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

RCU1383U-A

Thanks to the high contrast and wide viewing angle of the RCU1383U-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.

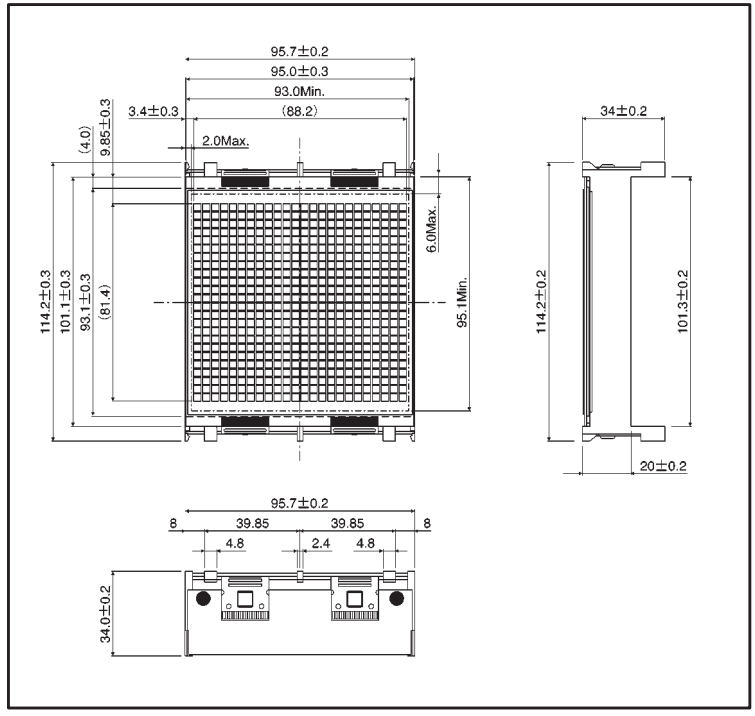
●Applications

Public displays such as airport displays, train station displays, information boards, and billboards.

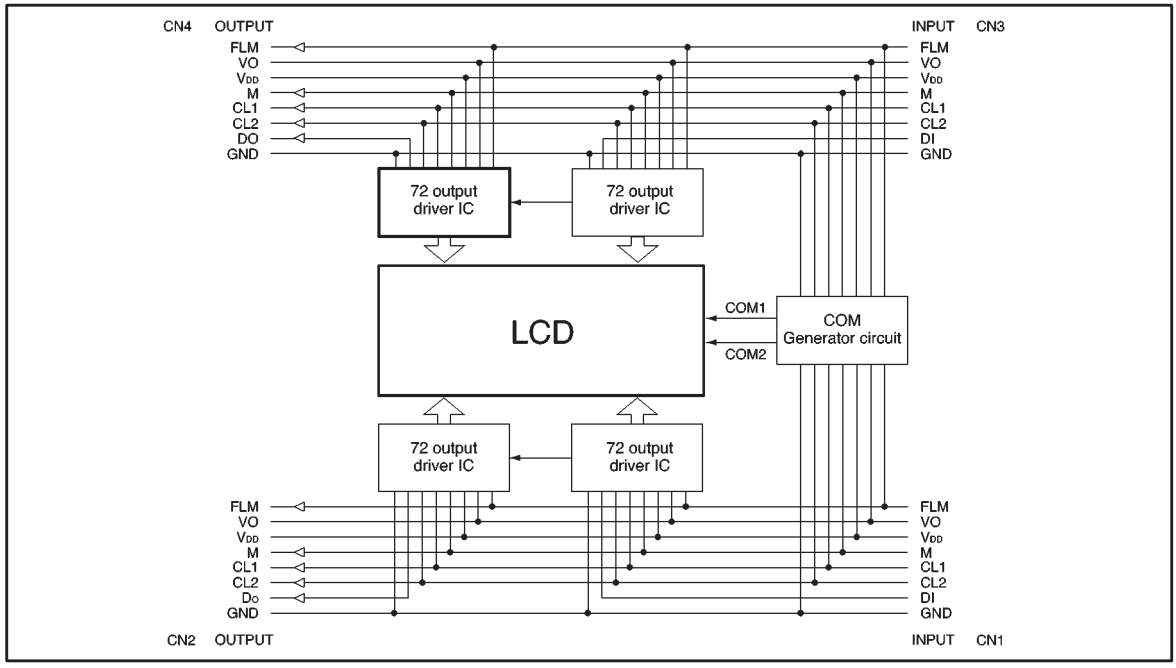
●Features

1) Wide viewing angle, high contrast, and fast response.
2) Compact and light weight for easy assembly.
3) Supports negative or positive display.
4) Low power consumption.

●External dimensions (Units: mm)



●Block diagram



●Pin functions

(1) Upper board

Input (CN3)

Pin no.	Symbol	IN / OUT	Function
1	GND	—	Ground potential
2	DI	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.	Symbol	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.	Symbol	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.	Symbol	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	Limics	Unit
Logic power supply voltage	V_{DD}	−0.3～+7.0	V
LCD drive voltage	V_{DD}-V_O	−0.3～+7.0	V
Input voltage	V_{IN}	−0.3～V_{DD}+0.3	V
Operating temperature	Topr	0～+50	℃
Storage temperature	Tstg	−10～+60	℃

●Electrical characteristics (V_{DD} = 5.0 V ± 0.25 V, Ta = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input high level voltage	V_{IH}	3.5	—	—	V	
Input low level voltage	V_{IL}	—	—	1.5	V	
Output high level voltage	V_{OH}	4.6	—	—	V	I_{OH}=−0.4mA
Output low level voltage	V_{OL}	—	—	0.4	V	I_{OL}=+0.4mA
Power supply current	I_{DD}	—	3.0	10	mA	F_{CL}=1MHz, F_M=70Hz

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

Parameter	Symbol	Applicable terminal	Min.	Typ.	Max.	Unit
Shift frequency	f_{CL}	CL2	—	—	1	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
Clock rise / fall time	t_{ct}	CL1, CL2	—	—	50	ns
FLM setup time	t_{FDS}	FLM	120	—	—	ns
FLM hold time	t_{FDH}	FLM	120	—	—	ns
Output delay time	t_{pd}	DO	—	—	250	ns
AC conversion signal	f_M	M	—	70	—	Hz

●Timing characteristics

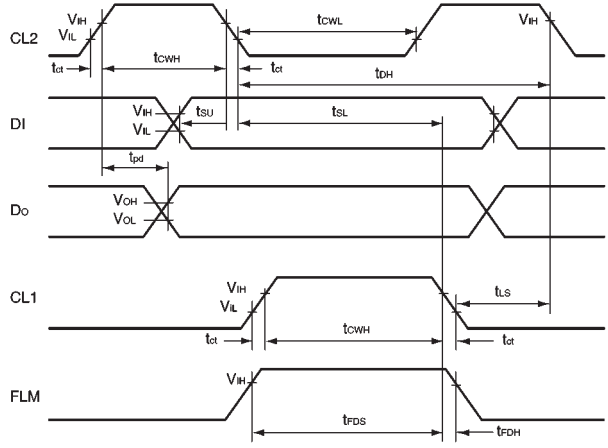
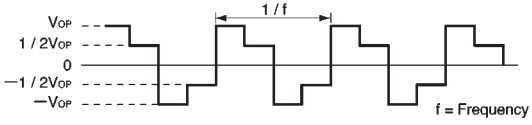


Fig.1

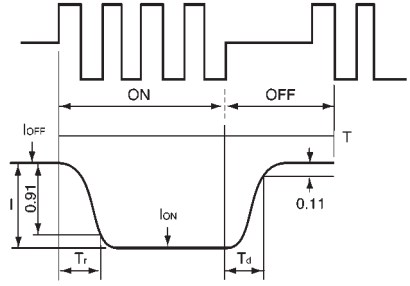
●Optical characteristics (Ta = 25°C)

NO.	Parameter		Symbol	Temperature (℃)	Min.	Typ.	Max.	Unit	Note
1	Response speed		Tr	25	—	65	130	ms	(Note 2)
			Td	25	—	45	100		
2	Viewing angle	Front-back	θ	25	0	—	60	deg	K≧3 (Note 3)
		Right-left	ϕ	25	90	—	270		
3	Contrast ratio			25	20	—	—	—	(Note 4)

(Note 1) Drive waveform
Static drive



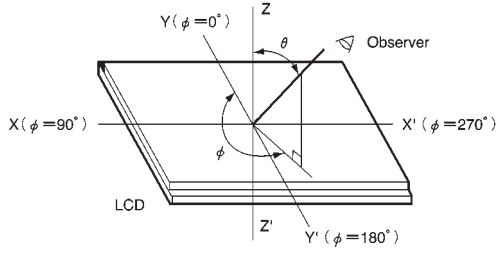
(Note 2) Definition of response speed



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 3) 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 4) Definition of contrast ratio

〈Definition〉

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

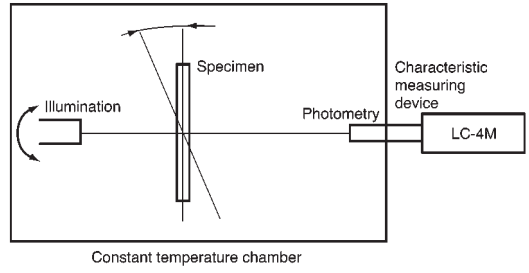
Except, n = 1 with positive display and n = −1 with negative display.

〈Measurement conditions〉

Drive conditions: As per specifications

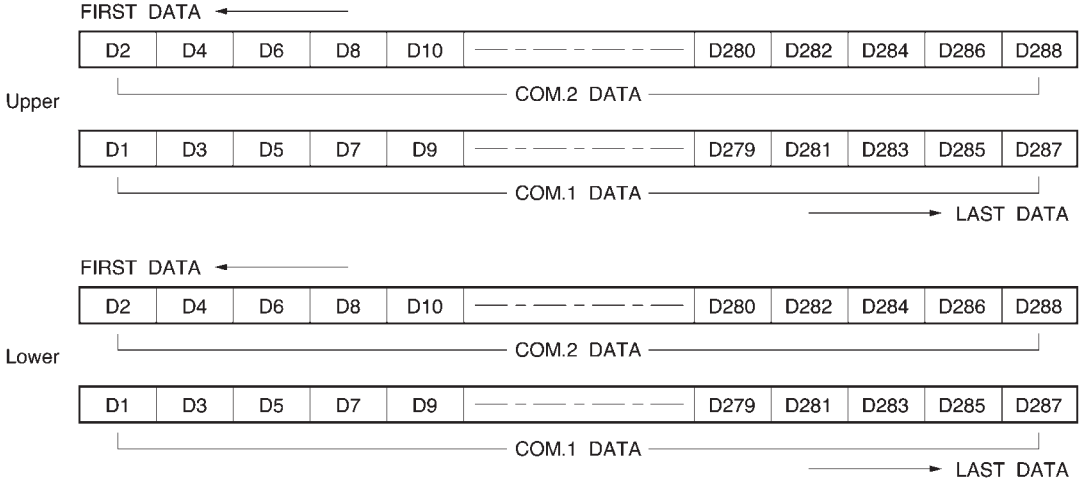
Viewing angle: ϕ = 180° , θ = 10°

(Note 5) Principles of optical measuring equipment

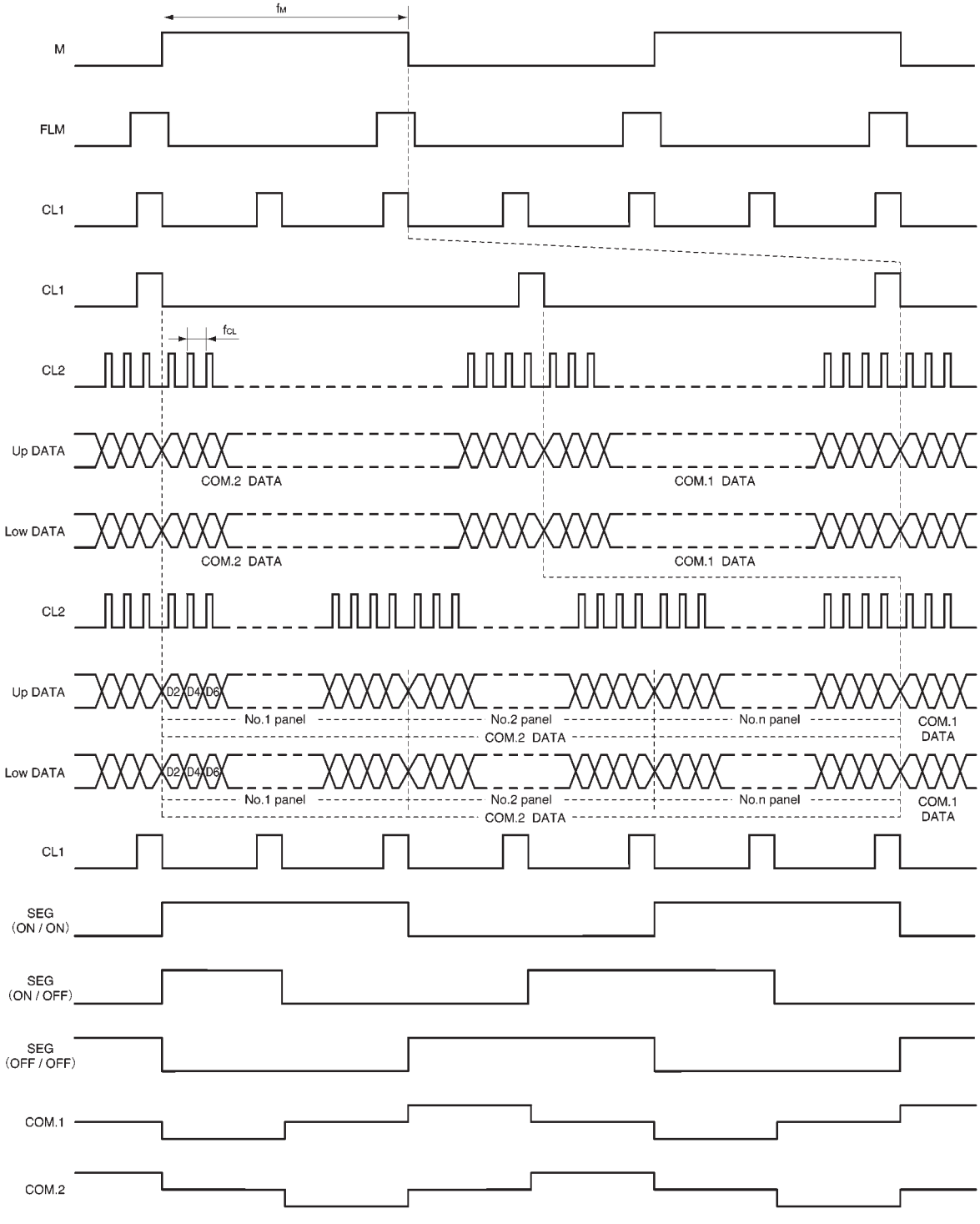


●Data format (data and display mapping)

Upper	D1	D13	D25									D253	D265	D277
	D2	D14	D26									D254	D266	D278
	D3	D15	D27									D255	D267	D279
	D4	D16	D28									D256	D268	D280
	D5	D17	D29									D257	D269	D281
	D6	D18	D30									D258	D270	D282
	D7	D19	D31									D259	D271	D283
	D8	D20	D32									D260	D272	D284
	D9	D21	D33									D261	D273	D285
	D10	D22	D34									D262	D274	D286
	D11	D23	D35									D263	D275	D287
Lower	D12	D24	D36									D264	D276	D288
	D1	D13	D25									D253	D265	D277
	D2	D14	D26									D254	D266	D278
	D3	D15	D27									D255	D267	D279
	D4	D16	D28									D256	D268	D280
	D5	D17	D29									D257	D269	D281
	D6	D18	D30									D258	D270	D282
	D7	D19	D31									D259	D271	D283
	D8	D20	D32									D260	D272	D284
	D9	D21	D33									D261	D273	D285
	D10	D22	D34									D262	D274	D286
	D11	D23	D35									D263	D275	D287
	D12	D24	D36									D264	D276	D288



●Timing chart



●Operation notes

(1) Attention points in handling

- 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.
- If the module is to be used for long periods subjected to direct sunlight, employ a filter to block the ultraviolet rays.
- Do not store the module in areas of high temperature or high humidity. Do not store the module in locations exposed to direct sunlight or fluorescent light.

(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 modules circuitry that can be easily damaged by static electricity.
- Do not remove the liquid crystal panel from the unit.
- Do not touch the back side of the liquid crystal panel.

(4) Precautions during unit assembly

- In order to protect the polarizing plate from dirt or scratches, it is recommended to use a protective cover on the front surface.