

## 16-Channel EL Lamp Driver Demoboard

### General Description

The Supertex HV881DB1 is a demo board with the necessary circuitry to demonstrate the features of the 16 channel EL lamp driver board HV881. An I<sup>2</sup>C interface needs to be provided to the board along with a power supply to drive the EL lamps.

The HV881DB1 has been optimized to drive 16 EL lamps, each of size 0.15in<sup>2</sup> (approx capacitance 500pF). Each of the EL lamps brightness can be controlled independently using the I<sup>2</sup>C interface. Each lamp brightness can be set independently between level 0 and level 15. Please refer to Table 1 for the I<sup>2</sup>C input to control each lamp brightness. For a different EL frequency or different lamp sizes, the HV881DB1 can be re-optimized by changing some of the component values.

The output voltage is typically ±170V for high lamp brightness. An external n-channel MOSFET, TN2425, is used to boost the input voltage of 3.3 - 4.2V to the nominal output voltage of 170V when driving 16 EL lamps of size each 0.15in<sup>2</sup>.

The discharge rate on the EL lamp can be controlled to have

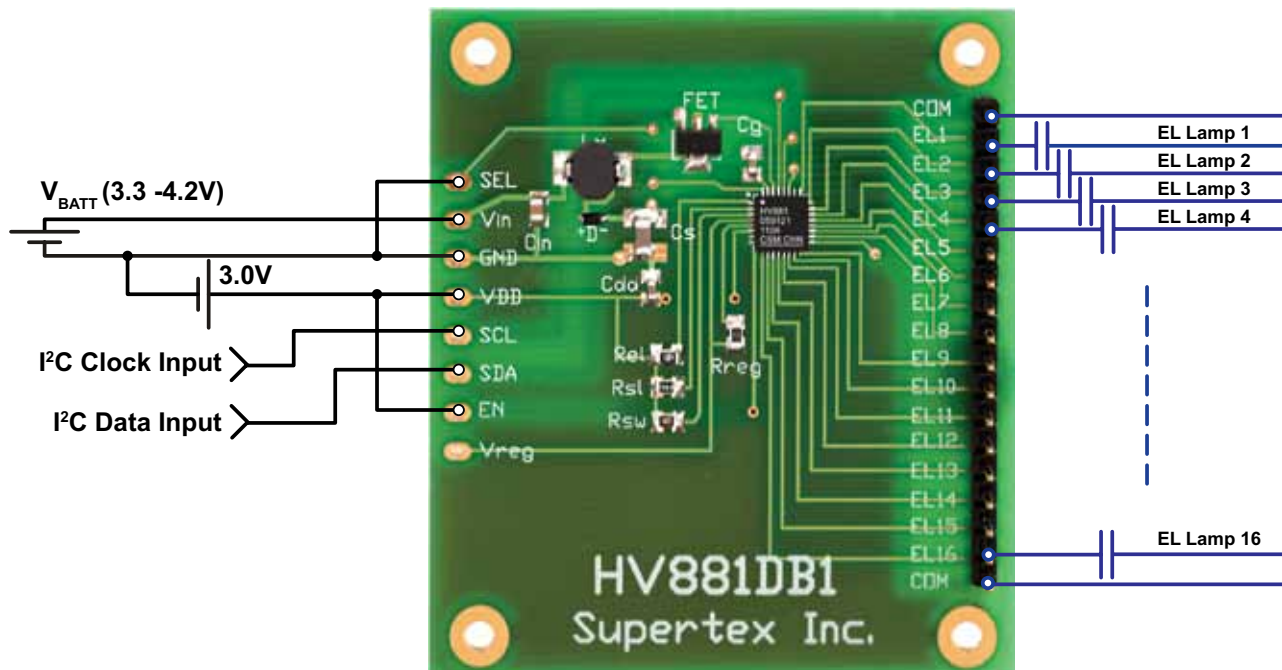
lower audible noise. By increasing the R<sub>SLOPE</sub> resistor value the discharge rate will increase, which will reduce the lamp audible noise and also decrease the lamp brightness.

The HV881DB1 has the provision to set the EL lamp frequency using the R<sub>EL</sub> resistor on the board or by an external clock input at the SEL pin. To use an external clock input at the SEL pin, the R<sub>EL</sub> resistor should be removed and the REL-Osc pin should be connected to GND.

### Specifications

Parameter	Value
V <sub>DD</sub> input voltage:	3.0V
V <sub>IN</sub> inductor supply voltage:	3.3V to 4.2V
Typical supply current:	60mA
Total lamp size:	0.15in <sup>2</sup> x 16
Lamp frequency:	385Hz
Converter frequency:	90kHz

### Board Layout and Connection Diagram



Actual Dimensions: 55mm x 60mm

## Connections:

### EN: Enable Input

Logic input enables/disables the lamp driver. A logic high (1.7V to  $V_{DD}$ ) enables the driver, and a logic low (connect to GND) disables the driver.

### $V_{DD}$ : IC Supply

Supplies the HV881 EL driver IC. The demoboard is optimized for 3.0V operation, with an operating range from 1.8V to 5.5V. Connect to the positive terminal of a power supply.

### $V_{IN}$ : Inductor Supply

Supplies the high voltage power converter. It connects to the positive terminal of a power supply. The demoboard is optimized for a battery input voltage range of 3.3V to 4.2V operation.

### I<sup>2</sup>C Input: SCL(Clock Input) SDA (Data Input)

I<sup>2</sup>C clock and data inputs for controlling lamp brightness.

The I<sup>2</sup>C 7-bit slave address is 000 0110 i.e, 0X06 (in hex) and the I<sup>2</sup>C is write-only. Each lamp's brightness control is a 4-bit binary number in the I<sup>2</sup>C data input.

### GND: Circuit Ground

Connect to  $V_{DD}$  and  $V_{IN}$  negative terminals. Supply bypass capacitors for both  $V_{DD}$  and  $V_{IN}$  are provided on the demoboard. External supply bypass capacitors are not required.

### EL1, EL2...EL16: Lamp Connections

They connect to the EL lamp terminals. Polarity is irrelevant.

### COM: Common Connection for all 16 lamps

Connect to one side of each of the 16 lamps.

### VREG: External Output Voltage Control

Input voltage to set the  $V_{CS}$  output regulation voltage. Output voltage can be set to any value between 0V and the typical regulation voltage of 170V.

The output voltage is  $(403 \pm 10\%) \cdot V_{REG}$ .

Using an external resistor between the VREG and VOUT pins sets the output charging rate. This charging rate is inversely proportional to the resistor value.

### SEL: External EL Frequency Control

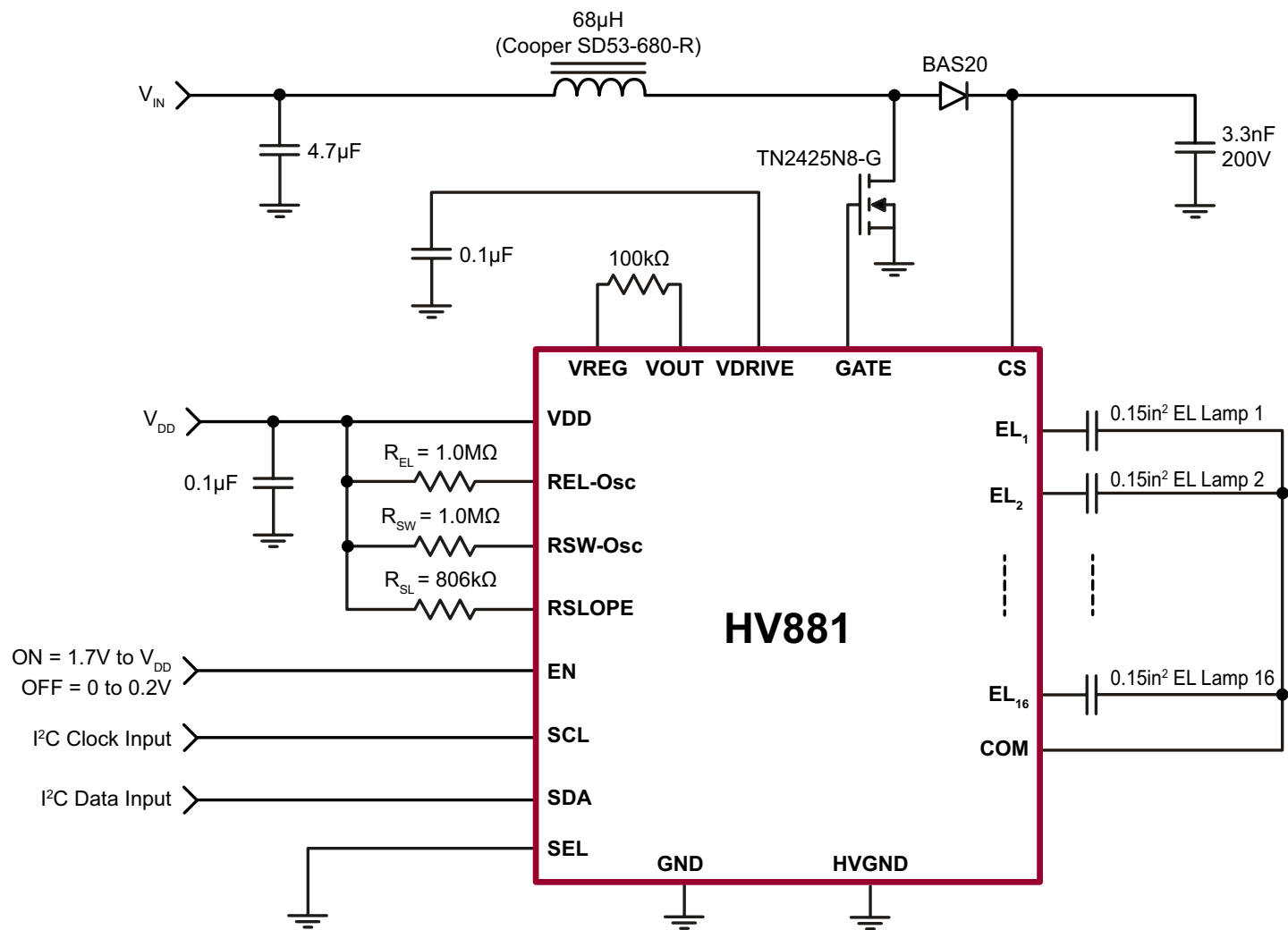
External logic signal input pin to set the EL frequency. To use this pin, the REL-Osc pin should be connected to ground.

The frequency input at this pin should be at 50% duty cycle and at eight times the desired EL out frequency.

**Table 1 :**

I <sup>2</sup> C Data Input	EL Lamp	EL Lamp Brightness Level
Bits 0 - 3	Lamp 1	Linearly proportional to the binary value of the bits.
Bits 4 - 7	Lamp 2	Linearly proportional to the binary value of the bits.
Bits 8 - 11	Lamp 3	Linearly proportional to the binary value of the bits.
Bits 12 - 15	Lamp 4	Linearly proportional to the binary value of the bits.
Bits 16 - 19	Lamp 5	Linearly proportional to the binary value of the bits.
Bits 20 - 23	Lamp 6	Linearly proportional to the binary value of the bits.
Bits 24 - 27	Lamp 7	Linearly proportional to the binary value of the bits.
Bits 28 - 31	Lamp 8	Linearly proportional to the binary value of the bits.
Bits 32 - 35	Lamp 9	Linearly proportional to the binary value of the bits.
Bits 36 - 39	Lamp 10	Linearly proportional to the binary value of the bits.
Bits 40 - 43	Lamp 11	Linearly proportional to the binary value of the bits.
Bits 44 - 47	Lamp 12	Linearly proportional to the binary value of the bits.
Bits 48 - 51	Lamp 13	Linearly proportional to the binary value of the bits.
Bits 52 - 55	Lamp 14	Linearly proportional to the binary value of the bits.
Bits 56 - 59	Lamp 15	Linearly proportional to the binary value of the bits.
Bits 60 - 63	Lamp 16	Linearly proportional to the binary value of the bits.

## HV881DB1 Circuit Schematic:



## Typical Performance

The specific external components used in Figure 1 are  $L_x = 68\mu\text{H}$  Cooper (SD53-680-R),  $C_s = 3.3\text{nF}$  200V NPO and Supertex MOSFET  $M = \text{TN2425}$ . The following was observed when driving a  $0.15\text{in}^2$  lamp on each of the 16 channels.

$V_{DD}$ (V)	$V_{IN}$ (V)	$I_{IN}$ (mA)	$V_{CS}$ ( $V_{PEAK}$ )	$f_{EL}$ (Hz)	Lamp Brightness	
					ft-lm	cd/m <sup>2</sup>
3.0	3.3	65	153	385	13.8	47.2
3.0	3.7	59	153	385	15.1	51.6
3.0	4.2	52	153	385	16.7	57.1

## Bill of Materials

Components	Description	Package	Manufacturer	Part #
$L_X$	68 $\mu$ H inductor	---	Cooper	SD53-680-R
$C_S$	3.3nF, 200V, NPO chip capacitor	1206	Tecate	CMC-200/332JN1206T
$R_{SW}$	1%, 1M $\Omega$ chip resistor	0805	Any	---
$R_{EL}$	1%, 1M $\Omega$ chip resistor	0805	Any	---
$R_{REG}$	1%, 100k $\Omega$ chip resistor	0805	Any	---
$R_{SL}$	1%, 806k $\Omega$ chip resistor	0805	Any	---
$C_{IN}$	4.7 $\mu$ F 10V ceramic chip capacitor	0603	Any	---
$C_{DD}$	0.1 $\mu$ F 16V ceramic chip capacitor	0603	Any	---
$C_G$	0.1 $\mu$ F 16V ceramic chip capacitor	0603	Any	---
Diode	250V fast recovery diode	SOD-323	Diodes Inc	BAS20HT1
MOSFET	250V n-channel enhancement MOSFET	SOT-89	Supertex	TN2425N8-G
U1	EL driver IC	QFN-32	Supertex	HV881K7-G

**Note:**

The above circuit may be optimized further based on specifications of the lamp/s used.

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