*Specification*

*For*

*LCD Module*

*CCM0820CSLS1*

**Prepared by:**_____

**Checked by:**_____

**Approved by:**_____

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# CCM0820CSLS1 LCD MODULE

## 1、FEATURES

- LCD Type: STN
- Display Format: 8 Characters x 2 Lines
- Input Data: 4-Bits or 8-Bits interface available
- Display Font: 5 x 8 Dots
- Display Mode: Yellow Green
- Driving Mode: 1/16Duty, 1/5Bias
- Operating Voltage: 5.0V
- Viewing Direction: 6 O'clock
- LED Backlight: 4.2V

## 2、ABSOLUTE MAXIMUM

| Item | Symbol | Min. | Max. | Unit |
|---|---|---|---|---|
| Power Supply for Logic | $V_{DD}$ | -0.3 | +7.0 | V |
| Power Supply for LCD Drive | $V_{LCD}$ | $V_{DD}$-15.0 | $V_{DD}$+0.3 | V |
| Input Voltage | $V_{IN}$ | -0.3 | $V_{DD}$+0.3 | V |
| Operating Temperature | $T_{OPR}$ | 0 | +50 | ℃ |
| Storage Temperature | $T_{STG}$ | -20 | +70 | ℃ |
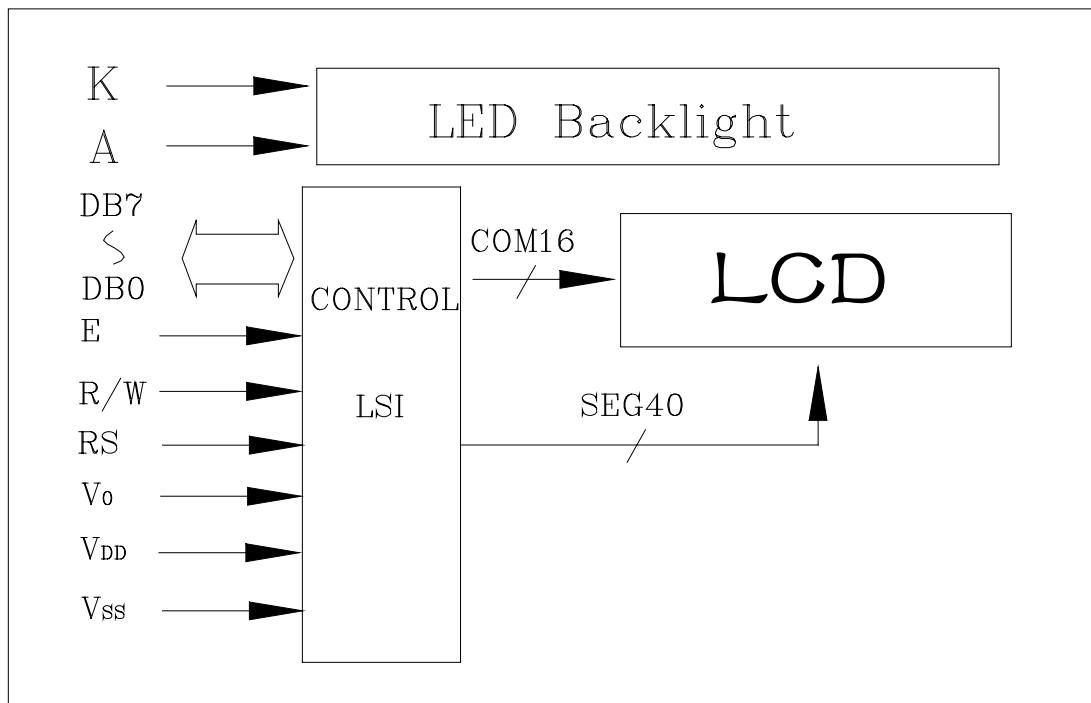
## 3、MECHANICAL PARAMETERS

| Item | Description | Unit |
|---|---|---|
| LCM Outline Dimension | 58.0 x 32.0 x 13.5 | mm |
| Viewing Area | 38.0 x 16.0 | mm |
| Weight | About 23 | g |

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# 4、SYSTEM BLOCK DIAGRAM



# 5、PIN ASSIGNMENT

| NO. | Symbol | Level | Function |
|---|---|---|---|
| 1 | $V_{SS}$ | -- | 0V |
| 2 | $V_{DD}$ | -- | +5.0V |
| 3 | $V_0$ | -- | For LCD Power Supply |
| 4 | RS | H/L | Register　　　H: Data register　　Select　　　L:Instruction register |
| 5 | R/W | H/L | H--Read　　L--Write |
| 6 | E | H, H-L | Enable Signal |
| 7 | DB0 | H/L | Data bus used in 8 bit transfer |
| 8 | DB1 | H/L | |
| 9 | DB2 | H/L | |
| 10 | DB3 | H/L | |
| 11 | DB4 | H/L | Data bus for both 4 and 8 bit transfer |
| 12 | DB5 | H/L | |
| 13 | DB6 | H/L | |
| 14 | DB7 | H/L | |
| -- | A | -- | The power for LED backlight |
| -- | K | -- | |

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## 6、DC CHARACTERISTICS  (KS0066U,$T_{OPR}$=25℃; $V_{DD}$=4.5~5.5V,$V_{SS}$=0V)

| Item | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Operating Voltage | $V_{DD}$ | - | 4.5 | 5.0 | 5.5 | V |
| LCD Voltage | $V_{LCD}$ | $V_{DD}$-$V_0$ | - | 5.0 | - | V |
| Power Supply Current | $I_{DD}$ | Fosc=270kHz, $V_{DD}$=3.3V | - | 1.2 | 1.8 | mA |
| Input High Voltage (except OSC1) | $V_{IH1}$ | - | $0.7V_{DD}$ | - | $V_{DD}$ | V |
| Input Low Voltage (except OSC1) | $V_{IL1}$ | - | -0.3 | - | 0.55 | V |
| Input High Voltage (OSC1) | $V_{IH2}$ | - | $0.7V_{DD}$ | - | $V_{DD}$ | V |
| Input Low Voltage (OSC1) | $V_{IL2}$ | - | - | - | $0.2V_{DD}$ | V |
| Output High Voltage (DB0-DB7) | $V_{OH1}$ | $I_{OH}$= -0.1mA | $0.75V_{DD}$ | - | - | V |
| Output Low Voltage (DB0-DB7) | $V_{OL1}$ | $I_{OL}$= 0.1mA | - | - | $0.2V_{DD}$ | V |
| Output High Voltage (except DB0-DB7) | $V_{OH2}$ | $I_O$=-0.04mA | $0.8V_{DD}$ | | - | V |
| Output Low Voltage (except DB0-DB7) | $V_{OL2}$ | $I_O$=0.04mA | - | - | $0.2V_{DD}$ | V |
| Voltage Drop | $Vd_{COM}$ | $I_O$=±0.1Ma | - | - | 1 | V |
| | $Vd_{SEG}$ | | - | - | 1 | V |
| Input Leakage Current | $I_{IKG}$ | $V_{IN}$=0 V to VDD | -1- | - | 1 | μA |
| Input Low Current | $I_{IL}$ | $V_{IN}$=0V,$V_{DD}$=3V (PULL UP) | -10 | -50 | -120 | μA |

## 7、AC CHARACTERISTICS  ($V_{DD}$ =2.7~5.5V,$V_{SS}$=0V, $T_{OPR}$=25℃)

(Write mode)

| Characteristic | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| E Cycle Time | Tc | 1000 | -- | -- | ns |
| E Rise/Fall Time | Tr, Tf | -- | -- | 25 | ns |
| E Pulse Width (High, Low) | Tpw | 450 | -- | -- | ns |
| R/W, RS AND E Setup Time | Tas | 60 | -- | -- | ns |
| R/W, RS AND E Hold Time | Tah | 20 | -- | -- | ns |
| DB0-DB7 Data Setup Time | Tdsw | 195 | -- | -- | ns |
| DB0-DB7 Data Hold Time | Th | 10 | -- | -- | ns |
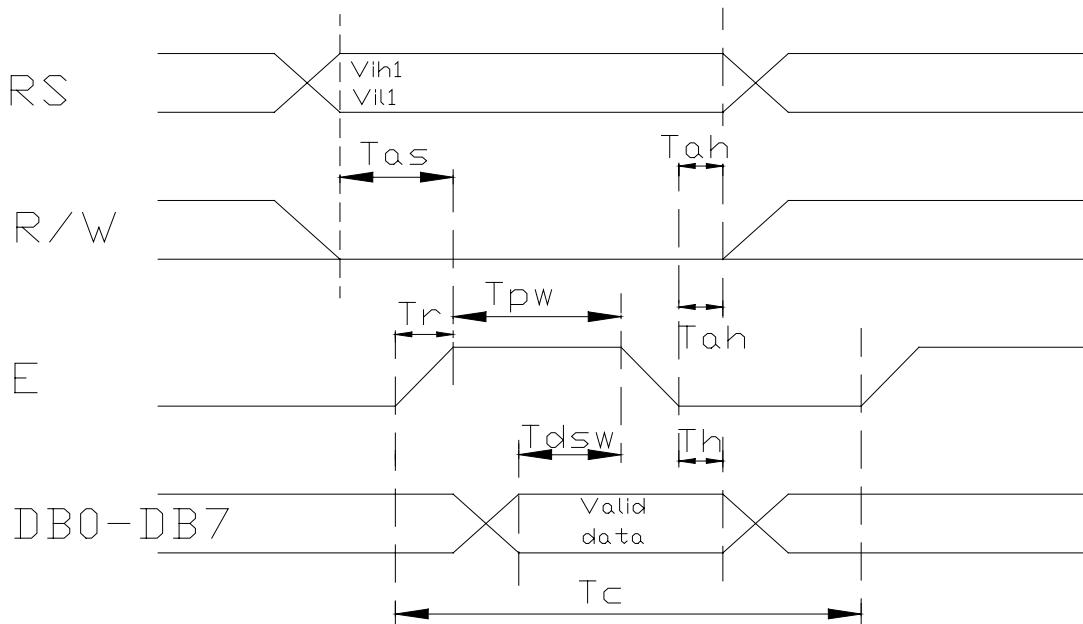
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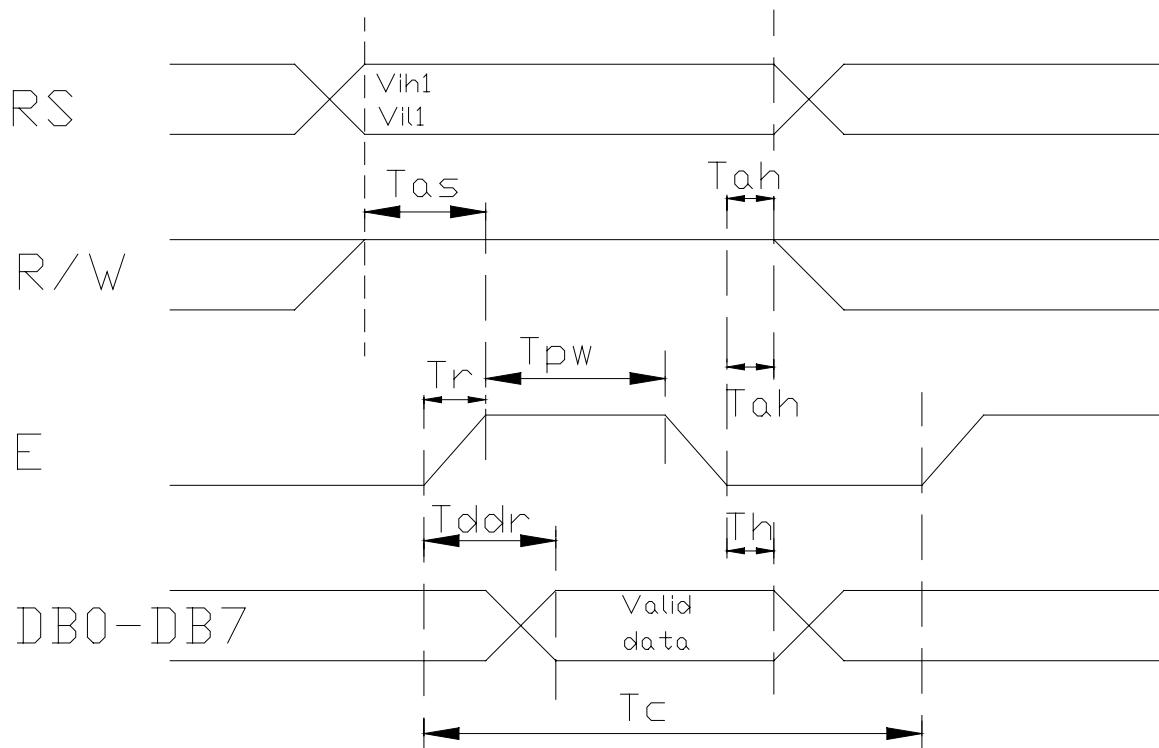
(Read mode)

| Characteristic | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| E Cycle Time | Tc | 1000 | -- | -- | ns |
| E Rise/Fall Time | Tr, Tf | -- | -- | 25 | ns |
| E Pulse Width (High, Low) | Tpw | 450 | -- | -- | ns |
| R/W, RS and E Setup Time | Tas | 60 | -- | -- | ns |
| R/W, RS and E Hold Time | Tah | 20 | -- | -- | ns |
| Data Output Delay Time | Tddr | -- | -- | 360 | ns |
| Data Hold Time | Th | 10 | -- | -- | ns |

# 8、WRITE MODE TIMING DIAGRAM

# 9、READ MODE TIMING DIAGRAM

# 10、CONTROL AND DISPLAY COMMAND

| Command | RS | R/W | DB7 | DB6 | DB5 | DB4 | DB3 | DB2 | DB1 | DB0 | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Display Clear | L | L | L | L | L | L | L | L | L | H | Write "20H" to DDRAM.and set DDRAM address to "00H" from AC. |
| Return Home | L | L | L | L | L | L | L | L | H | X | Set DDRAM address to'00H" from AC and return cursor to it's original position if shifted. The contents of DDRAM are not changed. |
| Entry Mode Set | L | L | L | L | L | L | L | H | I/D | SH | Assign cursor moving direction and make shift of entire display enable. |
| Display On/Off Control | L | L | L | L | L | L | H | D | C | B | Set display (D), cursor (C), and blinking of cursor (B) on/off control bit. |
| Cursor or Display Shift | L | L | L | L | L | H | S/C | R/L | X | X | Set cursor moving and display shift control bit, and the direction, without changing of DDRAM data. |
| Set Function | L | L | L | L | H | DL | N | F | X | X | Set interface data length(DL: 4-bit/8bit), numbers of display line(N:1-line/2line), display font type(F:5X8 dots/5X11 dots) |
| Set CGRAM Address | L | L | L | H | AC5 | AC4 | AC3 | AC2 | AC1 | AC0 | Set CGRAM address in address counter. |
| Set DDRAM Address | L | L | H | AC6 | AC5 | AC4 | AC3 | AC2 | AC1 | AC0 | Set DDRAM address in address counter. |
| Read Busy Flag & Address | L | H | BF | AC6 | AC5 | AC4 | AC3 | AC2 | AC1 | AC0 | Whether during internal operation or not can be known by reading BF. The contents of address counter can also be read. |
| Write Data to RAM | H | L | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Write data into internal DDRAM/CGRAM |
| Read Data from RAM | H | H | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Read data from internal DDRAM/CGRAM. |

"X": Don't Care

NOTE: When an MPU program with checking the Busy Flag (DB7) is made, it must be necessary 1/2Fosc is necessary for executing the next instruction by the falling edge of the 'E' signal after the Busy Flag (DB7) goes to "Low".

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## 11.FONT TABLE

NO.7066-0A

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# 12、ASSEMBLY DIAGRAM