24 × 24 dots multicolored large-sized liquid crystal display unit

RCM1381U-A

Thanks to the high contrast and wide viewing angle of the RCM1381U-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.
Moreover, the RCM1381U-A is a multi-purpose 24 × 24 dot multicolor display that is capable of displaying eight different colors for a vivid and colorful display.

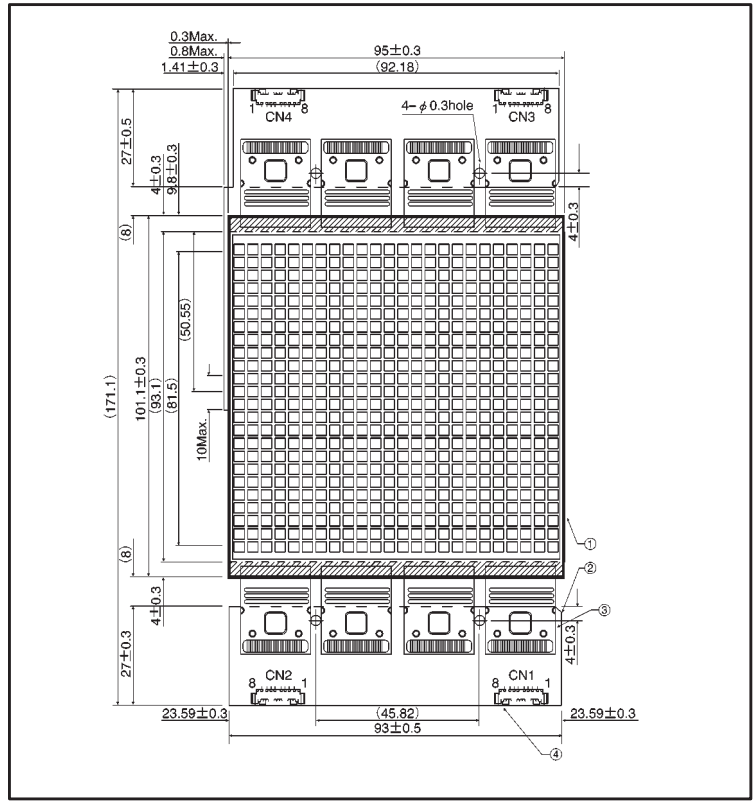
●Applications

Large displays such as airport displays, train station displays, message boards, etc.

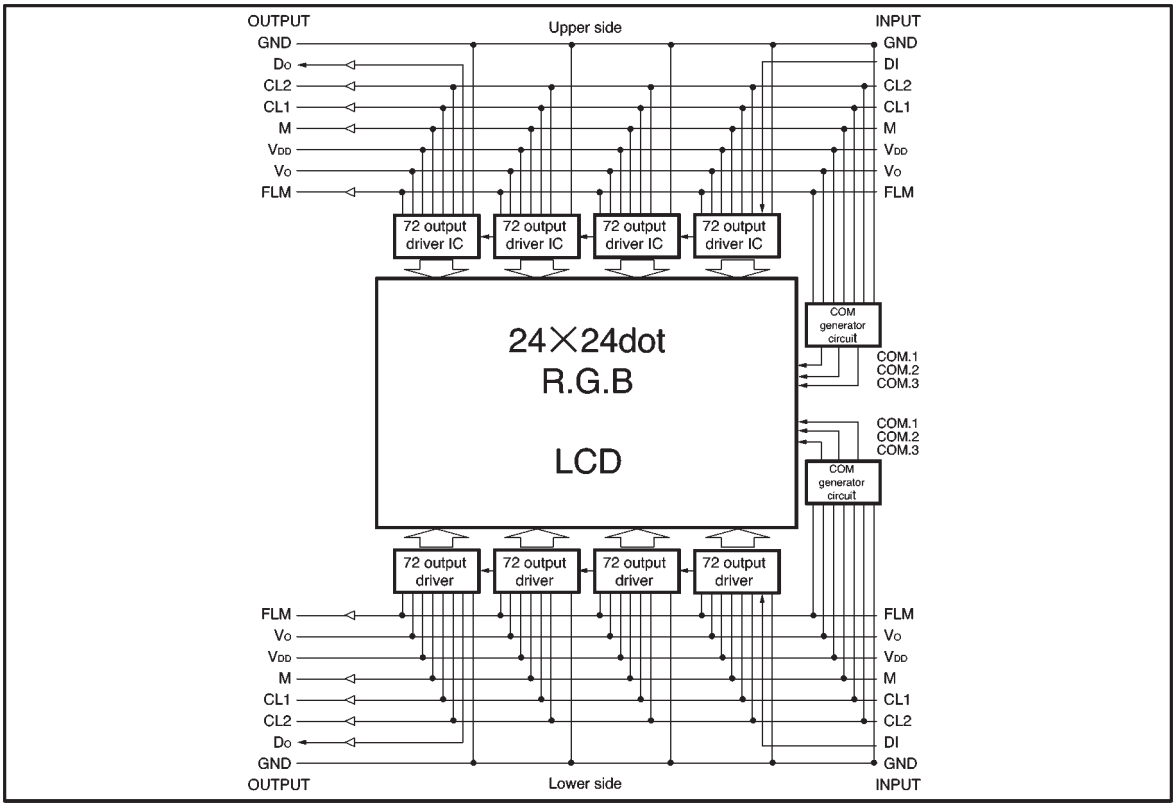
●Features

1) Wide viewing angle, high contrast, and fast response.
2) Compact and lightweight for easy assembly.
3) Low power consumption.

●External dimensions (Unit: mm)



●Block diagram



●Pin functions

(1) Upper board

Input (CN3)

Pin No.	Signal	IN / OUT	Function
1	GND	—	Ground potential
2	D	IN	Display data signal (1 : On, 0 : Off)
3	CL2	IN	Shift register shift signal, reads data at rise / fall
4	CL1	IN	Data latch signal, displays at rise / fall edge
5	M	IN	AC conversion signal for liquid crystal drive output
6	V_{DD}	—	5 volts
7	VO	—	Liquid crystal drive power supply
8	FLM	IN	Frame start signal

Output (CN4)

Pin No.	Signal	IN / OUT	Function
1	GND	—	Ground potential
2	DO	OUT	Display data signal
3	CL2	OUT	Shift register shift signal
4	CL1	OUT	Data latch signal
5	M	OUT	AC conversion signal
6	V_{DD}	—	5 volts
7	VO	—	Liquid crystal drive power supply
8	FLM	OUT	Frame start signal

(2) Lower board

Input (CN1)

Pin No.	Signal	IN / OUT	Function
1	FLM	IN	Frame start signal
2	VO	—	Liquid crystal drive power supply
3	V_{DD}	—	5 volts
4	M	IN	AC conversion signal for liquid crystal drive output
5	CL1	IN	Data latch signal, displays at rise / fall edge
6	CL2	IN	Shift register shift signal, reads data at rise/fall
7	DI	IN	Display data signal (1 : On, 0 : Off)
8	GND	—	Ground potential

Output (CN2)

Pin No.	Signal	IN / OUT	Function
1	FLM	OUT	Frame start signal
2	VO	—	Liquid crystal drive power supply
3	V_{DD}	—	5 volts
4	M	OUT	AC conversion signal
5	CL1	OUT	Data latch signal
6	CL2	OUT	Shift register shift signal
7	DO	OUT	Display data signal
8	GND	—	Ground potential

●Absolute maximum ratings (Ta=25°C)

Parameter		Symbol	Limits	Unit
Power supply voltage	Logic circuit	V_{DD}	−0.3～+7.0	V
	LCD drive	V_{DD}-V_{EE}	−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_{stg}	−10～+60	℃

●Electrical characteristics

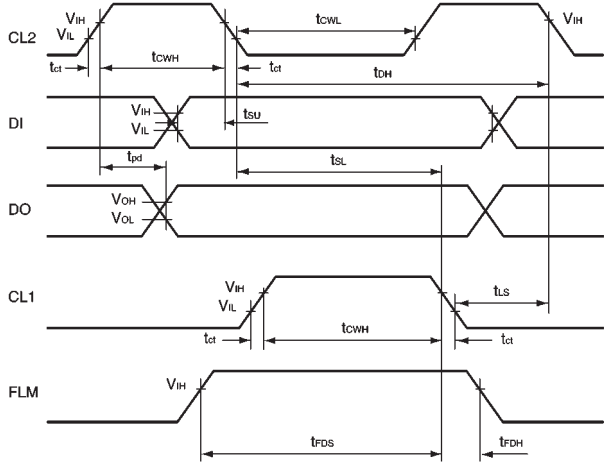
●DC characteristics (V_{DD}=5.0V±10%, V_{DD}-V_{EE}=3.0 to 6.0V, GND=0V, Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
High level input voltage	V_{IH}	3.5	—	—	V	
Low level input voltage	V_{IL}	—	—	1.5	V	
High level output voltage	V_{OH}	4.6	—	—	V	I_{OH}=−0.4mA
Low level output voltage	V_{OL}	—	—	0.4	V	I_{OH}=+0.4mA
Recommended LCD drive voltage	V_{LCD}	—	4.2	5.0	V	Ta=25℃
Current dissipation	I_{DD}	—	—	25.0	mA	f_{CL}=1MHz、f_M=70Hz

●AC characteristics (V_{DD}=5.0V±10%, V_{DD}-V_{EE}=3.0 to 6.0V, GND=0V, Ta=25°C)

Parameter	Symbol	Applicable terminal	Min.	Typ.	Max.	Unit
Shift frequency	f_{CL}	CL2	—	—	4	MHz
High level lock width	t_{CWH}	CL1, CL2	470	—	—	ns
Low level lock 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
FLM setup time	t_{FDS}	FLM	120	—	—	ns
FLM hold time	t_{FDH}	FLM	120	—	—	ns
Clock rise/fall time	t_{ct}	CL1, CL2	—	—	50	ns
Output delay time	t_{pd}	DO	—	—	250	ns
AC conversion signal	f_M	M	—	70	—	Hz

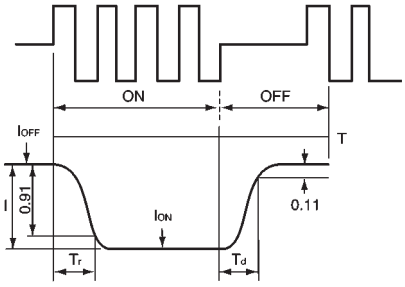
●Timing characteristics



●Optical characteristics (Ta=25°C)

No.	Parameter		Symbol	Temperature(℃)	Measuremenrt points			Unit	Note
					Min.	Typ.	Max.		
1	Response speed		Tr	25	—	75	150	ms	(Note 1)
				0	—	500	1000		
			Td	25	—	60	120		
				0	—	360	750		
2	Viewing angle	Front-back	θ	25	0	—	60	deg	K≧3 (Note 2)
		Right-left	ϕ	25	−40	—	270		
3	Contrast ratio		K	25	15	30	—		ϕ =180° θ =10°

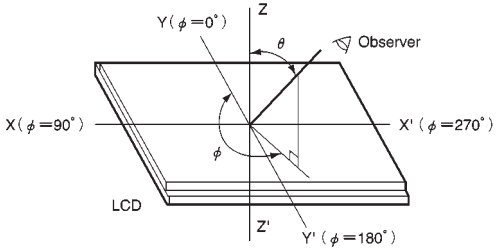
(Note 1) Definition of response speed



Tr : Time for segment to darken 90% after selective waveform switches to non-selective waveform.
ϕ = 180°, θ = 10°

Td : Time for segment to darken 90% after selective waveform switches to non-selective waveform.
ϕ = 180°, θ = 10°

(Note 2) Definition of viewing angle (ϕ, θ)



(1) ϕ : Angle subtended by the Y-Y'-axis and the observer's position projected onto the XY-plane.

(2) θ : Angle subtended by observer and the normal Z-Z'-axis (X-axis and Y-axis are positive)

(3) Maximum viewing angle: The direction with highest contrast expressed at the time axis (refer to above table).

(Note 3) Definition of contrast ratio

< Definition >

$$\text{Contrast ratio} = \left(\frac{\text{Luminance during application of non-selective waveform}}{\text{Luminance during application of selective waveform}} \right)^{n}$$

Except, n = 1 with positive display and n = −1 with negative display.

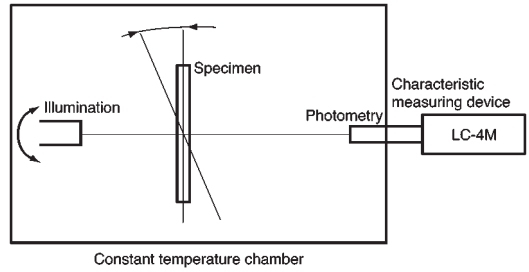
< Measurement conditions >

Drive conditions : As per specifications

Viewing angle : ϕ = 180°

θ = 10°

(Note 4) Principles of optical measuring equipment



●Data format

Upper

D1 RGB	D13 RGB	D25 RGB	D37 RGB					D241 RGB	D253 RGB	D265 RGB	D277 RGB
D2 RGB	D14 RGB	D26 RGB	D38 RGB					D242 RGB	D252 RGB	D266 RGB	D278 RGB
D3 RGB	D15 RGB	D27 RGB	D39 RGB					D243 RGB	D251 RGB	D265 RGB	D279 RGB
D4 RGB	D16 RGB	D28 RGB	D40 RGB					D244 RGB	D250 RGB	D264 RGB	D280 RGB
D5 RGB											D281 RGB
D6 RGB											D282 RGB
D7 RGB											D283 RGB
D8 RGB											D284 RGB
D9 RGB	D21 RGB	D33 RGB	D45 RGB					D249 RGB	D261 RGB	D273 RGB	D285 RGB
D10 RGB	D22 RGB	D34 RGB	D46 RGB					D250 RGB	D262 RGB	D274 RGB	D286 RGB
D11 RGB	D23 RGB	D35 RGB	D47 RGB					D251 RGB	D263 RGB	D275 RGB	D287 RGB
D12 RGB	D24 RGB	D36 RGB	D48 RGB					D252 RGB	D264 RGB	D276 RGB	D288 RGB

Lower

D1 RGB	D13 RGB	D25 RGB	D37 RGB					D241 RGB	D253 RGB	D265 RGB	D277 RGB
D2 RGB	D14 RGB	D26 RGB	D38 RGB					D242 RGB	D252 RGB	D266 RGB	D278 RGB
D3 RGB	D15 RGB	D27 RGB	D39 RGB					D243 RGB	D251 RGB	D265 RGB	D279 RGB
D4 RGB	D16 RGB	D28 RGB	D40 RGB					D244 RGB	D250 RGB	D264 RGB	D280 RGB
D5 RGB											D281 RGB
D6 RGB											D282 RGB
D7 RGB											D283 RGB
D8 RGB											D284 RGB
D9 RGB	D21 RGB	D33 RGB	D45 RGB					D249 RGB	D261 RGB	D273 RGB	D285 RGB
D10 RGB	D22 RGB	D34 RGB	D46 RGB					D250 RGB	D262 RGB	D274 RGB	D286 RGB
D11 RGB	D23 RGB	D35 RGB	D47 RGB					D251 RGB	D263 RGB	D275 RGB	D287 RGB
D12 RGB	D24 RGB	D36 RGB	D48 RGB					D252 RGB	D264 RGB	D276 RGB	D288 RGB

FIRST DATA ←

Upper

D1	D2	D3	D4				D285	D286	D287	D288

COM.1(Red)

D1	D2	D3	D4				D285	D286	D287	D288

COM.2(Green)

D1	D2	D3	D4				D285	D286	D287	D288

COM.3(Blue)

→ LAST DATA

FIRST DATA ←

Lower

D1	D2	D3	D4				D285	D286	D287	D288

COM.1(Red)

D1	D2	D3	D4				D285	D286	D287	D288

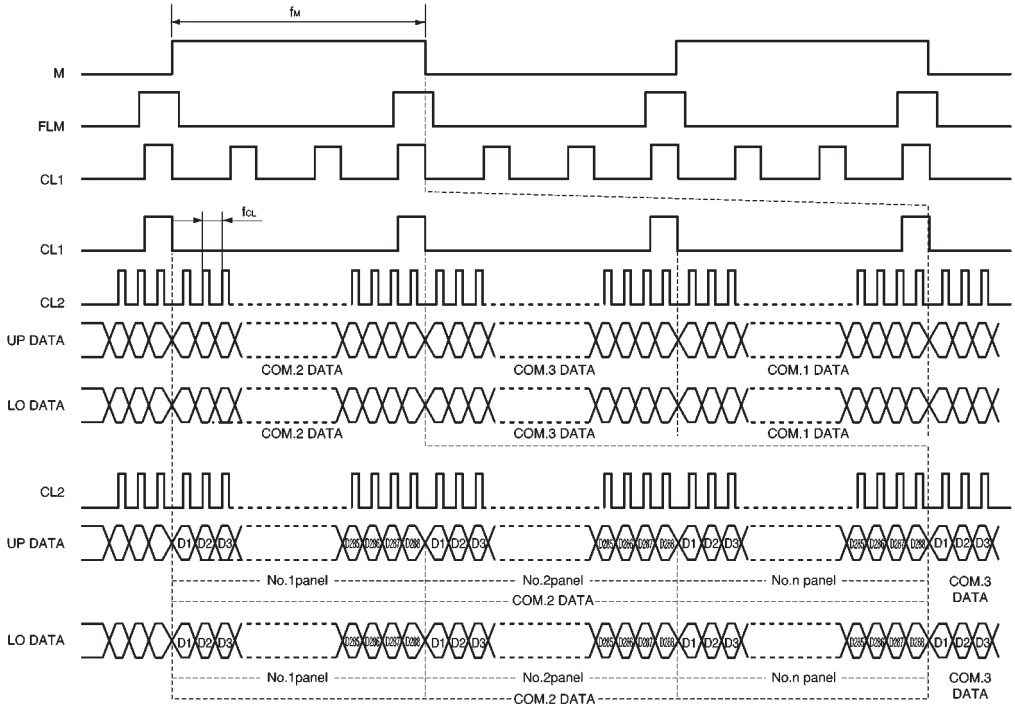
COM.2(Green)

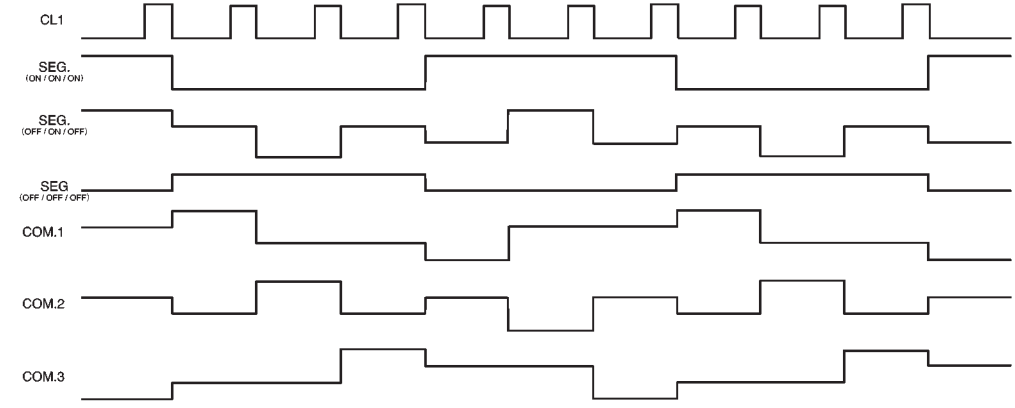
D1	D2	D3	D4				D285	D286	D287	D288

COM.3(Blue)

→ LAST DATA

●Timing chart





●Precautions during use

(1) Handling precautions

- Protect the module from strong shocks as they can cause damage or defective operation.
- The polarizing plate on the surface of the module is soft and can easily be scratched. Wipe away dirt and dust using an alcohol-based cleanser.
- If the liquid crystal panel is damaged and liquid crystal contacts your clothing or body, wash immediately with soap and water.
- Do not touch the IC lead electrodes or the electrode terminal components.
- If the module is to be used for long periods subjected to direct sunlight, employ a filter to block the ultraviolet rays.

(2) Precautions during operation

- Do not connect or disconnect the module while the power supply is turned on.
- Input the input signal after the module power supply is turned on. When turning it off, turn off the input signal first. Otherwise the IC may be damaged by the latch-up phenomenon.

(3) Precautions during installation

- Be careful to avoid damage from static electricity. A CMOS-IC is used in the module circuitry that can be easily damaged by static electricity.
- A protective film is pasted over the front and back of the module to protect the panel surfaces. When peeling this film off, be sure to peel as slow as possible in order to minimize the generation of static electricity. Use of an ion blower or other deionizing device is recommended.