



CLOVER DISPLAY LTD.

LCD MODULE SPECIFICATION

Model : CV12864C – _ _ - _ _ - _ _ - _

| | |
|---------------|---------------|
| Revision | 05 |
| Engineering | Hermus Leung |
| Date | 11 March 2004 |
| Our Reference | 4912 |

ADDRESS : ROOM 1006, 10/F WESTIN CENTRE, 26 HUNG TO ROAD, KWUN TONG,
KOWLOON, HONG KONG.

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

FAX : (852) 2357 4237 (SALES OFFICE) (852) 2341 8785 (GENERAL OFFICE)

E-MAIL : cdl@cloverdisplay.com

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

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

LCD MODULE NUMBER NOTATION:

CV12864C- 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 : 128 x 64 dots, graphic LCD module
 Interface : 8-bit parallel
 Driving method : 1/64 duty, 1/9 bias
 Controller IC : Toshiba T6963C or equivalent
 For the detailed information, please refer to the IC specifications.

MECHANICAL DIMENSIONS

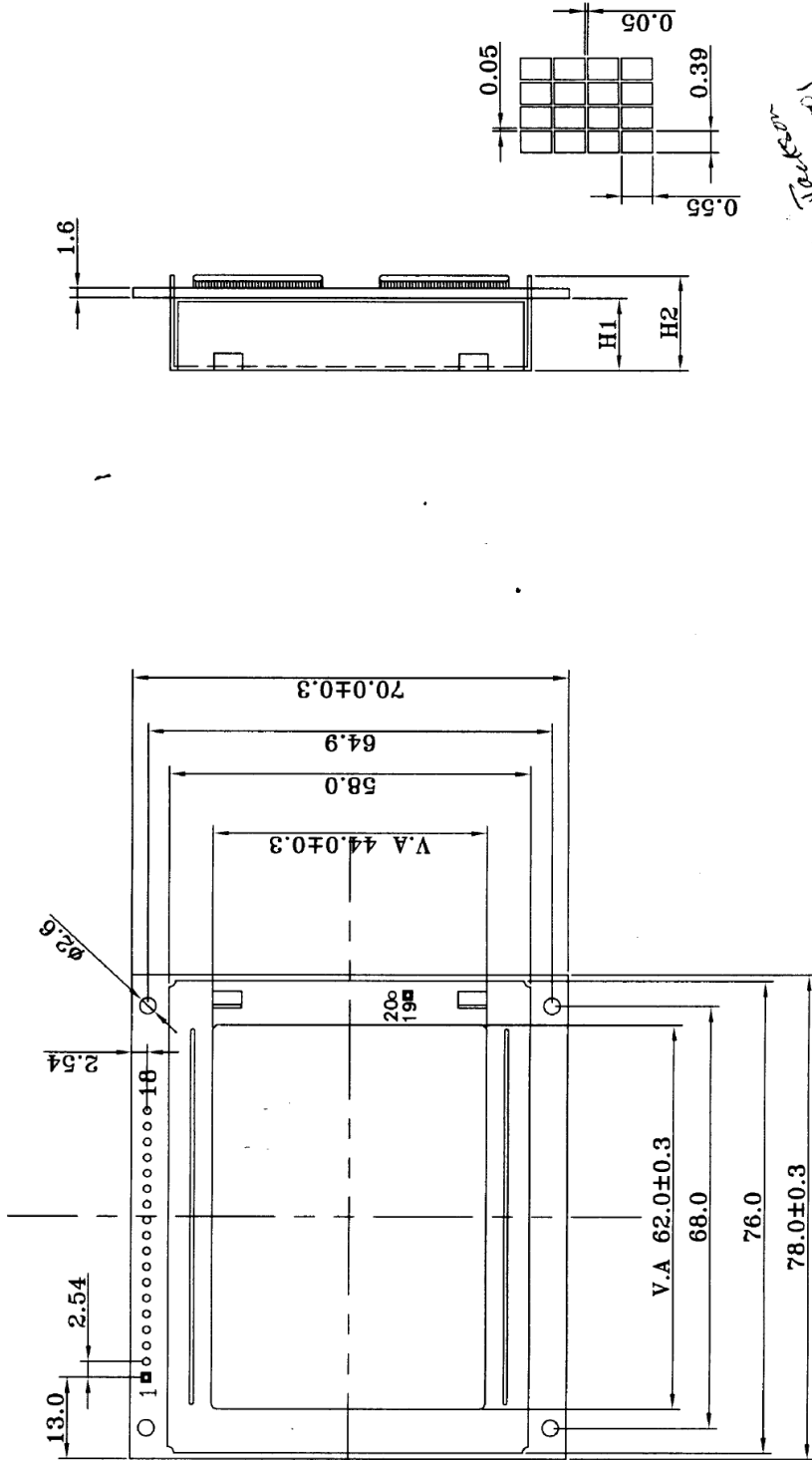
| Item | Dimension | | Unit | Item | Dimension | | Unit |
|--------------------|--------------------------|-----|------|---------------------|-----------------|------|------|
| Outline Dimension | 78.0(L)x70.0(W)x (H1/H2) | | mm | Dot Pitch | 0.44(L)x0.60(W) | | mm |
| Viewing Area | 62.0(L)x44.0(W) | | mm | Dot Size | 0.39(L)x0.55(W) | | mm |
| No Backlight (N) | H1 | 4.9 | mm | Side Backlight (L) | H1 | 10.0 | mm |
| | H2 | 9.0 | mm | | H2 | 15.0 | mm |
| EL Backlight (E) | H1 | 4.9 | mm | Array Backlight (M) | H1 | 10.0 | mm |
| | H2 | 9.0 | mm | | H2 | 15.0 | mm |
| CCFL Backlight (C) | H1 | — | mm | — | — | — | — |
| | H2 | — | mm | | — | — | — |

CONNECTOR PIN ASSIGNMENT

| Pin No. | Symbol | Function | Pin No. | Symbol | Function |
|---------|--------|-----------------------|---------|--------|-------------------------------|
| 1 | FG | Frame Ground | 11 | DB1 | Data Bus Line |
| 2 | GND | 0V Power Supply | 12 | DB2 | Data Bus Line |
| 3 | VDD | 5V Power Supply | 13 | DB3 | Data Bus Line |
| 4 | Vo | LCD Drive, 0V to -8V | 14 | DB4 | Data Bus Line |
| 5 | /WR | Write | 15 | DB5 | Data Bus Line |
| 6 | /RD | Read | 16 | DB6 | Data Bus Line |
| 7 | /CE | Chip Enable | 17 | DB7 | Data Bus Line |
| 8 | C/D | Register Select Input | 18 | FS | Font Select Input |
| 9 | /RST | Reset | 19 | BL- | Backlight supply terminal (-) |
| 10 | DB0 | Data Bus Line | 20 | BL+ | Backlight supply terminal (+) |

COUNTER DRAWING OF MODULE DIMENSION

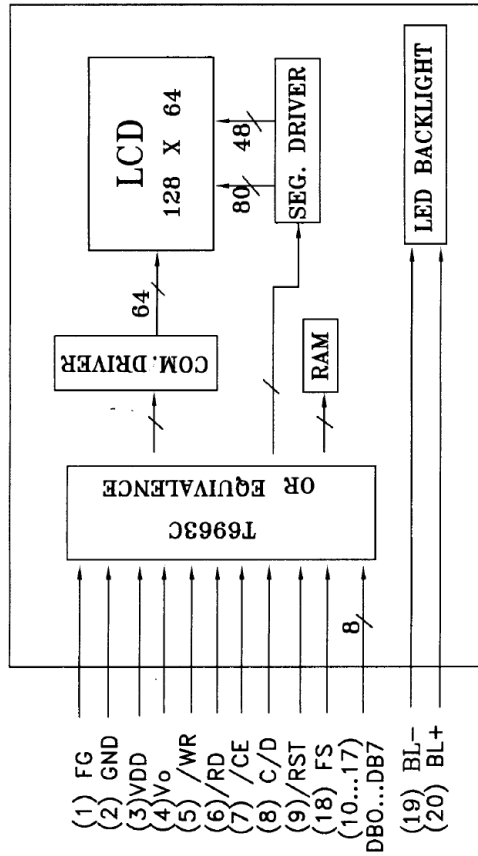
| | | | |
|------|-------|----------|---------|
| MARK | EASON | PREPARED | CHECKED |
| △ | | | |
| △ | | | |
| △ | | | |
| △ | | | |



| | | | | | | | |
|---------------------------------------|-----------------|------------|---------------|--------------------------|------------------|------------------|--|
| TOLERANCE IF NOT SPECIFY SCALE ±0.5mm | | UNIT IN mm | | CLOVER DISPLAY LTD. (HK) | | SHEET 1 OF 2 | |
| REV. | REVISION RECORD | DATE | CUSTOMER | APPROVED | MODEL NO. | CV12864C | |
| 00 | 1st ISSUE | 04-09-01 | AGENT | APPROVED | TITLE | MODULE DIMENSION | |
| | | | CUSTOMER REF. | OUR REF. 4912 | DRAWN BY : SM.Li | DATE : 04-09-01 | |
| | | | | | APPROVED BY : | DATE : 12/10/01 | |

COUNTER DRAWING OF PIN OUT & BLOCK DIAGRAM

BLOCK DIAGRAM



| PIN NUMBER | SYMBOL | I/O | FUNCTION |
|------------|--------|-----|-------------------------------|
| 1 | FG | - | Frame Ground |
| 2 | GND | - | 0V Power Supply |
| 3 | VDD | - | 5V Power Supply |
| 4 | Vo | I | LCD Drive, 0V to -8V |
| 5 | /WR | I | Write |
| 6 | /RD | I | Read |
| 7 | /CE | I | Chip Enable |
| 8 | C/D | I | Register Select Input |
| 9 | /RST | I | Reset |
| 10 | DB0 | I/O | Data Bus Line |
| 11 | DB1 | I/O | Data Bus Line |
| 12 | DB2 | I/O | Data Bus Line |
| 13 | DB3 | I/O | Data Bus Line |
| 14 | DB4 | I/O | Data Bus Line |
| 15 | DB5 | I/O | Data Bus Line |
| 16 | DB6 | I/O | Data Bus Line |
| 17 | DB7 | I/O | Data Bus Line |
| 18 | FS | I | Font Select Input |
| 19 | BL- | I | Backlight Supply terminal (-) |
| 20 | BL+ | I | Backlight Supply terminal (+) |

Jackson 12-10-01

| | | | | | | | |
|--|------------------------------|------------------|---------------|--------------------------|----------------------------------|---------------------------|--|
| TOLERANCE IF NOT SPECIFY SCALE ±0.5mm | | UNIT IN mm | | CLOVER DISPLAY LTD. (HK) | | SHEET 2 OF 2 | |
| REV. 00 | REVISION RECORD 1st ISSUE | DATE 04-09-01 | CUSTOMER | APPROVED | MODEL NO. CV12864C | TITLE MODULE DIMENSION | |
| | | | AGENT | APPROVED | DRAWN BY : SM.Li | DATE : 04-09-01 | |
| | | | CUSTOMER REF. | OUR REF. 4912 | APPROVED BY : <i>[Signature]</i> | DATE : 12/10/01 | |

ELECTRICAL CHARACTERISTICS

Conditions: VSS=0V, @Ta=25°C

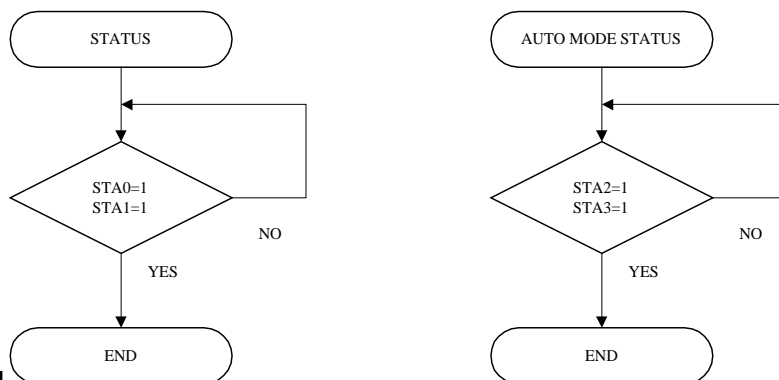
| Item | Symbol | MIN. | TYP. | MAX. | Unit | Item | Symbol | MIN. | TYP. | MAX. | Unit |
|--------------------------|--------|-------|-------|-------|------|--------------------------|--------|------|------|------|-------|
| Supply Voltage | VDD | 4.75 | 5.00 | 5.25 | V | “H”Level Input Voltage | VIH | 2.2 | — | VDD | V |
| Supply Current | IDD | — | 12.00 | 22.70 | mA | “L”Level Input Voltage | VIL | 0 | — | 0.8 | V |
| LCD Drive | VO | -3.80 | -3.60 | -3.40 | V | — | — | — | — | — | — |
| Backlight Voltage | | | | | | Backlight Current | | | | | |
| EL (@ Frequency 400Hz) | VEL | — | 100 | 150 | Vrms | — | — | — | — | — | — |
| Side-lited LED | | | | | | Side-lited LED | | | | | |
| White | VBL | — | 3.2 | 3.5 | V | White | IBL | — | 80 | 100 | mA |
| Blue | VBL | — | — | — | V | Blue | IBL | — | — | — | mA |
| Yellow Green | VBL | — | — | — | V | Yellow Green | IBL | — | — | — | mA |
| Array LED | | | | | | Array LED | | | | | |
| Yellow Green | VBL | 3.85 | 4.05 | 4.25 | V | Yellow Green | IBL | — | 240 | 430 | 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 | — | — | — | Vrms | White | IBL | — | — | — | mArms |

ABSOLUTE MAXIMUM RATINGS

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

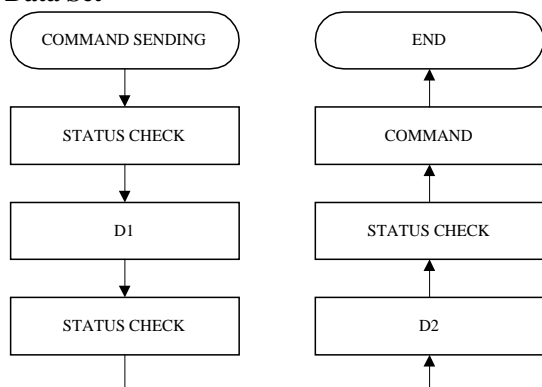
| Item | Symbol | Rating (for normal temperature) | Rating (for wide temperature) | Unit |
|-----------------------|--------|---------------------------------|-------------------------------|------|
| Supply Voltage | VDD | 7 | 7 | V |
| Input Voltage | VT | -0.3 to VDD +0.3 | -0.3 to VDD +0.3 | V |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

FLOWCHART OF COMMUNICATIONS WITH MPU



Status Read

Data Set



INSTRUCTIONS

| Instruction | C/D | RD | WR | Code | | | | | | | | D1 | D2 | Description |
|-----------------------|---|---|---|---|---|---|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--|---|---|
| | | | | DB7 | DB6 | DB5 | DB4 | DB3 | DB2 | DB1 | DB0 | | | |
| Status read | 1 | 0 | 1 | STA7 | STA6 | STA5 | STA4 | STA3 | STA2 | STA1 | STA0 | - | - | STA0: Check capability of command execution STA1: Check capability of data read/write STA2: Check capability of auto mode data read STA3: Check capability of auto mode data write STA4: Not use STA5: Check capability of controller operation STA6: Error flag. Using screen peek/copy command STA7: Check the condition blink |
| Register Set | 1 1 1 | 1 1 1 | 0 0 0 | 0 0 0 | 0 0 0 | 1 1 1 | 0 0 0 | 0 0 0 | 0 0 1 | 0 1 0 | 1 0 0 | X address Data Lo address | Y address 00H Hi address | Cursor pointer set Offset register set Address pointer set |
| Control Word Set | 1 1 1 1 | 1 1 1 1 | 0 0 0 0 | 0 0 0 0 | 1 1 1 1 | 0 0 0 0 | 0 0 0 0 | 0 0 0 0 | 0 0 0 0 | 0 0 1 1 | 0 1 0 1 | Lo address Columns Lo address Columns | Hi address 00H Hi address 00H | Text home address set Text area set Graphic home address set Graphic area set |
| Mode Set | 1 1 1 1 1 1 | 1 1 1 1 1 1 | 0 0 0 0 0 0 | 1 1 1 1 1 1 | 0 0 0 0 0 0 | 0 0 0 0 0 0 | 0 0 0 0 0 0 | x x x x x x | 0 0 0 1 0 1 | 0 0 1 0 x x | 0 0 1 0 x x | - - - - - - | - - - - - - | “OR” mode “EXOR” mode “AND” mode “Text attribute” mode Internal CG RAM mode External CG Ram mode |
| Display Mode | 1 1 1 1 1 1 | 1 1 1 1 1 1 | 0 0 0 0 0 0 | 1 1 1 1 1 1 | 0 0 0 0 0 0 | 0 0 0 0 0 0 | 1 1 1 1 1 1 | 0 x x 0 1 1 | 0 x x 1 0 1 | 0 1 1 x x x | 0 0 1 1 0 0 | - - - - - - | - - - - - - | Display off Cursor on, blink off Cursor on, blink on Text on, graphic off Text off, graphic on Text on, graphic on |
| Cursor Pattern Select | 1 1 1 1 1 1 1 1 | 1 1 1 1 1 1 1 1 | 0 0 0 0 0 0 0 0 | 1 1 1 1 1 1 1 1 | 0 0 0 0 0 0 0 0 | 1 1 1 1 1 1 1 1 | 0 0 0 0 0 0 0 0 | 0 0 0 0 0 0 0 0 | 0 0 0 0 0 0 0 0 | 0 0 0 0 1 0 1 1 | 0 1 0 1 0 1 0 1 | - - - - - - - - | - - - - - - - - | 1 line cursor 2 lines cursor 3 lines cursor 4 lines cursor 5 lines cursor 6 lines cursor 7 lines cursor 8 lines cursor |
| Data Auto Read/Write | 1 1 1 | 1 1 1 | 0 0 0 | 1 1 1 | 0 0 0 | 1 1 1 | 1 1 1 | 0 0 0 | 0 0 0 | 0 0 1 | 0 1 0 | - - - | - - - | Data auto write set Data auto read set Auto reset |
| Data Read/Write | 1 1 1 1 1 | 1 1 1 1 1 | 0 0 0 0 0 | 1 1 1 1 1 | 1 1 1 1 1 | 0 0 0 0 0 | 0 0 0 0 0 | 0 0 0 0 1 | 0 0 0 1 0 | 0 0 1 0 0 | 0 1 1 0 1 | Data - Data - Data - | - - - - - | Data write and ADP increment Data read and ADP increment Data write and ADP decrement Data read and ADP decrement Data write and ADP nonvariable Data read and ADP nonvariable |
| Screen Peek | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | - | - | Screen peek |
| Screen Copy | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | | | Screen copy |
| Bit Set/Reset | 1 1 1 1 1 1 1 1 1 | 1 1 1 1 1 1 1 1 1 | 0 0 0 0 0 0 0 0 0 | 1 1 1 1 1 1 1 1 1 | 1 1 1 1 1 1 1 1 1 | 1 1 1 1 1 1 1 1 1 | 0 1 x 0 x 1 x 1 | x x 0 0 x 1 x 1 | x x 0 0 0 1 0 1 | x x 0 0 1 1 0 1 | x x 0 1 0 1 0 1 | - - - - - - - - - | - - - - - - - - - | bit reset bit set bit0 (LSB) bit1 bit2 bit3 bit4 bit5 bit6 bit7 (MSB) |

ADDRESS CONFIGURATION OF DISPLAY DATA RAM**(1) TEXT HOME ADDRESS SET**

The starting address of external display RAM for Text display is defined by this command. The text home address shows the left end and most upper position. The relationship of external display RAM address and display position.

| | | |
|-------------|--|-------------|
| TH | | TH+CL |
| TH+TA | | TH+TA+CL |
| (TH+A)+TA | | TH+2TA+CL |
| (TH+2TA)+TA | | TH+3TA+CL |
| | | |
| TH+(n-1)TA | | TH+(n-1)+CL |

TH: Text home address

TA: Text area number (columns)

CL: Columns are fixed by hardware. (pin-programmable)

(EXAMPLE)

Text home address : 0000H
 Text area address : 0020h
 MD=H,MD3=H : 32 columns
 DUAL=H,MDX=L,MD1=H : 4 lines

| | | | | |
|-------|-------|--|-------|-------|
| 0000H | 0001H | | 001EH | 001FH |
| 0020h | 0021H | | 003EH | 003FH |
| 0040H | 0041H | | 005EH | 005FH |
| 0060H | 0061H | | 007EH | 007FH |

(2) GRAPHIC HOME ADDRESS SET

The starting address of external display RAM for Graphic display is defined by this command. The graphic home address shows the left end most upper line. The relationship of external display RAM address and display position:

| | | |
|-------------|--|-------------|
| GH | | GH+CL |
| GH+GA | | GH+GA+CL |
| (GH+GA)+GA | | GH+2GA+CL |
| (GH+2GA)+GA | | GH+3GA+CL |
| | | |
| GH+(n-1)GA | | GH+(n-1)+CL |

GH : Graphic home address

GA : Graphic number (columns)

CL : Columns are fixed by hardware. (pin-programmable)

(EXAMPLE)

Graphic home address : 0000H
 Graphic area : 0020H
 MD=H,MD3=H : 32 columns
 DUAL=H,MDS=L,MD0=H,MD1=H : 2 line

| | | | | |
|-------|--------|--|-------|-------|
| 0000H | 0001H | | 001EH | 001FH |
| 0020H | 00021H | | 003EH | 003FH |
| 0040H | 0041H | | 005EH | 005FH |
| 0060H | 0061H | | 007EH | 007FH |
| 0080H | 0081H | | 009EH | 009FH |
| 00A0H | 00A1H | | 00BEH | 00BFH |
| 00C0H | 00C1H | | 00DEH | 00DFH |
| 00E0H | 00E1H | | 00FEH | 00FFH |
| 0100H | 0101H | | 011EH | 011FH |
| 0120H | 0121H | | 013EH | 013FH |
| 0140H | 0141H | | 015EH | 015FH |
| 0160H | 0161H | | 017EH | 017FH |
| 0180H | 0181H | | 019EH | 019FH |
| 01A0H | 01A1H | | 01BEH | 01BFH |
| 01C0H | 01C1H | | 01DEH | 01DFH |
| 01E0H | 01E1H | | 01FEH | 01FFH |

(3) TEXT AREA SET

The columns of display are defined by the hardware setting. This command can be used to adjust columns of display.

(EXAMPLE)

LCD size : 20 columns,4 lines
 Text home address : 0000H
 Text area : 0014h
 MD=H,MD3=H : 32 columns
 DUAL=H,MDS=L,MD0=L,MD1=H : 4 lines

| | | | | | | |
|------|------|--|------|------|--|------|
| 0000 | 0001 | | 0013 | 0014 | | 001F |
| 0014 | 0015 | | 0027 | 0028 | | 0033 |
| 0028 | 0029 | | 003B | 003C | | 0047 |
| 003C | 003D | | 004F | 0050 | | 005B |

(4) GRAPHIC AREA SET

The columns of display are defined by the hardware setting. This command can be used to adjust columns of graphic display.

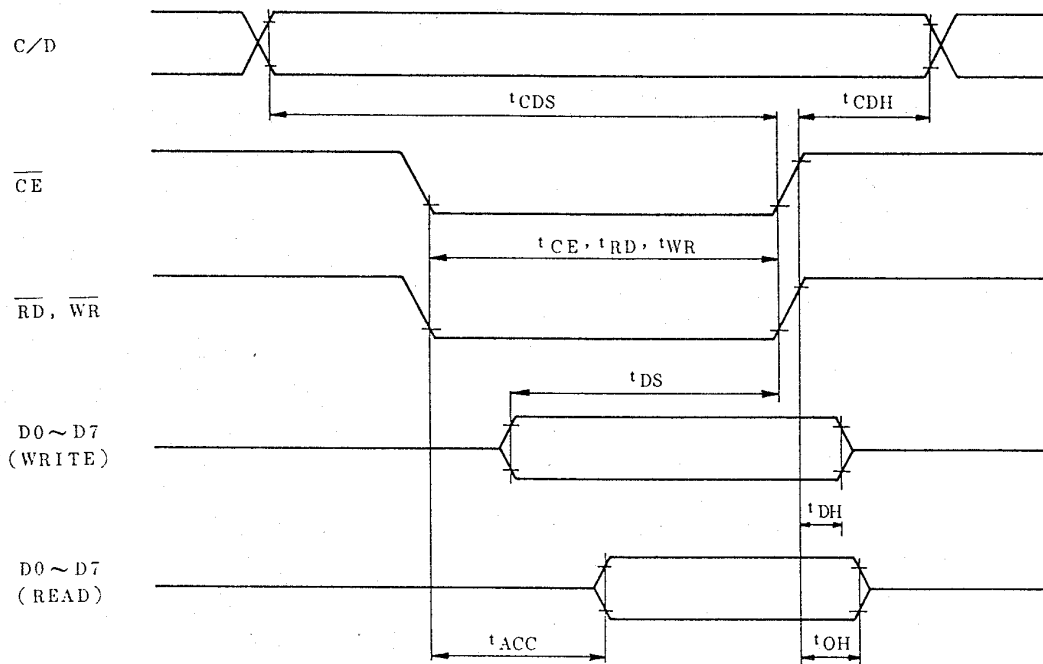
(EXAMPLE)

LCD size :20 columns,2lines
 Text home address :0000H
 Text area :0014H
 MD=H,MD3=H :32 columns
 DUAL=H,MDS=L,MD0=H,MD1=H :2 lines

| | | | | | | |
|------|------|--|------|------|--|------|
| 0000 | 0001 | | 0013 | 0014 | | 001F |
| 0014 | 0015 | | 0027 | 0028 | | 0033 |
| 0028 | 0029 | | 003B | 003C | | 0047 |
| 003C | 003D | | 004F | 0050 | | 005B |
| 0050 | 0051 | | 0063 | 0064 | | 006F |
| 0064 | 0065 | | 0077 | 0078 | | 0083 |
| 0078 | 0079 | | 008B | 008C | | 0097 |
| 008C | 008D | | 009F | 00A0 | | 00AB |
| 00A0 | 00A1 | | 00B3 | 00B4 | | 00BF |
| 00B4 | 00B5 | | 00C7 | 00C8 | | 00D3 |
| 00C8 | 00C9 | | 00DB | 00DC | | 00E7 |
| 00DC | 00DD | | 00EF | 00F0 | | 00FD |
| 00F0 | 00F1 | | 0103 | 0104 | | 011F |
| 0104 | 0105 | | 0127 | 0128 | | 0123 |
| 0128 | 0129 | | 013B | 013C | | 0147 |
| 013C | 013D | | 014F | 0150 | | 015B |

TIMING CHARACTERISTICS OF COMPATIBLE CONTROLLER CHIPS

Bus Timing



Unless otherwise specified, $V_{DD}=5.0V\pm 10\%$, $V_{SS}=0V$, $T_a=-10\sim 70^\circ C$

| ITEM | SYMBOL | TEST CONDITION | MIN. | MAX. | UNIT |
|------------------------|--------------------------|----------------|------|------|------|
| C/D Set Up Time | t_{CDS} | | 100 | - | ns |
| C/D Hold Time | t_{CDH} | | 10 | - | ns |
| CE, RD, WR Pulse Width | t_{CE}, t_{RD}, t_{WR} | | 80 | - | ns |
| Data Set Up Time | t_{DS} | | 80 | - | ns |
| Data Hold Time | t_{DH} | | 40 | - | ns |
| Access Time | t_{ACC} | | - | 150 | ns |
| Output Hold Time | t_{OH} | | 10 | 50 | ns |

ELECTRO-OPTICAL CHARACTERISTICS

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

| ITEM | SYMBOL | UNIT | TYP. STN |
|--|-----------|------|----------|
| RESPONSE TIME | T_{on} | ms | 220 |
| | T_{off} | ms | 280 |
| CONTRAST RATIO | Cr | - | 12 |
| VIEWING ANGLE (6 O'clock) ($Cr \geq 2$) | V3:00 | ° | 40 |
| | V6:00 | ° | 70 |
| | V9:00 | ° | 40 |
| | V12:00 | ° | 50 |

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 of 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

Use soft cloth with solvent (recommended below) to clean the display surface and wipe lightly.
- Isopropyl alcohol, ethyl alcohol, trichlorotrifluoroethane

Do not wipe the display surface with dry or hard materials that will damage the polarizer surface. Do not use the following solvent;
-water, ketone, aromatics

(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 direct to sunshine or high temperature/humidity.

(4) CAUTION FOR OPERATION

It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage than the limit causes the shorter LCD life. The use of direct current drive should be avoided because an electrochemical reaction due to direct current causes LCD's undesirable deterioration.

Response time will be extremely delayed at low temperature, and LCD's show dark color at high temperature. However those phenomena do not mean malfunction or out of order with LCD's.

Some font will be abnormally displayed when the display area is pushed hard during operation. But it resumes normal condition after turning off once.

(5) SAFETY

For crash damaged or unnecessary LCD's, it is recommended to wash off liquid crystal by either of solvents such as acetone and ethanol and should be burned up later.

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

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.