



CLOVER DISPLAY LTD.

LCD MODULE SPECIFICATION

Model : CV320240A - _ _ - _ _ - _ _ - _ _

Revision	08
Engineering	Hermus Leung
Date	17 January 2005
Our Reference	4935

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1. MODE OF DISPLAY

Display mode	Display condition	Viewing direction
STN : Yellow green	Reflective type	6 O' clock
Grey	Transflective type	12 O' clock
Blue (negative)	Transmissive type	3 O' clock
FSTN positive	Others	9 O' clock
FSTN negative		

2. LCD MODULE NUMBER NOTATION:

<u>CV320240A</u> -	<u>MY</u> -	<u>S</u> <u>F</u> -	<u>N</u> <u>6</u> -	<u>T</u>	* (1)---Model number of standard LCD Modules			
					* (2)---Backlight type			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	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)
								* (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)

3. GENERAL DESCRIPTION

Display mode	:	320 x 240 Dots, Graphic COB LCD module
Interface	:	4-bit parallel
Driving method	:	1/240 duty,1/15 bias
Driver IC	:	SUNPLUS SPLC086A or equivalent For the detailed information, please refer to the IC specifications.

4. MECHANICAL DIMENSIONS

Item	Dimension		Unit	Item	Dimension		Unit
Outline Dimension	161.0(L)x112.0(W)x (H1/H2)		mm	Dot Pitch	0.36(L)x0.36(W)		mm
Outline Dimension (With CCFL Backlight)	169.5(L)x113.0(W)x (H1/H2)		mm	Dot Size	0.33(L)x0.33(W)		mm
Viewing Area	122.0(L)x92.0(W)		mm	-	-		-
No Backlight (N)	H1	5.0	mm	Side Backlight (L)	H1	-	mm
	H2(MAX)	10.0	mm		H2(MAX)	-	mm
CCFL Backlight (C)	H1	7.9	mm	Array Backlight (M)	H1	-	mm
	H2(MAX)	13.0	mm		H2(MAX)	-	mm

5. CONNECTOR PIN ASSIGNMENT

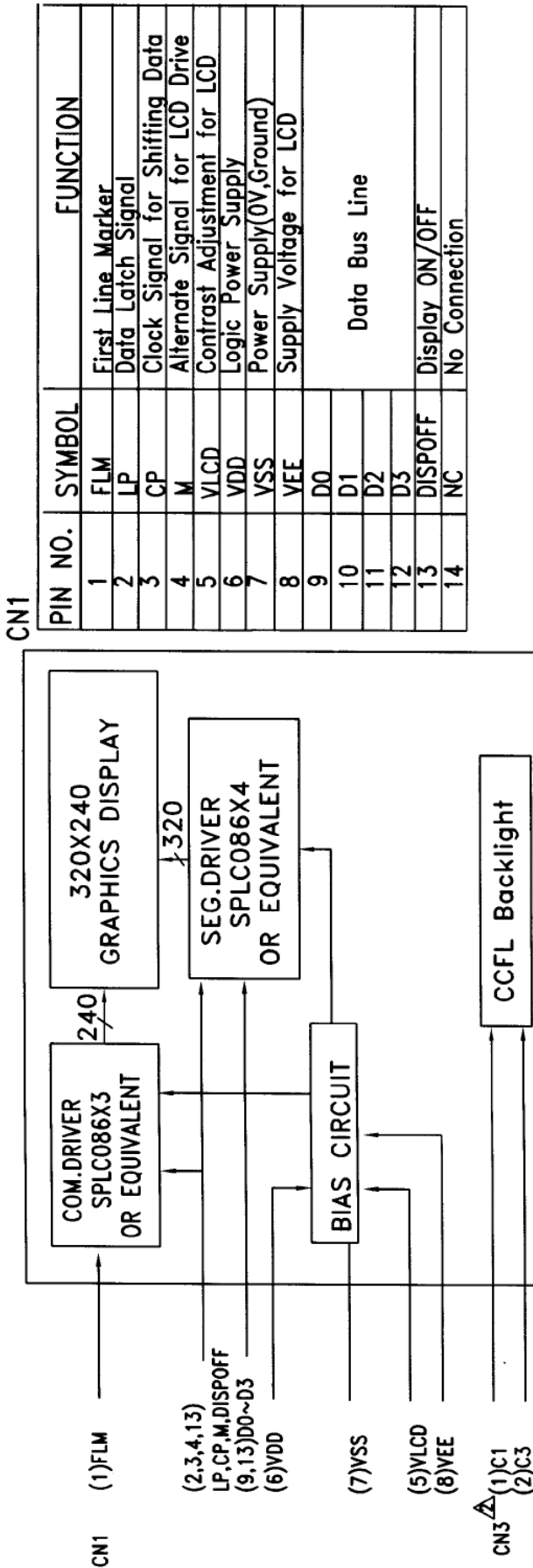
Pin No.	Symbol	Function	Pin No.	Symbol	Function
1	FLM	First line marker	8	VEE	Supply Voltage for LCD
2	LP	Data Latch Signal	9	D0	Data Bus Line
3	CP	Clock Signal for Shifting Data	10	D1	
4	M	Alternate Signal for LCD Drive	11	D2	
5	VLCD	Contrast Adjustment for LCD	12	D3	
6	VDD	Logic power supply	13	DISPOFF	Display On/Off
7	VSS	Power supply (0V,Ground)	14	NC	No Connection

5.1 CONNECTOR PIN ASSIGNMENT FOR CCFL BACKLIGHT (CN3)

Pin No.	Symbol	Function
1	C1	Power Supply for CCFL (HOT)
2	-	No Connection
3	C3	Power Supply for CCFL (GND)

6.1 COUNTER DRAWING OF PIN OUT & BLOCK DIAGRAM

BLOCK DIAGRAM



Note: *CN3 is used for CCFL backlight version only

CN1

PIN NO.	SYMBOL	FUNCTION
1	FLM	First Line Marker
2	LP	Data Latch Signal
3	CP	Clock Signal for Shifting Data
4	M	Alternate Signal for LCD Drive
5	VLCD	Contrast Adjustment for LCD
6	VDD	Logic Power Supply
7	VSS	Power Supply(0V,Ground)
8	VEE	Supply Voltage for LCD
9	D0	Data Bus Line
10	D1	
11	D2	
12	D3	
13	DISPOFF	Display ON/OFF
14	NC	No Connection

*CN3 A

PIN NO.	SYMBOL	FUNCTION
1	C1	Power Supply for CCFL(HOT)
2	NC	No Connection
3	C3	Power Supply for CCFL(GND)

TOLERANCE IF NOT SPECIFY ±0.5mm		SCALE	N.T.S.	UNIT IN mm	SHEET
REV.	REVISION RECORD	DATE	DATE	5 NOV 04	2 OF 3
00	1st ISSUE	8 Dec 04	5 Jan 05		
01	Re-dimension CN1 & revise VEE range	8 Dec 04			
02	Revise Dimension & Connector Annotation	5 Jan 05			
CUSTOMER STANDARD				APPROVED	MODEL NO. CV320240A
AGENT				APPROVED	TITLE: PIN OUT & BLOCK DIAGRAM
CUSTOMER REF.				OUR REF. 4935	DRAWN BY: Hermus DATE: 5 Jan 05
					CHECKED BY: <i>[Signature]</i> DATE: <i>[Signature]</i>
					APPROVED BY: <i>[Signature]</i> DATE: 11 Jan 05

CLOVER DISPLAY LTD. (HK)

MODEL NO. CV320240A

TITLE: PIN OUT & BLOCK DIAGRAM

DRAWN BY: Hermus DATE: 5 Jan 05

CHECKED BY: *[Signature]* DATE: *[Signature]*

APPROVED BY: *[Signature]* DATE: 11 Jan 05

7. ELECTRICAL CHARACTERISTICS

Conditions: VSS=0V, Ta=25

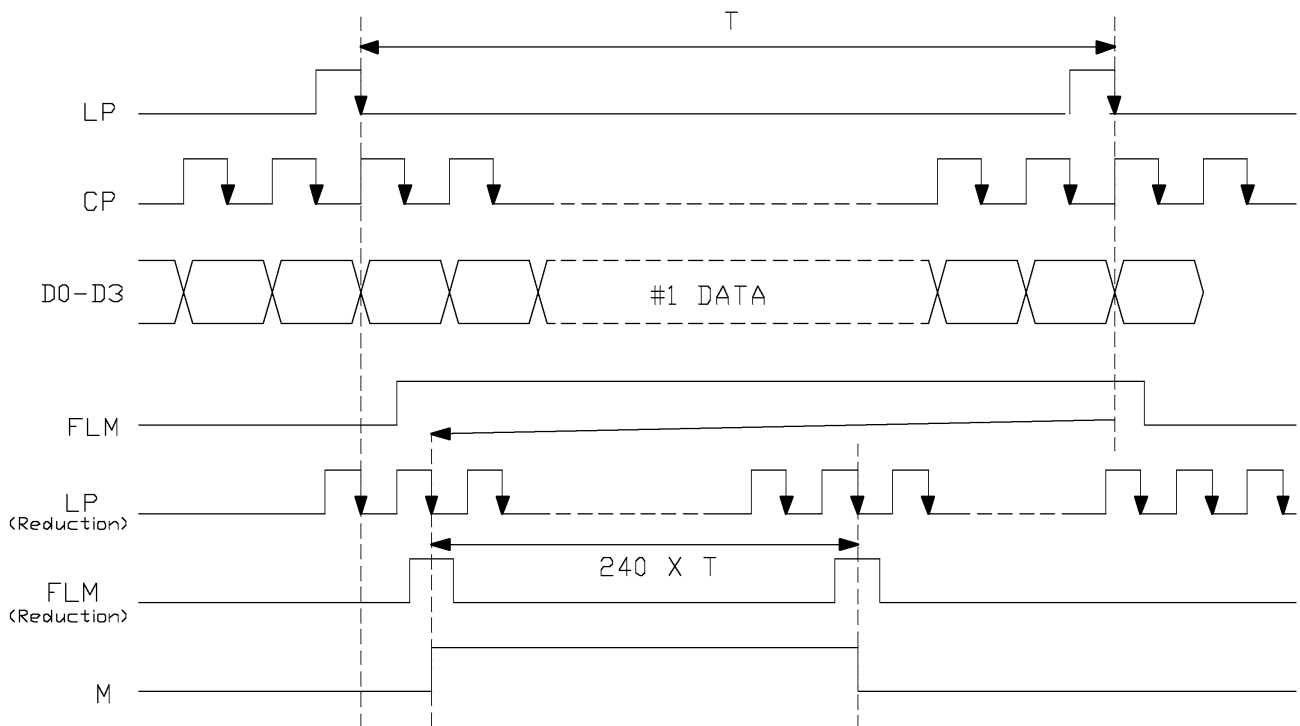
Item	Symbol	MIN.	TYP.	MAX.	Unit	Item	Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage	VDD	2.7	5.0	5.5	V	"H"Level Input Voltage	VIH	0.7VDD	-	VDD	V
Supply Current	IDD	-	6.0	-	mA	"L"Level Input Voltage	VIL	0	-	0.3VDD	V
Supply Voltage for LCD	VEE	-23.0	-	-20.0	V	Contrast Adjustment for LCD	VLCD	-19.2	-19.0	-18.8	V
Backlight Voltage						Backlight Current					
EL (@ Frequency 400Hz)	VEL	-	-	-	V _{rms}	-	-	-	-	-	-
Side-lited LED						Side-lited LED					
White	VBL	-	-	-	V	White	IBL	-	-	-	mA
Blue	VBL	-	-	-	V	Blue	IBL	-	-	-	mA
Yellow Green	VBL	-	-	-	V	Yellow Green	IBL	-	-	-	mA
Array LED						Array LED					
Yellow Green	VBL	-	-	-	V	Yellow Green	IBL	-	-	-	mA
Amber	VBL	-	-	-	V	Amber	IBL	-	-	-	mA
Orange	VBL	-	-	-	V	Orange	IBL	-	-	-	mA
Soft Orange	VBL	-	-	-	V	Soft Orange	IBL	-	-	-	mA
CCFL						CCFL					
White	VBL	-	300	400	V	White	IBL	-	5.0	6.0	mA

7.1. ABSOLUTE MAXIMUM RATINGS

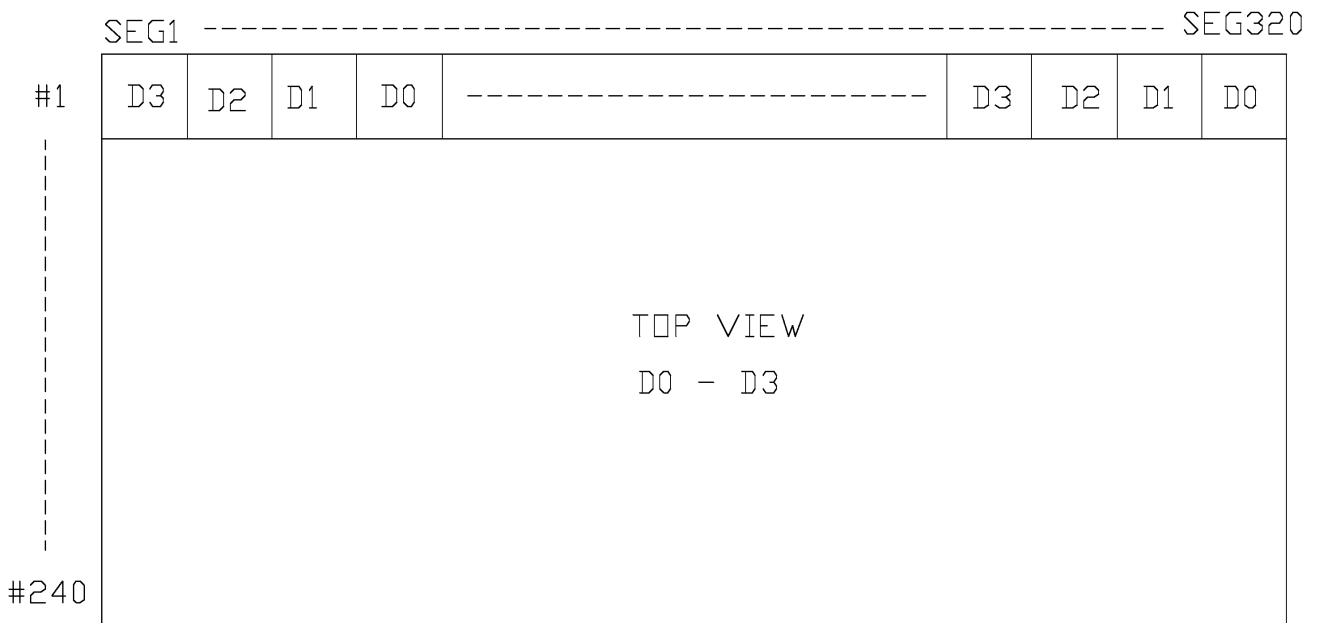
Please make sure not to exceed the following maximum rating values under the worst application conditions

Item	Symbol	Rating (for normal temperature)	Rating (for wide temperature)	Unit
Supply Voltage	VDD	7	7	V
Input Voltage	VT	-0.3 to Vdd+0.3	-0.3 to Vdd+0.3	V
Operating Temperature	Topr	0 to 50	-20 to 70	
Storage Temperature	Tstg	-10 to 60	-30 to 80	

8. TIMING CHART



9. DISPLAY AND DATA



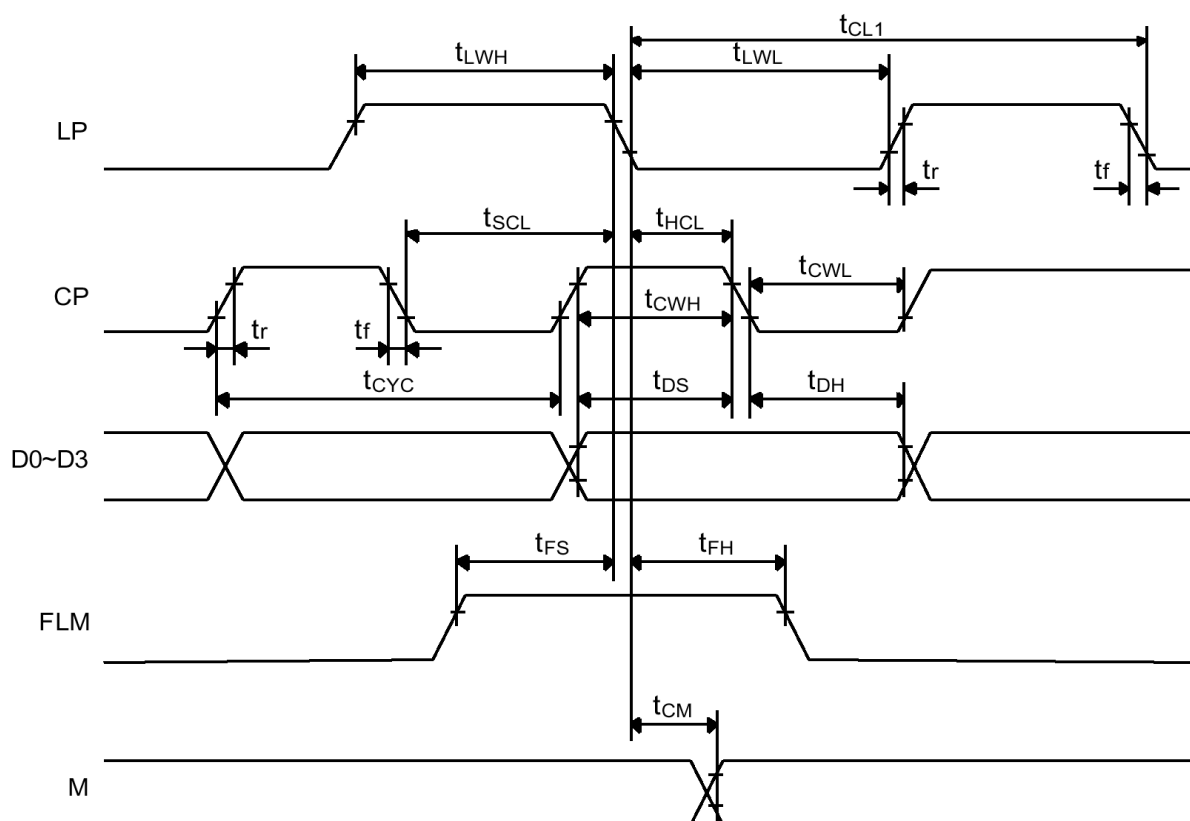
10. AC CHARACTERISTICS

Parameter	Symbol	Min.	Max.	Units
Clock Pulse Cycle Time	t_{CYC}	167	-	ns
Clock Pulse High Level Width	t_{CWH}	50	-	ns
Clock Pulse Low Level Width	t_{CWL}	50	-	ns
Clock Pulse Setup Time	T_{SCL}	80	-	ns
Clock Pulse Hold Time	t_{HCL}	80	-	ns
Clock Pulse Rise/Fall Time	t_r, t_f	-	50	ns
LP High Level Width	t_{LWH}	50	-	ns
LP Low Level Width	t_{LWL}	50	-	ns
LP Cycle Time	t_{CL1}	250	-	ns
Data Setup Time	t_{DS}	30	-	ns
Data Hold Time	t_{DH}	30	-	ns
FLM Data Setup Time	t_{FS}	100	-	ns
FLM Data Hold Time	t_{FH}	100	-	ns
M Phase Difference	t_{CM}	-	250	μs

Note : Please satisfy the following conditions (1), (2) in the same time.

(1) $t_r, t_f < (t_{CYC} - t_{CWH} - t_{CWL}) / 2$

(2) $t_r, t_f \leq 50$



11. ELECTRO-OPTICAL CHARACTERISTICS

MEASURING CONDITION: POWER SUPPLY = $V_{OP} / 64 \text{ Hz}$
 TEMPERATURE = $22 \pm 5 \text{ }^\circ\text{C}$
 RELATIVE HUMIDITY = $60 \pm 15 \%$

ITEM	SYMBOL	UNIT	TYP.
RESPONSE TIME	T _{on}	ms	370
	T _{off}	ms	370
CONTRAST RATIO	Cr	-	7
VIEWING ANGLE (6 O'clock) (Cr ≥ 2)	V _{3:00}	°	40
	V _{6:00}	°	50
	V _{9:00}	°	40
	V _{12:00}	°	30

THE ELECTRO-OPTICAL CHARACTERISTICS ARE MEASURED VALUE BUT NOT GUARANTEED ONES.

12. 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 cycles
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	—

13. 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

14. 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_O .

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.