES

14-1. Liquid Crystal Display Modules

LCD is composed of glass and polarizer. Pay attention to the following items when handling.

(1) Please keep the temperature within specified range for use and storage. Polarization degradation, bubble generation or polarizer peel-off may occur with high temperature and high humidity.

(2) Do not touch, push or rub the exposed polarizers with anything harder than an HB pencil lead (glass, tweezers, etc.).

(3) N-hexane is recommended for cleaning the adhesives used to attach front/rear polarizers and reflectors made of organic substances which will be damaged by chemicals such as acetone, toluene, ethanol and isopropylalcohol.

(4) When the display surface becomes dusty, wipe gently with absorbent cotton or other soft material like chamois soaked in petroleum benzin. Do not scrub hard to avoid damaging the display surface.

(5) Wipe off saliva or water drops immediately, contact with water over a long period of time may cause deformation or color fading.

(6) Avoid contacting oil and fats.

(7) Condensation on the surface and contact with terminals due to cold will damage, stain or dirty the polarizers. After products are tested at low temperature they must be warmed up in a container before coming is contacting with room temperature air.

(8) Do not put or attach anything on the display area to avoid leaving marks on.

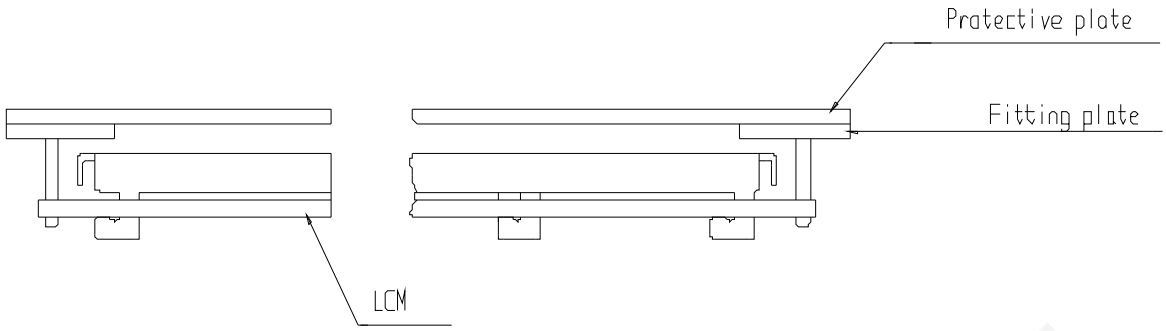
(9) Do not touch the display with bare hands. This will stain the display area and degradate insulation between terminals (some cosmetics are determinated to the polarizers).

(10) As glass is fragile. It tends to become or chipped during handling especially on the edges. Please avoid dropping or jarring.

14-2.Installing LCD Modules

The hole in the printed circuit board is used to fix LCM as shown in the picture below. Attend to the following items when installing the LCM.

(1) Cover the surface with a transparent protective plate to protect the polarizer and LC cell.



(2) When assembling the LCM into other equipment, the spacer to the bit between the LCM and the fitting plate should have enough height to avoid causing stress to the module surface, refer to the individual specifications for measurements. The measurement tolerance should be ±0.1mm.

14-3. Precaution for Handing LCD Modules

Since LCM has been assembled and adjusted with a high degree of precision, avoid applying excessive shocks to the module or making any alterations or modifications to it.

(1) Do not alter, modify or change the shape of the tab on the metal frame.

(2) Do not make extra holes on the printed circuit board, modify its shape or change the positions of components to be attached.

(3) Do not damage or modify the pattern writing on the printed circuit board.

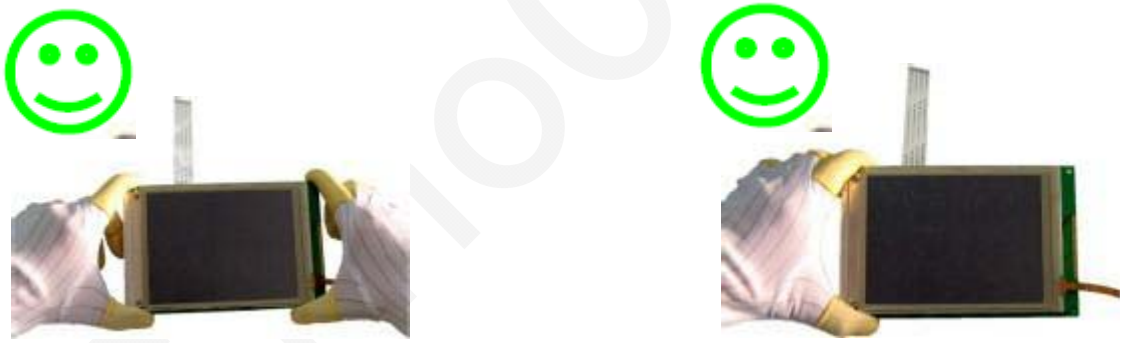
(4) Absolutely do not modify the zebra rubber strip (conductive rubber) or heat seal connector.

(5) Except for soldering the interface, do not make any alterations or modifications with a soldering iron.

(6) Do not drop, bend or twist LCM.

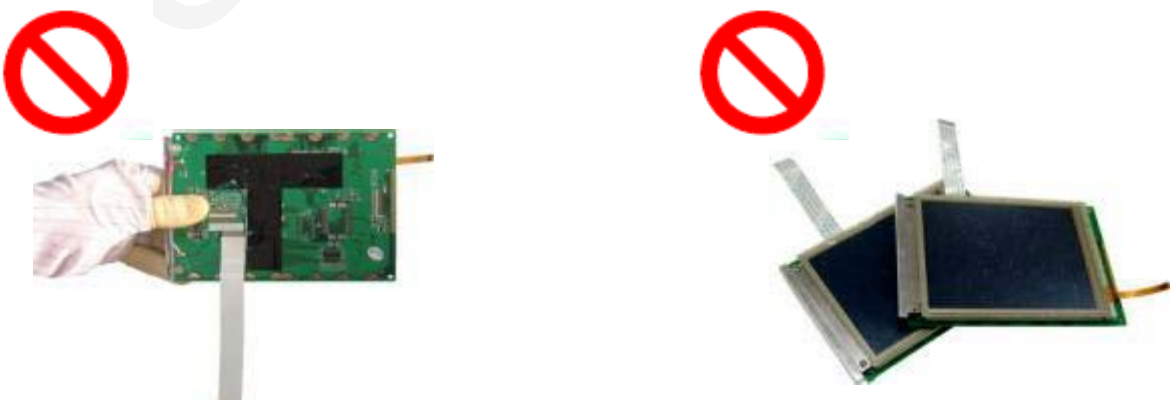
LCM is easy to be damaged. Please note below and be careful for handling.

Correct handling:



As above picture, please handle with anti-static gloves around LCM edges.

Incorrect handling:



Please don't touch IC directly.

Please don't stack LCM.

Please don't hold the surface of panel.

Please don't stretch interface of output, such as FPC cable.

Please don't hold the surface of IC.

Please don't operate with sharp stick such as pens。

14-4.Electro-Static Discharge Control

Since this module uses a CMOS LSI, the same careful attention should be paid to electrostatic discharge as for an ordinary CMOS IC.

(1) Make certain that you are grounded when handing LCM.

(2) Before remove LCM from its packing case or incorporating it into a set, be sure the module and your body have the same electric potential.

(3) When soldering the terminal of LCM, make certain the AC power source for the soldering iron does not leak.

(4) When using an electric screwdriver to attach LCM, the screwdriver should be of ground potentiality to minimize as much as possible any transmission of electromagnetic waves produced sparks coming from the commutator of the motor.

(5) As far as possible make the electric potential of your work clothes and that of the work bench the ground potential.

(6) To reduce the generation of static electricity be careful that the air in the work is not too dried. A relative humidity of 50%-60% is recommended.

14-5. Precaution for soldering to the LCM

(1) Observe the following when soldering lead wire, connector cable and etc. to the LCM.

- Soldering iron temperature : 280°C ± 10°C.
- Soldering time : 3-4 sec.
- Solder : eutectic solder.

If soldering flux is used, be sure to remove any remaining flux after finishing to soldering operation. (This does not apply in the case of a non-halogen type of flux.) It is recommended that you protect the LCD surface with a cover during soldering to prevent any damage dur to flux spatters.

(2) When soldering the electroluminescent panel and PC board, the panel and board should not be detached more than three times. This maximum number is determined by the temperature and time conditions mentioned above, though there may be some variance depending on the temperature of the

soldering iron.

(3) When remove the electoluminescent panel from the PC board, be sure the solder has completely melted, the soldered pad on the PC board could be damaged.

14-6.Precautions for Operation

(1) Viewing angle varies with the change of liquid crystal driving voltage (VO). Adjust VO to show the best contrast.

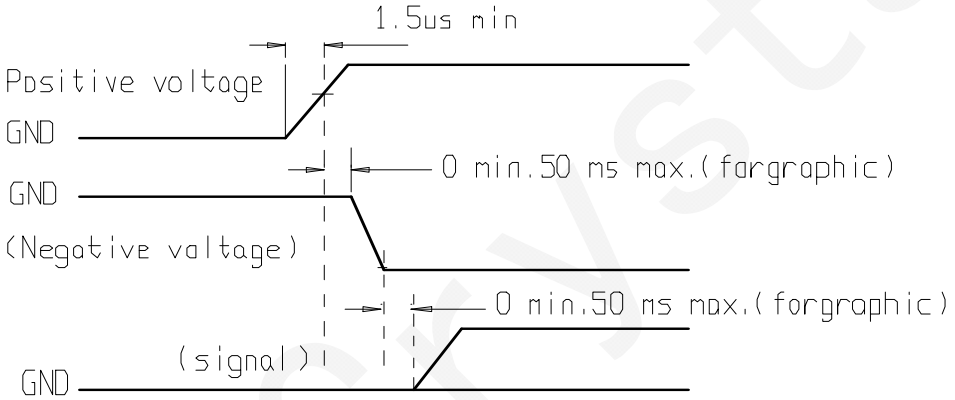
(2) Driving the LCD in the voltage above the limit shortens its life.

(3) Response time is greatly delayed at temperature below the operating temperature range. However, this does not mean the LCD will be out of the order. It will recover when it returns to the specified temperature range.

(4) If the display area is pushed hard during operation, the display will become abnormal. However, it will return to normal if it is turned off and then back on.

(5) Condensation on terminals can cause an electrochemical reaction disrupting the terminal circuit. Therefore, it must be used under the relative condition of 40°C , 50% RH.

(6) When turning the power on, input each signal after the positive/negative voltage becomes stable.



14-7. Storage

When storing LCDs as spares for some years, the following precaution are necessary.

(1) Store them in a sealed polyethylene bag. If properly sealed, there is no need for dessicant.

(2) Store them in a dark place. Do not expose to sunlight or fluorescent light, keep the temperature between 0°C and 35°C.

(3) The polarizer surface should not come in contact with any other objects. (We advise you to store them in the container in which they were shipped.)

(4) Environmental conditions :

- Do not leave them for more than 168hrs. at 60°C.
- Should not be left for more than 48hrs. at -20°C.

14-8. Safety

(1) It is recommended to crush damaged or unnecessary LCDs into pieces and wash them off with solvents such as acetone and ethanol, which should later be burned.

(2) If any liquid leakes out of a damaged glass cell and comes in contact with the hands, wash off thoroughly with soap and water.

14-9.Return LCM under warranty

No warranty can be granted if the precautions stated above have been disregarded. The typical examples of violations are :

- Broken LCD glass.
- PCB eyelet's damaged or modified.
- PCB conductors damaged.

- Circuit modified in any way, including addition of components.
- PCB tampered with by grinding, engraving or painting varnish.
- soldering to or modifying the bezel in any manner.

Module repairs will be invoiced to the customer upon mutual agreement. Modules must be returned with sufficient description of the failures or defects. Any connectors or cable installed by the customer must be removed completely without damaging the PCB eyelet's, conductors and terminals.