
Specification

For

LCD Module

CGM128112PFE

Prepared By : _____

Checked By : _____

Approved By: _____

CGM128112PFE LCD MODULE

1、 FEATURES

- Display TYPE: FSTN
- Display Mode: POSITIVE/Transflective
- Viewing Direction: 6 O'clock
- Driving Mode: 1/128Duty, 1/11.6Bias
- Power Supply: Single Power Supply (5.0V \pm 5%)
- Data Transfer: 8 Bit Parallel
- Dot Matrix: 128X112 Dots
- Backlight: EL (Blue-green)

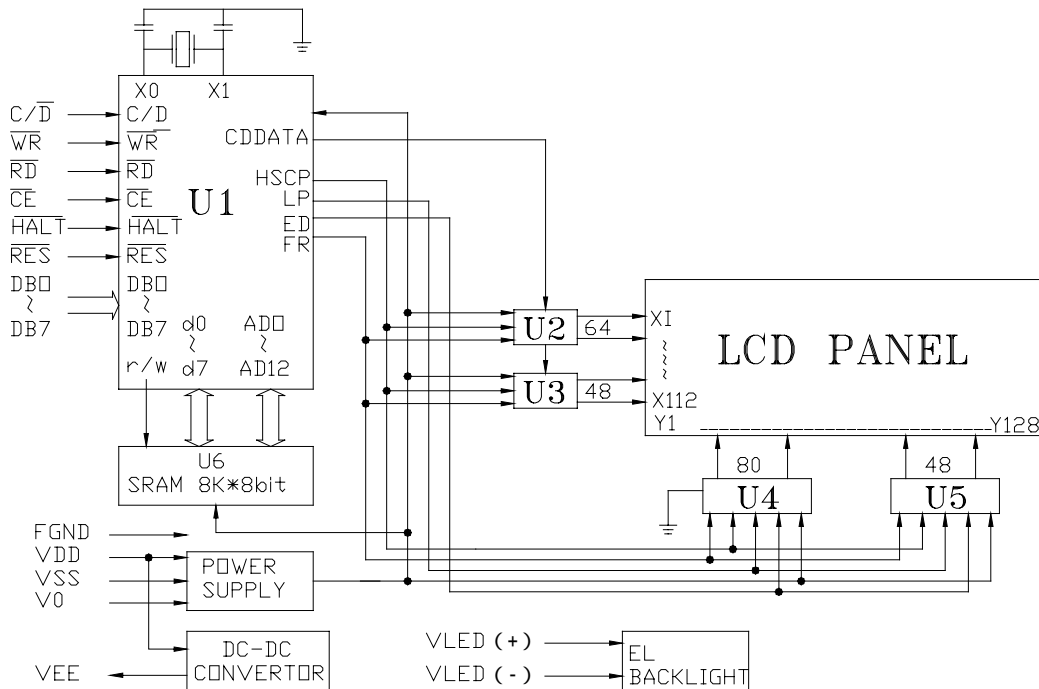
2、 ABSOLUTE MAXIMUM RATINGS

| Item | Symbol | Min. | Max. | Unit |
|------------------------|------------------|------|----------------------|------|
| Power Supply for Logic | V _{DD} | -0.3 | 7.0 | V |
| Input Voltage | V _{in} | -0.3 | V _{DD} +0.3 | V |
| Operating Temperature | T _{opr} | 0 | 50 | |
| Storage Temperature | T _{str} | -20 | 60 | |

3、 MECHANICAL PARAMETERS

| Item | Description | Unit |
|-----------------------|-----------------------------|------|
| LCM Outline Dimension | 110 (L) x 90.6(W) x12.8 (H) | mm |
| Viewing Area | 77.0(L) x 66.0(W) | mm |
| Active Area | 69.08(L) x 59.32(W) | mm |
| DOT SIZE | 0.50 x 0.49 | mm |
| DOT PITCH | 0.54 x 0.53 | mm |
| Weight | TBD | g |

4、 SYSTEM BLOCK DIAGRAM



5、 LIGHTING SPECIFICATIONS

1. Absolute maximum rating

Ta=25°C

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|-----------------|------------|------|------|------|-------|
| Input Voltage | — | — | — | 150 | Vrms |
| Input Frequency | AC100Vrms | — | — | 800 | Hz |

2. Operating characteristics

Ta=25°C

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|--------------------------------|------------------------------------|------|------|------|-------------------|
| Input Voltage | — | — | 100 | — | Vrms |
| Input Frequency | — | — | 400 | — | Hz |
| Current | AC100Vrms, 400Hz | — | 9.4 | 12.0 | mA |
| Luminance of Backlight Surface | AC100Vrms, 400Hz | 40 | 50 | — | cd/m ² |
| Life | AC100Vrms, 400Hz Ta=20°C, 60%RH | 2000 | — | — | hrs |

6、 DC CHARACTERISTICS

(1) Segment Driver Application

| ITEM | SYMBOL | TEST CIR-CUIT | TEST CONDITION | MIN | TYP. | MAX | UNIT | PIN NAME | |
|---------------------------------|-----------------|-----------------|--|--|------------------------|-------------------------|------|--|-----------------|
| Supply Voltage 1 | — | — | — | 4.5 | 5.0 | 5.5 | V | V _{DD} | |
| Supply Voltage 2 | V5 | — | — | V _{DD} -28 | V _{DD} -23 | V _{DD} -8.0 | V | V5 | |
| Input Voltage | H Level | V _{IH} | T _{opr} = -10 to 75°C (*2) | V _{DD} -0.8 (*3) | — | V _{DD} | V | SCP, FR, LP, DIR, EIO1, EIO2, DI1 to DI4, DF1, DF2, DUAL | |
| | L Level | V _{IL} | | T _{opr} = -10 to 75°C (*2) | 0 | — | | | 0.8 (*4) |
| Output Voltage | H Level | V _{OH} | — | V _{DD} -0.3 | — | V _{DD} | V | EIO1, EIO2 | |
| | L Level | V _{OL} | | — | 0 | — | | | 0.3 |
| Output Resistance (1) | H Level | R _{OH} | — | V _{OUT} = V _{DD} - 0.5V | — | — | 1.0 | kΩ | |
| | L Level | R _{OL} | | V _{OUT} = V _{SS} + 0.5V | — | — | 1.0 | | |
| Output Resistance (2) | H Level | R _{OH} | — | V _{OUT} = V _{DD} - 0.5V (*5) | — | — | 1.5 | kΩ | |
| | M Level | R _{OM} | | V _{OUT} = V ₂ ± 0.5V (*5) | — | — | 1.5 | | |
| | | R _{OM} | | V _{OUT} = V ₃ ± 0.5V (*5) | — | — | 1.5 | | |
| | L Level | R _{OL} | | V _{OUT} = V ₅ + 0.5V (*5) | — | — | 1.5 | | |
| Current Consumption (1) (*5) | I _{SS} | — | V _{DD} = 5.5V V5 = -22.5V f _{FR} = 35Hz f _{SCP} = 2.5MHz O1 to O80 : No Load (*7) | Input Data: every bit inverted | — | 1050 | 1400 | μA | V _{SS} |
| | | | | Input Data: low | — | 770 | 1000 | | |
| Current Consumption (2) (*6) | I _{SS} | — | As mentioned above (*7) | Input Data: every bit inverted | — | 260 | 350 | μA | V _{SS} |

NOTES:

- Applied to CL1, CL2, ELB, ERB, D1_SID - D4_DR, SHL, DISPOFFB, M, CS, AMS pin
- ELB, ERB pin
- V0, V12, V43, V5 pin
- V_{LCD} = V_{DD} - V_{EE}, V0 = V_{DD} = 5V, V5 = V_{EE} = -23V
V12 = V_{DD} - 2/n(V_{LCD}), V43 = V_{EE} + 2/n(V_{LCD}), n = 17 (1/256 duty, 1/17 bias)
- V0 = V_{DD}, V12 = 1.71V(V_{DD} = 5V) or -0.06V(V_{DD} = 3V),
V43 = -19.71V(V_{DD} = 5V) or -19.94V(V_{DD} = 3V), V5 = V_{EE} = -23V, no-load condition (1/256 duty, 1/17 bias)
4-bit parallel interface mode
I_{STBY}: V_{DD} = 5V, f_{CL2} = 5.12MHz, SHL = V_{SS}, DISPOFFB = V_{DD}, M = V_{SS}, display data pattern = 0000
I_{DD}: V_{DD} = 3V, f_{CL2} = 4MHz, display data pattern = 0101
V_{DD} = 5V, f_{CL2} = 5.12MHz, display data pattern = 0101
I_{EE}: V_{DD} = 5V, f_{CL2} = 5.12MHz, display data pattern = 0101, V_{EE} pin

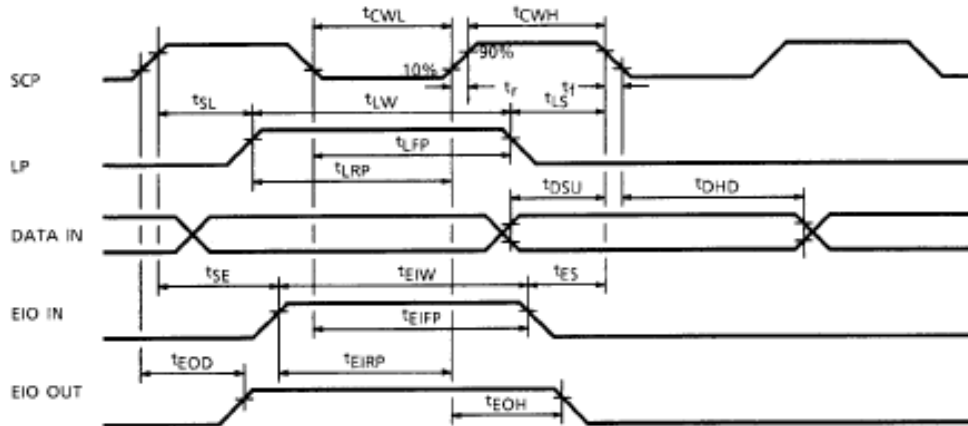
(2) Common Driver Application

| ITEM | SYMBOL | TEST CIR-CUIT | TEST CONDITION | MIN | TYP. | MAX | UNIT | PIN NAME |
|---------------------|-----------------|-----------------|---|-----------------------|------|-----------------------|------|------------------------------------|
| Supply Voltage 1 | V _{DD} | — | — | 4.5 | 5.0 | 5.5 | V | V _{DD} |
| Supply Voltage 2 | V _S | — | — | V _{DD} - 28 | — | V _{DD} - 8.0 | V | V _S |
| Input Voltage | H Level | V _{IH} | (*2) | V _{DD} - 0.8 | — | V _{DD} | V | FR, DIR, DIO1, DIO2, DUAL, LP, TSW |
| | L Level | V _{IL} | (*2) | 0 | — | 0.8 | | |
| Output Voltage | H Level | V _{OH} | I _{OH} = -0.5 mA | V _{DD} - 0.5 | — | V _{DD} | V | DIO1, DIO2 |
| | L Level | V _{OL} | I _{OL} = 0.5 mA | — | — | 0.5 | | |
| Output Resistance | H Level | R _{OH} | V _{OUT} = V _{DD} - 0.5 V (*3) | — | — | 1.2 | kΩ | O1 to O68 |
| | M Level | R _{OM} | V _{OUT} = V ₁ ± 0.5 V (*3) | — | — | 1.2 | | |
| | M Level | R _{OM} | V _{OUT} = V ₄ ± 0.5 V (*3) | — | — | 1.2 | | |
| | L Level | R _{OL} | V _{OUT} = V _S + 0.5 V (*3) | — | — | 1.2 | | |
| Current Consumption | I _{SS} | — | V _{DD} = 5.5 V V _S = -22.5 V f _{FR} = 35.5 Hz f _{LP} = 7.1 kHz O1 to O68 : no load Input Data : f _{DIO} = 71 Hz (Duty : 1 / 100) Input Voltage : H = V _{DD} L = V _{SS} (*3) | — | 2.0 | 4.0 | μA | V _{SS} |

7、 AC CHARACTERISTICS

(1) Segment Driver Application

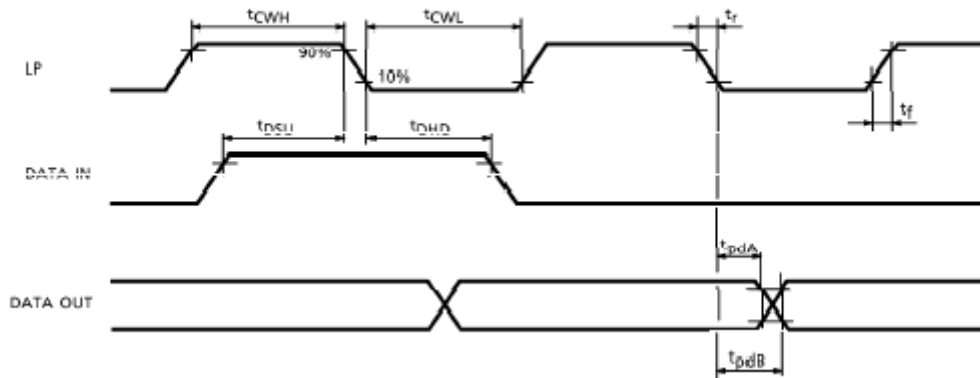
AC CHARACTERISTICS



| ITEM | SYMBOL | TEST CONDITION | MIN | MAX | UNIT |
|---------------------------|------------|----------------|-----|-----|------|
| Operating Frequency | t_{SCP} | — | — | 4.0 | MHz |
| SCP Pulse Width | t_{CWH} | — | 95 | — | ns |
| SCP Pulse Width | t_{CWL} | — | 95 | — | |
| Data Set-up Time | t_{DSU} | — | 20 | — | |
| Data Hold Time | t_{DHD} | — | 40 | — | |
| SCP Rise / Fall Time | t_r, t_f | — | — | 30 | |
| LP Set-up Time | t_{LRP} | — | 20 | — | |
| LP Hold Time | t_{LFP} | — | 40 | — | |
| LP Pulse Width | t_{LW} | — | 40 | — | |
| SCP-Rise-to-LP-Rise Time | t_{SL} | — | 10 | — | |
| LP-Fall-to-SCP-Fall Time | t_{LS} | — | 10 | — | |
| EIO IN Set-up Time | t_{EIRP} | — | 20 | — | |
| EIO IN Hold Time | t_{EIFP} | — | 40 | — | |
| EIO IN Pulse Width | t_{EIW} | — | 40 | — | |
| SCP-Rise-to-EIO-Rise Time | t_{SE} | (*8) | 10 | — | |
| EIO-Fall-to-SCP-Fall Time | t_{ES} | (*8) | 10 | — | |
| EIO OUT Data Delay Time | t_{EOD} | — | — | 100 | |
| EIO OUT Hold Time | t_{EOH} | — | — | 95 | |

(2) Common Driver Application (CL=10 PF)

AC CHARACTERISTICS



| ITEM | SYMBOL | TEST CONDITION | MIN | MAX | UNIT |
|--------------------------|------------|--------------------|-----|-----|---------|
| SCP Pulse Width H | t_{CWH} | LP | 30 | — | ns |
| SCP Pulse Width L | t_{CWL} | LP | 1 | — | μ s |
| Input Rise / Fall Time | t_r, t_f | LP, FR, DIO1, DIO2 | — | 50 | ns |
| Data Set-up Time | t_{DSU} | DIO1, DIO2 | 30 | — | ns |
| Data Hold Time | t_{DHD} | DIO1, DIO2 | 50 | — | ns |
| Output Data Delay Time A | t_{pdA} | DIO1, DIO2 (*4) | 80 | — | ns |
| Output Data Delay Time B | t_{pdB} | DIO1, DIO2 (*4) | — | 1 | μ s |

8、INTERFACE PIN ASSIGNMENT

| NO. | Symbol | Function |
|-----|-------------------|--|
| 1 | FG | FRAME GROUND |
| 2 | V _{SS} | POWER SUPPLY (GND) |
| 3 | V _{DD} | POWER SUPPLY (+5V) |
| 4 | V ₀ | OPERATING VOLTAGE FOR LCD DRIVING |
| 5 | V _{EE} | POWER SUPPLY FOR LCD DRIVING OUTPUT |
| 6 | \overline{WR} | L: DATA WRITE (LCD ← MPU) |
| 7 | \overline{RD} | L: DATA READ (LCD ← MPU) |
| 8 | \overline{CE} | L: CHIP ENABLE |
| 9 | C/ \overline{D} | W/R="L": C/D="H": COMMOND WRITE; C/D="L": DATA WRITE R/D="L", C/D="H": STATUS READ; C/D="L": DATA WRITE |
| 10 | /HALT | H: NORMAL; L: STOPS THE OSCILLATION OF THE CLOCK |
| 11 | RESET | H: NORMAL; L: INITIALIZE |
| 12 | DB0 | DATA INPUT/OUTPUT (LSB) |
| 13 | DB1 | DATA INPUT/OUTPUT |
| 14 | DB2 | DATA INPUT/OUTPUT |
| 15 | DB3 | DATA INPUT/OUTPUT |
| 16 | DB4 | DATA INPUT/OUTPUT |
| 17 | DB5 | DATA INPUT/OUTPUT |
| 18 | DB6 | DATA INPUT/OUTPUT |
| 19 | DB7 | DATA INPUT/OUTPUT |
| 20 | NC | -- |
| 21 | EL1 | POWER SUPPLY FOR LED BACKLIGHT |
| 22 | EL2 | POWER SUPPLY FOR LED BACKLIGHT |

9、COMMAND LIST

| COMMAND | CODE | D1 | D2 | FUNCTION |
|-----------------------|----------|-------------|--------------|--------------------------------|
| REGISTER SET | 00100001 | X address | Y address | Cursor pointer set |
| | 00100010 | Data | 00H | offset register set |
| | 00100100 | Low address | High address | Address pointer set |
| CONTROL WORD SET | 01000000 | Low address | High address | Text home address set |
| | 01000001 | Columns | Columns | Text area set |
| | 01000010 | Low address | High address | Graphic home address set |
| | 01000011 | Columns | Columns | Graphic area set |
| MODE SET | 1000x000 | -- | -- | "OR" mode |
| | 1000x001 | -- | -- | "EXOR" mode |
| | 1000x011 | -- | -- | "AND" mode |
| | 1000x100 | -- | -- | "Text attribute" mode |
| | 1000xxx | -- | -- | Internal CG ROM mode |
| | 10001xxx | -- | -- | External CG RAM mode |
| DISPLAY MODE | 10010000 | -- | -- | Display off |
| | 1001xx10 | -- | -- | Cursor on, blink off |
| | 1001xx11 | -- | -- | Cursor on, blink on |
| | 100101xx | -- | -- | Text on, graphic off |
| | 100110xx | -- | -- | Text off, graphic on |
| | 100111xx | -- | -- | Text on, graphic on |
| CURSOR PATTERN SELECT | 10100000 | -- | -- | 1 line cursor |
| | 10100001 | -- | -- | 2 line cursor |
| | 10100010 | -- | -- | 3 line cursor |
| | 10100011 | -- | -- | 4 line cursor |
| | 10100100 | -- | -- | 5 line cursor |
| | 10100101 | -- | -- | 6 line cursor |
| | 10100110 | -- | -- | 7 line cursor |
| | 10100111 | -- | -- | 8 line cursor |
| COMMAND | CODE | D1 | D2 | FUNCTION |
| DATA AUTO READ/WRITE | 10110000 | -- | -- | Data auto write set |
| | 10110001 | -- | -- | Data auto read set |
| | 10110010 | -- | -- | Auto reset |
| DATA READ/WRITE | 11000000 | Data | -- | Data write and ADP increment |
| | 11000001 | -- | -- | Data read and ADP increment |
| | 11000010 | Data | -- | Data write and ADP decrement |
| | 11000011 | -- | -- | Data read and ADP decrement |
| | 11000100 | Data | -- | Data write and ADP nonvariable |
| | 11000101 | -- | -- | Data read and ADP nonvariable |
| SCREEN PEEK | 11100000 | -- | -- | Screen peek |
| SCREEN COPY | 11101000 | -- | -- | Screen copy |
| BIT SET/RESET | 11110xxx | -- | -- | bit reset |
| | 11111xxx | -- | -- | bit set |
| | 1111x000 | -- | -- | bit0(LSB) |
| | 1111x001 | -- | -- | bit1 |
| | 1111x010 | -- | -- | bit2 |
| | 1111x011 | -- | -- | bit3 |
| | 1111x100 | -- | -- | bit4 |
| | 1111x101 | -- | -- | bit5 |
| | 1111x110 | -- | -- | bit6 |
| | 1111x111 | -- | -- | bit7(MSB) |

10、ASSEMBLY DIAGRAM

| PIN | SYMBOL |
|-----|--------|
| 1 | FC |
| 2 | VSS |
| 3 | VCC |
| 4 | V0 |
| 5 | VEE |
| 6 | /WR |
| 7 | /RD |
| 8 | /CE |
| 9 | C/D |
| 10 | /HALT |
| 11 | /RESET |
| 12 | DB0 |
| 13 | DB1 |
| 14 | DB2 |
| 15 | DB3 |
| 16 | DB4 |
| 17 | DB5 |
| 18 | DB6 |
| 19 | DB7 |
| 20 | NC |
| 21 | EL1 |
| 22 | EL2 |

(SCALE 12:1)

REMARK:

- 1 DISPLAY TYPE: FSTN
- 2 DISPLAY MODE: POSITIVE
- 3 BACKLIGHT: EL, BLUE-GREEN
- 4 OPERATING TEMP: 0° C-50° C
- 5 STORAGE TEMP: -20° C-60° C

| | | |
|-------------------|--|-------|
| DUTY CYCLE | | 1/128 |
| BIASING | | 1/116 |
| OPERATING VOLTAGE | | 5.0V |
| CLOCK | | 6 0 |

| | | | |
|------------|--|--------------------------|--|
| TITLE | | CASIL SEMICONDUCTOR LTD. | |
| PRODUCT NO | | CGM28112FE | |
| REV | | C | |
| UNIT | | MM | |
| SCALE | | APPD | |

| | | | | | |
|------|------|--------------|--------|------|--------------|
| CH | APPD | DATE | STATUS | APPD | DATE |
| FROM | TO | MODIFICATION | FROM | TO | MODIFICATION |