

High Voltage EL Lamp Driver

Ordering Information

Device	Input Voltage	Package Options		
		8-Lead SO	MSOP-8	Die
HV825	1.0 to 1.6V	HV825LG	HV825MG*	HV825X

* Product supplied on 2500 piece carrier tape reels.

Features

- Processed with HVC MOS[®] technology
- 1.0V to 1.6V operating supply voltage
- DC to AC conversion
- Output load of typically up to 6nF
- Adjustable output lamp frequency
- Adjustable converter frequency
- Enable function

Applications

- Pagers
- Portable Transceiver
- Cellular phones
- Remote control units
- Calculators

Absolute Maximum Ratings*

Supply voltage, V_{DD}	-0.5V to +2.5V
Operating Temperature Range	-25°C to +85°C
Storage Temperature Range	-65°C to +150°C
MSOP-8 Power Dissipation	300mW
SO-8 Power Dissipation	400mW

Note:

*All voltages are referenced to GND.

For detailed circuit and application information, please refer to application notes AN-H33 and AN-H34.

General Description

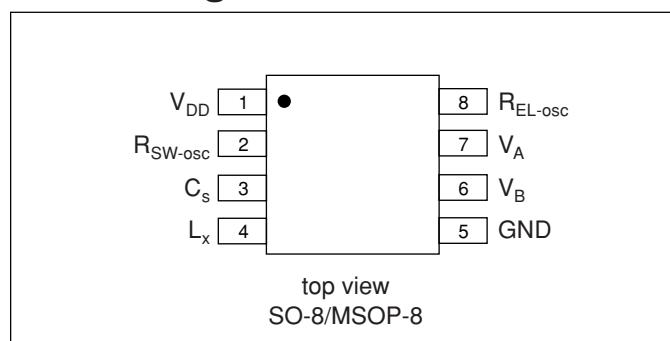
The Supertex HV825 is a high voltage driver designed for driving EL lamps typically up to 6nF. The input supply voltage range is from 1.0V to 1.6V. The device uses a single inductor and a minimum number of passive components. Typical output voltage that can be applied to the EL lamp is $\pm 56V$.

The HV825 can be enabled/disabled by connecting the R_{SW-osc} resistor to V_{DD} /ground.

The HV825 has two internal oscillators, a switching bipolar junction transistor (BJT), and a high voltage EL lamp driver. The frequency for the switching BJT is set by an external resistor connected between the R_{SW-osc} pin and the supply pin V_{DD} . The EL lamp driver frequency is set by an external resistor connected between R_{EL-osc} pin and the V_{DD} pin. An external inductor is connected between the L_x and V_{DD} pins. A 0.01 to 0.1 μF , 100V capacitor is connected between C_s and ground. The EL lamp is connected between V_A and V_B .

The switching BJT charges the external inductor and discharges it into the 0.01 to 0.1 μF , 100V capacitor at C_s . The voltage at C_s will start to increase. The outputs V_A and V_B are configured as an H-bridge and are switching in opposite states to achieve a peak-to-peak voltage of two times the V_{CS} voltage across the EL lamp.

Pin Configuration



Electrical Characteristics

DC Characteristics (Over recommended operating conditions unless otherwise specified, $T_A=25^{\circ}\text{C}$)

Symbol	Parameter	Min	Typ	Max	Units	Conditions
$R_{DS(ON)}$	On-resistance of switching transistor			15	Ω	$I=50\text{mA}$
I_{IN}	V_{DD} supply current (including inductor current)		30	38	mA	$V_{DD}=1.5\text{V}$. See test circuit.
I_{DDQ}	Quiescent V_{DD} supply current			1.0	μA	$R_{SW-osc}=\text{GND}$
V_{CS}	Output voltage on V_{CS}	52	56	62	V	$V_{DD}=1.5\text{V}$. See test circuit.
V_{A-B}	Differential output voltage across lamp	104	112	124	V	$V_{DD}=1.5\text{V}$. See test circuit.
f_{EL}	V_{A-B} output drive frequency	400			Hz	$V_{DD}=1.5\text{V}$. See test circuit.
f_{SW}	Switching transistor frequency		30		KHz	$V_{DD}=1.5\text{V}$. See test circuit.
D	Switching transistor duty cycle		88		%	

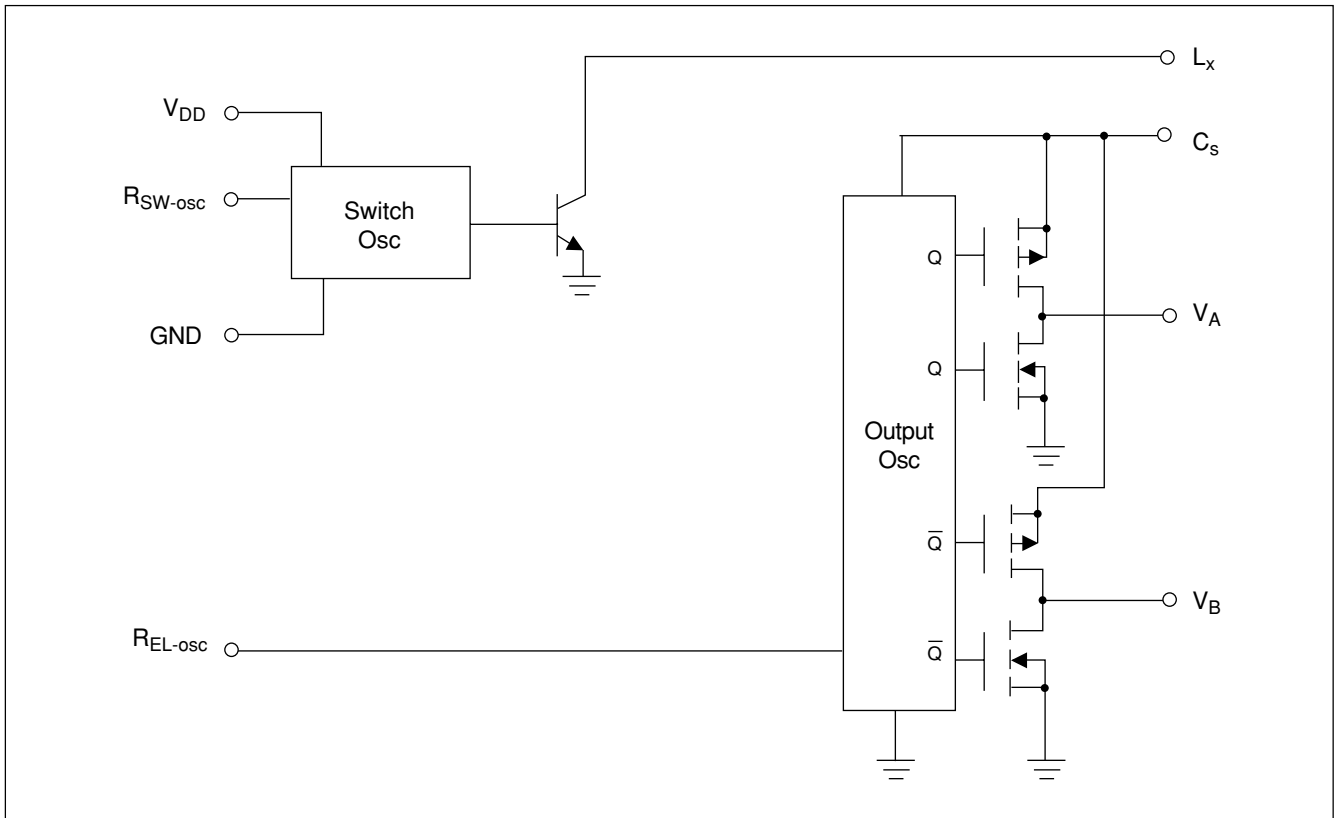
Recommended Operating Conditions

Symbol	Parameter	Min	Typ	Max	Units	Conditions
V_{DD}	Supply voltage	1.0		1.6	V	
C_L	Load Capacitance	0	6.0		nF	
T_A	Operating temperature	-25		+85	$^{\circ}\text{C}$	

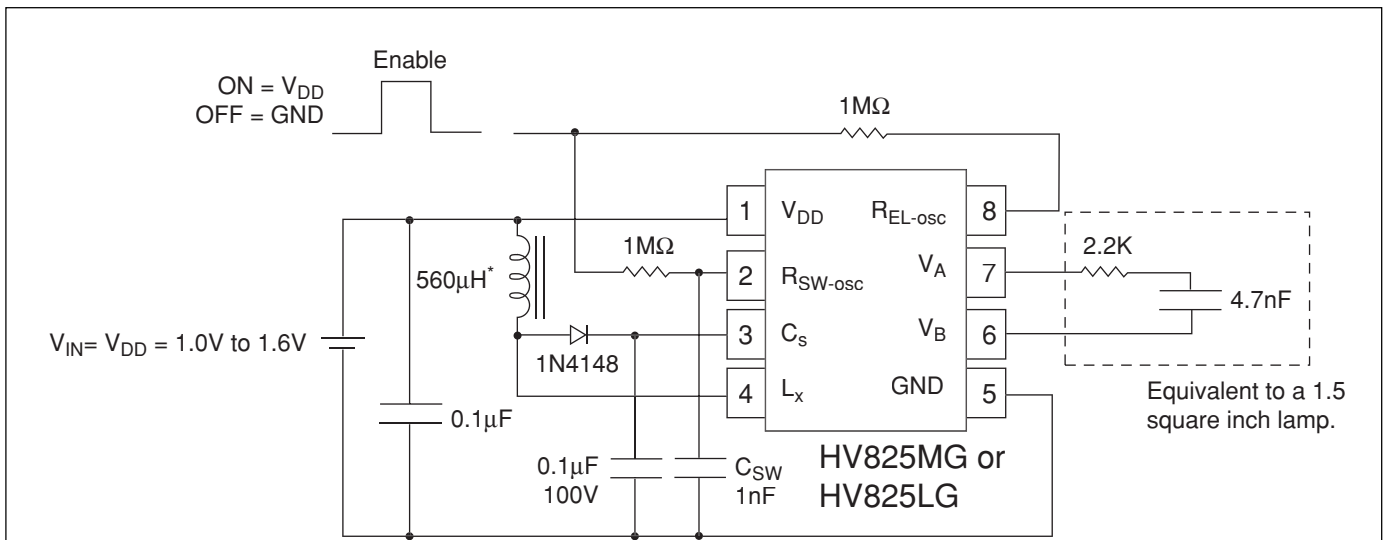
Enable/Disable Table

Symbol	Parameter	Min	Typ	Max	Units	Conditions
V_{IL}	Low level input voltage to R_{SW-osc} resistor	0		0.2	V	$V_{DD}=1.0\text{V}-1.6\text{V}$.
V_{IH}	High level input voltage to R_{SW-osc} resistor	$V_{DD}-0.5$		V_{DD}	V	$V_{DD}=1.0\text{V}-1.6\text{V}$.

Block Diagram



Test Circuit



*560μH Murata inductor (LQH4N561K04), max DC resistance of 14.5Ω.

Typical Performance

Lamp Size	V _{DD}	I _{DD}	V _{CS}	f _{EL}	Brightness
1.5 in ²	1.5v	30mA	56v	450Hz	3.65ft-lm

External Component Description

External Component	Selection Guide Line
Diode	Fast reverse recovery, 1N4148 or equivalent.
C_S Capacitor	0.01 to 0.1 μ F, 100V capacitor to GND is used to store the energy transferred from the inductor.
R_{EL-osc} Resistor	<p>The lamp frequency is controlled via the R_{EL-osc}. The lamp frequency increases as the R_{EL-osc} decreases. As the lamp frequency increases, the amount of current drawn from the battery will increase and the output voltage V_{CS} will decrease. This is because the lamp will draw more current from V_{CS} when driven at higher frequencies.</p> <p>In general, as the lamp size increases, larger R_{EL-osc} is recommended to provide higher V_{CS}. However, the color of the lamp is dependent upon its frequency and the shade of the color will change slightly with different frequencies.</p>
R_{SW-osc} Resistor	The switching frequency of the inductor is controlled via the R_{SW-osc} . The switching frequency increases as the R_{SW-osc} decreases. As the switching frequency increases, the amount of current drawn from the battery will decrease and the output voltage V_{CS} will also decrease.
L_x Inductor	<p>The inductor L_x is used to boost up the low input voltage. When the internal switch is on, the inductor is being charged. When the internal switch is off, the charge in the inductor will be transferred to the high voltage capacitor C_S. The energy stored in the capacitor is connected to the internal H-bridge and therefore to the lamp. In general smaller value inductors, which can handle more current, are more suitable to drive larger size lamps. As the inductor value decreases, the switching frequency of the inductor (controlled by R_{SW-osc}) should be increased to avoid saturation.</p> <p>The test circuit uses a Murata (LQH4N561) 560μH inductor. Using different inductor values or inductors from different manufacturers will affect the performance.</p> <p>As the inductor value decreases, smaller R_{SW-osc} value shall be used. This will prevent inductor saturation. Inductor with the same inductance value (560μH) but lower series resistance will charge faster. The R_{SW-osc} resistor value needs to be decreased to prevent inductor saturation and high current consumption.</p>
C_{SW} Capacitor	A 1nF capacitor is recommended from R_{SW-OSC} to GND. This capacitor is used to shunt any switching noise that may couple into the R_{SW-OSC} pin.