



CLOVER DISPLAY LTD.

LCD MODULE SPECIFICATION

Model : CV4202C - _ _ - _ _ - _ _ - _ _

Revision	02
Engineering	NICK FOK
Date	4 September 2012
Our Reference	4949

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MODE OF DISPLAY**Display mode**

- TN positive
 TN negative
STN : Yellow green
 Grey
 Blue (negative)
 FSTN positive
 FSTN negative

Display condition

- Reflective type
 Transflective type
 Transmissive type
 Others

Viewing direction

- 6 O' clock
 12 O' clock
 3 O' clock
 9 O' clock

LCD MODULE NUMBER NOTATION:CV4202C- M Y - S F - N 6 - T

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

*(1)---Model number of standard LCD Modules

*(2)---Backlight type

- N – No backlight
E – EL backlight
L – Side-lited LED backlight
M– Array LED backlight
C – CCFL

*(3)---Backlight color

- N – No backlight
A – Amber
B – Blue
O– Orange
W–White
Y – Yellow green

*(4)---Display mode

- T – TN
V – TN (Negative)
S – STN Yellow green
G – STN Grey
B – STN Blue (Negative)
F – FSTN
N – FSTN (Negative)
E – EBTN

*(5)---Rear polarizer type

- R – Reflective
F – Transflective
T – Transmissive

*(6)---Temperature range

- N – Normal
W– Extended

*(7)---Viewing direction

- 6 – 6 O'clock
2 – 12 O'clock
3 – 3 O'clock
9 – 9 O'clock

*(8)---Special code for other requirements
(Can be omitted if not used)

- T – Touch panel (Analog)
P – Touch panel (Digital)

GENERAL DESCRIPTION

Display mode : 20 Characters x 2 Lines COB LCD module
 Interface : 8 bit parallel
 Driving method : 1/16 duty, 1/5 bias
 Controller IC : Sunplus SPLC780C or equivalent
 For the detailed information, please refer to the IC specifications.

MECHANICAL DIMENSIONS

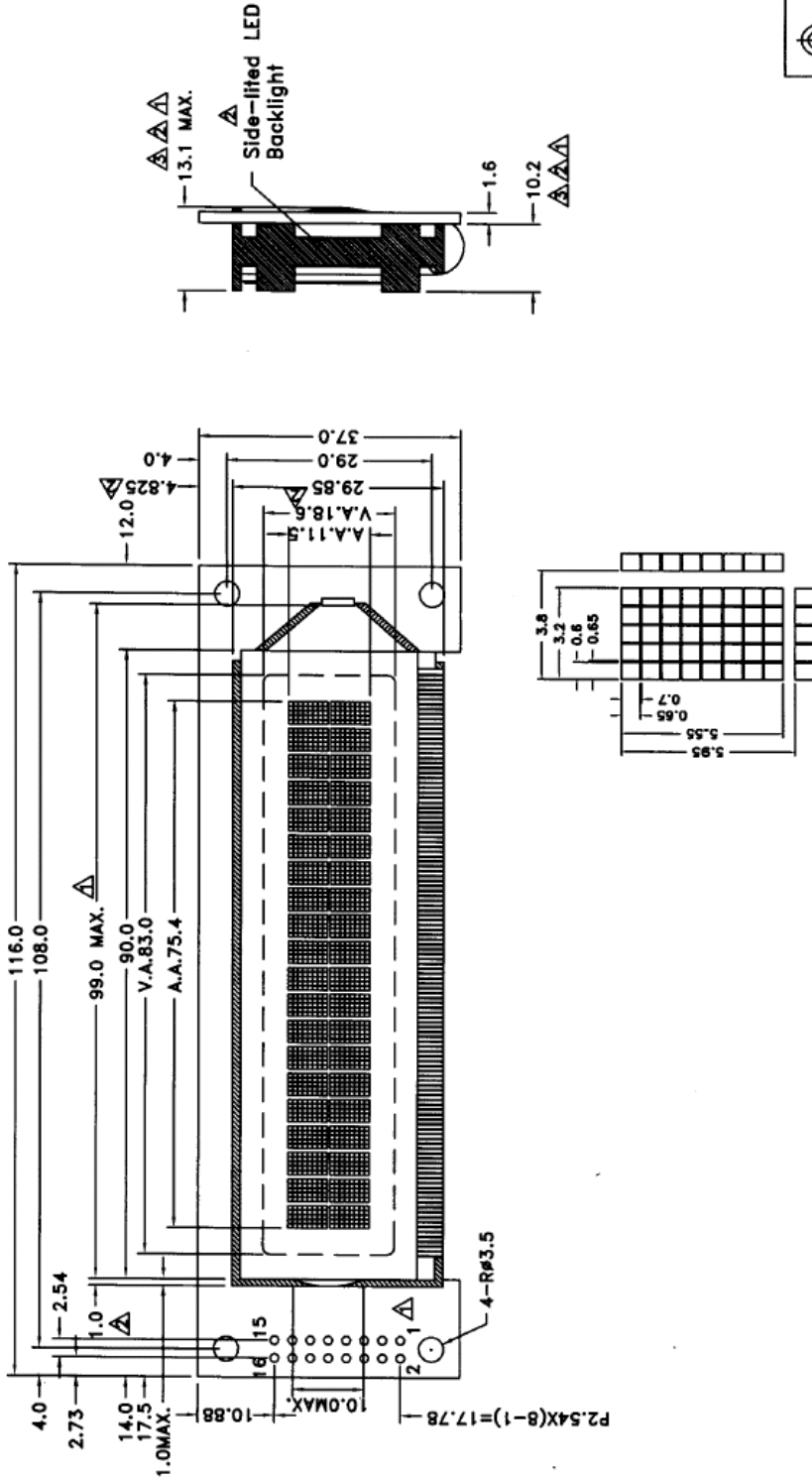
Item	Dimension	Unit	Item	Dimension	Unit
Outline Dimension	116.0(L)x37.0(W)x13.1MAX.(H)	mm	Character Size	3.2(L)x5.55(W)	mm
Viewing Area	83.0(L)x18.6(W)	mm	Dot Size	0.60(L)x0.65(W)	mm
Character Pitch	3.8(L)x5.95(W)	mm	—	—	—

CONNECTOR PIN ASSIGNMENT

Pin No.	Symbol	Function
1	A	Supply Voltage for Backlight (+VE)
2	K	Supply Voltage for Backlight (-VE)
3	VSS	Ground
4	VDD	Supply Voltage for Logic
5	VO	Input Voltage for LCD
6	RS	Register Select Input
7	R/W	Read / Write
8	E	Enable Signal
9	DB0	Data Bus Line
10	DB1	
11	DB2	
12	DB3	
13	DB4	
14	DB5	
15	DB6	
16	DB7	

COUNTER DRAWING OF MODUAL DIMENSION

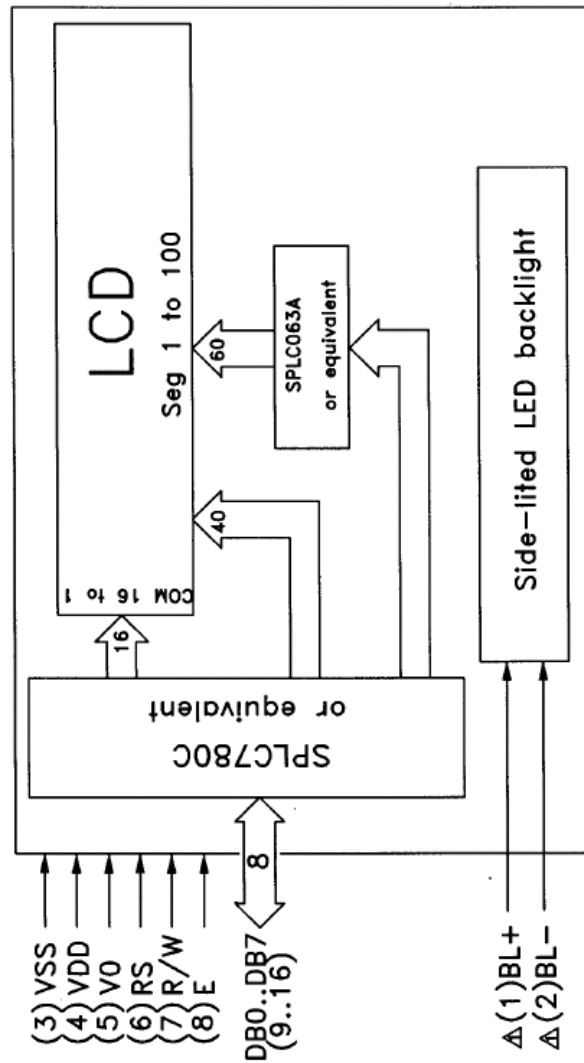
MARK	REASON	PREPARED	DATE
△	Change dimension & backlight voltage,update pinout	HERMUS	15 JAN 05
△	Change backlight design and module dimension	YAMAHA	16 JUL 05
△	Change backlight design and module dimension	ROGER	16 FEB 06
△			



TOLERANCE IF NOT SPECIFY SCALE ±0.5mm		N.T.S.		UNIT IN mm		CLOVER DISPLAY LTD. (HK)		SHEET 1 OF 3	
REV.	REVISION RECORD	DATE	CUSTOMER	APPROVED	OUR REF.	DATE	AGENT	DATE	APPROVED
00	1st ISSUE	24 JUN 04	STANDARD		4949				
01	Change dimension & backlight voltage,update pinout	15 JAN 05							
02	Change backlight design and module dimension	16 JUL 05							
03	Change backlight design and module dimension	18 FEB 06							
MODEL NO. CV4202C		TITLE: MODULE DIMENSION		DRAWN BY: LIKEN		DATE: 18 FEB 06		CHECKED BY: <i>[Signature]</i>	
				DATE: 16/03/06		DATE: 16/03/06		APPROVED: <i>[Signature]</i>	

COUNTER DRAWING OF PIN OUT & BLOCK DIAGRAM

PIN NO.	SYMBOL	FUNCTION
1	BL+	Supply voltage for backlight(+)
2	BL-	Supply voltage for backlight(-)
3	VSS	Supply voltage(OV,ground)
4	VDD	Supply voltage for logic
5	V0	Input voltage for LCD
6	RS	Register select Input
7	R/W	Read/write
8	E	Enable signal
9	DB0	Data bus line
10	DB1	
11	DB2	
12	DB3	
13	DB4	
14	DB5	
15	DB6	
16	DB7	



TOLERANCE IF NOT SPECIFY SCALE ±0.5mm		SCALE N.T.S.	UNIT IN mm	CLOVER DISPLAY LTD. (HK)		SHEET 2 OF 3
REV.	REVISION RECORD	DATE	CUSTOMER	APPROVED	MODEL NO.	CV4202C
00	1st ISSUE	24 JUN 04	STANDARD		TITLE:	PIN OUT & BLOCK DIAGRAM
01	Change dimension & backlight voltage,update pinout	15 JAN 05	AGENT	APPROVED	DRAWN BY:	LIKEN DATE: 18 FEB 06
02	Change backlight design and module dimension	16 JUL 05			CHECKED BY:	DATE: 16/5/06
03	Change backlight design and module dimension	18 FEB 06			APPROVED BY:	DATE: 16/9/07
			CUSTOMER REF.	OUR REF.	4949	

ELECTRICAL CHARACTERISTICS

Conditions: VSS=0V, Ta=25°C

Item	Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage	VDD	4.5	5.0	5.5	V
Supply Current	IDD	—	1.5	2.0	mA
Input Voltage for LCD (*)	V0	-0.2	0	0.2	V
“H”Level Input Voltage	VIH	2.2	—	VDD	V
“L”Level Input Voltage	VIL	-0.3	—	0.6	V

Note (*): There is tolerance in optimum LCD driving voltage during production and it will be within the specified range.

Side-lited LED

Constant current driving:

Item	Symbol	MIN.	TYP.	MAX.	Unit	Condition
White Backlight voltage	V _{BL}	4.9	5.0	5.1	V	I _{BL} = 15mA

ABSOLUTE MAXIMUM RATINGS

Please make sure not to exceed the following maximum rating values under the worst application conditions.

Item	Symbol	Rating (for normal temperature)	Rating (for wide temperature)	Unit
Supply Voltage	VDD	-0.3 to 7	-0.3 to 7	V
Input Voltage	VIN	-0.3 to VDD +0.3	-0.3 to VDD +0.3	V
Operating Temperature	T _{opr}	0 to 50	-20 to 70	°C
Storage Temperature	T _{stg}	-10 to 60	-30 to 80	°C

INSTRUCTIONS

Instruction	Instruction Code										Description	Execution time (fosc=270KHz)	
	RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0			
Clear Display	0	0	0	0	0	0	0	0	0	1	Write "20H" to DDRAM and set DDRAM address to "00H" from AC	1.52ms	
Return Home	0	0	0	0	0	0	0	0	0	1	- Set DDRAM address to "00H" from AC and return cursor to its original position if shifted. The contents of DDRAM are not changed.	1.52ms	
Entry Mode Set	0	0	0	0	0	0	0	0	1	I/D	S	Assign cursor moving direction and enable the shift of entire display	38μs
Display ON/OFF Control	0	0	0	0	0	0	0	1	D	C	B	Set display(D), cursor(C), and blinking of cursor(B) on/off control bit.	38μs
Cursor or Display Shift	0	0	0	0	0	1	S/C	R/L	-	-	-	Set cursor moving and display shift control bit, and the direction, without changing of DDRAM data.	38μs
Function Set	0	0	0	0	1	DL	N	F	-	-	-	Set interface data length (DL: 8-bit/4-bit), numbers of display line (N: 2-line/1-line) and, display font type (F:5x10 dots/5x8 dots)	38μs
Set CGRAM Address	0	0	0	1	AC5	AC4	AC3	AC2	AC1	AC0		Set CGRAM address in address counter.	38μs
Set DDRAM Address	0	0	1	AC6	AC5	AC4	AC3	AC2	AC1	AC0		Set DDRAM address in counter	38μs
Read Busy Flag and Address Counter	0	1	BF	AC6	AC5	AC4	AC3	AC2	AC1	AC0		Whether during internal operation or not can be known by reading BF. The contents of address counter can also be read.	
Write Data to RAM	1	0	D7	D6	D5	D4	D3	D2	D1	D0		Write data into internal RAM (DDRAM/CGRAM).	38μs
Read Data from RAM	1	1	D7	D6	D5	D4	D3	D2	D1	D0		Read data from internal RAM (DDRAM/CGRAM).	38μs

Note: "-": don't care

I / D = 1: Increment I / D = 0: Decrement S = 1: Accompanies display shift S / C = 1: Display shift S / C = 0: Cursor move R / L = 1: shift to the right R / L = 0: shift to the left DL = 1: 8 bits DL = 0: 4 bits N = 1: 2 lines N = 0: 1 line F = 1: 5 x 10 dots F = 0: 5 x 7 dots BF = 1: Internally operating BF = 0: Can accept instruction	AC: Address counter used for both DD and CG RAM address.
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DISPLAY DD RAM AND CHARACTER POSITION

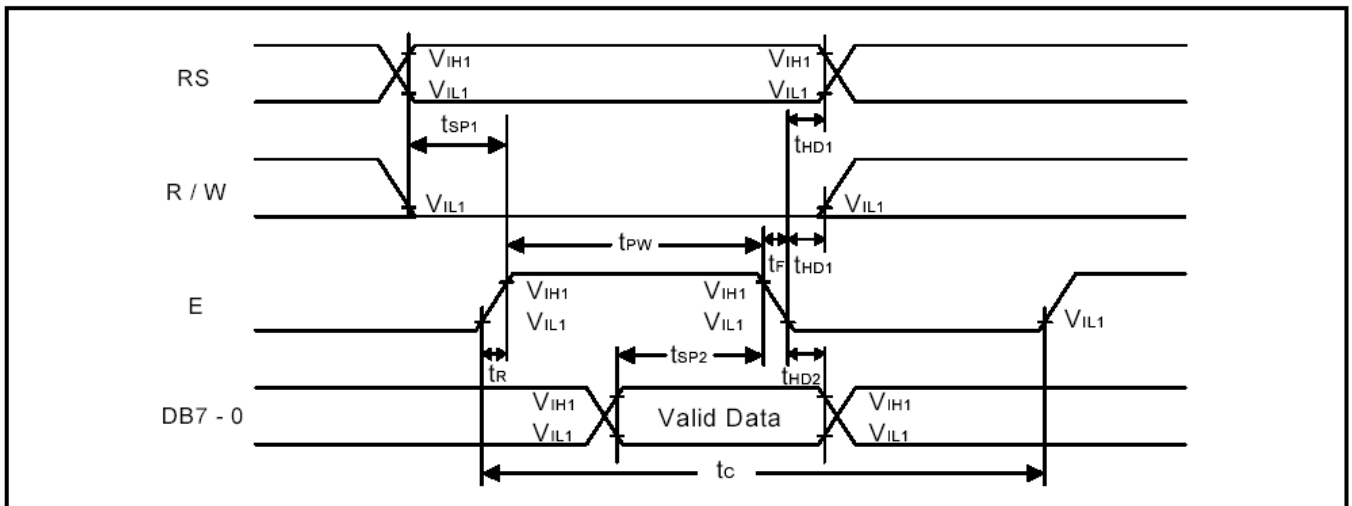
20x2, 1/16 DUTY CYCLE

	1	2		20	DISPLAY POSITION
line 1	00	01	13	DD RAM ADDRESS
line 2	40	41	53	

WRITE MODE

Characteristics	Symbol	Limit			Unit	Test Condition
		Min.	Typ.	Max.		
E Cycle Time	t_c	500	-	-	ns	Pin E
E Pulse Width	t_{PW}	230	-	-	ns	Pin E
E Rise/Fall Time	t_r, t_f	-	-	20	ns	Pin E
Address Setup Time	t_{SP1}	40	-	-	ns	Pins: RS, R/W, E
Address Hold Time	t_{HD1}	10	-	-	ns	Pins: RS, R/W, E
Data Setup Time	t_{SP2}	80	-	-	ns	Pins: DB0 - DB7
Data Hold Time	t_{HD2}	10	-	-	ns	Pins: DB0 - DB7

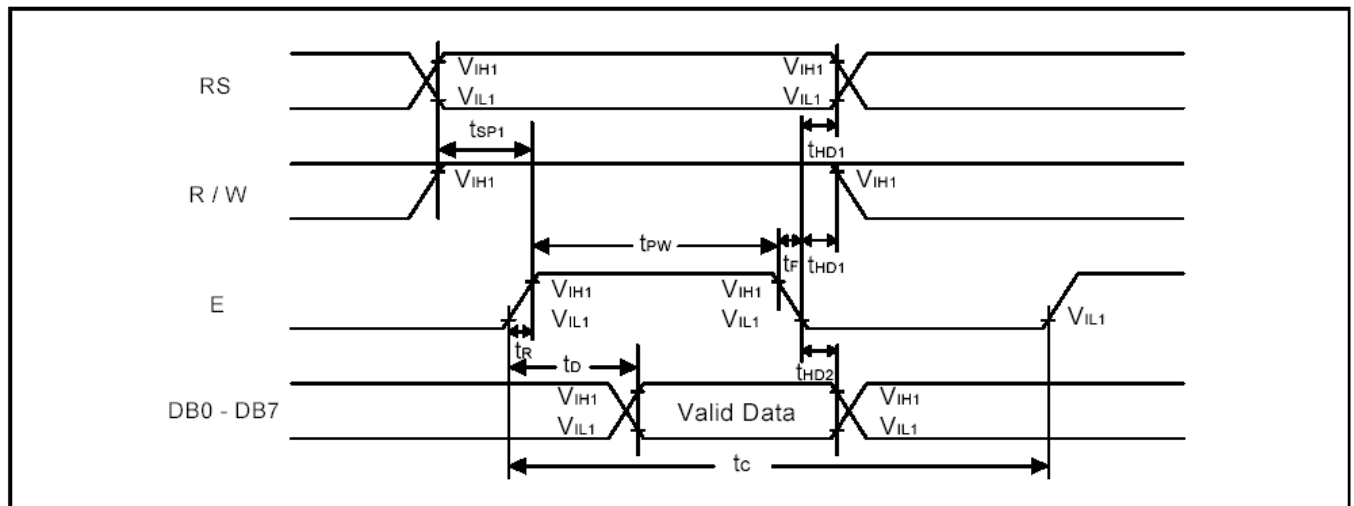
WRITE MODE TIMING DIAGRAM



READ MODE

Characteristics	Symbol	Limit			Unit	Test Condition
		Min.	Typ.	Max.		
E Cycle Time	t_c	500	-	-	ns	Pin E
E Pulse Width	t_w	230	-	-	ns	Pin E
E Rise/Fall Time	t_r, t_f	-	-	20	ns	Pin E
Address Setup Time	t_{SP1}	40	-	-	ns	Pins: RS, R/W, E
Address Hold Time	t_{HD1}	10	-	-	ns	Pins: RS, R/W, E
Data Output Delay Time	t_D	-	-	120	ns	Pins: DB0 - DB7
Data hold time	t_{HD2}	5.0	-	-	ns	Pin DB0 - DB7

READ MODE TIMING DIAGRAM



RELIABILITY OF LCD MODULE

ITEM	TEST CONDITION FOR NORMAL TEMPERATURE	TEST CONDITION FOR WIDE TEMPERATURE	TIME
High temperature operating	50°C	70°C	240 hours
Low temperature operating	0°C	-20°C	240 hours
High temperature storage	60°C	80°C	240 hours
Low temperature storage	-10°C	-30°C	240 hours
Temperature-humidity storage	40°C 90% R.H.	60°C 90% R.H.	96 hours
Temperature cycling	-10°C to 60°C 30 Min Dwell	-30°C to 80°C 30 Min Dwell	5 cycle
Vibration Test at LCM Level	Freq 10-55 Hz Sweep rate: 10-55-10 at 1 min Sweep mode Linear Displacement: 2 mm p-p 1 Hour each for X, Y, Z	Freq 10-55 Hz Sweep rate: 10-55-10 at 1 min Sweep mode Linear Displacement: 2 mm p-p 1 Hour each for X, Y, Z	—

QUALITY STANDARD OF LCD MODULE

1.0	Sampling Method Sampling Plan : MIL STD 105 E Class of AQL : Level II/Single Sampling Critical : 0.25% Major 0.65% Minor 1.5%		
2.0	Defect Group	Failure Category	Failure Reasons
	Critical Defect 0.25%(AQL)	Malfunction	Open Short Burnt or dead component Missing part/improper part P.C.B. Broken
	Major Defect 0.65%(AQL)	Poor Insulation	Potential short High current Component damage or scratched or Lying too close improper coating
		Poor Conduction	Damage joint Wrong polarity Wrong spec. part Uneven/intermittent contact Loose part Copper peeling Rust or corrosion or dirt's
	Minor Defect 1.5%(AQL)	Cosmetic Defect	Minor scratch Flux residue Thin solder Poor plating Poor marking Crack solder Poor bending Poor packing Wrong size

HANDLING PRECAUTIONS

(1) CAUTION OF LCD HANDLING & CLEANING

The polarizing plate on the surface of the panel is made from organic substances. Be very careful for chemicals not to touch the plate or it leads the polarizing plate to deteriorate.

If the use of a chemical is unavoidable, wipe the panel lightly with soft materials, such as gauze and absorbent cotton, soaked in a solvent.

*Usable solvent: Alcohol (ethanol, IPA and the like)

*Appropriate solvent: Ketones, ethyl alcohol

Avoid wiping with a dry cloth, since it could damage the surface of the polarizing plate and others.

(2) CAUTION AGAINST STATIC CHARGE

The LCD modules use CMOS LSI drivers, so customers are recommended that any unused input terminal would be connected to V_{DD} or V_{SS} , do not input any signals before power is turned on, and ground your body, work/assembly areas, assembly equipment to protect against static electricity.

(3) PACKAGING

Avoid intense shock and falls from a height and do not operate or store them exposed to direct sunshine or high temperature/humidity for long periods.

(4) CAUTION FOR OPERATION

The viewing angle can be adjusted by varying the LCD driving voltage V_0 .

Driving voltage should be kept within specified range, excess voltage shortens display life.

Response time increases with decrease in temperature.

Display may turn black or dark Blue at temperature above its operational range; this is however not destructive and the display will return to normal once the temperature falls back to range.

Mechanical disturbance during operation (such as pressing on the viewing area) may cause the segments to appear "fractured". They will recover once the display is turned off.

Condensation at terminals will cause malfunction and possible electrochemical reaction. Relative humidity of the environment should therefore be kept below 60%.

(5) SAFETY

Liquid crystal may leak out of a damaged LCD, it is recommended to wash off the liquid crystal by using solvents such as acetone or ethanol and should be burned up later.

If any liquid leaks out of a damaged glass cell comes in contact with your hands, wash it off with soap and water immediately.

WARRANTY

CLOVER will replace or repair any of her LCD module in accordance with her LCD specification for a period of one year from date of shipment. The warranty liability of Clover is limited to repair and/or replacement. Clover will not be responsible for any subsequent or consequential event.

FOR INTERNAL USE ONLY