# MOSAIC DISPLAY UNIT

## RCM1583U-A

Thanks to the high contrast and wide viewing angle of the RCM1583U-A, which is provided by its unique design technology, this module brings forth new applications in brand new LCD fields. ROHM large-sized LCD units are perfect displays for information or sign boards. As a media for informational display, large-sized LCD units must possess high visibility, wide viewing angles, and other such superior qualities. ROHM large-sized LCDs boast an excellent track record and possess guaranteed functionality for assured satisfaction in a variety of situations.

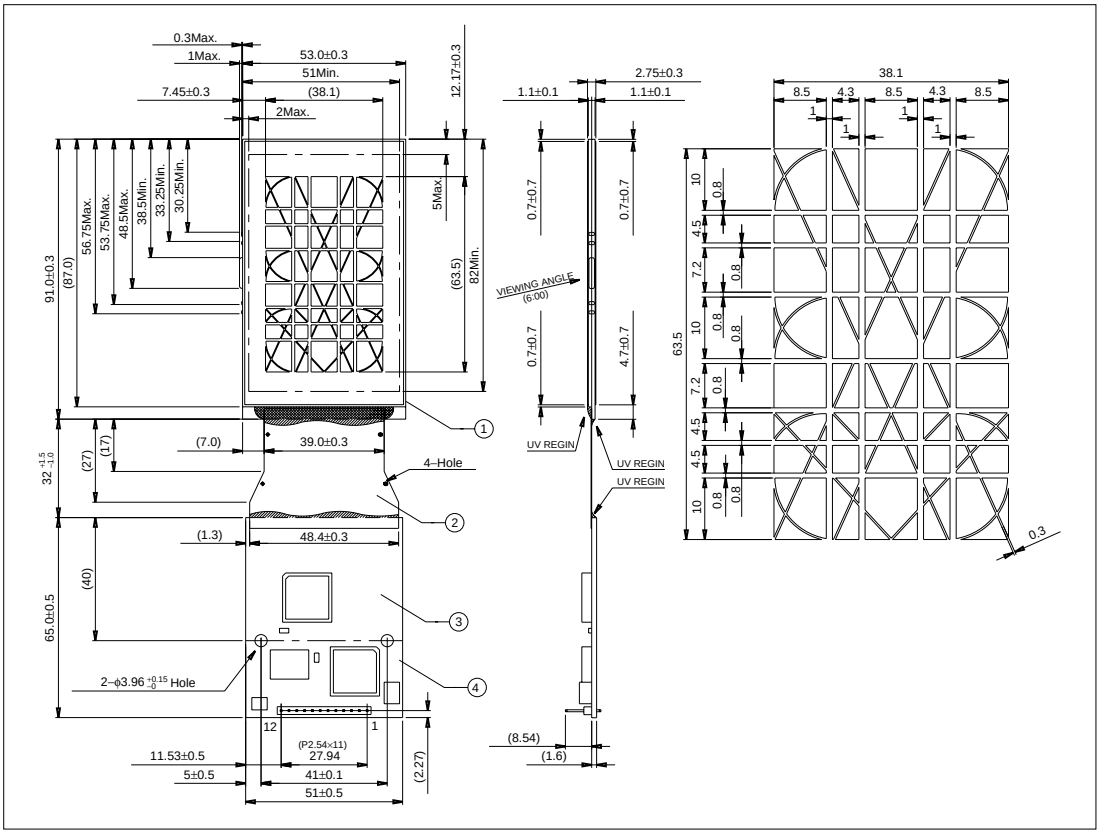
### ●Applications

Indoor information board (airport, train station, bus depot), In-hall or in-store display, public message board.

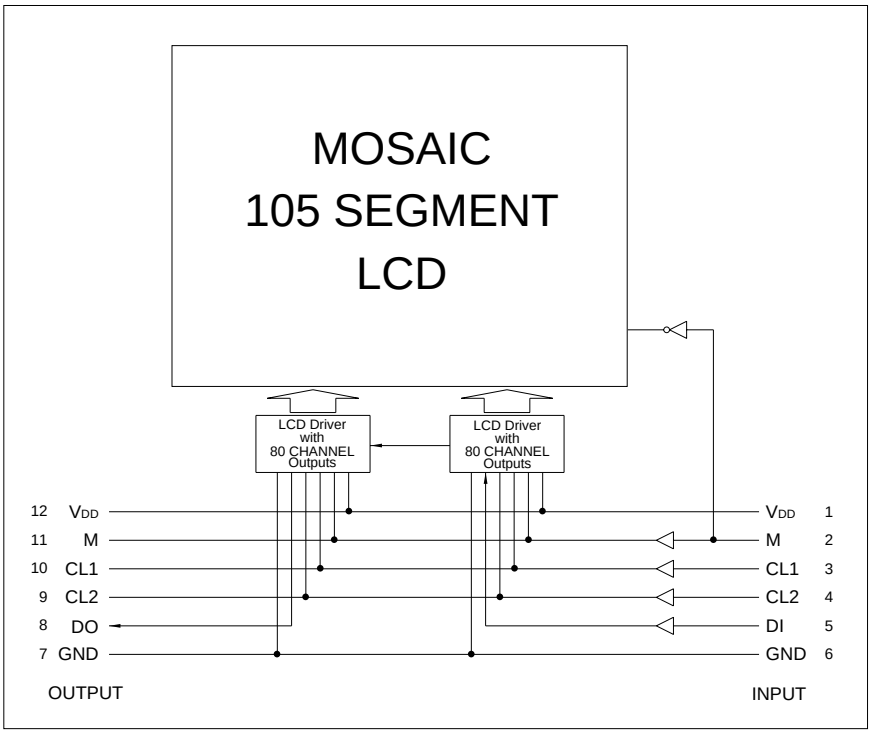
### ●Features

1) Most suitable for the alphabet and number display.
2) Wide viewing angle and high contrast.
3) Compact and light weight for easy assembly.
4) Low power consumption.

### ●External dimensions (Units : mm)



●**Block diagram**

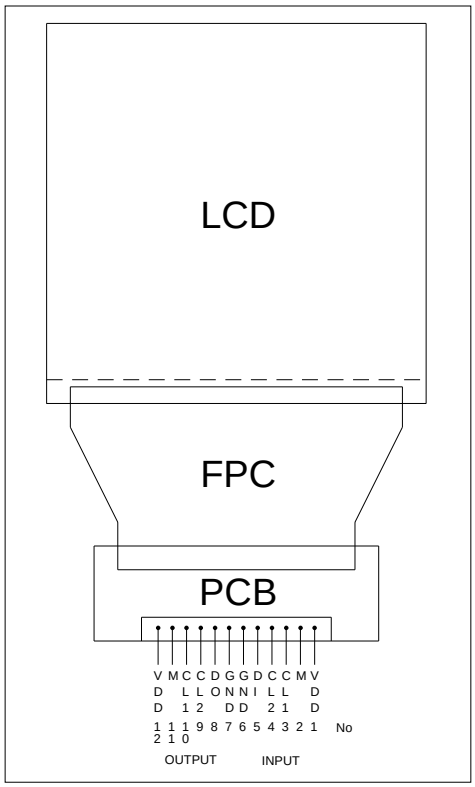



●**Pin functions**

(1) Input (CN1)

| Pin No. | Symbol | IN / OUT | Function |
|---|---|---|---|
| 1 | $V_{DD}$ | – | Charge 5Volt |
| 2 | M | IN | Alternating signal of LCD operating output |
| 3 | CL1 | IN | Data latch signal (display at descending edge) |
| 4 | CL2 | IN | Shift resistor signal (displayed at descending edge) |
| 5 | DI | IN | Display data signal (1: Lighting 0: Non-Lighting) |
| 6 | GND | – | Ground electric potential |
| 7 | GND | – | Ground electric potential |
| 8 | DO | OUT | Display data signal |
| 9 | CL2 | OUT | Shift resistor signal |
| 10 | CL1 | OUT | Data latch signal |
| 11 | M | OUT | Alternating signal |
| 12 | $V_{DD}$ | – | 5Volt |

●**Pin**



## ●Absolute maximum ratings (Ta = 25°C)

| Parameter | | Symbol | Limits | Unit |
|---|---|---|---|---|
| Power supply voltage | Circuit | $V_{DD}$ | –0.3 ~ +7.0 | V |
| | LCD operation | $V_{DD}$–$V_{EE}$ | –0.3 ~ +7.0 | V |
| Input voltage | | $V_{IN}$ | –0.3 ~ $V_{DD}$+0.3 | V |
| Operating temperature | | Topr | –20 ~ +70 | °C |
| Storage temperature | | Tstg | –40 ~ +85 | °C |

## ●Electrical characteristics ($V_{DD}$ = 5.0V, GND = 0V, Ta = 25°C)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| Input high level voltage | $V_{IH}$ | 0.8$V_{DD}$ | – | $V_{DD}$ | V | |
| Input low level voltage | $V_{IL}$ | – | – | 0.2$V_{DD}$ | V | |
| Output high level voltage | $V_{OH}$ | $V_{DD}$–0.4 | – | – | V | $I_{OH}$ = –0.4mA |
| Output low level voltage | $V_{OL}$ | – | – | 0.4 | V | $I_{OL}$ = +0.4mA |
| Input LCD voltage | VLCD | – | 5.0 | – | V | |
| Comsumpting current | $I_{DD}$ | – | – | 6.0 | mA | $f_{CL}$ = 1MHz, $f_M$ = 100Hz |

## ●AC characteristics ($V_{DD}$ = 5.0V, GND = 0V, Ta = 25°C)

| Parameter | Symbol | Applicable terminal | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Data shift flequency | $f_{CL}$ | CL2 | – | – | 1 | MHz |
| Clock high level width | $t_{CWH}$ | CL1, CL2 | 470 | – | – | ns |
| Clock low level width | $t_{CWL}$ | CL2 | 470 | – | – | ns |
| Data setup time | $t_{SU}$ | DI | 120 | – | – | ns |
| Clock setup time 1 | $t_{SL}$ | CL2 | 220 | – | – | ns |
| Clock setup time 2 | $t_{LS}$ | CL1 | 220 | – | – | ns |
| Data hold time | $t_{DH}$ | DI | 120 | – | – | ns |
| Clock rise / fall time | $t_{ct}$ | CL1, CL2 | – | – | 50 | ns |
| Output delay time | $t_{pd}$ | DO | – | – | 250 | ns |
| Alternating signal | $f_M$ | M | 50 | 100 | 150 | Hz |

## ●Timing characteristics

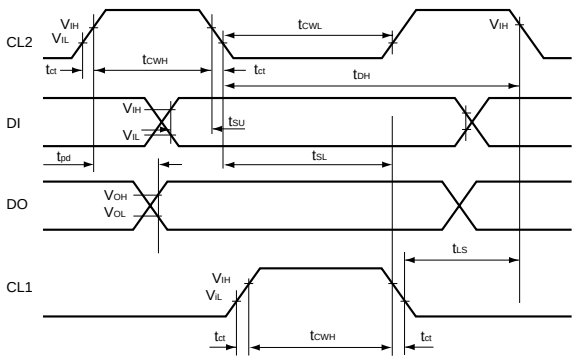


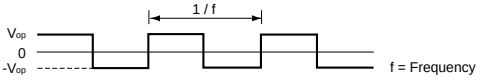

Fig.1

●**Optical characteristics** (Ta = 25°C)

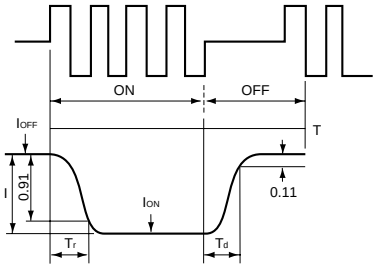
| No. | Parameter | | Symbol | Temperature (°C) | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Response time | | Tr | 0 | – | 400 | 800 | ms | (Note 2) |
| | | | | 25 | – | 65 | 100 | | |
| | | | Td | 0 | – | 150 | 300 | | |
| | | | | 25 | – | 45 | 100 | | |
| 2 | Viewing Range | Vertical | θ | 25 | 0 | – | 60 | deg | (Note 3) K≥3 |
| | | horizontal | ϕ | 25 | 90 | – | 270 | | |
| 3 | Contrast ratio | | K | 25 | 35 | 50 | – | – | ϕ = 180°, θ = 10° |

(Note 1) Driving pulse

Static drive




(Note 2) Response time definition and condition



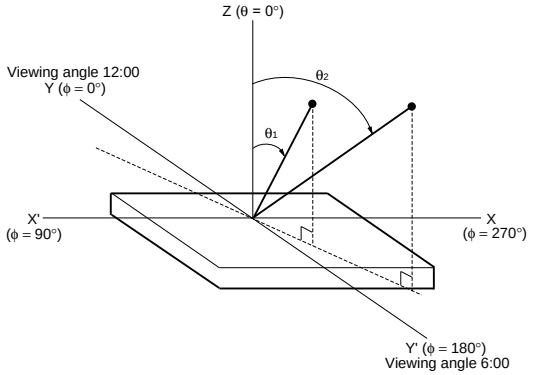

Tr : The time required to activate from non-selecting wave pattern to selecting wave pattern and to change 90% for darken.

ϕ = 180°, θ = 10°

Td : The time required to activate from selecting wave pattern to non-selecting wave pattern and to change 90% for darken.

ϕ = 180°, θ = 10°

(Note 3) Definition of viewing angle (ϕ, θ)




(1) ϕ : Angle which an obsever will become Z Z'.

(2) θ : When obsevers position is consideres as flat X,Y over a projector angle which makes Y Y'.

(3) Greatest viewing angle derection : Time axis which represent best contrast ratio.

(Note 4) Definition of contrast ratio

<Definition>

$$\text{Contrast ratio} = \left( \frac{\text{Luminous intensity at off segment transmissivity}}{\text{Luminous intensity at on segment transmissivity}} \right)^{n}$$

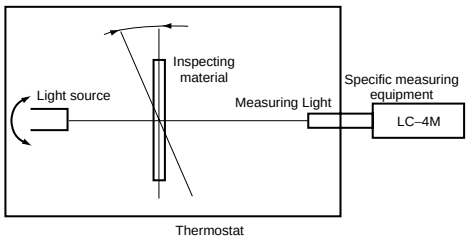
Positive type n = 1, Negative type n = -1

<Measurement conditions>

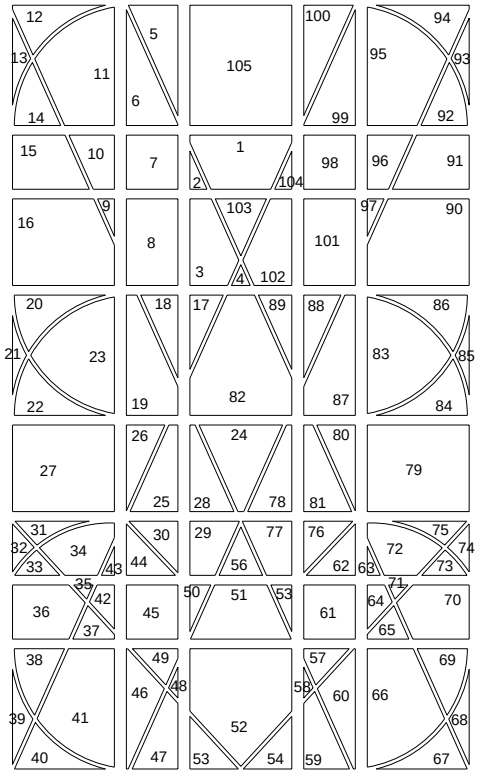
Drive conditions: Specific value condition

Viewing angle: ϕ = 180°, θ = 10°

(Note 5) Optical measuring equipment theory plan



●**Data format** (data and display mapping)

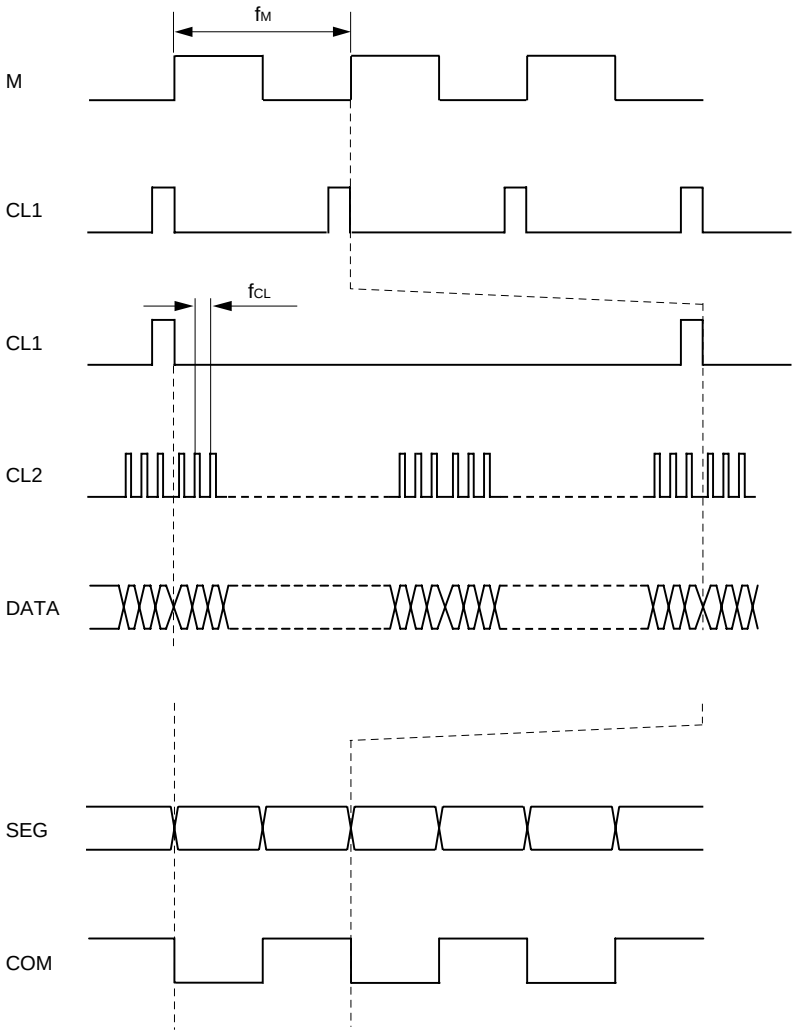



FIRST DATA ←

| D1 | D2 | D3 | — — — — — | D103 | D104 | D105 | D106 | D107 | — — — | D159 | D160 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| effective data | | | | | | | invalid data | | | | |

→ LAST DATA

●**Timing chart**




Note) LCD operation output voltage

| M | DATA | COM Voltage | SEG Voltage |
|---|---|---|---|
| 1 | 1 | GND | $V_{DD}$ |
| 1 | 0 | GND | GND |
| 0 | 1 | $V_{DD}$ | GND |
| 0 | 0 | $V_{DD}$ | $V_{DD}$ |

**●Operation notes**

(1) Handling instruction

- Attention must be paid to avoid external shock, which will cause operational failure.
- Polarizer on the surface is gentle and can be damaged easily by scratch, thus please take extra care when handling. For surface termination, please wipe off with alcohol.
- The liquid used in the LCD panel is a harmful substance and must not be licked or awallowed. If you touch this liquid, wash it out completely.
- Do not touch IC lead and terminal.
- Do not expose to direct sunlight for a long period of time and if it will be used at direct sunlight, recommend to use UV cut filter.
- For storage please avoid in high temperature, high humidity. When long-term storage is required, keep the panels in low temperature (5°C ~ 25°C) and low humidity.
- To prevent TAB damage, TAB bent time must be up to twice.

(2) Operational instruction

- Please do not connect or take away the LCD module to the system in the condition of power on.
- Please input signal after LCD module power is turned on when turning off. Please turn off from input signal. In worst case IC can be broken by ratch up phenomenon.

(3) Mounting instruction

- In the circuit CMOS-IC is used. Please be careful for ESD.
- Protection sheet is put on LCD module surface and back side. At removing the sheet, electric static is generated. So it must be removed slowly and recommend to use Ion blower etc.

(4) Cautions for LCD with FPC

- Do not pend nor pull FPC.
- Do not hold FPC with fingers directly nor suspend FPC.
- When bending FPC, keep 5mm from the edge of grass (FPC joint) and bend toward mother board side.

(5) Production

- Production in Japan or China.