



CLOVER DISPLAY LTD.

LCD MODULE SPECIFICATION

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

Revision	10
Engineering	Allen Ng
Date	27 June 2013
Our Reference	4935

ADDRESS : 1st FLOOR, EFFICIENCY HOUSE, 35 TAI YAU STREET, SAN PO KONG,
KOWLOON, HONG KONG.

TEL : (852) 2341 3238 (SALES OFFICE) (852) 2342 8228 (GENERAL OFFICE)

FAX : (852) 2357 4237 (SALES OFFICE)

E-MAIL : cdl@cloverdisplay.com

URL : <http://www.cloverdisplay.com>

1. MODE OF DISPLAY**Display mode**

- 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

2. LCD MODULE NUMBER NOTATION:CV320240A- MY - 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)

*(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)x10.0MAX(H1)	mm	Dot Pitch	0.36(L)x0.36(W)	mm
Outline Dimension (side-lited Backlight)	161.0(L)x112.0(W)x13.0MAX(H2)	mm	Dot Size	0.33(L)x0.33(W)	mm
Viewing Area	122.0(L)x92.0(W)	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

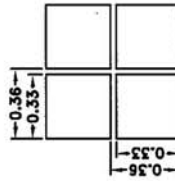
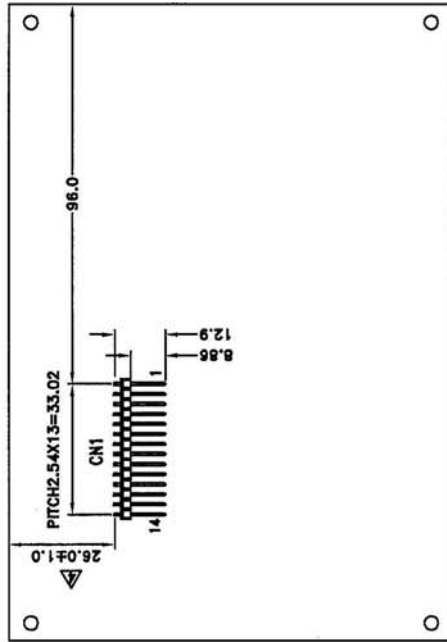
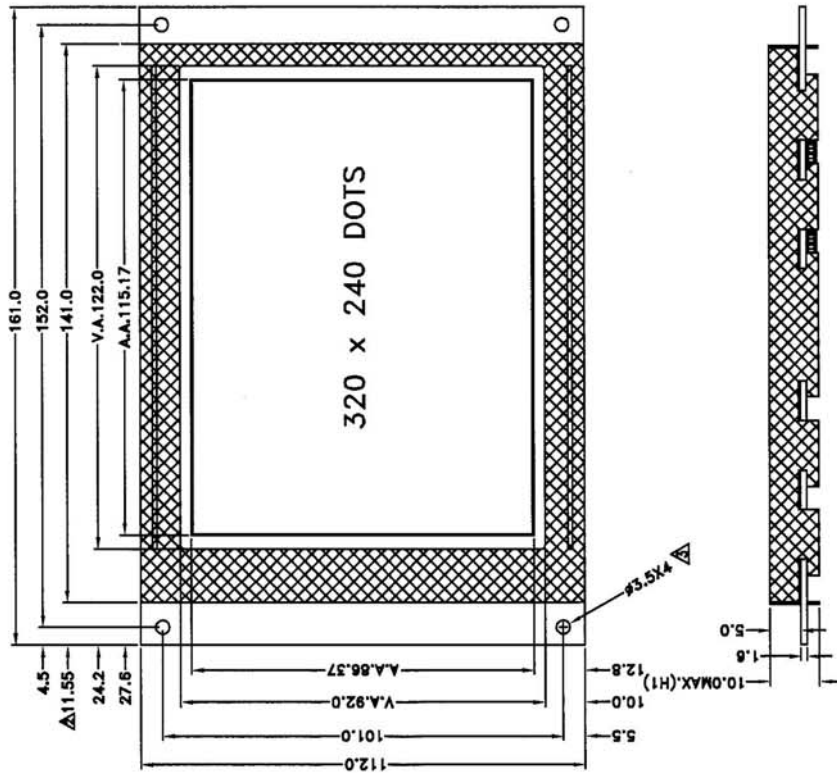
5.1 CONNECTOR PIN ASSIGNMENT FOR SIDE-LITED BACKLIGHT (CN2)

Pin No.	Symbol	Function
1	A	Power supply for backlight (+)
2	K	Power supply for backlight (-)

6. COUNTER DRAWING OF MODULE DIMENSION

MARK	REASON	PREPARED	DATE
⚠	Re-dimension CN1 & revise VEE range	Hermus	8 DEC 04
⚠	Revise dimension & connector annotation	Hermus	5 JAN 05
⚠	Change BL type to side-lifted LED	HCC	04 FEB 13
⚠	Change the dimension tolerance and VLCD	HCC	27 JUN 13

⚠ No backlight version

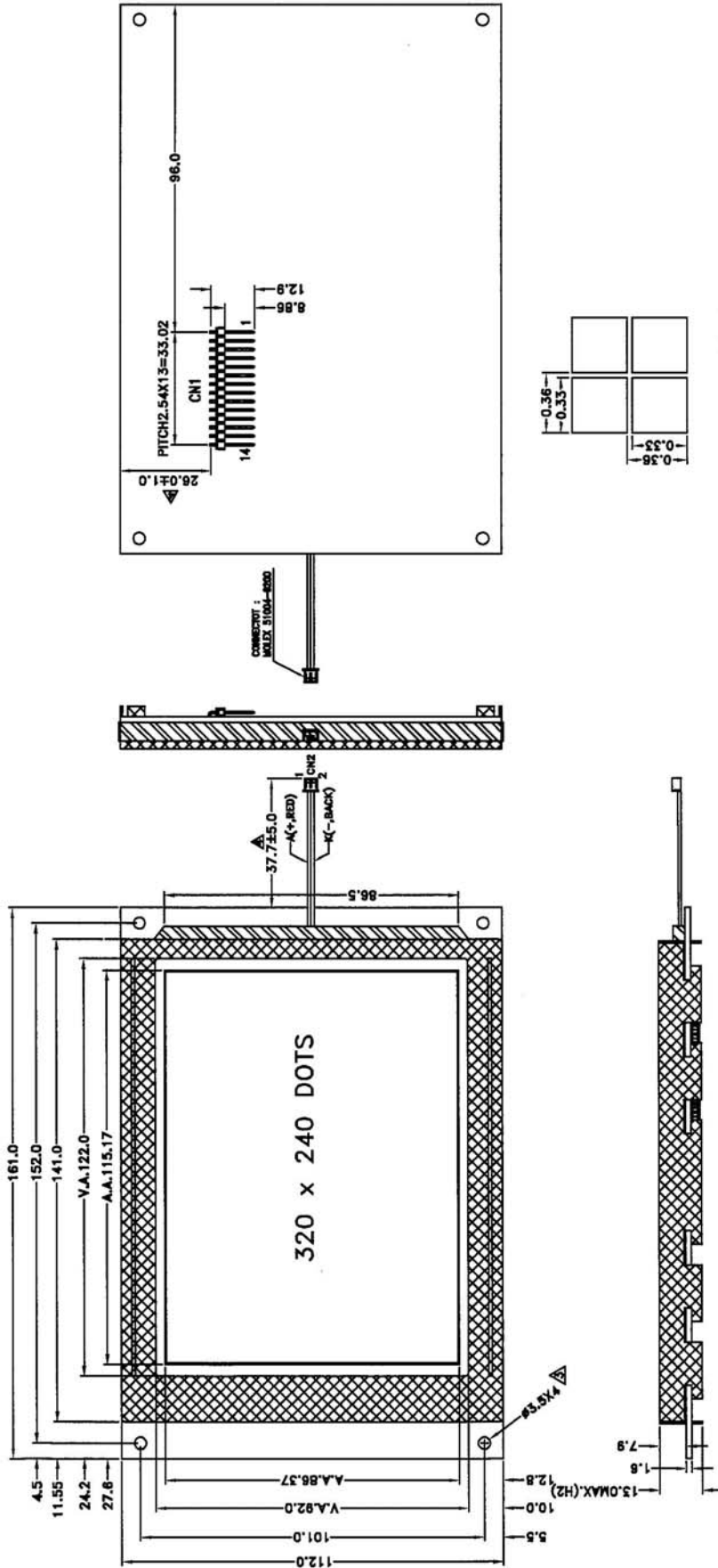


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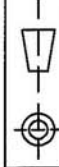


TOLERANCE IF NOT SPECIFY ±0.5mm		SCALE N.T.S.	UNIT IN mm	CLOVER DISPLAY LTD. (HK)	
REV.	REVISION RECORD	CUSTOMER	DATE	APPROVED	SHEET 1 OF 4
00	1st ISSUE	STANDARD	5 NOV 04	MODEL NO. CV320240A	
01	Re-dimension CN1 & revise VEE range	AGENT	8 DEC 04	TITLE: MODULE DIMENSION 1	
02	Revise dimension & connector annotation		5 JAN 05	DRAWN BY: HCC	DATE: 27 JUN 13
03	Change BL type to side-lifted LED		04 FEB 13	CHECKED BY: Allen	DATE: 2013.08.27 16:01:26
04	Change the dimension tolerance and VLCD	CUSTOMER REF.	27 JUN 13	APPROVED BY: <i>Allen</i>	DATE: 2013.08.27 16:01:26

3 side-lit backlight version



SCALE 49:1



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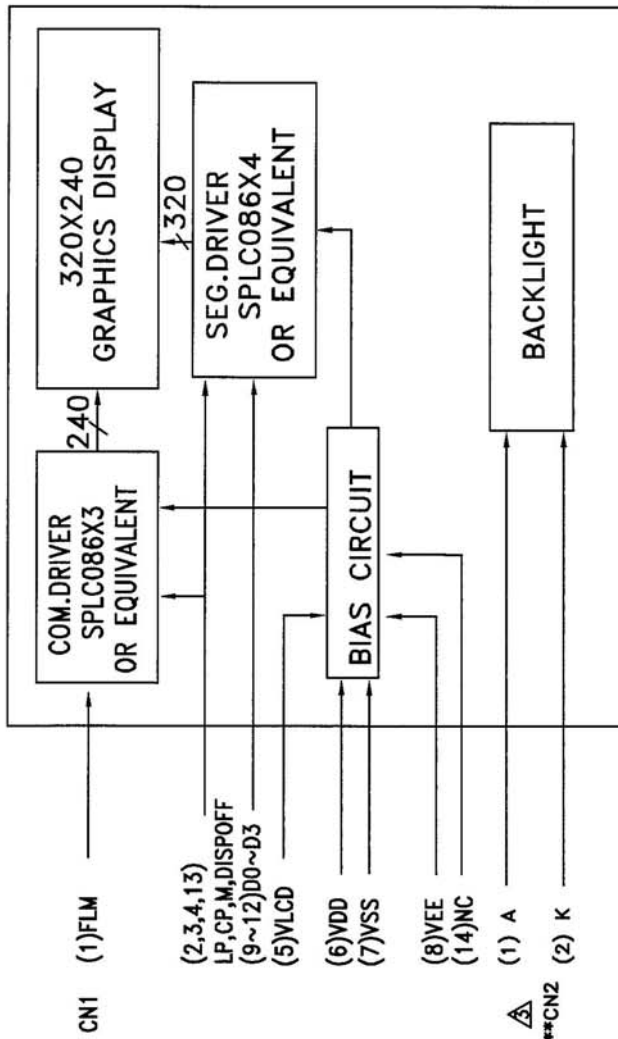
TOLERANCE IF NOT SPECIFY ±0.5mm

REV.	REVISION RECORD	SCALE	UNIT IN mm	DATE
00	1st ISSUE	N.T.S.		5 NOV 04
01	Re-dimension CN1 & revise VEE range			8 DEC 04
02	Revise dimension & connector annotation			5 JAN 05
03	Change BL type to side-lit LED			04 FEB 13
04	Change the dimension tolerance and VLCD			27 JUN 13

CUSTOMER	APPROVED	MODEL NO.	SHEET
STANDARD		CV320240A	2 OF 4
AGENT	APPROVED	TITLE: MODULE DIMENSION 2	
CUSTOMER REF.	OUR REF. X4947	DRAWN BY: HCC	DATE: 27 JUN 13
		CHECKED BY: Allen	DATE: 2013.06.27 16:01:40
		APPROVED BY: <i>[Signature]</i>	DATE: 27/6/13

6.1 COUNTER DRAWING OF PIN OUT & BLOCK DIAGRAM

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	Ground
8	VEE	Supply voltage for LCD
9	D0	Data bus
10	D1	
11	D2	
12	D3	
13	DISPOFF	Display ON/OFF
14	NC	No connection

**CN2 Δ

PIN NO.	SYMBOL	FUNCTION
1	A	Power supply for backlight(+)
2	K	Power supply for backlight(-)

Δ REMARK: **CN2 is used for side-lit LED backlight version only

TOLERANCE IF NOT SPECIFY $\pm 0.5mm$		SCALE N.T.S.	UNIT IN mm	CLOVER DISPLAY LTD. (HK)		SHEET 3 OF 4	
REV.	REVISION RECORD	DATE	CUSTOMER	APPROVED	MODEL NO.	CV320240A	
00	1st ISSUE	5 NOV 04	STANDARD	APPROVED	TITLE:	PIN OUT & BLOCK DIAGRAM	
01	Re-dimension CN1 & revise VEE range	8 DEC 04		DRAWN BY:	HCC	DATE:	27 JUN 13
02	Revise dimension & connector annotation	5 JAN 05		CHECKED BY:	Allen	DATE:	2013.06.27 16:01:52
03	Change BL type to side-lit LED	04 FEB 13		OUR REF.	X4947	APPROVED BY:	<i>[Signature]</i> DATE: 27/6/13
04	Change the dimension tolerance and VLCD	27 JUN 13	CUSTOMER REF.				

7. ELECTRICAL CHARACTERISTICS

Conditions: VSS=0V, Ta=25°C

Item	Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage	VDD	2.7	5.0	5.5	V
Supply Current	IDD	—	6.0	—	mA
Supply Voltage for LCD	VEE	-23.0	—	-20.0	V
Contrast Adjustment for LCD (*)	VLCD	-21.8	-20.5	-19.2	V
“H”Level Input Voltage	VIH	0.8VDD	—	VDD	V
“L”Level Input Voltage	VIL	0	—	0.3VDD	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:

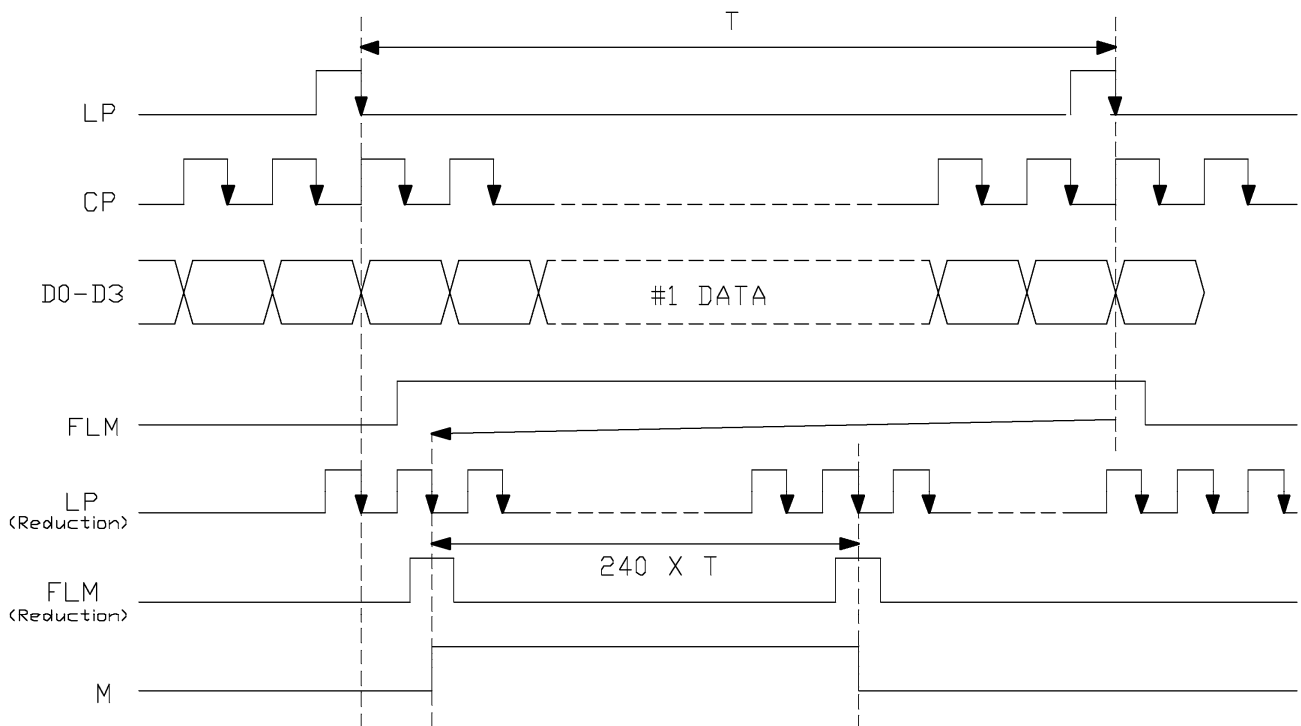
Item	Symbol	MIN.	TYP.	MAX.	Unit	Condition
White Backlight voltage	V _{BL}	—	3.5	3.8	V	I _{BL} = 120mA

7.1. ABSOLUTE MAXIMUM RATINGS

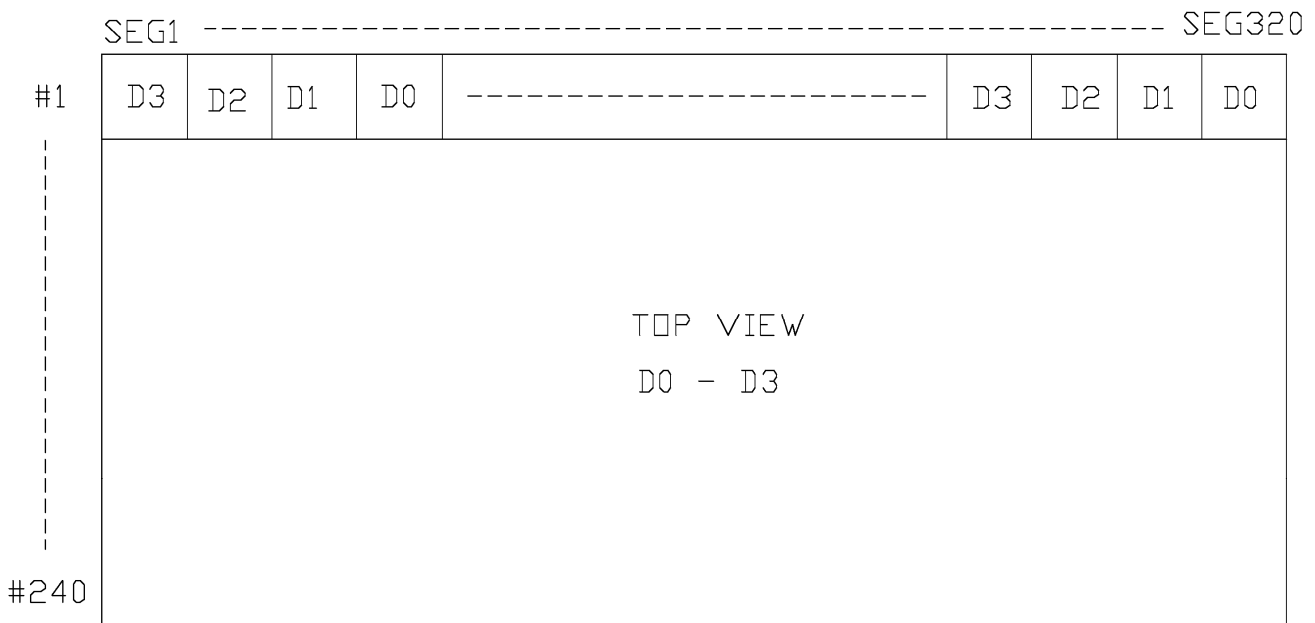
Please make sure not to exceed the following maximum rating values under the worst application conditions

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	°C
Storage Temperature	Tstg	-10 to 60	-30 to 80	°C

8. TIMING CHART



9. DISPLAY AND DATA

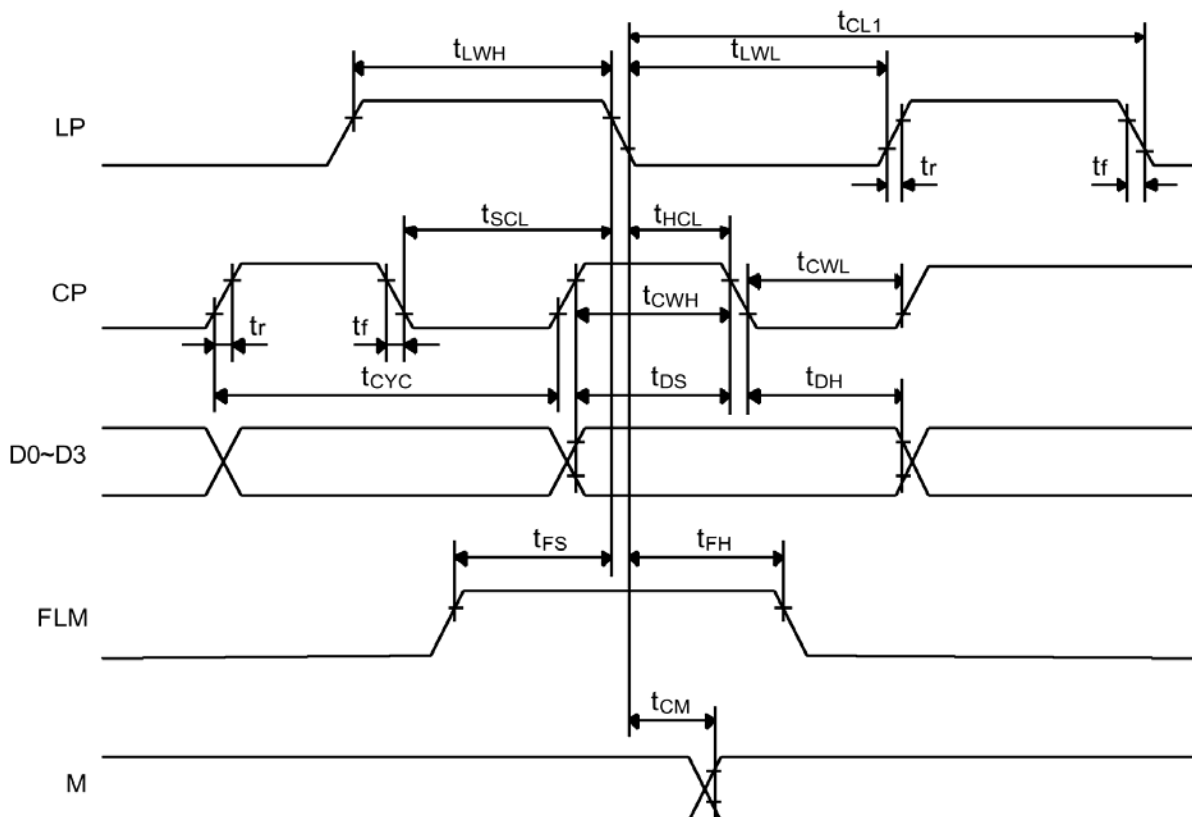


10. AC CHARACTERISTICS

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	Ton	ms	370
	Toff	ms	370
CONTRAST RATIO	Cr	-	7
VIEWING ANGLE (6 O'clock) (Cr \geq 2)	V3:00	$^\circ$	40
	V6:00	$^\circ$	50
	V9:00	$^\circ$	40
	V12:00	$^\circ$	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 $^\circ\text{C}$	70 $^\circ\text{C}$	240 hours
Low temperature operating	0 $^\circ\text{C}$	-20 $^\circ\text{C}$	240 hours
High temperature storage	60 $^\circ\text{C}$	80 $^\circ\text{C}$	240 hours
Low temperature storage	-10 $^\circ\text{C}$	-30 $^\circ\text{C}$	240 hours
Temperature-humidity storage	40 $^\circ\text{C}$ 90% R.H.	60 $^\circ\text{C}$ 90% R.H.	96 hours
Temperature cycling	-10 $^\circ\text{C}$ to 60 $^\circ\text{C}$ 30 Min Dwell	-30 $^\circ\text{C}$ to 80 $^\circ\text{C}$ 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_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 come 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.