

Application Note

Application of SSD1810V to Existing LCD Modules
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INTRODUCTION

SSD1810 is a single-chip CMOS LCD driver with controller for liquid crystal dot-matrix graphic display system. It is capable for driving 98x34 or 100x32 displays, which are commonly used in mobile phone applications. This application note describes how to apply SSD1810 into existing LCD modules.

COMPATIBILITY OF SSD1810

SSD1810 uses one input pin (MODE) setting to select which display mode (32 or 34 mux) it operates. Both operating modes are commonly be used and similar devices could be found in different IC manufacturers.

An example is given in this application note to explain how to tackle the differences between SSD1810 and another manufacturer devices.

SPECIFICATION OF EXAMPLE MODULE

The related specification of this example is given below:

- Display Size: 96 x 32 Dot Matrix with 45 Icons
- Driving Scheme: 1/33 Duty, 1/6 Bias
- Logic Supply (V_{DD}): 2.7 to 3.5V
- Negative Supply (V_{NEG}): -8.8 to -9.6V, -9.2V typ.
- Data Interface: 8-bit Parallel Interface

Other requirements on the driver IC:

- External negative supply voltage provided, internal DC-DC converter disabled
- Internal bias divider enabled
- Part of the bonding diagram is drafted in Figure 1.

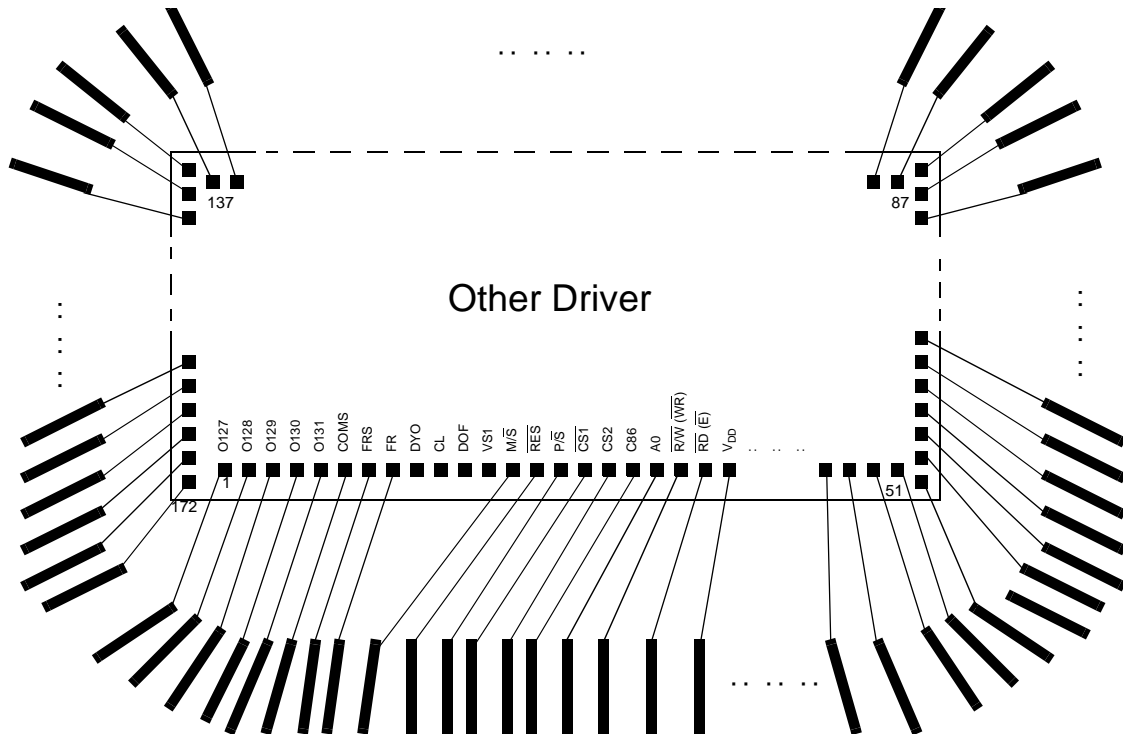


Figure 1: Selected Part of Bonding Diagram of a LCD module example

DIFFERENCES OF SSD1810

For application of COB, SSD1810V (bare die) is recommended to be used. SSD1810V differs slightly from other manufacturers' driver IC in terms of pin assignment. Table 1 is a comparison of the most critical pins.

OTHER DRIVER			SSD1810V		
Pin #	Pin Name	Description	Pin #	Pin Name	Description
6	COMS	Indicator COM output	6	ICONS	Special icon or indicator line
7	FRS	Static Driver output	7	FRS	Frame signal output
8	FR	LCD AC signal input/output	8	FR	Static drive (indicator) output
9	DYO	Common drive signal output			
10	CL	Display clock input/output	9	CL	Display clock output
11	DOF	LCD blanking control input/output	10	IRS	Internal resistors network for voltage regulator enable input
12	VS1	Internal power supply voltage monitor output	11	V _{DD}	Logic power supply, connected to other V _{DD} internally
13	M/S	Master/Slave mode select input	12	MODE	Display mode (34/32mux) selection input
14	RES	Reset input pin	13	RES	Reset signal input
15	P/S	Serial data input/parallel data input select pin	14	P/S	Serial/parallel interface input
16	CS1	Chip select input, negative enable	15	CS1	Chip select input, negative enable
17	CS2	Chip select input, positive enable	16	CS2	Chip select input, positive enable
18	C86	Microprocessor Interface select terminal	17	C68/80	Microprocessor select input
19	A0	Control/display data flag input	18	D/C	Control/Display data input flag
20	R/W (WR)	Write enable input	19	R/W (WR)	Microprocessor write interface signal input
21	RD (E)	RD signal for 8080 series MCU/Enable signal for 6800 series MCU	20	RD (E)	RD signal for 8080 series MCU/Enable signal for 6800 series MCU
22	V _{DD}	Logic power supply	21	V _{DD}	Logic power supply, connected to other V _{DD} internally

Table 1: Comparison between other driver and SSD1810

From Table 1, both ICs have very similar pin assignments. There is one pin less in SSD1810, which relative position corresponding to pin 9 (DYO) of the other driver. For the pins other than that in Table 1, they are also well matched and thus skipped mentioning here. In the example LCD module used in this document, pin 9 to pin 13 are left open while bonding to the PCB.

A study on how to replace the other driver by SSD1810 will be given below:

1. DYO of other driver
Since it is NC in the example application, missing this output pin in SSD1810 has no effect. But it should be noted that due to missing of this pin, the **pin number of corresponding pins** (from pin9 to pin171) for SSD1810V will be **1 less** than that of other driver.
2. CL of other driver
The SSD1810 CL pin has the same function. This pin is also NC in the example.
3. $\overline{\text{DOF}}$ of other driver
This pin is NC in the application. For SSD1810, the corresponding pin in the relative position is IRS. Pulling IRS High will enable internal resistor network of the internal voltage regulator, while NC or pulling Low will disable the resistor network.

Since in the example, external negative supply driving voltage will be provided, it should be opening this pin.

4. VS1 of other driver
This pin is NC in the application. For SSD1810, the corresponding pin in the relative position is V_{DD} . This pin is suggested to be connected to the logic power supply. As this pad is internally connected to other V_{DD} pad, **NC** at this pin will not create serious problem.
5. M/\bar{S} of other driver
Since there is only one driver in the example, this pin is pulled up in the PCB. The corresponding pin of SSD1810 is MODE. A High input at this pin will force SSD1810 to work in 34mux mode, while a Low input or NC will be in 32mux mode.

Since the display size of the example is **96x32** dots, this pin should be left **NC**, instead of bonding to the pin on the PCB. (see Figure 2)

Note: In some other applications, the display size may be **96x33**. In that cases, this pin should also be **bonded** to the PCB. (see Figure 3)

6. Other pins of other driver
For the other pins, since there will be a corresponding pin on SSD1810 at the relative position, the bonding could be make the same.

The revised bonding diagrams for using SSD1810V in 96x32 and 96x33 dots display modules is give in Figure 2 and Figure 3 followed correspondingly.

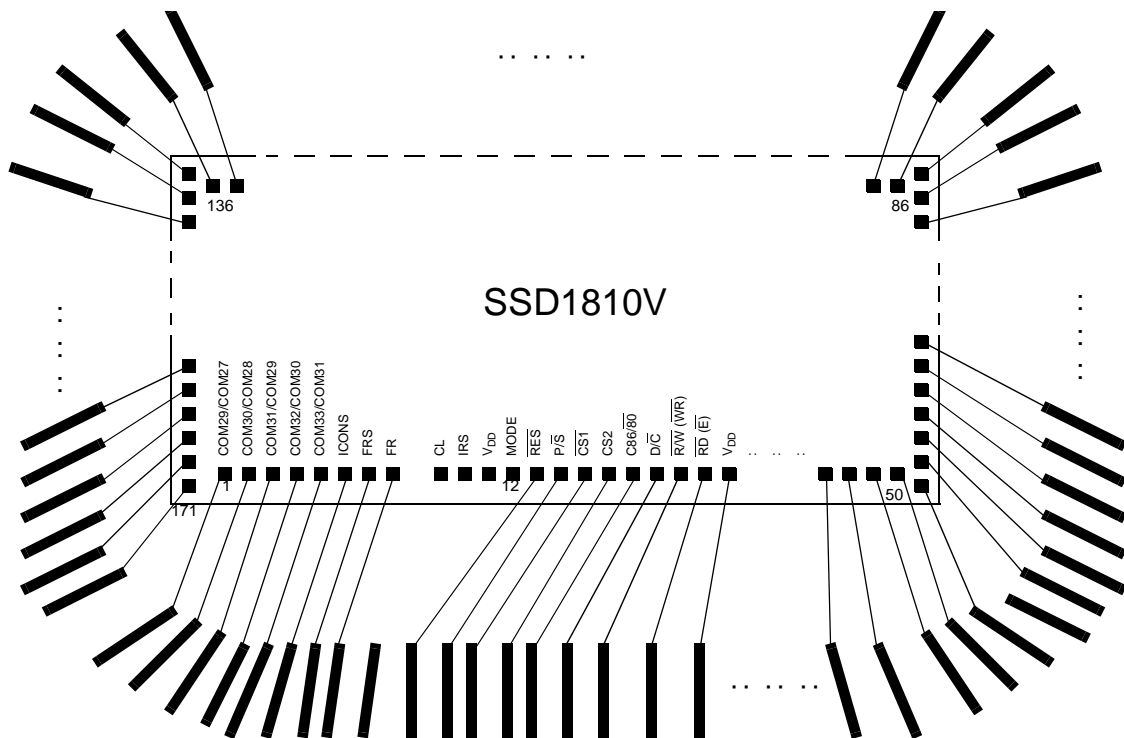


Figure 2: Selected Part of Bonding Diagram of 96x32 LCD module using SSD1810V

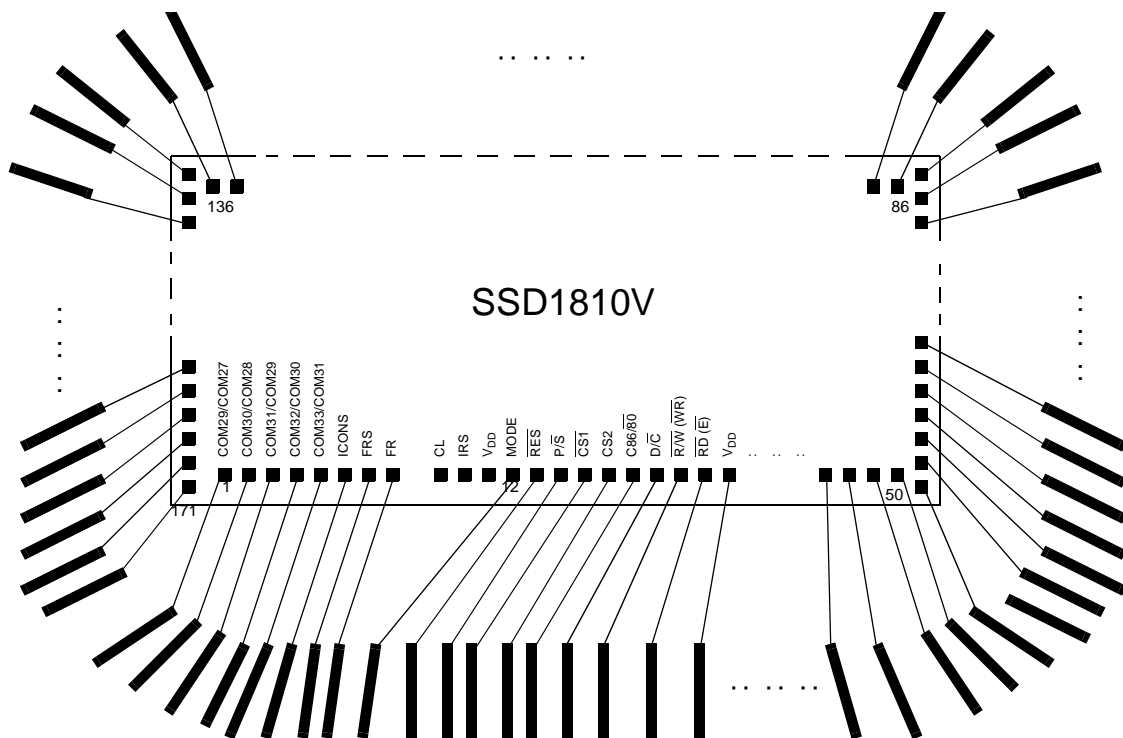


Figure 3: Selected Part of Bonding Diagram of 96x33 LCD module using SSD1810V

CONCLUSION

Although SSD1810V differs slightly in pin assignment from other manufacturers' LCD drivers, after taking care in the COB bonding, it could be used with same PCB in mobile phone application. In this document, one examples has been given with two suggested modifications.

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