CLOVER DISPLAY LTD.

LCD MODULE SPECIFICATION

Model : CV320240E - _ _ - _ _ - _ _ - _

Revision	03
Engineering	ALLEN NG
Date	17 July 2012
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:*

CV320240E- 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 : 8 bit parallel

Driving method : 1/240 duty,1/15 bias

Controller IC : RAIO RA8803 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 (H2)		mm	Dot Pitch	0.36(L) x0.36 (W)		mm
Viewing Area	122.0(L) x92.0 (W)		mm	Dot Size	0.33(L) x0.33 (W)		mm
No Backlight (N)	H1	5.0	mm	Side Backlight (L)	H1	7.9	mm
	H2	10.0	mm		H2	13.0	mm

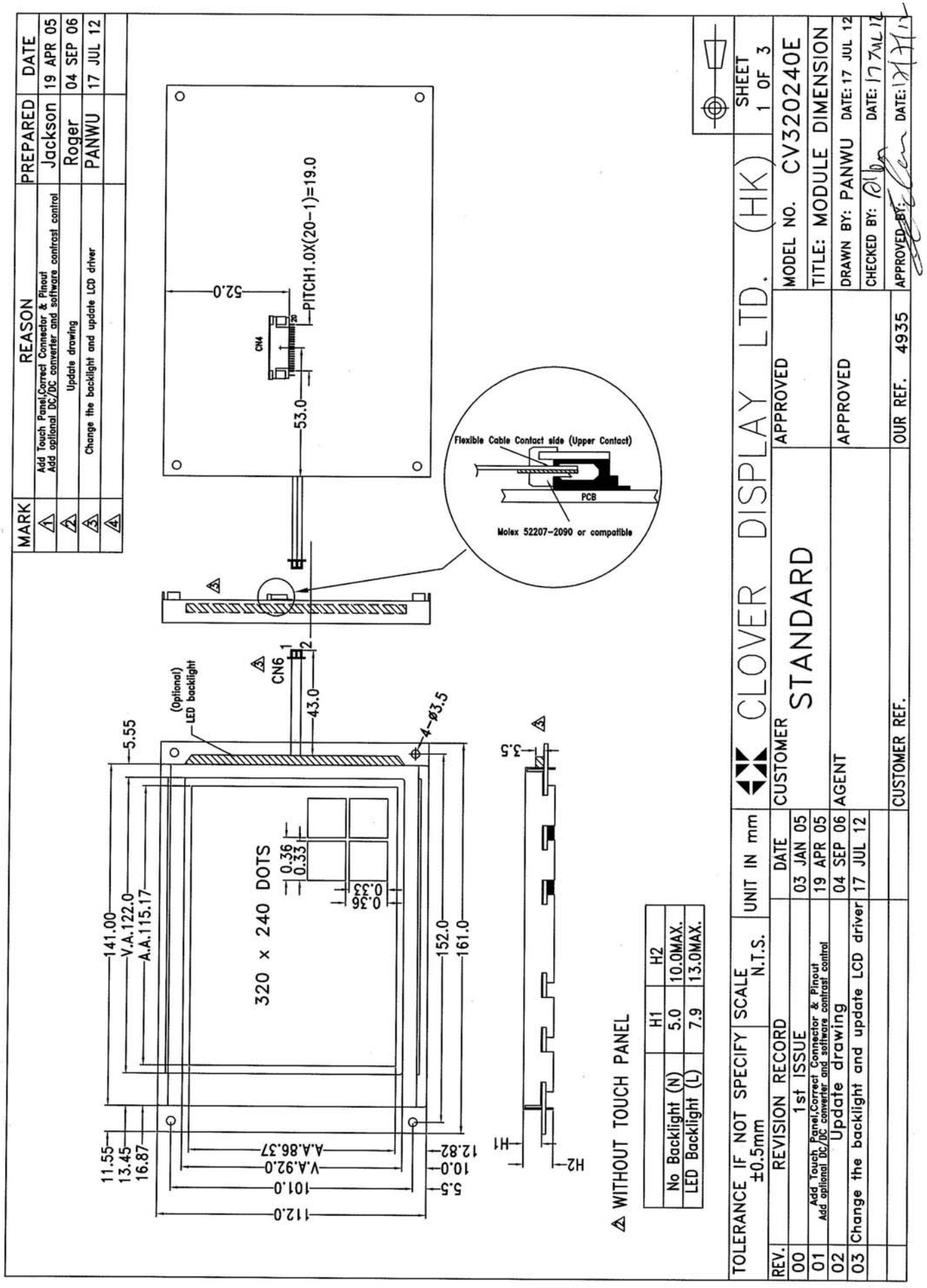
5. CONNECTOR PIN ASSIGNMENT (CN4)

Pin No.	Symbol	Function	Pin No.	Symbol	Function
1	RS	Register Select	11	DB2	Data Bus Line
2	WR	Write Signal	12	DB3	
3	RD	Read Signal	13	DB4	
4	CS1	Chip Select 1	14	DB5	
5	VLCD	Contrast Adjustment for LCD	15	DB6	
6	VDD	Logic Power Supply	16	DB7	
7	VSS	Power Supply (0V,Ground)	17	CS2	Chip Select 2
8	V_0	Supply Voltage for LCD	18	BSY	Busy Signal
9	DB0	Data Bus Line	19	INT	Interrupt Signal
10	DB1		20	RST	Reset Signal

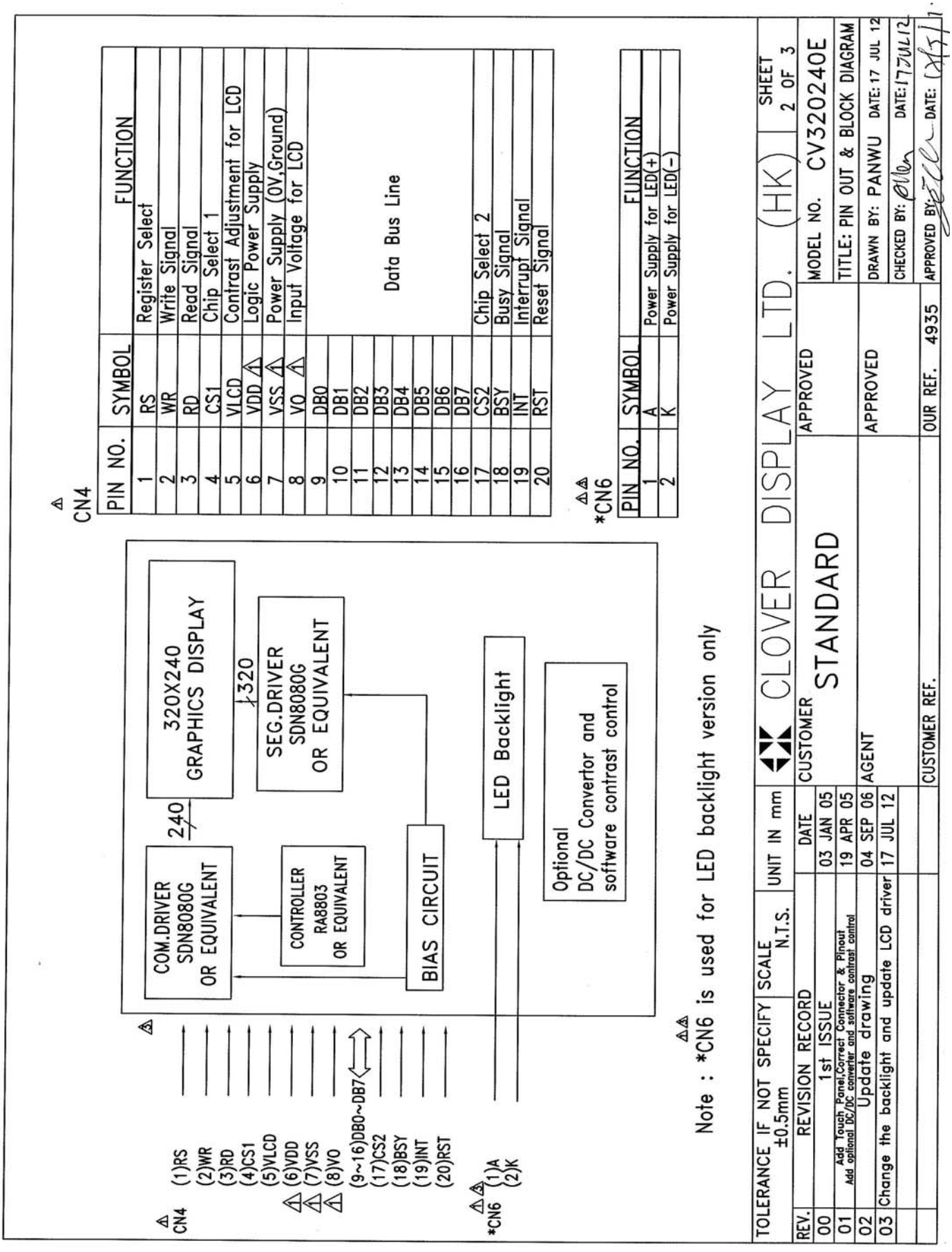
5.1 CONNECTOR PIN ASSIGNMENT FOR LED BACKLIGHT (CN6)

Pin No.	Symbol	Function
1	A	Power Supply for LED (+)
2	K	Power Supply for LED (-)

6. COUNTER DRAWING OF MODULE DIMENSION



6.1 COUNTER DRAWING OF PIN OUT & BLOCK DIAGRAM



7. 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}	—	—	24.3	mA
Supply Voltage for LCD	V_{EE}	-20.0	—	-23.0	V
Contrast Adjustment for LCD **(*)**	VLCD	-19.2	-19.0	-18.8	V
"H"Level Input Voltage	V_{IH}	0.8V_{DD}	—	V_{DD}	V
"L"Level Input Voltage	V_{IL}	0	—	0.2V_{DD}	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:

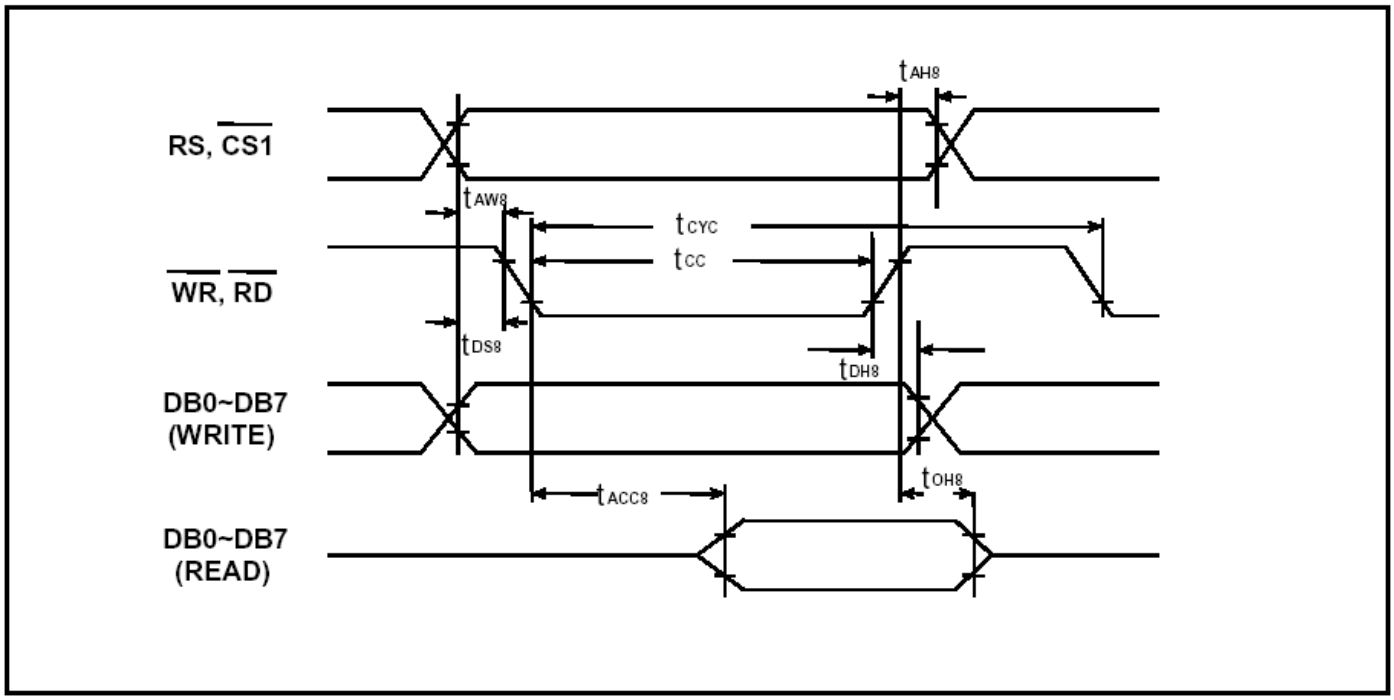
Item	Symbol	MIN.	TYP.	MAX.	Unit	Condition
White Backlight voltage	V_{BL}	—	3.5	3.8	V	I_{BL} = 120mA

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	V_{DD}	-0.3 to 6.5	-0.3 to 6.5	V
Input Voltage	V_{IN}	-0.3 to VDD+0.3V	-0.3 to VDD+0.3V	V
Operating Temperature	T_{opr}	0 to 50	-20 to 70	℃
Storage Temperature	T_{stg}	-20 to 70	-30 to 80	℃

8. TIMING CHART



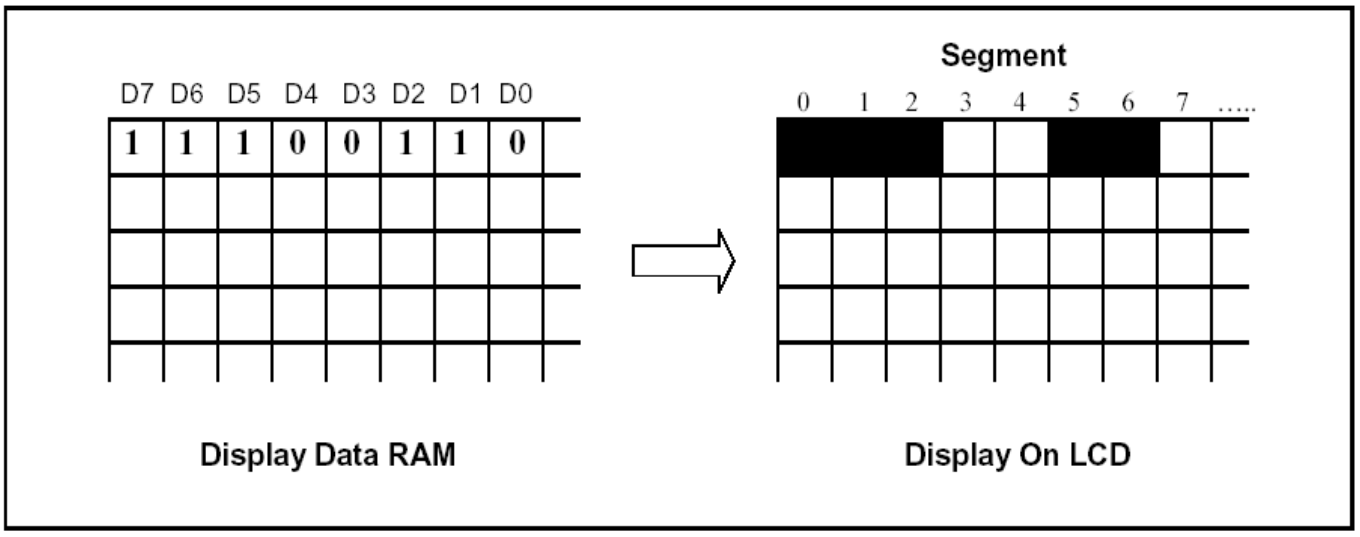
8.1 AC CHARACTERISTICS

Signal	Symbol	Parameter	Rating		Unit	Condition
			Min	Max		
RS, CS1#	t_{AH8}	Address hold time	10	--	ns	System Clock: 8MHz
	t_{Aw8}	Address setup time	63	--	ns	
WR#, RD#	t_{CYC}	System cycle time	800	--	ns	
	t_{CC}	Strobe pulse width	400	--	ns	
DB0 to DB7	t_{DS8}	Data setup time	63	--	ns	
	t_{DH8}	Data hold time	10	--	ns	
	t_{ACC8}	RD access time	--	330	ns	
	t_{OH8}	Output disable time	10	--	ns	

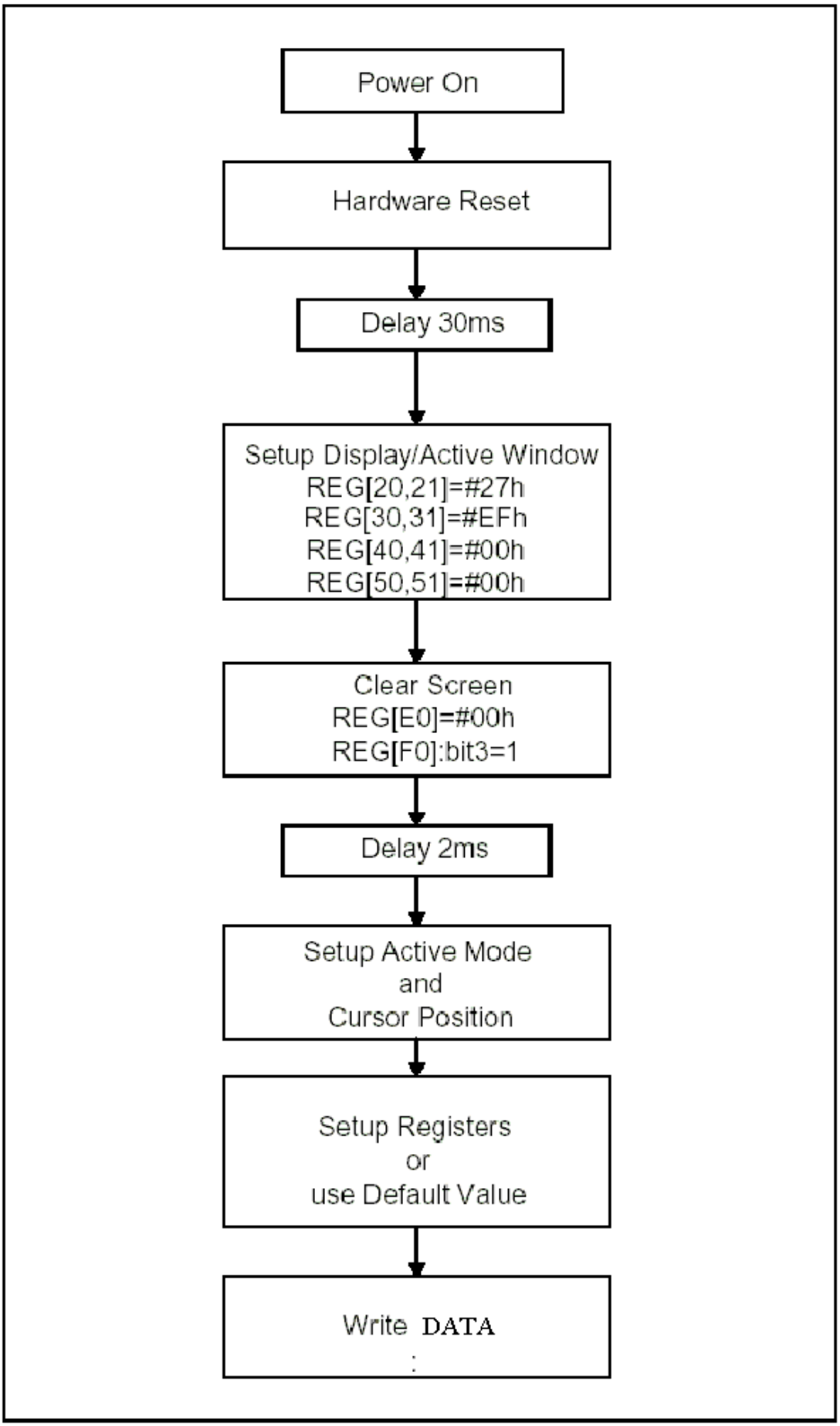
9. DATA ACCESS WITH MCU

No.	RS	6800	8080		DB0-DB7	Function
		R/W#	RD#	WR#		
①	1	1	0	1	xxh	Read Display Data
②	1	0	1	0	High Byte -->Low Byte	Write Display Data (Character Mode – Chinese): Execute Step ② twice. At first, write the High Byte of Chinese Code, then write Low Byte.
③	1	0	1	0	xxh	Write Display Data (Character Mode – English, ASCII)
④	1	0	1	0	xxh	Write Display Data (Graphic Mode)
⑤	0	0	1	0	Address	Read Data(Status) from Register: Step ⑤ → Step ⑥
⑥	0	1	0	1	Status	
⑦	0	0	1	0	Address	Write Command to Register: Step ⑦ → Step ⑧
⑧	0	0	1	0	Command	

9.1 DISPLAY DATA TO LCD MAP



10. POWER ON/RESET PROCESS



11. ELECTRO-OPTICAL CHARACTERISTICS

MEASURING CONDITION: POWER SUPPLY = V_{OP} / 64 Hz
TEMPERATURE = 22 ± 5 °C
RELATIVE HUMIDITY = 60 ± 15 %

ITEM	SYMBOL	UNIT	TYP.
RESPONSE TIME	Ton	ms	370
	Toff	ms	470
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 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

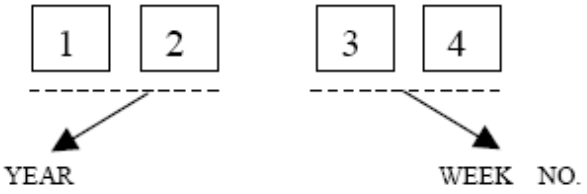
CLOVER will replace or repair any of her LCD module in accordance with her LCD specification for a period of one year from date of shipment. The warranty liability of Clover is limited to repair and/or replacement. Clover will not be responsible for any subsequent or consequential event.

APPENDIX

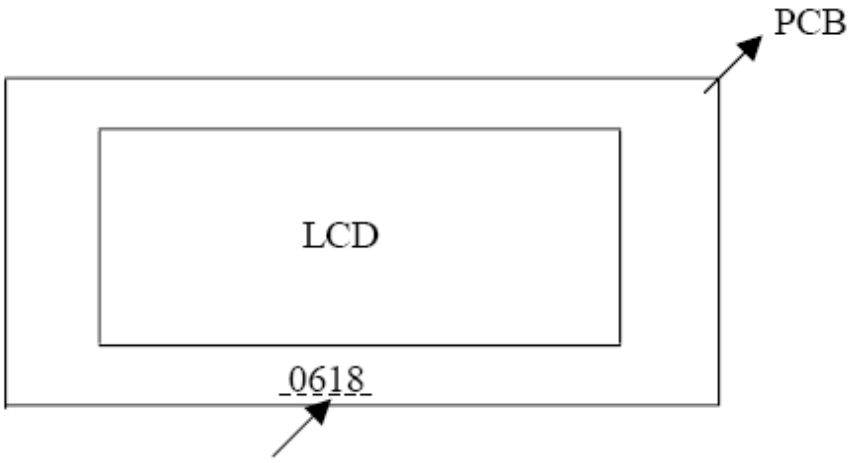
LOT INDICATION OF LCD MODULE

CODING SYSTEM:

4-DIGIT CODE:



LOCATION AS SHOWN BELOW:



e.g. WEEK 18 OF YEAR 2006