

FEATURES

- CMOS LSI chips
- Connection with CPU
 - Can be directly coupled with 80-port or 68-port system
- Available in chip form or in 100-pin plastic QFP
- Pin-to-Pin Replacement for SED1520 Series
- Many command set
- Total 80 (segment+common) drive sets
- Low power consumption - 30 μ W maximum at 2kHz external clock
- Power supply $V_{DD} - V_{SS}$: 2.4 to -5.5V
 $V_{DD} - V_5$: 3.5 to -10.0V

DESCRIPTION

The IZ6570 family of dot matrix LCD (Liquid Crystal Display) drivers are designed for the display of characters and graphics.

The drivers generate LCD drive signals derived from bit mapped data stored in an internal RAM.

The IZ6570 family drivers incorporate innovative circuit design strategies to achieve very low power dissipation at a wide range of operating voltages.

These features give the designer a flexible means of implementing small to medium size LCD displays for compact, low power systems.

The IZ6570 which is able to drive two lines of twelve characters each.



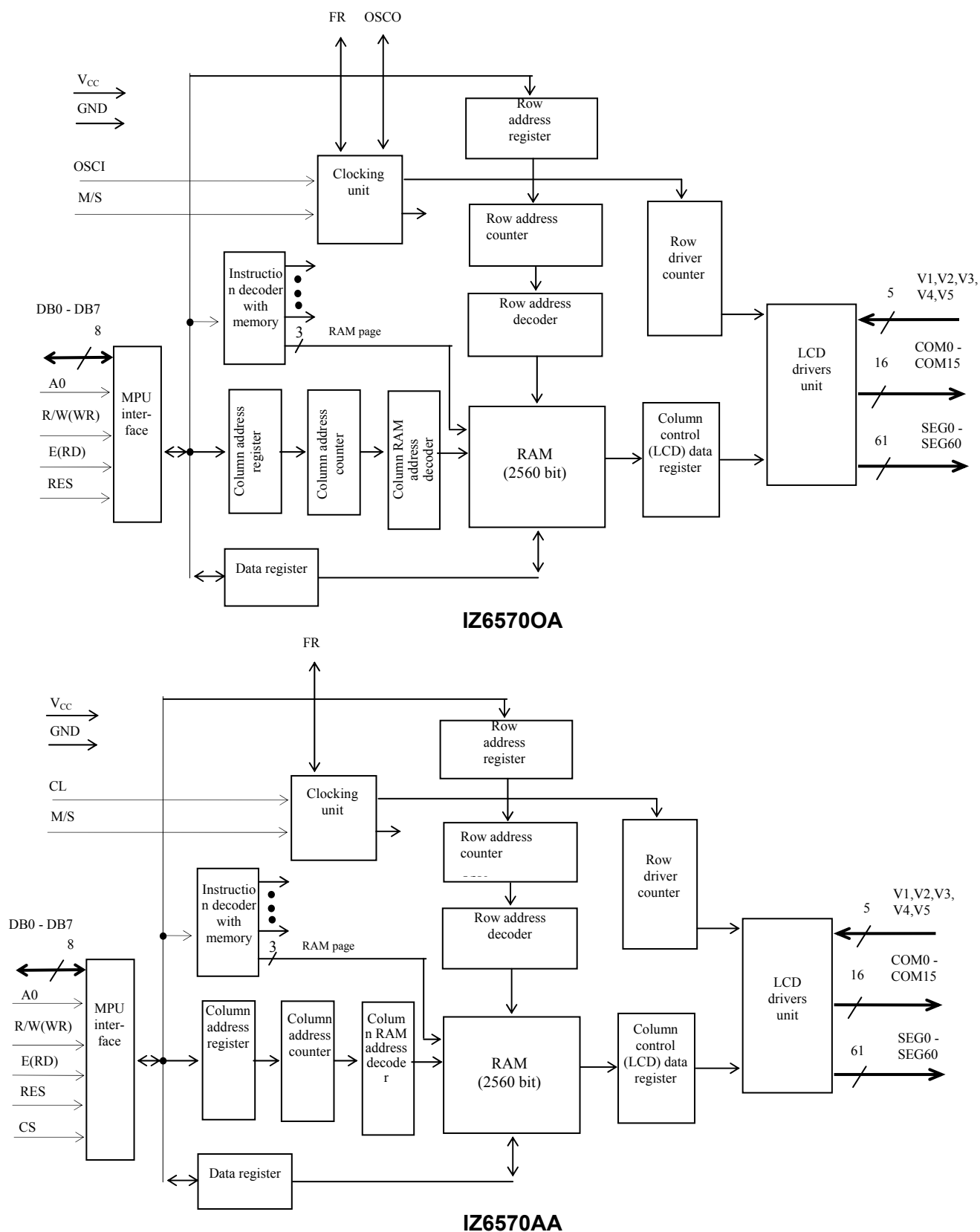


Fig. 1 – Block diagrams

DISPLAY COMMANDS

(Based on the 80-port MPU; the RD and WR commands differ for the 68-port MPU)

	Code											Description
Command	RD	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0	
Display ON/OFF	1	0	0	1	0	1	0	1	1	1	0/1	Switches the entire display ON or OFF regardless of the Display RAM's data or the internal status. *Note
Display START Line	1	0	0	1	1	0	Display START address (0 ÷ 31)				Determines the line of RAM data to be displayed at the display's top line (COM0)	
Page Address Set	1	0	0	1	0	1	1	1	0	Page (0 ÷ 3)		Sets the page of the Display RAM in the page address register
Column (Segment) Address Set	1	0	0	0	Column address (0 ÷ 79)						Sets the column address of the Display RAM in the column address register	
Status Read	0	1	0	B U S Y	A D C	ON / OFF	R E S E T	0	0	0	0	Reads the status. BUSY 1: Working 0: Ready ADC 1: Clockwise output 0: Counter clockwise ON/OFF 1: Display OFF 0: Display ON RESET 1: Reset 0: Normal
Write Display Data	1	0	1	Write Data							Write the data to the Display Data RAM	These commands access a previously specified address of the Display RAM, after which the column address is incremented one
Read Display Data	0	1	1	Read Data							Read the data from the Display Data RAM	
ADC Select	1	0	0	1	0	1	0	0	0	0	0/1	Used to reverse the correspondence between the Display RAM's column addresses and segment driver output ports 0: Rightward (forward) output 1: Leftward (reverse)
Static Drive ON/OFF	1	0	0	1	0	1	0	0	1	0	0/1	Selects normal display operation or static all-fit drive display operation 1: Static drive (Power Save) 0: Normal display
Duty Select	1	0	0	1	0	1	0	1	0	0	0/1	Selects the duty factor for driving LCD cells 1: 1/32 duty 0: 1/16 duty
Read Modify Write	1	0	0	1	1	1	0	0	0	0	0	Increments the column address counter by one only when display data is written but not when it is read
End	1	0	0	1	1	1	0	1	1	1	0	Cancels the Ready Modify Write mode
Reset	1	0	0	1	1	1	0	0	0	1	0	Resets the Display START line to the 1-st line in the register. Resets the column address counter and page address register to 0.

Note: Power Save mode is entered by selecting static drive in the Display OFF status

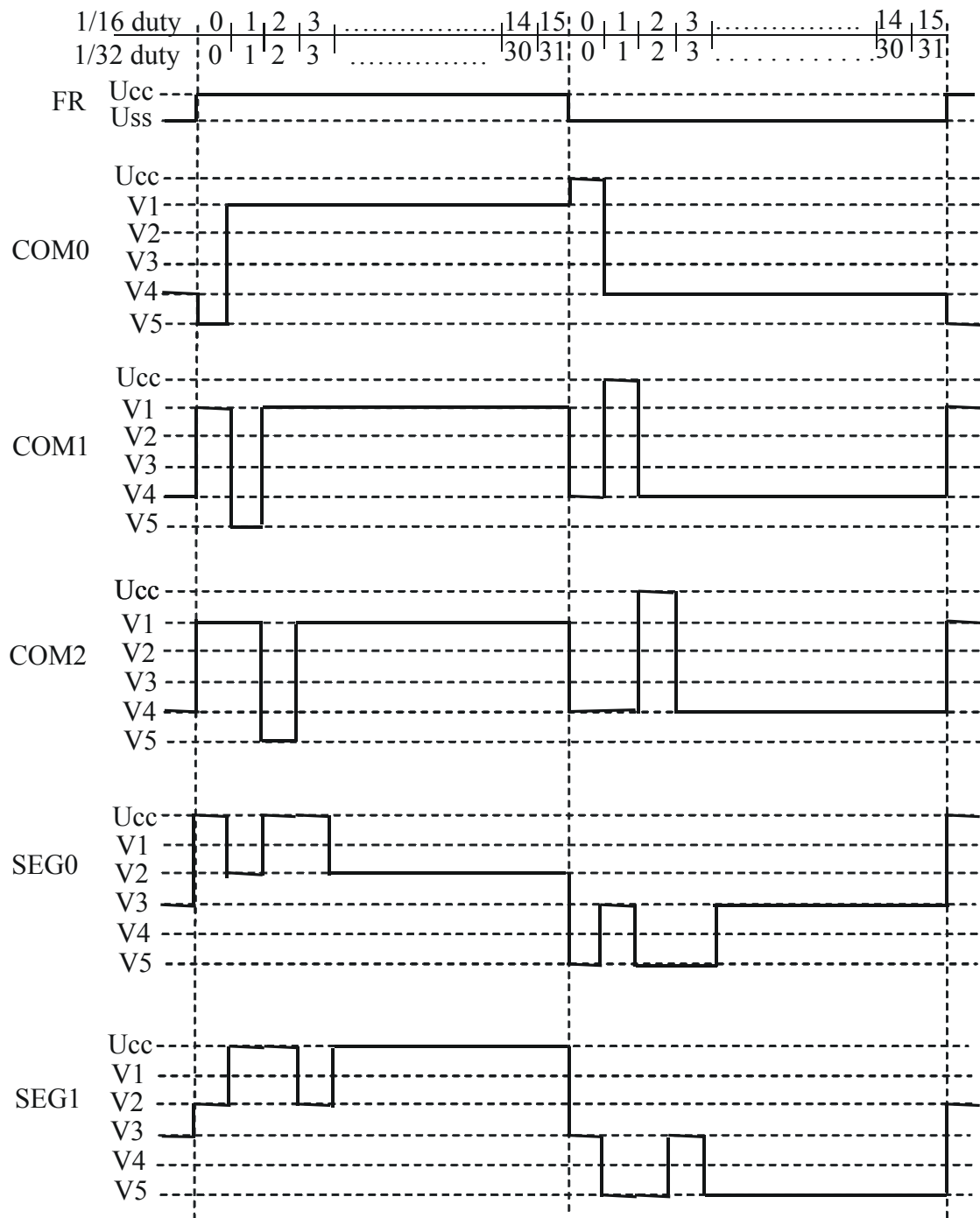


Fig.2 LCD Driving Waveform

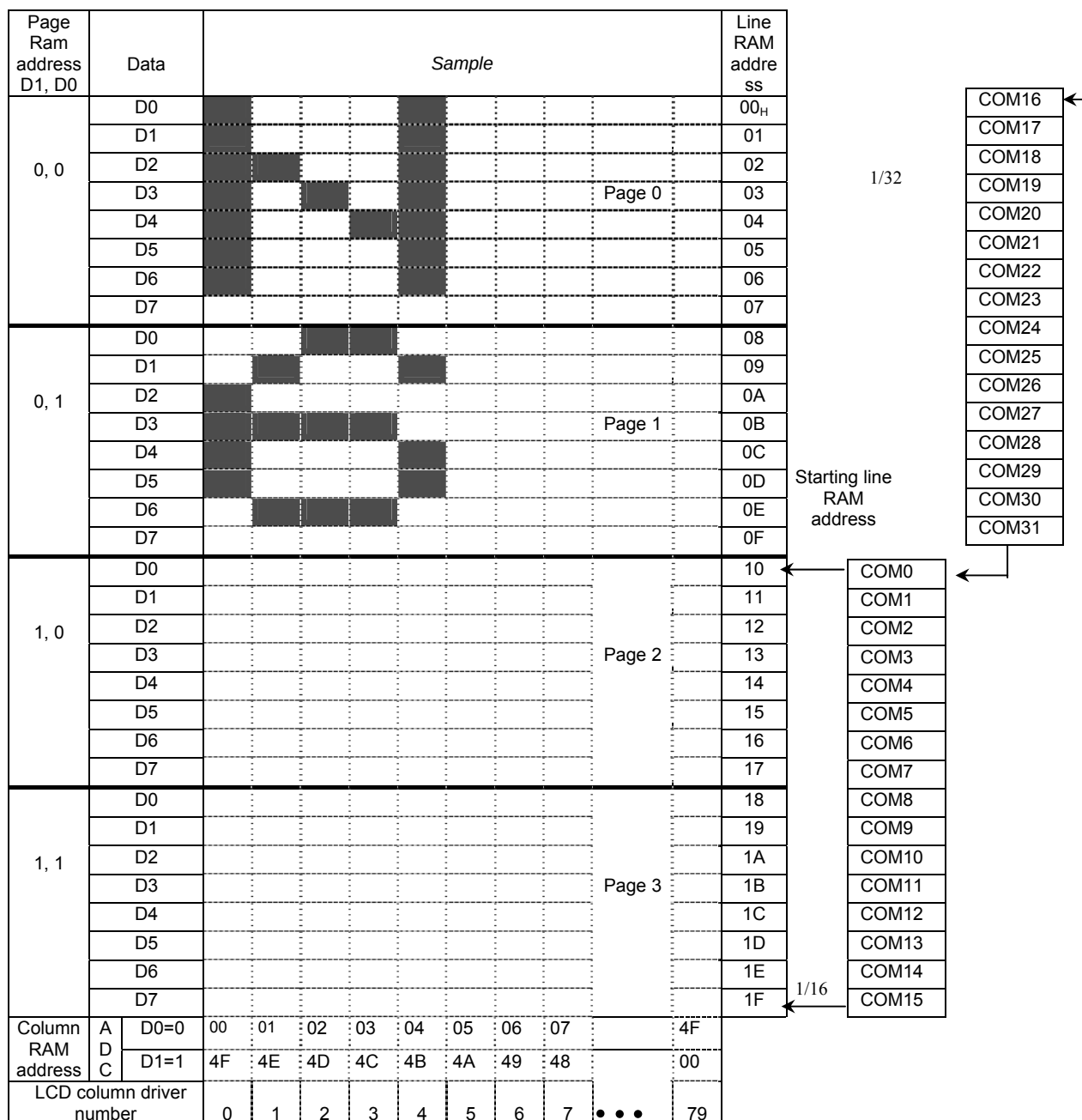


Fig.3 - Соответствие ячеек ОЗУ пикселям ЖКИ (для примера начальный адрес строки ОЗУ равен 10H)

Electric parameters

(Tamb=25 °C Ucc = 4.5–5.5V)

Parameter, unit	Symbol	Mode	Norm		Note
			Min.	Max.	
High level output voltage, V	Uoh1	Ioh=-3.0 mA Ucc=4.5V.	2.4	—	Pins D0-D7
	Uoh2	Ioh=-2.0 mA Ucc=4.5V.	2.4	—	Pin FR

	Uoh3	Ioh=0.12mA Ucc=4.5V.	0.8*Ucc	–	Pin OSC2
Low level output voltage, V	Uo11	I _{o1} = 3.0 mA Ucc=4.5V.	–	0.4	Pins D0-D7
	Uo12	I _{o1} = 2.0 mA Ucc=4.5V.	–	0.4	Pin FR
	Uo13	I _{o1} =0.12mA Ucc=4.5V.	–	0.2*Ucc	Pin OSC2
High level input current, μ A	Ih1	V _{in} = Ucc. Ucc=5.5V.	–	3.0	Pins D0-D7,FR
	Ih2	V _{in} = Ucc. Ucc=5.5V.	–	1.0	Pins A0, E, R/W,CL,RES,M/S
Low level input current, μ A	I11	V _{in} =0V. Ucc=5.5V.	–	-3.0	Pins D0-D7,FR
	I12	V _{in} =0V. Ucc=5.5V.	–	-1.0	Pins A0, E, R/W,CL,RES,M/S
Output voltage drop, V	Ud	I _o =+/-0.1mA VLCD=5.0V Ucc=5.0 V	V _i – 1	V _i +1	(1)
Supply current, static, μ A	Icc1	Ucc=5.5 V.	–	1.0	
Supply current, dynamic, μ A	Icc2	F _{cyc} =200 kHz Ucc=5.5 V.	–	500	
Supply current, dynamic, μ A	Icc3	F _{osc} =18 kHz Ucc=5.5 V.	–	15	(2)
Build-in oscillator frequency, kHz.	Fec	R=1.0 m Ω , Ucc=5.0 V.	11	21	
Supply Current, Dynamic, μ A	Icc4	F _{cyc} =2 kHz Ucc=5.5 V		5.0	(3)

Notes

1. Correspond to driver resistance not more 10 k Ω .
2. Consumption current for IZ6570OA not loaded (LCD capacity or measurer capacity).
3. Consumption current for IZ6570AA not loaded (LCD capacity or measurer capacity).

(Tamb=25 °C Ucc = 2.4–3.3V)

Parameter, unit	Symbol	Mode	Norm		Note
			Min.	Max.	
High level output voltage, V	Uoh1	Ioh=-0.5 mA Ucc=2.4V.	0.8*Ucc	–	Pins D0-D7
	Uoh2	Ioh=-0.5 mA Ucc=2.4V.	0.8*Ucc	–	Pin FR
	Uoh3	Ioh=0.05mA Ucc=2.4V.	0.8*Ucc	–	Pin OSC2
Low level output voltage, V	Uo11	Iol= 0.5 mA Ucc=2.4V.	–	0.2*Ucc	Pins D0-D7
	Uo12	Iol= 0.5 mA Ucc=2.4V.	–	0.2*Ucc	Pin FR
	Uo13	Iol=0.05mA Ucc=2.4V.	–	0.2*Ucc	Pin OSC2
High level input current, μ A	Ih1	Vin= Ucc. Ucc=3.3V.	–	3.0	Pins D0-D7,FR
	Ih2	Vin= Ucc. Ucc=3.3V.	–	1.0	Pins A0,E,R/W,CL,RES,M/S
Low level input current, μ A	I11	Vin=0V. Ucc=3.3V.	–	-3.0	Pins D0-D7,FR
	I12	Vin=0V. Ucc=3.3V.	–	-1.0	Pins A0,E,R/W,CL,RES,M/S
Output voltage drop, V	Ud	Iol=+-10 μ A VLCD=3.5V Ucc=3.3 V	Vi – 0.5	Vi+0.5	(4)
Supply current, static, μ A	Icc1	Ucc=3.3 V.	–	1.0	
Supply current, dynamic, μ A	Icc2	Fcyc=200kHz Ucc=3.3 V.	–	500	
Supply current, dynamic, μ A	Icc3	Fosc=18 kHz Ucc=3.3 V.	–	12	(5)
Oscillator frequency, kHz.	Fec	R=1.0 M Ω , Ucc=3.0 V.	11	21	
Supply Current, Dynamic, μ A	Icc4	Fcyc=2 kHz Ucc=3.3 V		5.0	(6)

Notes:

4. Correspond to driver resistance not less 50 k Ω .

5. Consumption current for IZ6570OA not loaded (LCD capacity or measurer capacity).

6. Consumption current for IZ6570AA not loaded (LCD capacity or measurer capacity).

Absolute maximum ratings & recommended operating modes

Parameter, unit	Symbol	Recommended operating modes		Absolute maximum ratings	
		Min.	Max.	Min.	Max.
Low-voltage part supply voltage, V	(Ucc)	2.4	5.5	-0.3	7.0
High-voltage part supply voltage (V5), V	(V5)	Ucc-10.0	Ucc-3.5	Ucc-11	Ucc+0.3
Switching levels, V*	V1,V4, V2,V3	V5	Ucc	V5	Ucc+0.3
High level input voltage, V For pins: D0-D7,A0,E,R/W,CS	Uih1	0.8*Ucc (for Ucc = 2.4–3.3V) Ucc-2.5 (for Ucc = 4.5–5.5V)	Ucc	-0.3	Ucc+0.3
CL,FR,RES,M/S	Uih2	0.8*Ucc	Ucc		
Low level input voltage, V For pins: D0-D7,A0,E,R/W,CS	Uil1	Uss	0.2*Ucc (for Ucc = 2.4–3.3V) 0.8 (for Ucc = 4.5–5.5V)	-0.3	Ucc+0.3
CL,FR,RES,M/S	Uil2	Uss	0.2*Ucc		

Note:

* Ucc ≥ V1 ≥ V2 ≥ V3 ≥ V4 ≥ V5.

Operation

Data to display are received from MCU. The IZ6570 supports data exchange protocols with Intel MCU series 80XXX (80-port system) and Motorola MCU series 68XXX (68-port system) via 8-bit bi-directional data bus (D0–D7). The MCU interface is selected by means of RES signal.

High level of RES set 68-port MCU interface Low level - 80-port MCU interface

MCU access to the LCD driver not depends from the forming of the drivers COM0 ÷ COM15 and SEG0 ÷ SEG60.

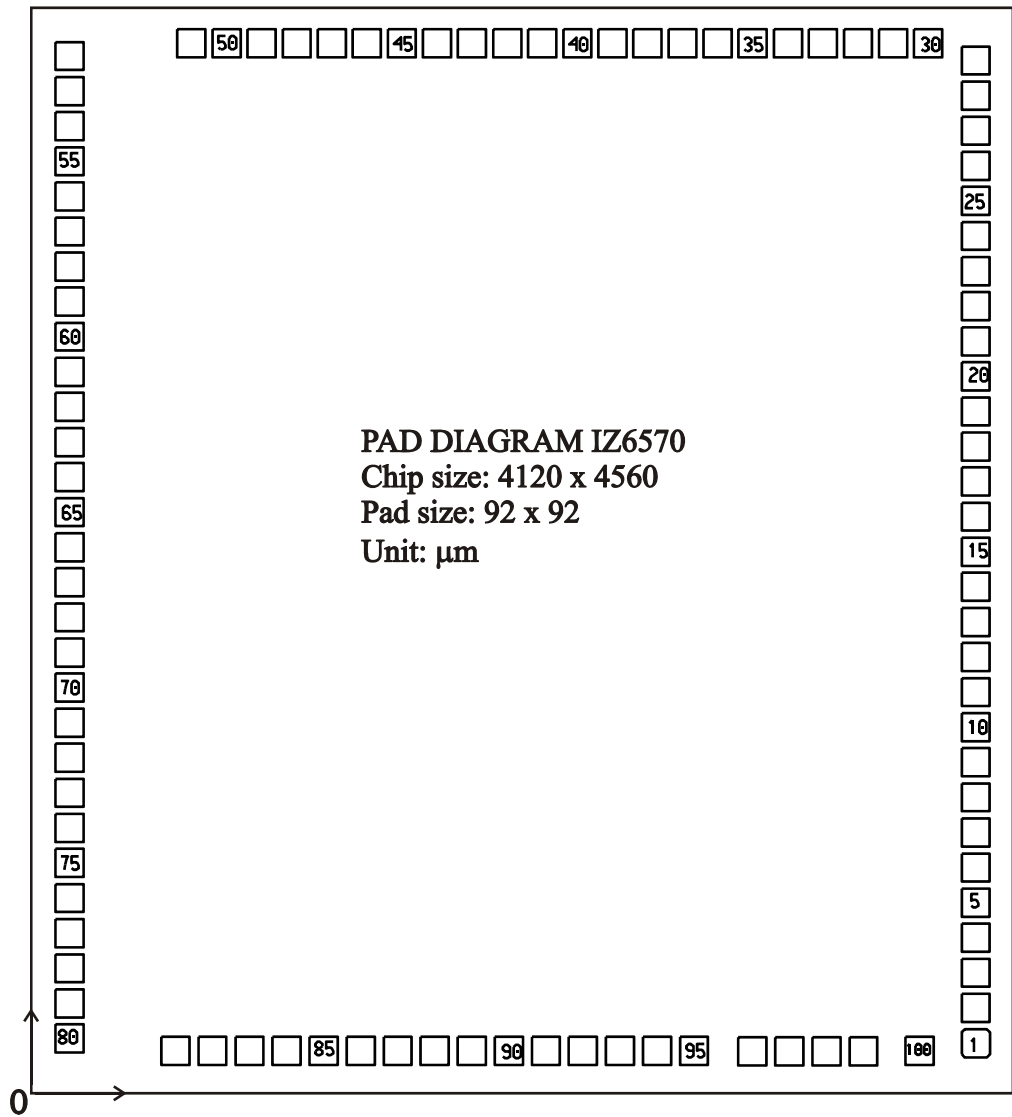
Displayed on the LCD data is stored in the 2560 bits RAM (80x8x4). RAM organized as 4 pages of 80 bytes each. Before RAM access (read or write) RAM page address is set (the command "Page address set") and column address of RAM (command "Column address set"), and then to writing of data (command "Write display data") or data reading (command "Read display data") is performed. At the next address to the RAM column address is automatically incremented by 1. If the column address is 79, then with a further appeal to the RAM data is not recorded, the column address counter of RAM (see block diagram) is not reset to zero and the transition on the next page is not happening.

There is available mode (the command "Read modify write"), in which the column address is increased by 1 only when writing data, and the ending of the regime by the command "End". Changing the page number by command "Page address set" not effects to column address.

To control the LCD driver RAM reading is performed line by line, the line to be read first is set by the command "Display start line" and it corresponds to the driver COM0. Lines are read sequentially. Line memory contains 80 data bits: 61 bits are used LCD driver SEG0 ÷ SEG60, control column 61 and 19 bits are reserved. Logic "1" in the line bit (cell memory) corresponds to luminous pixel on the display and vice versa. Relevance of data RAM LCD driver control is shown in Fig. 3. Command "Display ON / OFF" enables/disables transfer of data RAM to data register of LCD columns drivers (see block diagram).

Drivers COM0 ÷ COM15 formed on the basis of counter of LCD lines driver, which sets the priorities for their activities. There are two multiplex mode: "1/16 duty" (16 lines control the LCD driver) and "1 / 32 duty" (32 lines control the LCD driver). Mode "1 / 32 duty" is used in the construction of advanced LCD panels. LCD driver timing diagram is shown in Fig. 2.

PAD LOCATION



Note: STEP by PAD 150 μm ;
pad size in a layer of pad window.

Fig.4 Contact pad layout diagramm

PAD COORDINATES

Pad No.	Pad Name	Coordinates		Pad No.	Pad Name	Coordinates		Pad No.	Pad Name	Coordinates	
		X (um)	Y (um)			X (um)	Y (um)			X (um)	Y (um)
1	COM5	3918	101	35	SEG37	2933	4359	69	SEG3	102	1751
2	COM6	3918	251	36	SEG36	2783	4359	70	SEG2	102	1601
3	COM7	3918	401	37	SEG35	2633	4359	71	SEG1	102	1451
4	COM8	3918	551	38	SEG34	2483	4359	72	SEG0	102	1301
5	COM9	3918	701	39	SEG33	2333	4359	73	A0	102	1151
6	COM10	3918	851	40	SEG32	2183	4359	74	CS/ OSC1	102	1001
7	COM11	3918	901	41	SEG31	2033	4359	75	CL/OSCO	102	851
8	COM12	3918	1151	42	SEG30	1883	4359	76	E(RD)	102	701
9	COM13	3918	1301	43	SEG29	1733	4359	77	R/W(WR)	102	551
10	COM14	3918	1451	44	SEG28	1583	4359	78	GND	102	401
11	COM15	3918	1601	45	SEG27	1433	4359	79	DB0	102	251
12	SEG60	3918	1751	46	SEG26	1283	4359	80	DB1	102	101
13	SEG59	3918	1901	47	SEG25	1133	4359	81	DB2	597	101
14	SEG58	3918	2051	48	SEG24	983	4359	82	DB3	747	101
15	SEG57	3918	2201	49	SEG23	833	4359	83	DB4	897	101
16	SEG56	3918	2351	50	SEG22	683	4359	84	DB5	1047	101
17	SEG55	3918	2501	51	SEG21	533	4359	85	DB6	1197	101
18	SEG54	3918	2651	52	SEG20	102	4301	86	DB7	1347	101
19	SEG53	3918	2801	53	SEG19	102	4151	87	V _{CC}	1498	101
20	SEG52	3918	2951	54	SEG18	102	4001	88	RES	1648	101
21	SEG51	3918	3101	55	SEG17	102	3851	89	FR	1798	101
22	SEG50	3918	3251	56	SEG16	102	3701	90	V5	1948	101
23	SEG49	3918	3401	57	SEG15	102	3551	91	V3	2122	101
24	SEG48	3918	3551	58	SEG14	102	3401	92	V2	2272	101
25	SEG47	3918	3701	59	SEG13	102	3251	93	M/S	2422	101
26	SEG46	3918	3851	60	SEG12	102	3101	94	V4	2572	101
27	SEG45	3918	4001	61	SEG11	102	2351	95	V1	2722	101
28	SEG44	3918	4151	62	SEG10	102	2801	96	COM0	2977	101
29	SEG43	3918	4301	63	SEG9	102	2651	97	COM1	3127	101
30	SEG42	3683	4359	64	SEG8	102	2501	98	COM2	3277	101
31	SEG41	3533	4359	65	SEG7	102	2351	99	COM3	3432	101
32	SEG40	3383	4359	66	SEG6	102	2201	100	COM4	3650	101
33	SEG39	3233	4359	67	SEG5	102	2051				
34	SEG38	3083	4359	68	SEG4	102	1901				

Note: Pads 74,75 are OSC1, OSC2 for IZ6570_{0A} and CS, CL for IZ6570_{AA} respectively. All other pad names are identical.



Pad description table

Pad number	Symbol		Description
	IZ6570AA	IZ6570AA	
01	COM5	COM5	Common output for driving the LCD
02	COM6	COM6	Common output for driving the LCD
03	COM7	COM7	Common output for driving the LCD
04	COM8	COM8	Common output for driving the LCD
05	COM9	COM9	Common output for driving the LCD
06	COM10	COM10	Common output for driving the LCD
07	COM11	COM11	Common output for driving the LCD
08	COM12	COM12	Common output for driving the LCD
09	COM13	COM13	Common output for driving the LCD
10	COM14	COM14	Common output for driving the LCD
11	COM15	COM15	Common output for driving the LCD
12	SEG60	SEG60	Segment output for driving the LCD
13	SEG59	SEG59	Segment output for driving the LCD
14	SEG58	SEG58	Segment output for driving the LCD
15	SEG57	SEG57	Segment output for driving the LCD
16	SEG56	SEG56	Segment output for driving the LCD
17	SEG55	SEG55	Segment output for driving the LCD
18	SEG54	SEG54	Segment output for driving the LCD
19	SEG53	SEG53	Segment output for driving the LCD
20	SEG52	SEG52	Segment output for driving the LCD
21	SEG51	SEG51	Segment output for driving the LCD
22	SEG50	SEG50	Segment output for driving the LCD
23	SEG49	SEG49	Segment output for driving the LCD
24	SEG48	SEG48	Segment output for driving the LCD
25	SEG47	SEG47	Segment output for driving the LCD
26	SEG46	SEG46	Segment output for driving the LCD
27	SEG45	SEG45	Segment output for driving the LCD
28	SEG44	SEG44	Segment output for driving the LCD
29	SEG43	SEG43	Segment output for driving the LCD
30	SEG42	SEG42	Segment output for driving the LCD
31	SEG41	SEG41	Segment output for driving the LCD
32	SEG40	SEG40	Segment output for driving the LCD
33	SEG39	SEG39	Segment output for driving the LCD
34	SEG38	SEG38	Segment output for driving the LCD
35	SEG37	SEG37	Segment output for driving the LCD
36	SEG36	SEG36	Segment output for driving the LCD
37	SEG35	SEG35	Segment output for driving the LCD
38	SEG34	SEG34	Segment output for driving the LCD
39	SEG33	SEG33	Segment output for driving the LCD
40	SEG32	SEG32	Segment output for driving the LCD
41	SEG31	SEG31	Segment output for driving the LCD
42	SEG30	SEG30	Segment output for driving the LCD
43	SEG29	SEG29	Segment output for driving the LCD
44	SEG28	SEG28	Segment output for driving the LCD
45	SEG27	SEG27	Segment output for driving the LCD
46	SEG26	SEG26	Segment output for driving the LCD
47	SEG25	SEG25	Segment output for driving the LCD
48	SEG24	SEG24	Segment output for driving the LCD
49	SEG23	SEG23	Segment output for driving the LCD
50	SEG22	SEG22	Segment output for driving the LCD
51	SEG21	SEG21	Segment output for driving the LCD
52	SEG20	SEG20	Segment output for driving the LCD
53	SEG19	SEG19	Segment output for driving the LCD



Pad number	Symbol		Description
	IZ6570AA	IZ6570AA	
54	SEG18	SEG18	Segment output for driving the LCD
55	SEG17	SEG17	Segment output for driving the LCD
56	SEG16	SEG16	Segment output for driving the LCD
57	SEG15	SEG15	Segment output for driving the LCD
58	SEG14	SEG14	Segment output for driving the LCD
59	SEG13	SEG13	Segment output for driving the LCD
60	SEG12	SEG12	Segment output for driving the LCD
61	SEG11	SEG11	Segment output for driving the LCD
62	SEG10	SEG10	Segment output for driving the LCD
63	SEG9	SEG9	Segment output for driving the LCD
64	SEG8	SEG8	Segment output for driving the LCD
65	SEG7	SEG7	Segment output for driving the LCD
66	SEG6	SEG6	Segment output for driving the LCD
67	SEG5	SEG5	Segment output for driving the LCD
68	SEG4	SEG4	Segment output for driving the LCD
69	SEG3	SEG3	Segment output for driving the LCD
70	SEG2	SEG2	Segment output for driving the LCD
71	SEG1	SEG1	Segment output for driving the LCD
72	SEG0	SEG0	Segment output for driving the LCD
73	A0	A0	Select display data or functions.
74	CS	OSCI	Chip Select input/ Clock input at "Master mode"
75	CL	OSCO	Clock input/ clock input at "slave mode" /clock output at "Master mode"
76	E(RD)	E(RD)	Read/Write Enable input
77	R/W(WR)	R/W(WR)	Read/Write Select signal
78	GND	GND	Ground
79	DB0	DB0	Data I/O
80	DB1	DB1	Data I/O
81	DB2	DB2	Data I/O
82	DB3	DB3	Data I/O
83	DB4	DB4	Data I/O
84	DB5	DB5	Data I/O
85	DB6	DB6	Data I/O
86	DB7	DB7	Data I/O
87	V _{CC}	V _{CC}	Power supply input
88	RES	RES	Interface select/driver reset input
89	FR	FR	LCD Frame signal input/output
90	V5	V5	Power supplies for driving the LCD
91	V3	V3	Power supplies for driving the LCD
92	V2	V2	Power supplies for driving the LCD
93	M/S	M/S	Master/slave mode select input
94	V4	V4	Power supplies for driving the LCD
95	V1	V1	Power supplies for driving the LCD
96	COM0	COM0	Common output for driving the LCD
97	COM1	COM1	Common output for driving the LCD
98	COM2	COM2	Common output for driving the LCD
99	COM3	COM3	Common output for driving the LCD
100	COM4	COM4	Common output for driving the LCD

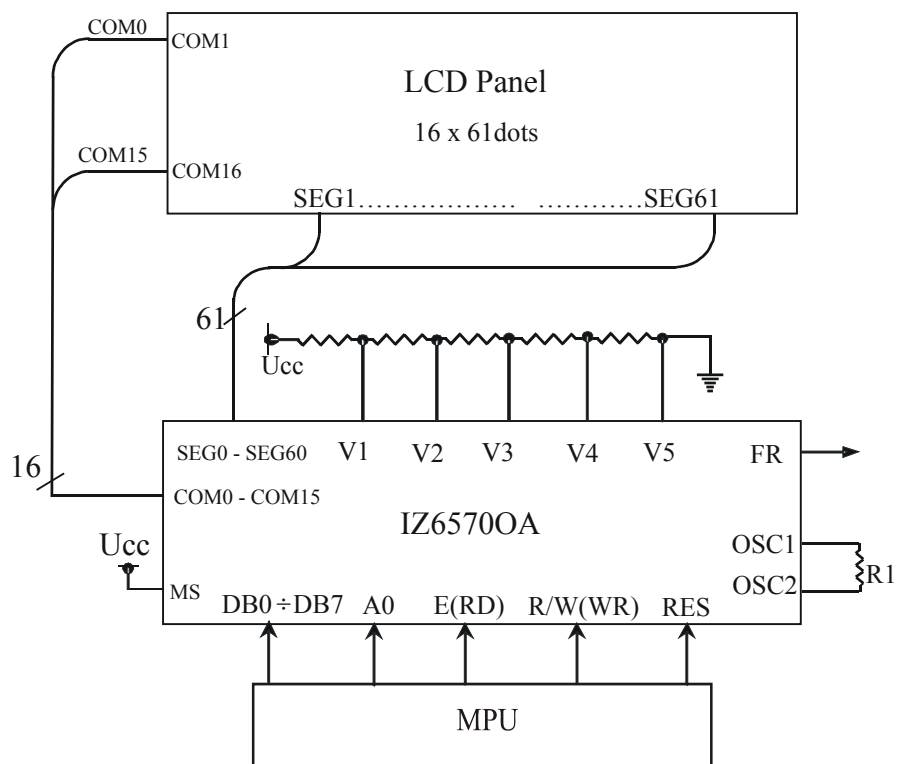


Fig. 5 - IZ6570OA application circuit for 16x61 dots LCD panel (multiplex 1/16).

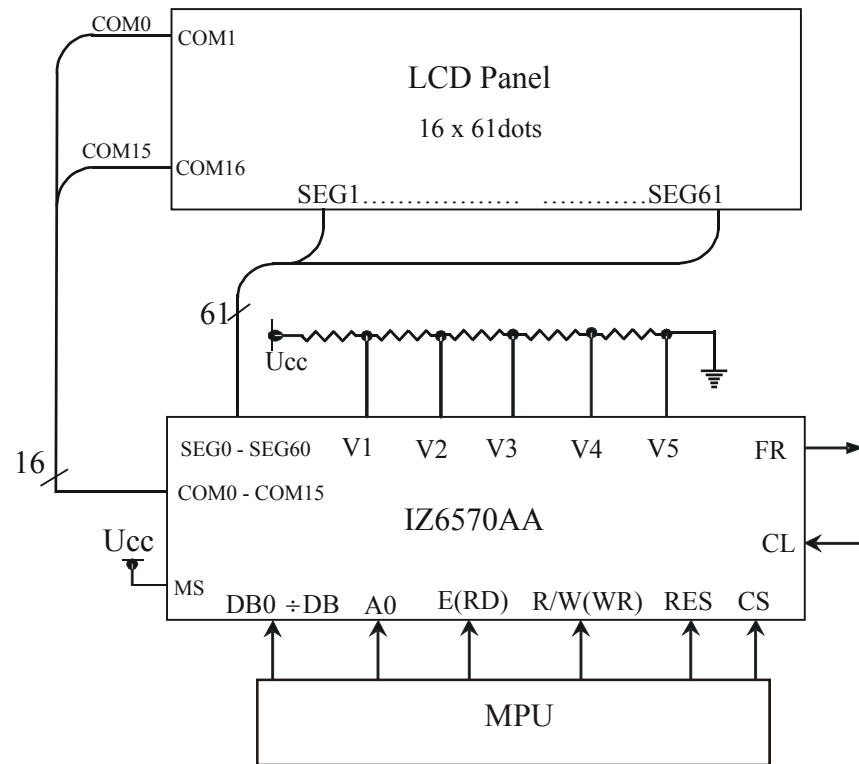


Fig. 6 - IZ6570AA application circuit for 16x61 dots LCD panel (multiplex 1/16).

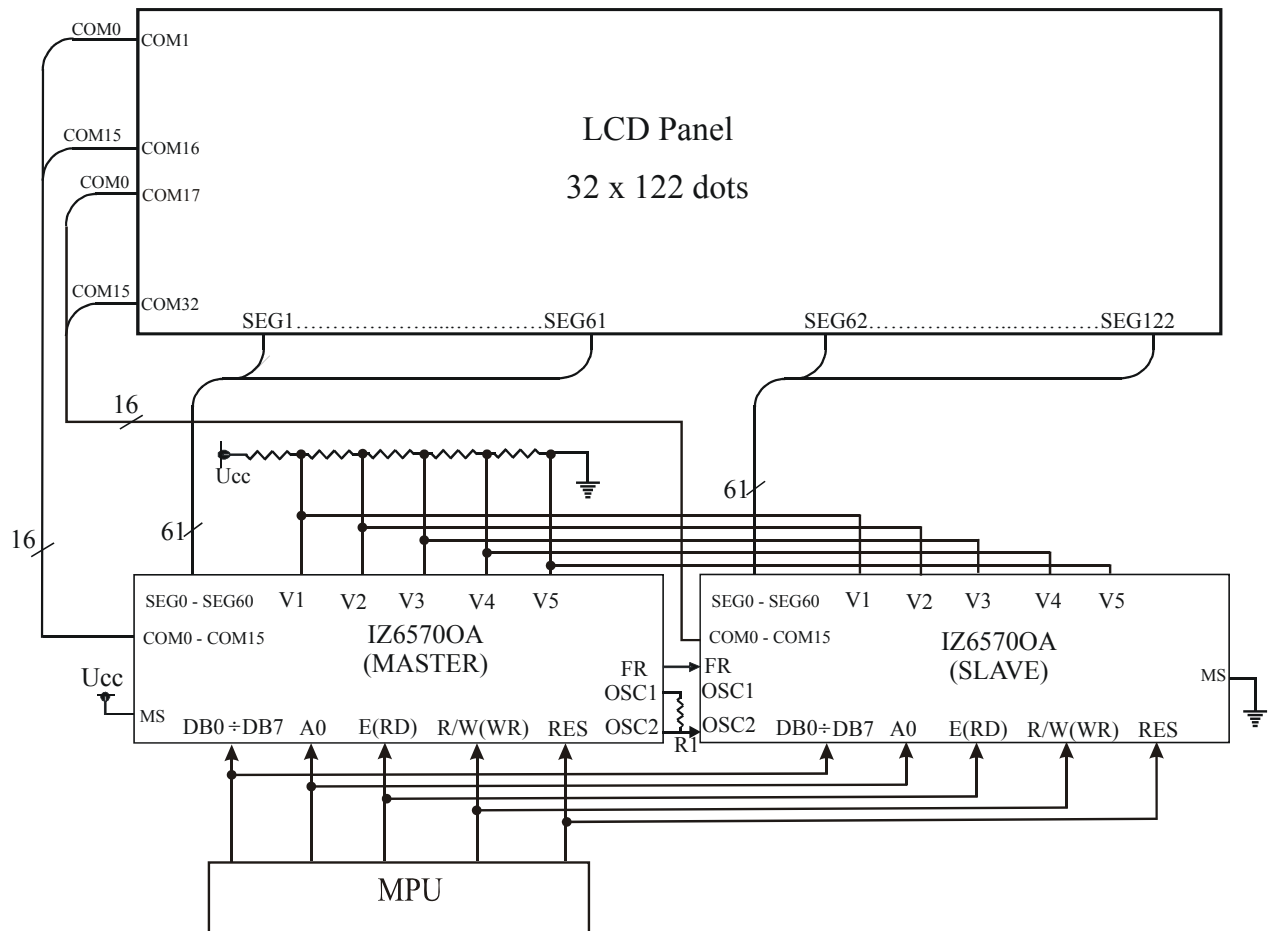


Fig. 7 - IZ6570OA application circuit for 32x122 dots LCD panel (multiplex 1/32).