sames

SA8806A

64 SEGMENT LIQUID CRYSTAL DISPLAY DRIVER PARALLEL INTERFACE

FEATURES

- Drives up to 64 segments
- Standard parallel interface
- Operates over a wide temperature range
- External contrast control
- Low power CMOS

DESCRIPTION

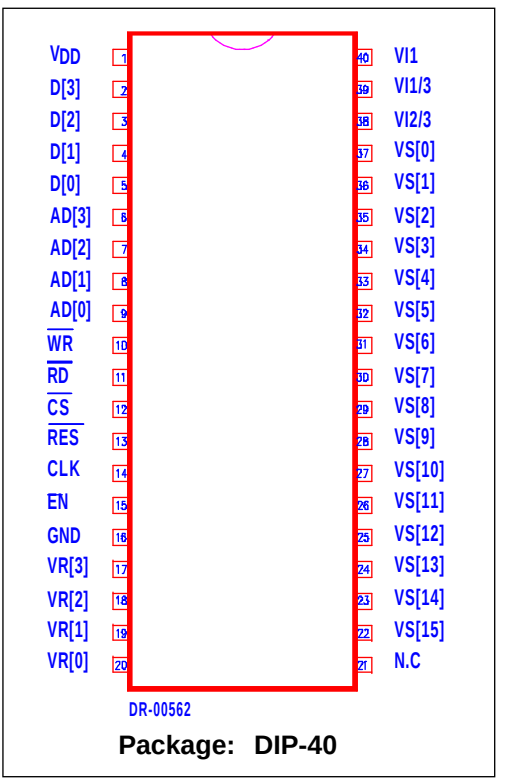
The SAMES SA8806A Liquid Crystal Display (LCD) Driver is capable of driving up to 64 LCD segments and is designed for displays having 4 track multiplexed backplanes.

The SA8806A includes an on-chip oscillator. The device may be programmed from a standard µP or µC Bus.

This LCD driver is ideal for any µ-Controller based system requiring up to an 8 digit LCD display.

The SA8806A integrated circuit is available in both 40 pin dual-in-line plastic (DIP-40), as well as 44 pin plastic leaded chip carrier (PLCC-44) package types.

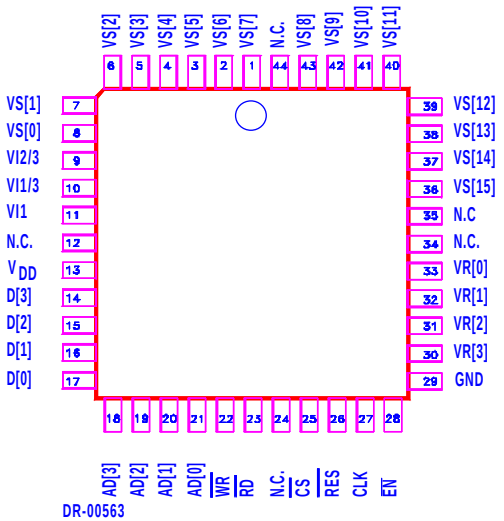
PIN CONNECTIONS



Package: DIP-40

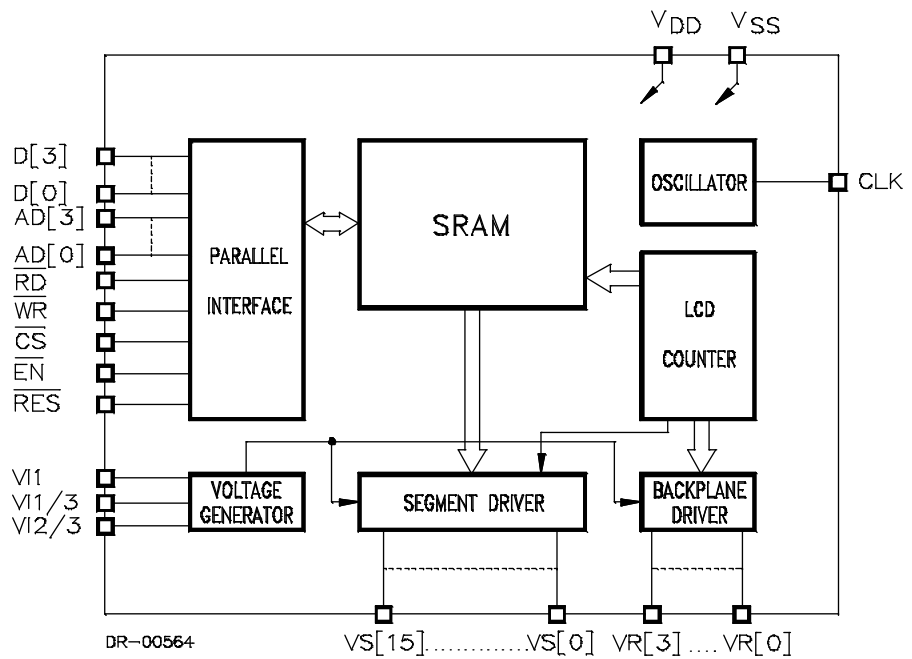
4072 PDS039-SA8806-001 REV. D 12-09-1995

PIN CONNECTIONS



Package: PLCC-44

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS*

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V_{DD} -V_{SS}	-0.3	6.0	V
Current on any pin	I_{PIN}	-100	+100	mA
Storage Temperature	T_{STG}	-40	+125	°C
Operating Temperature	T_O	-25	+85	°C

* Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only. Functional operation of the device at these or any other condition above those indicated in the operational sections of this specification, is not implied. Exposure to Absolute Maximum Ratings for extended periods may affect device reliability.

ELECTRICAL CHARACTERISTICS

(Over the temperature range -10°C to +70°C[#], V_{DD} = 5V, V_{SS} = 0V unless otherwise specified.)

Parameter	Symbol	Min	Typ	Max	Unit	Condition
Supply Voltage	V_{DD}-V_{SS}	4.5	5.0	5.5	V	
Supply Current	I_{DD}			100	µA	
LCD ON Voltages	V_{ON}		V_{DD} & V_{SS}		V	
LCD OFF Voltages	V_{OFF}		1/3V_{DD} & 2/3 V_{DD}		V	

[#] Extended Operating Temperature Range available on request.

PIN DESCRIPTION

Pin PLCC-44	Pin DIP-40	Designation	Description
29	16	GND	Ground
13	1	V_{DD}	Positive Supply Voltage
17	5	D[0]	Data inputs/outputs
16	4	D[1]	
15	3	D[2]	
14	2	D[3]	
21	9	AD[0]	Data address inputs
20	8	AD[1]	
19	7	AD[2]	
18	6	AD[3]	
22	10	$\overline{WR}$	Write Enable input, active low
23	11	$\overline{RD}$	Read Enable input, active low
25	12	$\overline{CS}$	Chip Select input, active low
26	13	$\overline{RES}$	Reset input, active low
27	14	CLK	Oscillator Input
8	37	VS[0]	LCD segment driver outputs
7	36	VS[1]	
6	35	VS[2]	
5	34	VS[3]	
4	33	VS[4]	
3	32	VS[5]	
2	31	VS[6]	
1	30	VS[7]	
43	29	VS[8]	
42	28	VS[9]	
41	27	VS[10]	
40	26	VS[11]	
39	25	VS[12]	
38	24	VS[13]	
37	23	VS[14]	
36	22	VS[15]	

PIN DESCRIPTION (Continued)

Pin PLCC-44	Pin DIP-40	Designation	Description
33	20	VR[0]	LCD backplane driver outputs
32	19	VR[1]	
31	18	VR[2]	
30	17	VR[3]	
28	15	$\overline{EN}$	LCD Voltage Divider Enable input, active low
11	40	VI1	Optional external LCD voltage inputs
10	39	VI1/3	
9	38	VI2/3	
34	21	NC	Not connected
12		NC	
24		NC	
35		NC	
44		NC	

FUNCTIONAL DESCRIPTION

The SA8806A is a CMOS Liquid Crystal Display Driver integrated circuit for displays, having 4 track multipexed backplanes and up to 64 LCD segments.

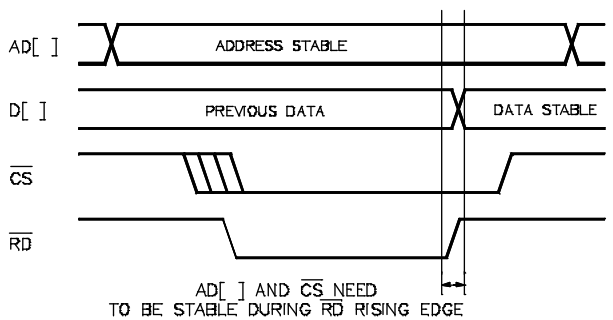
The integrated circuit has a parallel interface, with external contract control and a low power mode.

1. Parallel Interface

Read Mode: With $\overline{CS}$ and $\overline{RD}$ both active (low), the data corresponding to the selected address, is switched to the output.

The Read cycle timing diagram is given below:

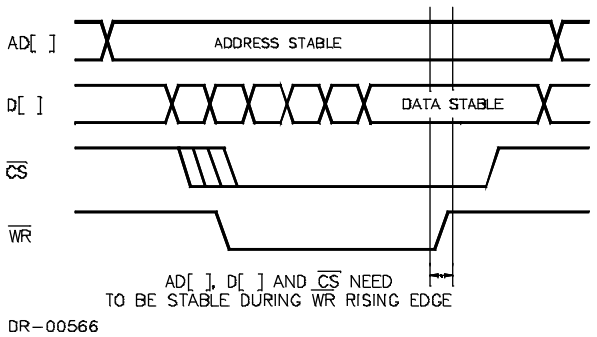
Diagram 1: Read Cycle



Write Mode: With $\overline{CS}$ and $\overline{WR}$ both active (low), the data corresponding to the address selected, is latched into memory.

The Write cycle timing diagram is given below:

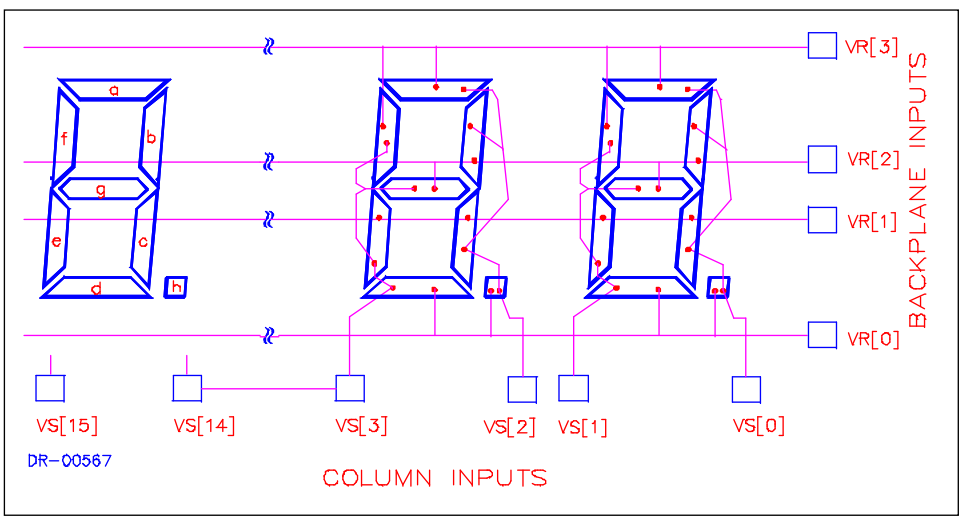
Diagram 2: Write Cycle



2. LCD Display

The SA8806A LCD Driver is capable of driving a 4 backplane, 8 digit (7 segment) display, plus decimal points.

The most significant digit is addressed by columns VS[14] and VS[15] and the least significant digit; by VS[0] and VS[1]. The display segments addressed via the column outputs are given in a typical configuration below:

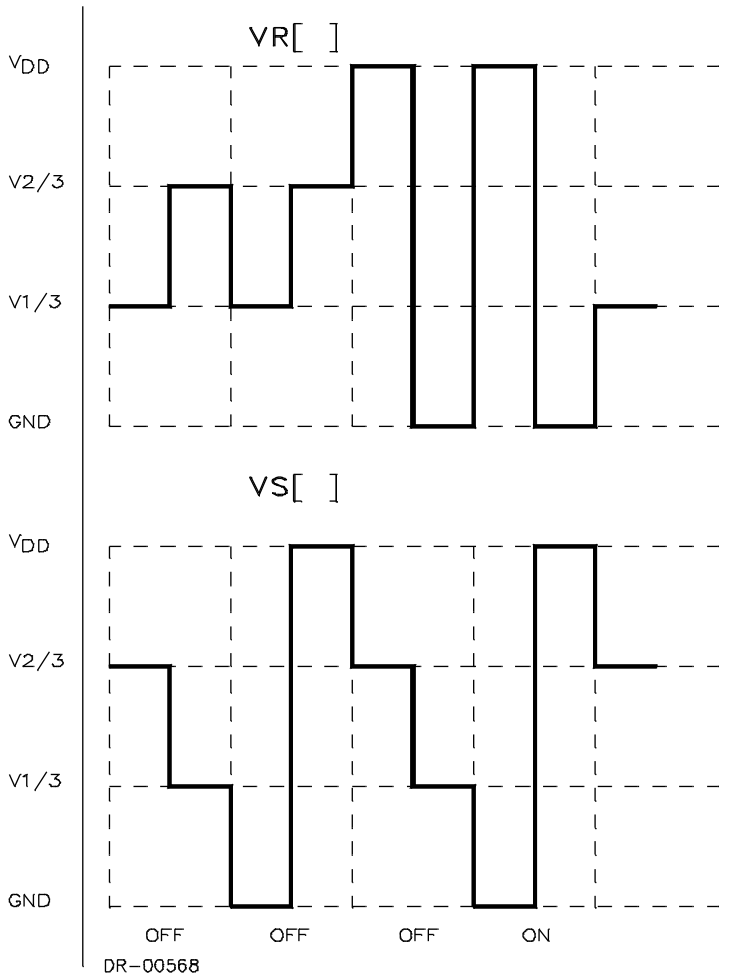


The data in memory is constantly being displayed on the liquid crystal display. New data is displayed as soon as it is latched into memory.

When a high level (+5V) on a backplane driver output corresponds with a low level (0V) on a segment driver output (or vice versa), the LCD segment to which they are connected, will be activated (see Diagram 3).

The backplane multiplex rate is determined by the clock frequency on the CLK input.

Diagram 3: LCD Driving Signals



3. LCD Character Mapping

The device has 16 address locations, A0 - A15 which correspond to VS[0] - VS[15]. Each location contains 4 bits, D[3] to D[0] which correspond to VR[3] - VR[0].

The mapping is detailed in the table below:

SEG	VS[0]	VS[1]	VS[2]	VS[3]	.....	VS[12]	VS[13]	VS[14]	VS[15]
VR[0]	0-0	1-0*	2-0	3-0	.....	12-0	13-0	14-0	15-0
VR[1]	0-1	1-1	2-1	3-1	.....	12-1	13-1	14-1	15-1
VR[2]	0-2	1-2	2-2	3-2	.....	12-2	13-2	14-2	15-2
VR[3]	0-3	1-3	2-3	3-3	.....	12-3	13-3	14-3	15-3

Note: A '1' switches the corresponding segment on.

* The address number and bit number of the byte is given, e.g. 1-0 is address 1 and bit 0 (LSB).

4. On-Chip LCD Voltage Divider Disable

The integrated divider for the LCD voltages can be disabled by applying a high level on the $\overline{EN}$ input ($\overline{EN}$ = 1).

5. Contrast Setting

The contrast may be adjusted in two ways:

An external resistor divider supplying the LCD voltage inputs VI1, VI1/3, VI2/3, with the internal divider disabled as described in paragraph 4.

Applying an external LCD voltage on input V1, with the internal voltage divider activated.

6. Oscillator

The on-chip oscillator circuit requires one external capacitor for operation. The capacitor value is calculated as follows:

C = 7µF.1Hz/f

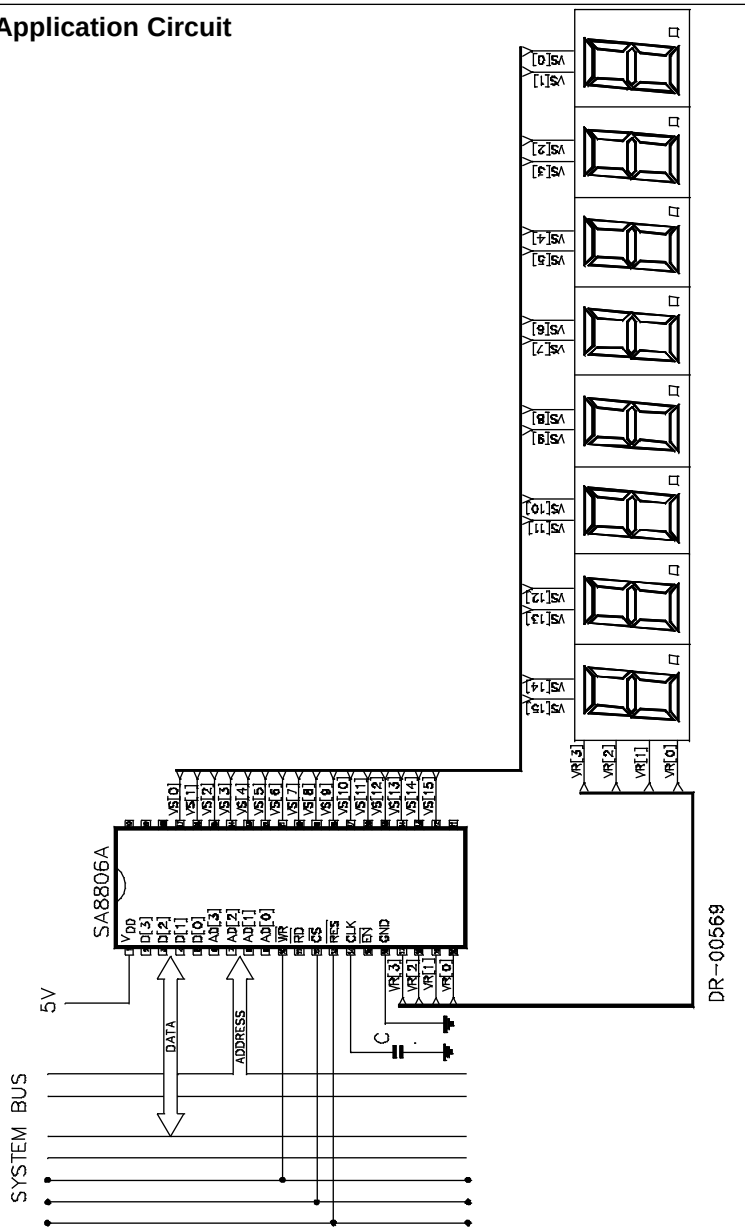
f = Required oscillator frequency

The multiplex rate is 64 times lower than the clock frequency.

TYPICAL APPLICATION

The Application Circuit (Figure 1) shows the connections for a typical application utilising an 8 digit (7 segment) display, plus decimal points.

Figure 1: Application Circuit



ORDERING INFORMATION

Part Number	Package
SA8806APA	DIP-40
SA8806AFA	PLCC-44

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