Inductorless, Liquid Lens Driver Demoboard

General Description

The HV892DB1 liquid lens driver demoboard is controlled via an I²C interface, is capable of driving capacitive loads of up to 200pF, and is compatible with $40V_{RMS}$ to $60V_{RMS}$ lenses.

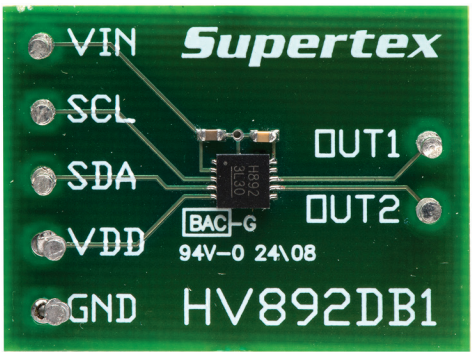
A charge pump boost converter integrated on-chip provides the high voltage necessary for driving the lens. No external inductors or diodes are needed. The board requires only two ceramic chip capacitors to complete a lens driver circuit.

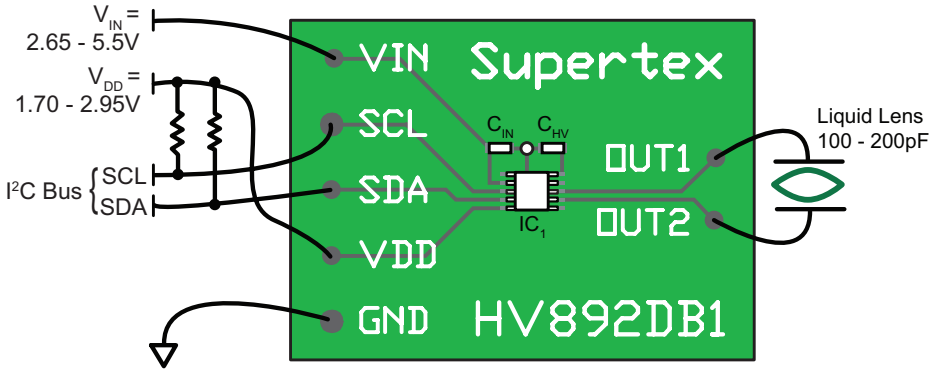
An H-bridge output stage provides AC drive to the lens, allowing the use of a single high voltage boost converter while providing alternating polarity to the lens. Controlled rising and falling edges on the drive waveform reduces EMI.

Specifications

Parameter	Value
Supply voltage (V_{IN}):	2.65 – 5.50V
Supply current (I_{IN}):	20mA max operating 500nA max standby
Output voltage (OUT1 – OUT2):	9.8 – 62.6V_{RMS}, adjustable via I²C
Load (lens) capacitance:	100 – 200pF
I²C reference voltage (V_{DD}):	1.70 – 2.95V
I²C clock:	400kHz max
I²C address (7-bit):	0100011b
Board dimensions:	35.6mm x 26.2mm

Board Layout and Connections





Connections:

VIN
Supply voltage to the HV892. Externally supplied V_{IN} should be between 2.65 and 5.50V.

GND
Circuit common.

VDD
Externally supplied logic reference voltage for the I²C interface. V_{DD} should be between 1.70 and 2.95V.

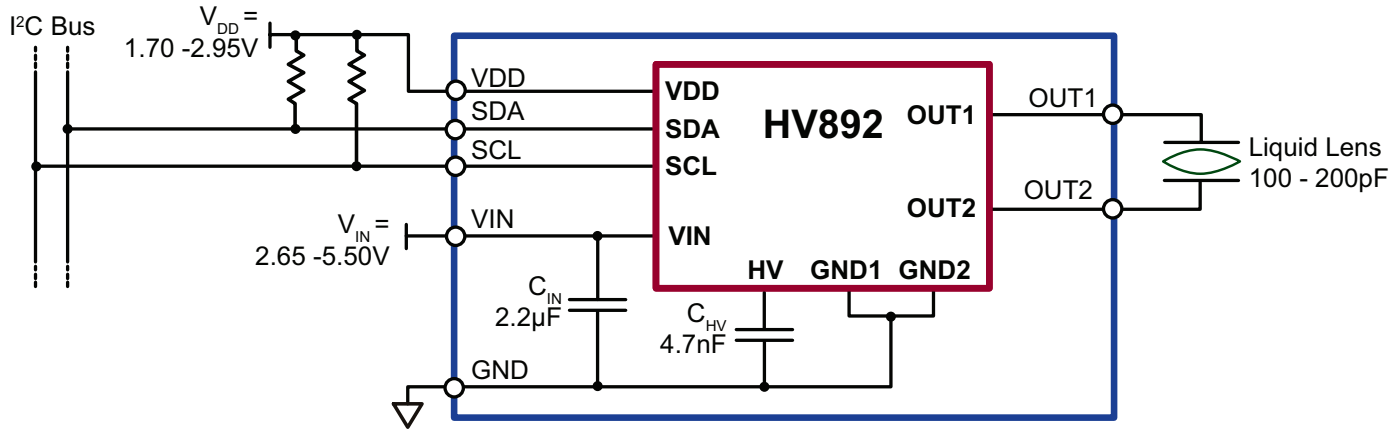
SCL
I²C clock. Clock frequency should be no greater than 400kHz.

SDA
I²C data.

OUT1 and **OUT2**
The lens driver output. Connect the lens between these two terminals. Load (lens) capacitance should be between 100 and 200pF, including any stray capacitance.

Note:
The resistors shown in the connection diagram are the normal I²C pull-ups. No additional pull-ups are required.

HV892DB1 Circuit Schematic



Bill of Materials

Part	Description	Value	Tolerance	Rating	Package	Manufacturer	Part Number
C_{IN}	Ceramic capacitor	2.2µF	20%	6.3V	0603	Any	---
C_{HV}	Ceramic capacitor	4.7nF	10%	100V	0603	Any	---
IC_1	Lens driver	-	-	-	4x4 DFN	Supertex	HV892K7-G

Operation

A single byte (AMP) written to the HV892 controls the operation of the driver. Setting AMP = 00h causes the HV892 to go into low power standby mode. Setting AMP = 01h to FFh controls output amplitude in 255 monotonic steps.

$$V_{OUT(RMS)} = 9.6V_{RMS} + AMP \bullet 208mV_{RMS}$$

The HV892 is write-only. No readback of the AMP byte is possible.

The HV892's 7-bit address is 0100011b. For large quantity orders, other 7-bit addresses may be obtained.

The resistors shown on the above schematic are the I²C bus' normal pull-ups. No additional pull-ups are required. Externally supplied V_{DD} is the I²C bus' reference voltage.

Externally supplied V_{IN} should be ramped up in less than 2.0ms to ensure the driver starts-up in standby mode. If brought up slower, the driver may not start-up in standby mode, with output amplitude at an indeterminate level. In this case, writing AMP = 00h brings the driver to standby mode. No damage will occur if V_{IN} is brought up slower than 2.0ms.

Light capacitive loads may result in waveform distortion. This is due to the output pins being held at a high-Z state for a portion of the waveform. Without adequate capacitance to hold up the voltage, some droop may be observed when DC-loaded by oscilloscope probes.

To avoid loading down the outputs, use instruments having at least 10MΩ input impedance when taking measurements. While many voltmeters may have a very high input resistance on the DC scale, they frequently have only 1.0MΩ input impedance on the AC scale. Also, be sure to use a voltmeter with true RMS capability.

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