



High Voltage Low Noise Inductorless EL Lamp Driver

Features

- No external components required when using an external EL clock frequency
- EL frequency can be set by an external resistor
- Low Noise
- DC to AC converter
- Drives up to 4.5nF load (approx. 2.0² inches)
- Output voltage regulation
- Enable function

Applications

- Cell phone keypads and displays
- Transceivers
- MP3 Players
- Watches
- Pagers
- Measuring instruments/gauges

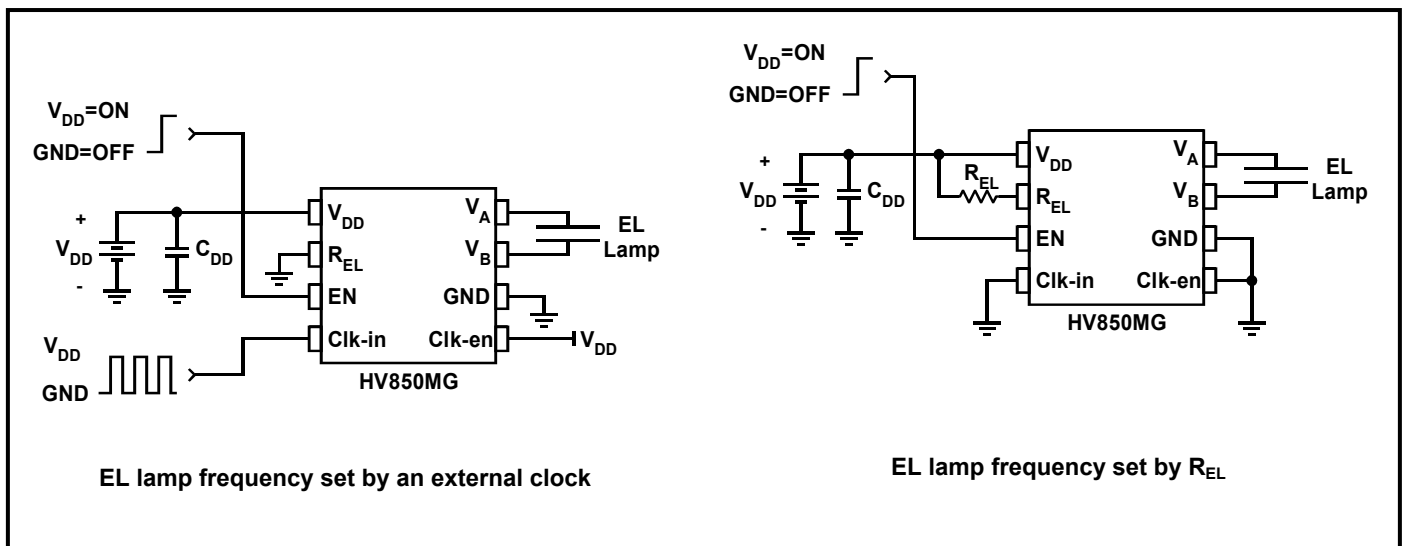
General Description

Supertex HV850 is a high voltage electroluminescent (EL) Lamp Driver IC. It is designed to drive EL lamps of up to 2.0in², with capacitive values up to 4.5nF. HV850 converts a low voltage DC input to a high voltage AC output across an EL lamp. It uses a charge pump scheme to boost the input voltage eliminating the need for an external inductor, diode, and high voltage capacitor commonly found in conventional topologies.

The charge pump circuit discharges its energy into an EL lamp through a high voltage H-bridge. Once the voltage reaches its regulated limit, it is turned off to conserve power. The EL lamp is then discharged to ground and the H-bridge changes state to allow the charge pump to charge the EL lamp in the opposite direction.

The EL lamp frequency can be set either by an external resistor R_{EL} or by applying an external clock where the clock frequency is divided by 128 to set the EL lamp frequency.

Typical Application Circuits



Ordering Information

Device	Package	
	MSOP-8	Die
HV850	HV850MG*	HV850X

*Product supplied on 2500 piece Carrier Tape Reels.

Absolute Maximum Ratings*

V _{DD} , Supply Voltage	-0.5V to 4.5V
Operating Temperature	-25°C to +85°C
Storage Temperature	-65°C to +150°C
Power Dissipation MSOP-8	300mW

*Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied. Continuous operation of the device at the absolute rating level may affect device reliability. All voltages are referenced to device ground.

Electrical Characteristics (unless otherwise specified: T_A = 25°C, V_{DD} = 3.5V)

Symbol	Parameter	Min	Typ	Max	Units	Conditions
I _{DDQ}	Quiescent current			150	nA	EN=0V
V _A or V _B	Peak output voltage	63	70	77	V	No load.
V _A -V _B	Peak to Peak output voltage	126	140	154	V	
f _{EL}	EL lamp frequency	225	250	275	Hz	R _{EL} =1.65MΩ or CLK=32KHz
I _{DD}	Operating current			16	mA	See Figure 1, V _{DD} =3.5V, R _{EL} =1.5MΩ, Load=3.3nF+1KΩ
V _A or V _B	Peak output voltage	54	61	68.5	V	
V _A -V _B	Peak to Peak output voltage	110	122	134	V	
f _{EL}	EL lamp frequency	250	294	338	Hz	
t _{rout}	Output voltage rise time	1.5			ms	f _{EL} =250Hz, 1in ² lamp, 0V to 90% of final value

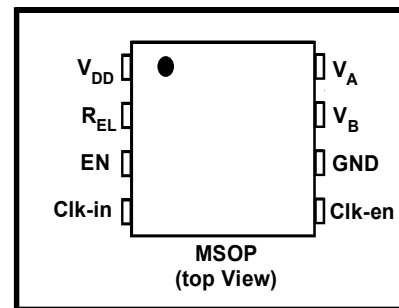
Logic Inputs

Symbol	Parameter	Min	Typ	Max	Units	Conditions
V _{IL}	Input logic low voltage	0		0.5	V	
V _{IH}	Input logic high voltage	2.0		V _{DD}	V	
I _{IL}	Input logic low current			1.0	μA	
I _{IH}	Input logic high current			1.0	μA	
EN _{rise}	Enable input rise time (for delay turn off)	0.01		10	ms	Using external R-C circuit, see Figure 2.
EN _{fall}	Enable input fall time (for delay turn off)	10μ		5	s	
C _{in}	Logic input capacitance			10	pF	

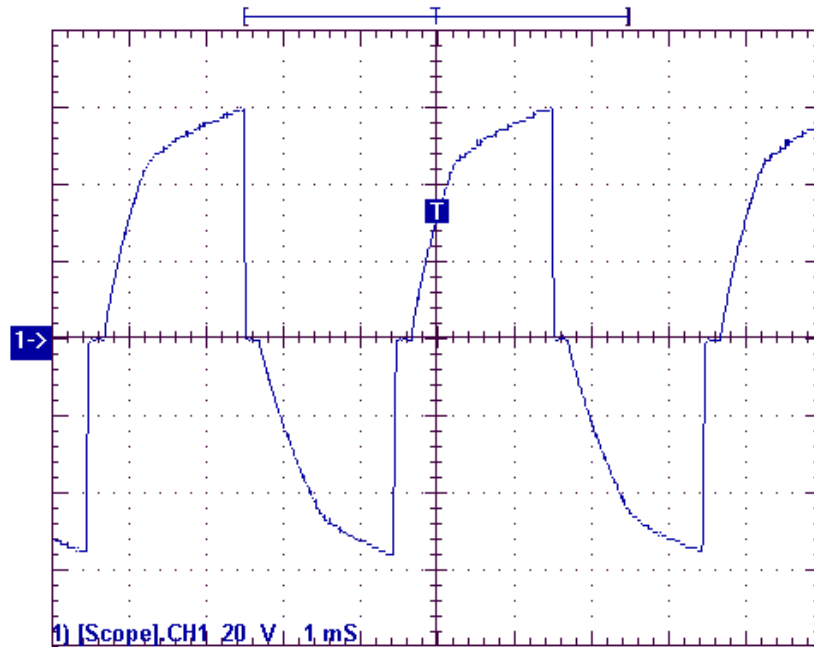
Recommended Operating Conditions

Symbol	Parameter	Min	Typ	Max	Units	Conditions
V _{DD}	Input voltage	3.0		4.2	V	
f _{req}	EL lamp frequency	50		500	Hz	
C _{load}	EL lamp capacitance	0		3.5	nF	
T _A	Operating Temperature	-25		+85	°C	

Pin Configuration

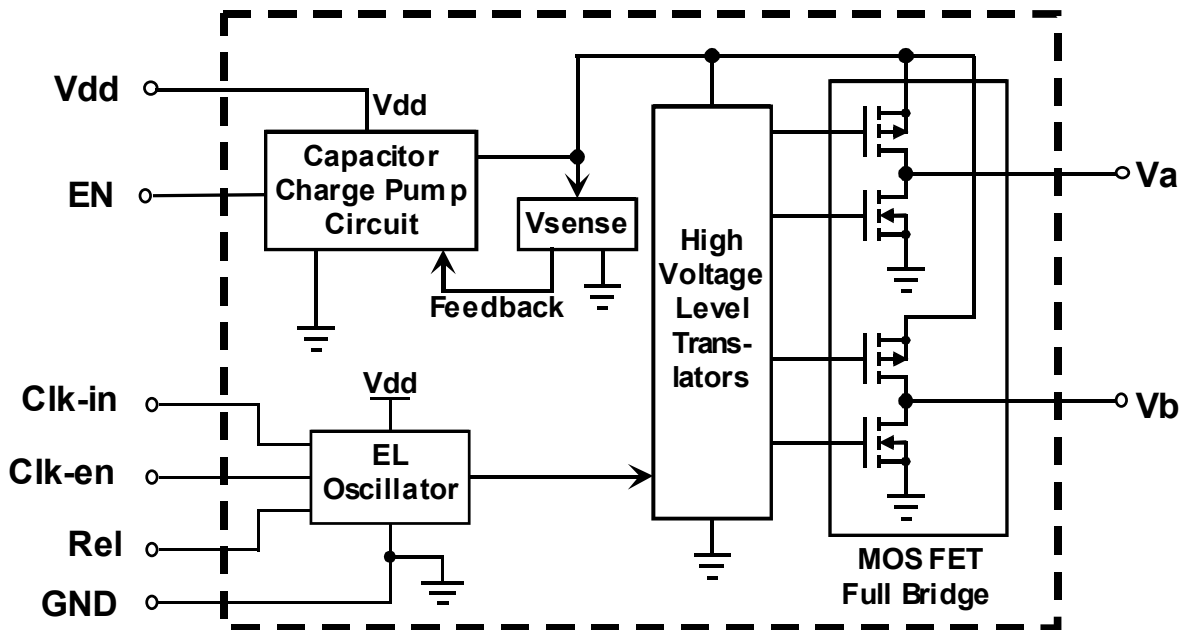


Typical Output Waveform



Vdd=3.5V, Fel=250.0Hz; Load=3.3nF+1 kohm; Idd=9.19mA, CH1 20V/div, 1mS/div

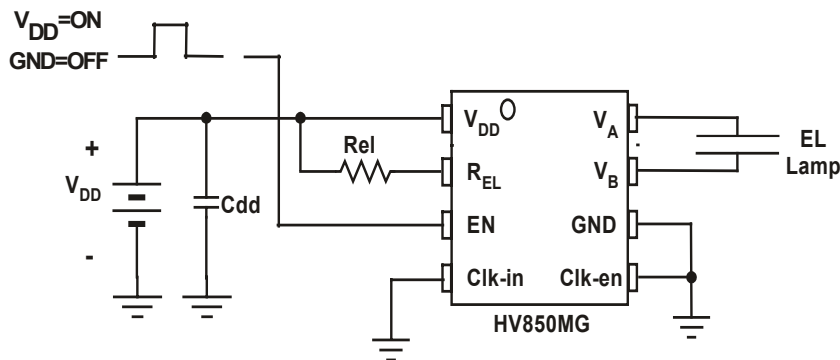
Block Diagram



Pin Description

Pin #	Pad	Description
1	V _{DD}	Input supply voltage pin.
2	R _{EL}	An external resistor to V _{DD} will set the EL lamp frequency.
3	EN	Enable input pin. Logic high will turn the device on. An external R-C circuit can be added for a delayed turn off.
4	Clk-in	Logic input pin. An external logic clock applied to this pad can be used to set the EL lamp frequency (see Figure 3). This is useful for applications requiring the EL lamp to be synchronized to a system clock. Connect to ground when no in use.
5	Clk-en	Logic input pin. Logic high will cause the EL lamp frequency to be set by the Clk-in input. Logic low will cause the EL lamp frequency to be set by the external Rel resistor.
6	Gnd	IC ground pin.
7	V _B	EL lamp driver output pin. The EL lamp is connected across V _A and V _B terminals.
8	V _A	EL lamp driver output pin. The EL lamp is connected across V _A and V _B terminals.

Figure 1: Typical Applications



Note: C_{dd}=2.2μF, 6.3V low ESR

Load	R _{EL}	V _{DD}	I _{DD}	Peak V _A	f _{EL}
3.3nF+1KΩ	1.5MΩ	3.0V	8.9mA	53V	294Hz
		3.5V	10.2mA	61V	
		4.0V	10.4mA	66V	

Additional Examples

Lamp Size	R _{EL}	V _{DD}	I _{DD}	Peak V _A	f _{EL}	Brightness
1.0in ²	1.65MΩ	3.0V	8.4mA	53V	250Hz	7.31cd/m ²
		3.5V	9.4mA	62V		10.35cd/m ²
		4.0V	9.9mA	66V		12.62cd/m ²
0.5in ²	2.0MΩ	3.0V	5.5mA	62V	210Hz	11.54cd/m ²
		3.5V	5.3mA	68V		14.33cd/m ²
		4.0V	4.9mA	68V		14.90cd/m ²
1.0in ²	3.3MΩ	3.0V	5.6mA	62V	128Hz	8.55cd/m ²
		3.5V	5.4mA	67V		10.29cd/m ²
		4.0V	5.0mA	68V		10.94cd/m ²
0.5in ²	3.3MΩ	3.0V	4.6mA	64V	128Hz	8.25cd/m ²
		3.5V	4.1mA	68V		9.62cd/m ²
		4.0V	3.8mA	68V		9.95cd/m ²
1.0in ²	4.7MΩ	3.0V	4.8mA	64V	89Hz	6.02cd/m ²
		3.5V	4.4mA	68V		7.50cd/m ²
		4.0V	5.0mA	68V		10.94cd/m ²

Figure 2: Push Button Turn on with Delay Turn off

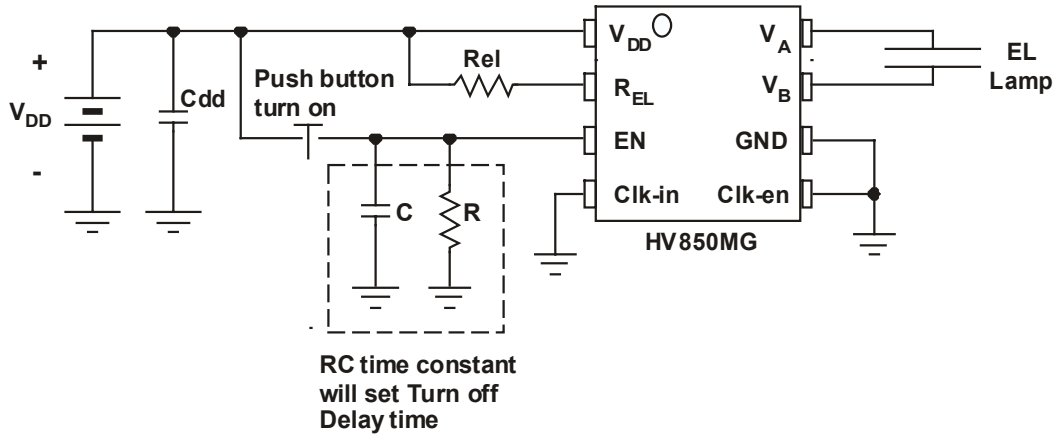
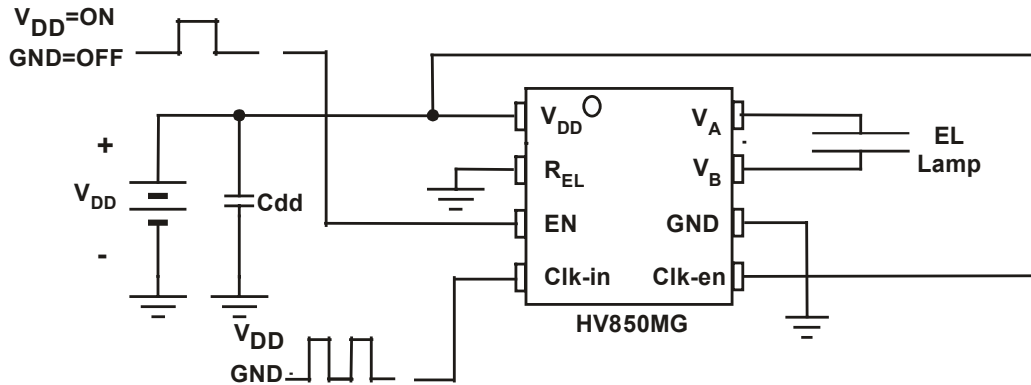
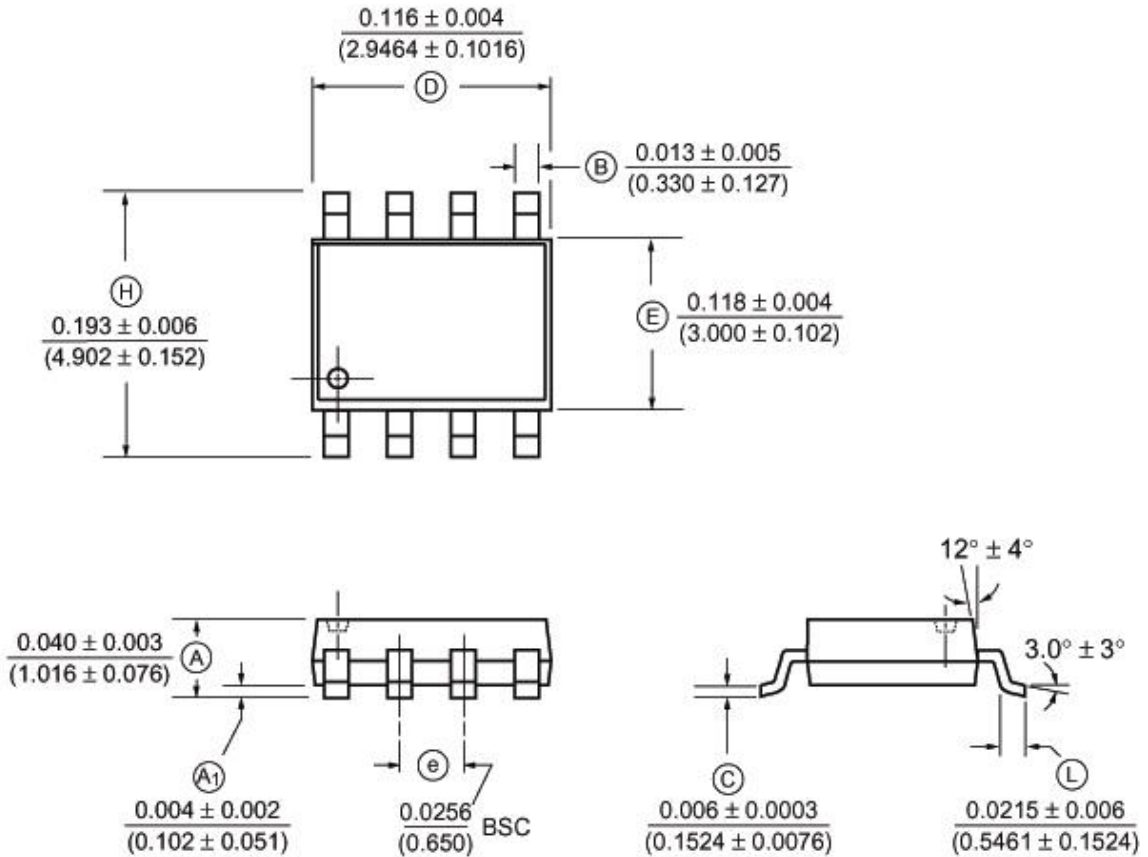


Figure 3: Independent Programmable Output Frequency (f_{EL})



8-LEAD MSOP PACKAGE OUTLINE (MG)



Note: Circle (e.g. (B)) Indicates JEDEC Reference.

Measurement Legend = $\frac{\text{Dimensions in Inches}}{\text{(Dimensions in Millimeters)}}$