CLOVER DISPLAY LTD.

LCD MODULE SPECIFICATION

Model : CV160160A - _ _ - _ _ - _ _ - _

Revision	05
Engineering	Timmy Kwan
Date	12 October 2010
Our Reference	4945

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		

LCD MODULE NUMBER NOTATION:

CV160160A- 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)

GENERAL DESCRIPTION

Display mode : 160x160 dots, Graphic COB LCD module,

Interface : 4 bit parallel

Driving method : 1/160 duty, 1/15 bias

Driver IC : Avant SDN8080G or equivalent
For the detailed information, please refer to the IC specifications.
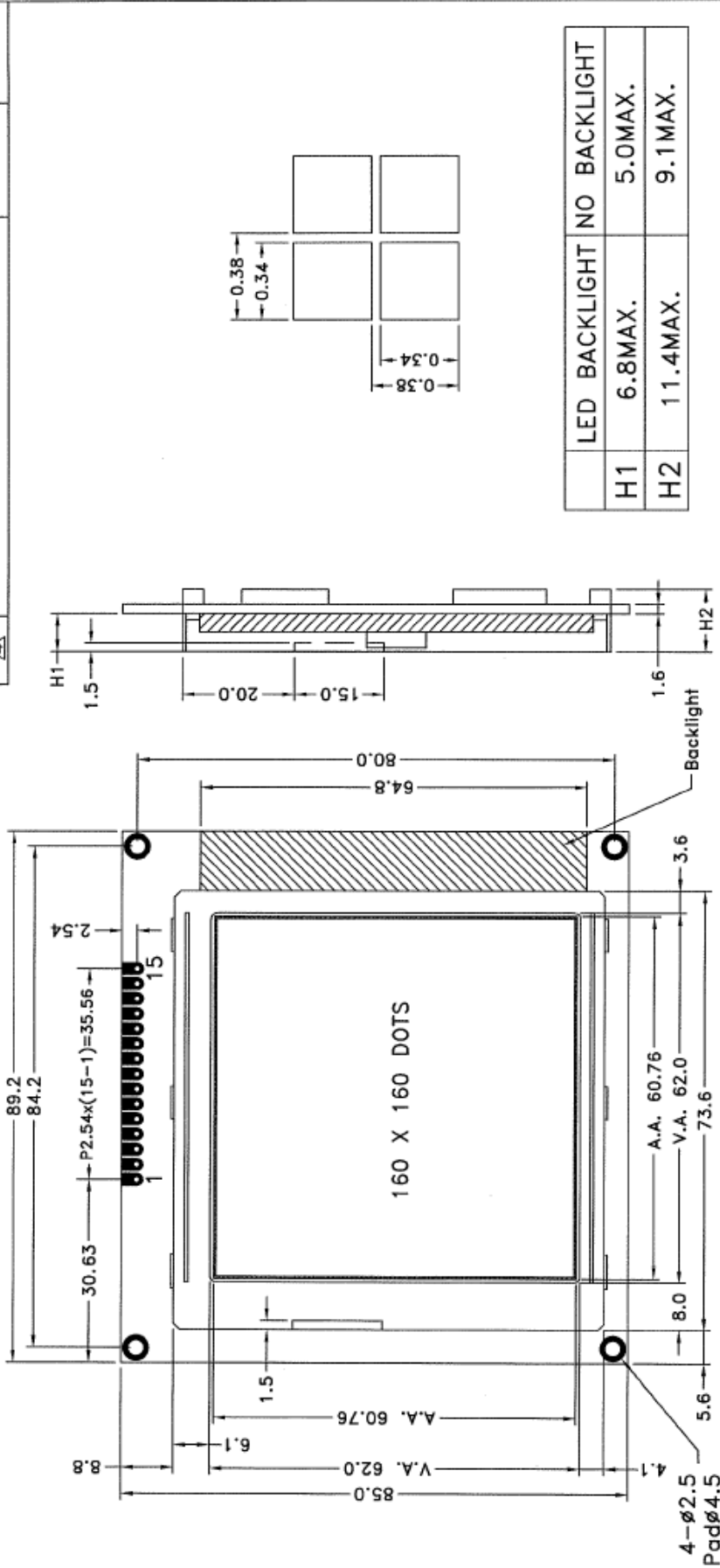
MECHANICAL DIMENSIONS

Item	Dimension		Unit	Item	Dimension		Unit
Outline Dimension	89.2(L)x85.0(W)x(H1/H2)		mm	Dot Pitch	0.38(L)x0.38(W)		mm
Viewing Area	62.0(L)x62.0(W)		mm	Dot Size	0.34(L)x0.34(W)		mm
No Backlight (N)	H1	5.0	mm	Side Backlight (L)	H1	6.8	mm
	H2	9.1	mm		H2	11.4	mm

CONNECTOR PIN ASSIGNMENT

Pin No.	SYMBOL	Function
1	Vss	Ground
2	M	Alternate signal for LCD drive
3	FLM	First Line Marker
4	CL1	Latch Signal
5	CL2	Clock Pulse
6	D3	Data Bus
7	D2	
8	D1	
9	D0	
10	VEE	Power supply for LCD
11	VDD	Supply voltage logic
12	VO	LCD contrast adjustment
13	DISPOFF	Display off control
14	K	Supply voltage for backlight(-VE)
15	A	Supply voltage for backlight(+VE)

COUNTER DRAWIING OF MODULE DIMENSION

	LED BACKLIGHT	NO BACKLIGHT
H1	6.8MAX.	5.0MAX.
H2	11.4MAX.	9.1MAX.

CLOVER DISPLAY LTD. (HK)

MODEL NO.	CV160160A
TITLE:	MODULE DIMENSION

DRAWN BY: Alfred   DATE: 23 FEB 09

CHECKED BY:

APPROVED BY:

OUR REF. X4945

SHEET 1 OF 3

CUSTOMER		APPROVED
	STANDARD	
AGENT		APPROVED
CUSTOMER REF.		

UNIT IN mm

TOLERANCE IF NOT SPECIFY ±0.5mm

SCALE N.T.S.

REV.	REVISION RECORD	DATE
00	1st ISSUE	05 JUN 02
01	Change the IC driver	27 FEB 06
02	Change the IC driver	23 FEB 09

MARK	REASON	PREPARED	DATE
	Change the IC driver	Roger	27 FEB 06
	Change the IC driver	Alfred	23 FEB 09

160 X 160 DOTS

COUNTER DREWING OF PIN OUT & BLOCK DIAGRAM

PIN NO.	SYMBOL	FUNCTION
1	VSS	Ground
2	M	Alternate signal for LCD drive
3	FLM	First line marker
4	CL1	Latch signal
5	CL2	Clock pulse
6	D3	Data bus
7	D2	
8	D1	
9	D0	
10	VEE	Power supply for LCD
11	VDD	Supply voltage for logic
12	VO	LCD contrast adjustment
13	DISPOFF	Display off control
*14	K	Supply voltage for backlight(−VE)
*15	A	Supply voltage for backlight(+VE)
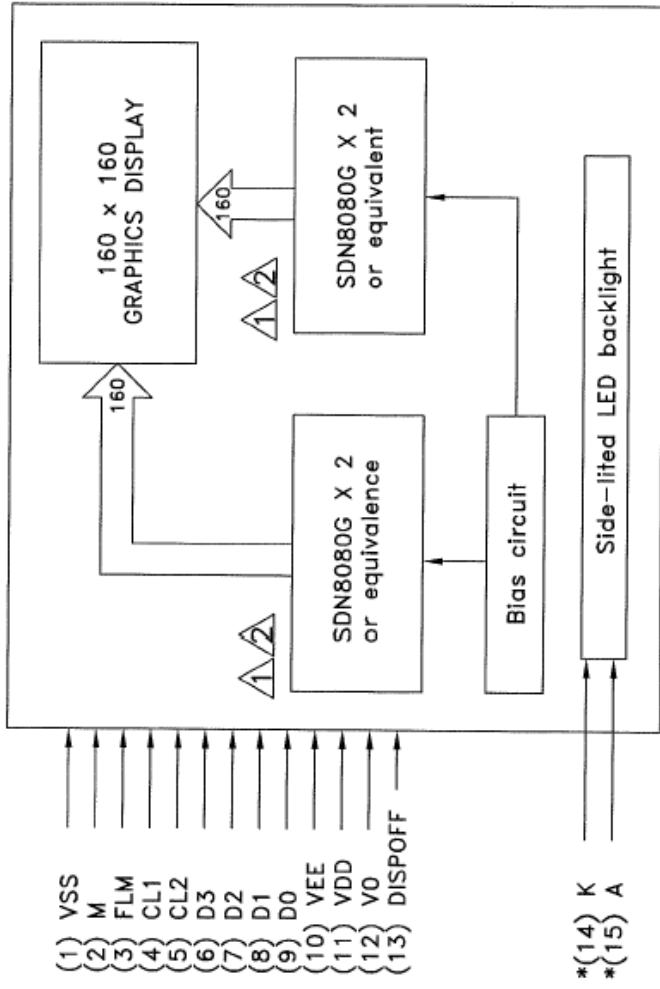
(*)Note: Pin 14, 15 are used for backlight versions only.

160 × 160 GRAPHICS DISPLAY

SDN8080G × 2 or equivalent

SDN8080G × 2 or equivalence

Bias circuit

Side−lited LED backlight

(1) VSS
(2) M
(3) FLM
(4) CL1
(5) CL2
(6) D3
(7) D2
(8) D1
(9) D0
(10) VEE
(11) VDD
(12) VO
(13) DISPOFF
*(14) K
*(15) A

TOLERANCE IF NOT SPECIFY ±0.5mm	SCALE N.T.S.	UNIT IN mm	

REV.	REVISION RECORD	DATE
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CLOVER DISPLAY LTD. (HK)

STANDARD

CUSTOMER	APPROVED
AGENT	APPROVED
CUSTOMER REF.	

MODEL NO. CV160160A

TITLE:PIN OUT & BLOCK DIAGRAM

DRAWN BY:Alfred   DATE: 23 FEB 09

CHECKED BY: DATE:

APPROVED BY: DATE:

OUR REF. X4945

SHEET 2 OF 3

ELECTRICAL CHARACTERISTICS

Conditions: VSS=0V, @Ta=25℃

Item	Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage	V_{DD}	4.75	5.00	5.25	V
Supply Current	I_{DD}	−	2.3	3.45	mA
Supply Voltage for LCD (*)	V_{EE}	-25.0	−	-18.0	V
"H"Level Input Voltage	V_{IH}	0.8 VDD	−	VDD	V
"L"Level Input Voltage	V_{IL}	0	−	0.2 VDD	V
Voltage Adjust for LCD	VO	-18.1	-17.2	-16.3	V

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

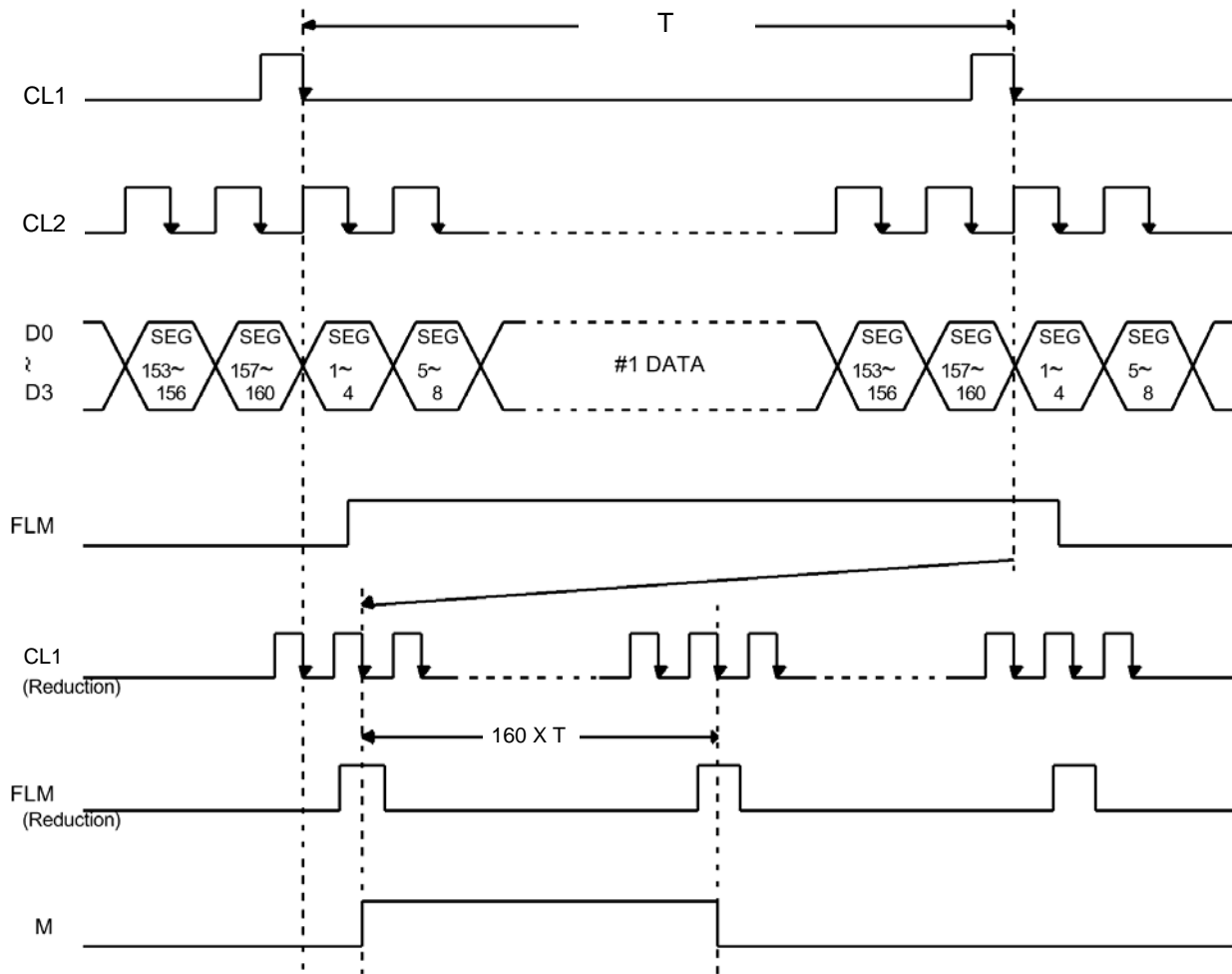**Side Backlight**

Constant voltage driving:

| Item	Symbol	MIN.	TYP.	MAX.	Unit	Condition
White Backlight Voltage	V_{BL}	19.5	20.0	20.5	V	$I_{BL} = 20mA$

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	V_{DD}	-0.3 to +7.0	-0.3 to +7.0	V
Input Voltage	V_T	-0.3 to V_{DD} +0.3	-0.3 to V_{DD} +0.3	V
Operating Temperature	T_{opr}	0 to 50	-20 to 70	℃
Storage Temperature	T_{stg}	-10 to 60	-30 to 80	℃

TIMING CHART

DISPLAY AND DATA

SEG1 - SEG160

| | D3 | D2 | D1 | D0 | - | D1 | D0 |

TOP VIEW
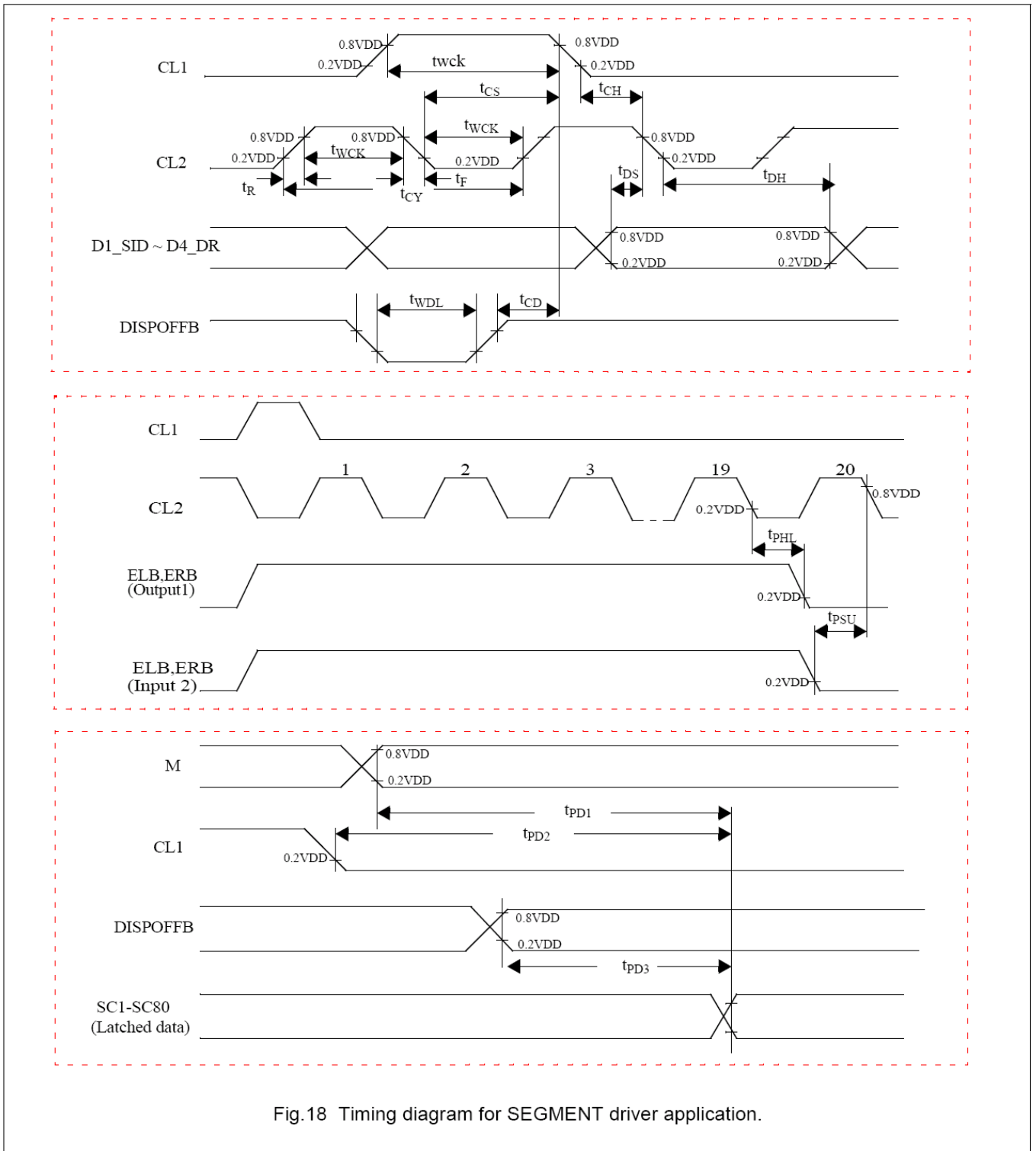
D0~D3
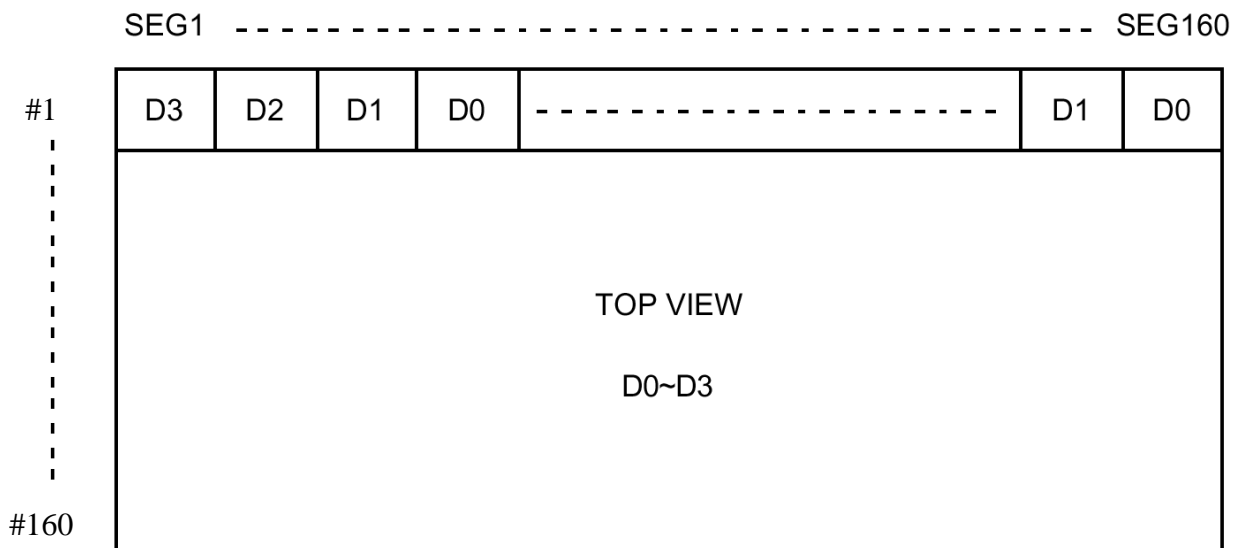
TIMING DIAGRAM FOR SEGMENT DRIVER APPLICATION

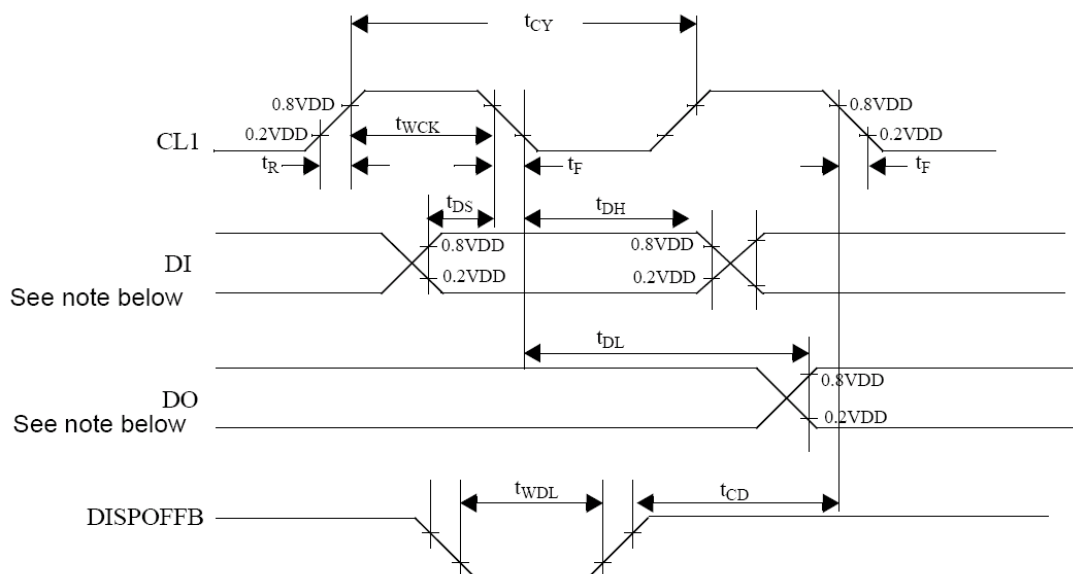Fig.18 Timing diagram for SEGMENT driver application.

AC CHARACTERISTICS FOR SEGMENT DRIVER APPLICATION

V_{DD} = 5 V $\pm$10%; V_{SS} = 0 V; T_{amb} = -30 °C to +85°C.

SYMBOL	PARAMETER	VDD=5V±10%			VDD=3V±10%			Test condition	UNIT
		MIN.	TYP	MAX.	MIN.		MAX.		
t_{CY}	Clock cycle time	125			250			Duty=50%	ns
t_{WCK}	Clock pulse width	45			95				ns
t_R, t_F	Clock rise/fall time			30			30		ns
t_{DS}	Data set-up time	30			65				ns
t_{DH}	Data hold time	30			65				ns
t_{CS}	Clock set-up time	80			120				ns
t_{CH}	Clock hold time	80			120				ns
t_{PHL}	Propagation delay time (ELB output)			60			125		ns
t_{PHL}	Propagation delay time (ERB output)			60			125		ns
t_{PSU}	ELB set-up time	30			65			ELB input	ns
t_{PSU}	ERB set-up time	30			65			ERB input	ns
t_{WDL}	DISPOFFB low pulse width	1200			1200				ns
t_{CD}	DISPOFFB clear time	100			100				ns
t_{PD1}	M - OUT propagation delay time			1000			1200	C_L= 15 pF	ns
t_{PD2}	CL1 - OUT propagation delay time			1000			1200	C_L= 15 pF	ns
t_{PD3}	DISPOFFB - OUT propagation delay time			1000			1200	C_L= 15 pF	ns

TIMING DIAGRAM FOR COMMON DRIVER APPLICATION

Note:

When in single-type interface mode:

(1) DI=> D2_DL (SHL=L), D4_DR (SHL=H).

(2) DO=> D4_DR (SHL=L), D2_DL (SHL=H).

When in dual-type interface mode:

(3) DI=>D2_DL and D3_DM (SHL=L), D4_DR and D3_DM (SHL=H)
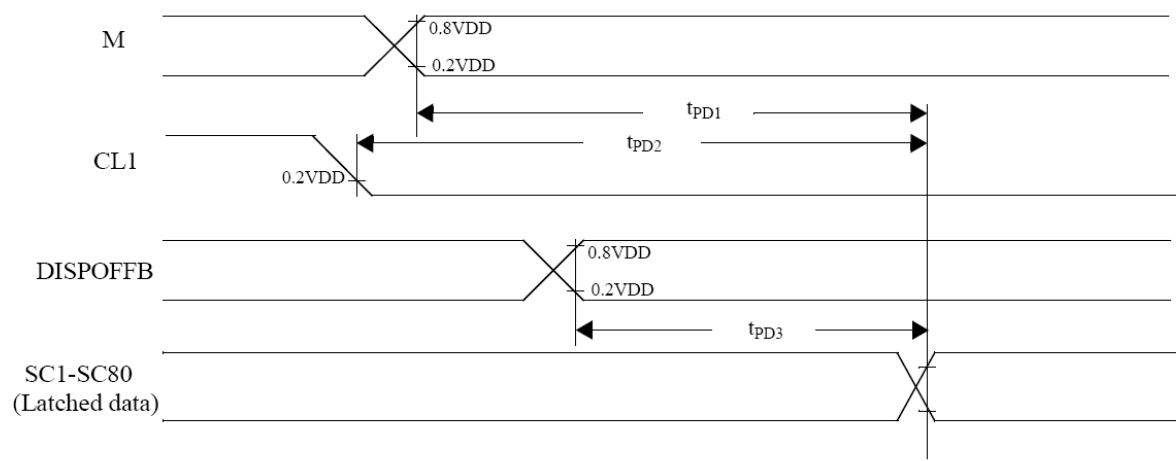
(4) DO=>D4_DR (SHL=L), D2_DL (SHL=H).

Fig.19 Timing diagram for COMMON driver application.

AC CHARACTERISTICS FOR COMMON DRIVER APPLICATION

V_{DD} = 5 V ±10%; V_{SS} = 0 V; T_{amb} = -30 °C to +85°C.

SYMBOL	PARAMETER	VDD=5V±10%			VDD=3V±10%			Test condition	UNIT
		MIN.	TYP	MAX.	MIN.		MAX.		
t_{CY}	Clock cycle time	250			500			Duty=50%	ns
t_{WCK}	Clock pulse width	45			95				ns
t_R, t_F	Clock rise/fall time			50			50		ns
t_{DS}	Data set-up time	30			65				ns
t_{DH}	Data hold time	30			65				ns
t_{WDL}	DISPOFFB low pulse width	1200			1200				ns
t_{CD}	DISPOFFB clear time	100			100				ns
t_{DL}	Output delay time			200			250	C_L= 15 pF	ns
t_{PD1}	M - OUT propagation delay time			1000			1200	C_L= 15 pF	ns
t_{PD2}	CL1 - OUT propagation delay time			1000			1200	C_L= 15 pF	ns
t_{PD3}	DISPOFFB - OUT propagation delay time			1000			1200	C_L= 15 pF	ns

ELECTRO-OPTICAL CHARACTERISTICS

MEASURING CONDITION: POWER SUPPLY = V_{OP} / 64 Hz

TEMPERATURE = 23 ± 5 °C

RELATIVE HUMIDITY = 60 ± 20 %

ITEM	SYMBOL	UNIT	TYP. STN
RESPONSE TIME	Ton	ms	320
	Toff	ms	430
CONTRAST RATIO	Cr	-	8
VIEWING ANGLE (6 O'clock) (Cr ≥ 2)	$V_{3:00}$	°	40
	$V_{6:00}$	°	55
	$V_{9:00}$	°	40
	$V_{12:00}$	°	35

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

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	—

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 VO.

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.
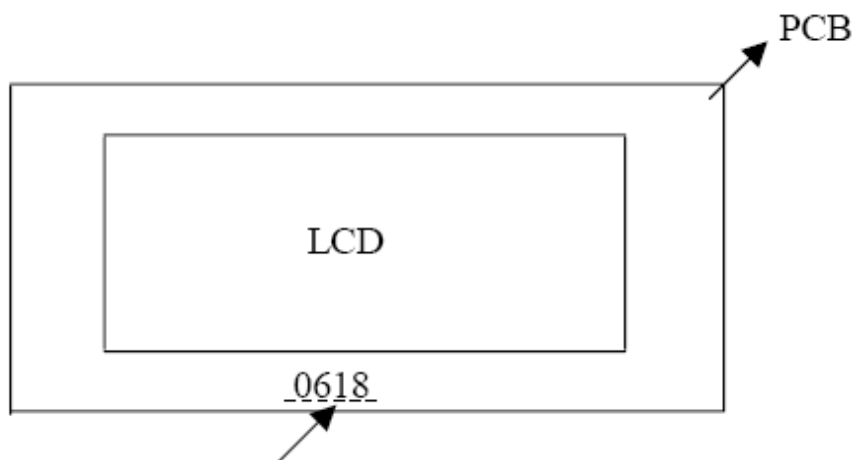
APPENDIX

LOT INDICATION OF LCD MODULE

CODING SYSTEM:

4-DIGIT CODE:

1	2		3	4

YEAR   WEEK NO.
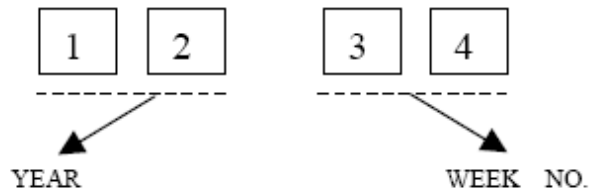
LOCATION AS SHOWN BELOW:

PCB

LCD

0618

e.g. WEEK 18 OF YEAR 2006