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16 × 16 dots transmissive large-sized liquid crystal display unit

RCM1277U

Thanks to the high contrast and wide viewing angle of the RCM1277U, 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.

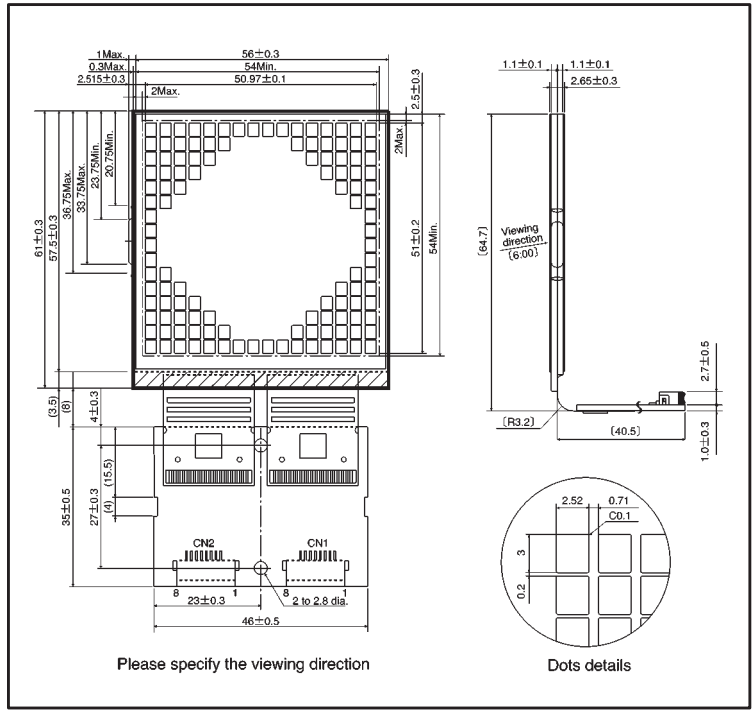
●Applications

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

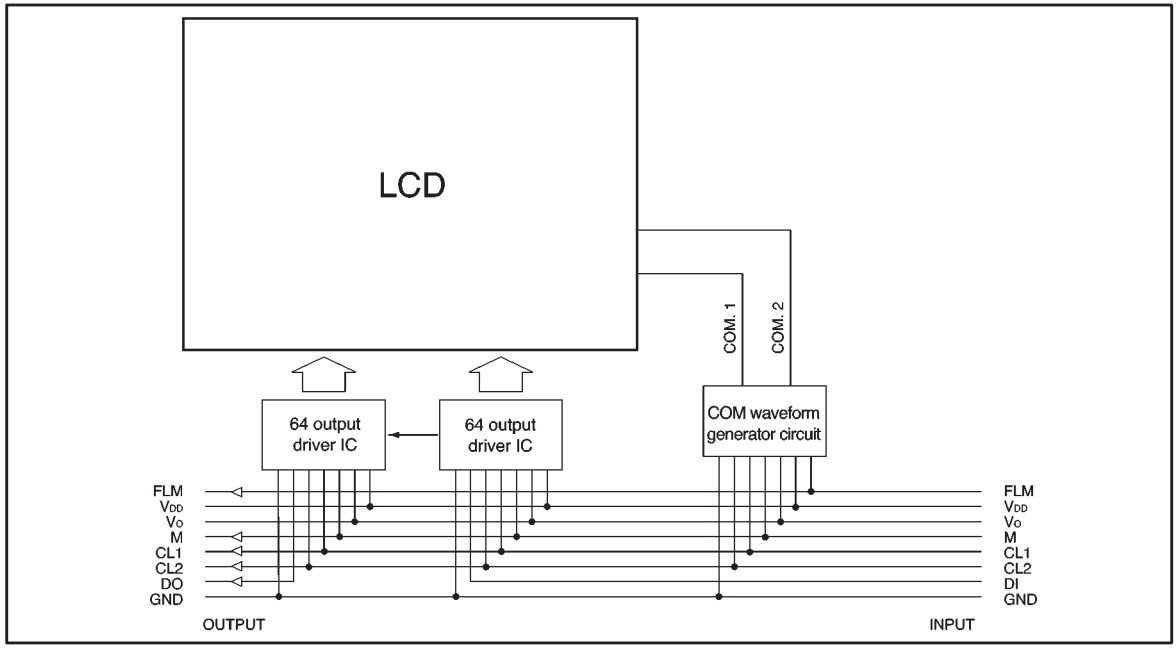
●Features

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) Input (CN1)

Pin no.	Symbol	IN / OUT	Function
1	FLM	IN	Frame start code
2	V_O	—	Liquid crystal drive power supply
3	V_{DD}	—	Applies 5 V
4	M	IN	Liquid crystal drive output AC conversion signal
5	CL1	IN	Data latch signal (displays at rising edge)
6	CL2	IN	Shift register shift signal (reads data at falling edge)
7	DI	IN	Display data signal (1: On, 0: Off)
8	GND	—	Ground

(2) Output (CN2)

Pin no.	Symbol	IN / OUT	Function
1	GND	—	Ground
2	DO	OUT	Display data code
3	CL2	OUT	Shift lock signal
4	CL1	OUT	Data latch signal
5	M	OUT	AC conversion signal
6	V_{DD}	—	5 V
7	V_O	—	Liquid crystal drive power supply
8	FLM	OUT	Frame start signal

●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}	—	—	6.0	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

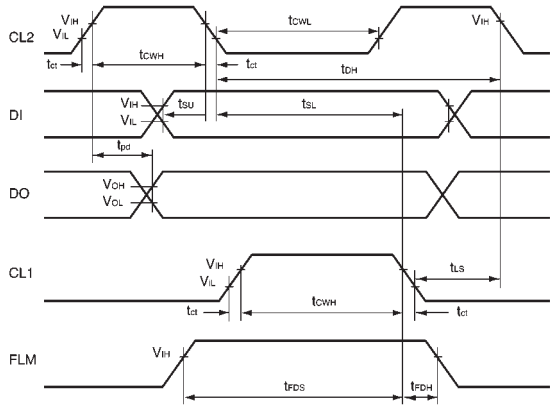
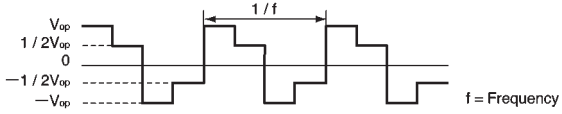


Fig.1

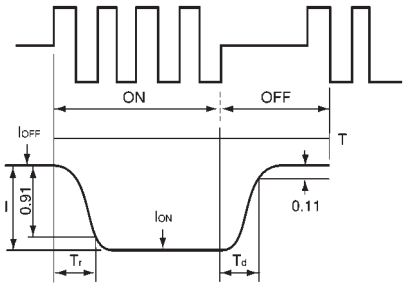
●Optical characteristics (Ta = 25°C)

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	10	—	60	deg	φ=180° (Note 3)
		Right-left	θ	25	−90	—	270		φ=90°, 270°
3	Contrast ratio			25	20	—	—	—	(Note 4)

(Note 1) Drive waveform
Static drive



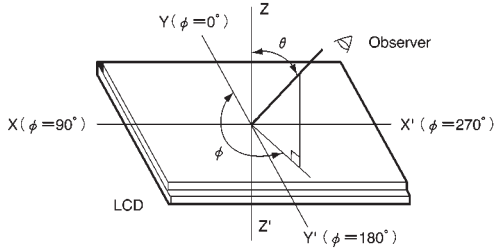
(Note 2) Definition of response speed



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〉

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

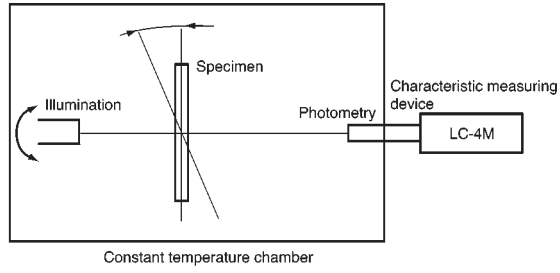
Except, n = 1 with positive display and n = −1 with negative display.

〈Measurement conditions〉

Drive conditions: As per specifications

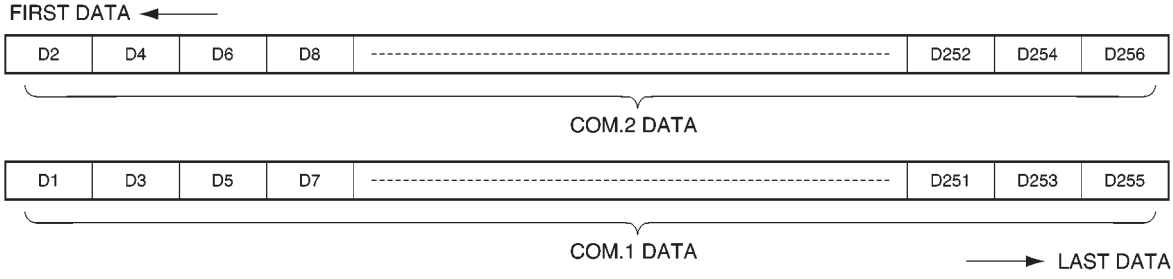
Viewing angle: φ = 180° , θ = 10°

(Note 5) Principles of optical measuring equipment

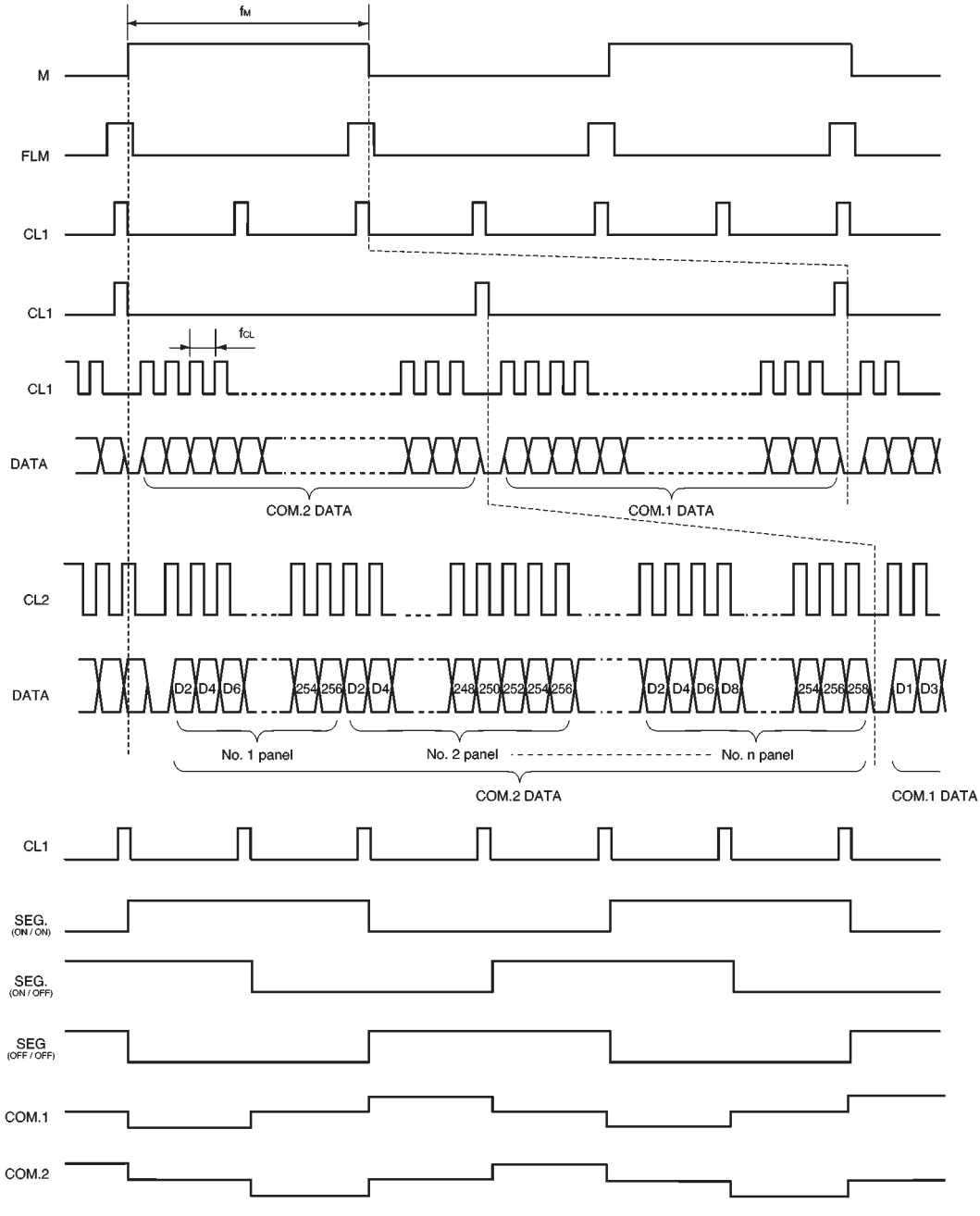


●Data format (data and display mapping)

D1	D17	D33	D49	D65	D81							D193	D209	D225	D241
D2	D18	D34	D50	D66	D82							D194	D210	D226	D242
D3	D19	D35	D51	D67	D83							D195	D211	D227	D243
D4	D20	D36	D52	D68	D84							D196	D212	D228	D244
D5												D197	D213	D229	D245
D6															D246
D7															D247
D8															D248
D9															D249
D10															D250
D11															D251
D12											D188	D204	D220	D236	D252
D13	D29	D45	D61	D77							D189	D205	D221	D237	D253
D14	D30	D46	D62	D78							D190	D206	D222	D238	D254
D15	D31	D47	D63	D79							D191	D207	D223	D239	D255
D16	D32	D48	D64	D80							D192	D208	D224	D240	D256



●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.
- 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.
- 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.
- During handling of the module, in order to prevent damage to the tab, do not bend it more than two times.

(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.
- 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 a ion blower or other deionizing device is recommended.