Initial Release

Low Noise Dual EL Lamp Driver

Features

- Low audible noise
- Independent input control for lamp selection
- 180V_{pp} output voltage
- Split supply capability
- Patented output timing
- One miniature inductor to power both lamps
- Low shutdown current
- Wide input voltage range 2.0V to 5.8V
- Output voltage regulation
- No SCR output
- Available in DFN/MLP - 10 package

Applications

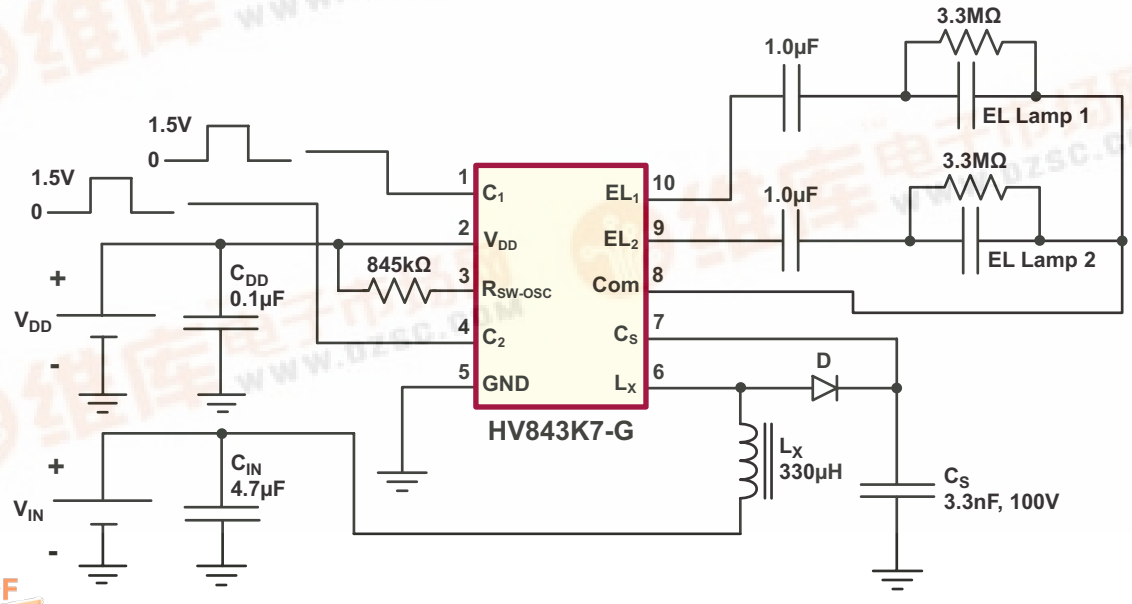
- Dual display cellular phones
- Keypad and LCD backlighting
- Portable instrumentation
- Dual segment lamps
- Hand held wireless communication devices

General Description

The Supertex HV843 is a low noise, high voltage driver designed for driving two EL lamps with a combined area of 3.5 square inches. The input supply voltage range is from 2.0V to 5.8V. The device is designed to reduce the amount of audible noise emitted by the lamp. This device uses a single inductor and a minimum number of passive components to drive two EL lamps. The nominal regulated output voltage of ±90V is applied to the EL lamps. The two EL lamps can be turned ON and OFF by the two logic input control pins, C_1 and C_2. The device is disabled when both C_1 and C_2 (pins 1 and 4) are at logic low.

The HV843 has an internal oscillator, a switching MOSFET, and two high voltage EL lamp drivers. Each driver has its own half bridge common output (COM1 and COM2) connected to a single pin called COM which minimizes the DC offset seen by the EL lamp. An external resistor connected between the R_{SW-OSC} pin and the voltage supply pin, V_{DD}, sets the frequency for the switching MOSFET. The EL lamp driver frequency is set by dividing the MOSFET switching frequency by 512. An external inductor is connected between the L_X and the V_{DD} pins. Depending on the EL lamp size, a 1.0 to 10.0nF, 100V capacitor is connected between C_S and Ground. The switching MOSFET charges the external inductor and discharges it into the capacitor at C_S. The voltage at C_S increases. Once the voltage at C_S reaches a nominal value of 90V, the switching MOSFET is turned OFF to conserve power.

Typical Application Circuit

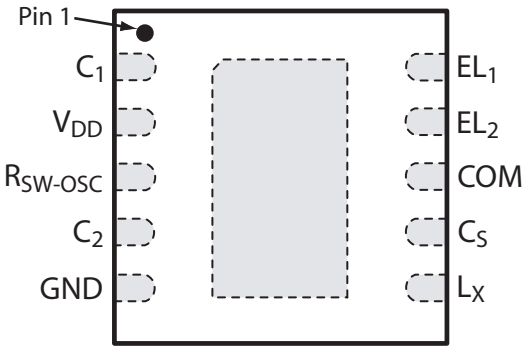


Ordering Information

Device	Package Options
	DFN/MLP - 10
HV843	HV843K7-G

-G indicates package is RoHS compliant ('Green')

Pin Configuration



HV843K7-G
Top View

Note: Pads are on the bottom of the package.
Back-side heat slug is at ground potential.

Absolute Maximum Ratings

Parameter	Value
Supply Voltage, V_{DD}	-0.5V to 7.5V
Output Voltage, V_{CS}	-0.5V to 120V
Operating Temperature Range	-40°C to 85°C
Storage temperature	-65°C to 150°C

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.

Thermal Resistance

Package	θ_{ja}
DFN/MLP - 10	60°C/W

Note: Mounted on FR4 board, 25mm x 25mm x 1.57mm

Recommended Operating Conditions

Symbol	Parameter	Min	Typ	Max	Units	Conditions
V_{DD}	Supply voltage	2.0		5.8	V	---
T_A	Operating temperature	-40		+85	°C	---

Electrical Characteristics

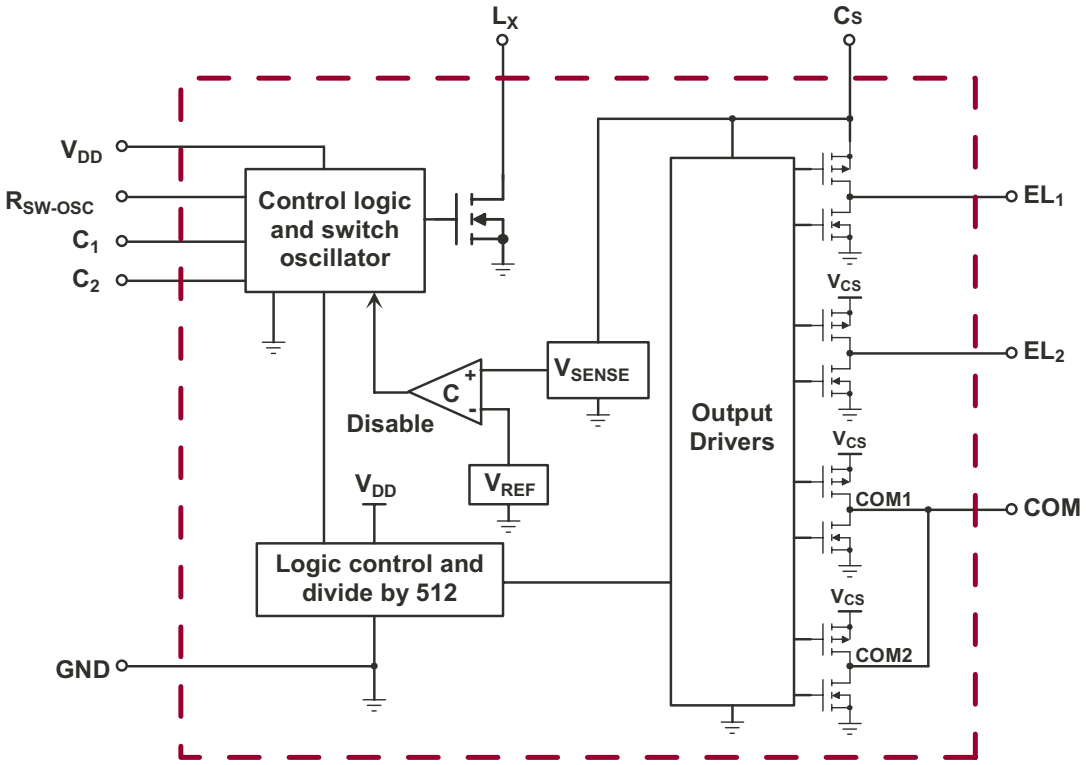
(Over recommended operating conditions unless otherwise specified - $V_{IN} = V_{DD} = 3.3V$, $T_A=25°C$)

Symbol	Parameter	Min	Typ	Max	Units	Conditions
$R_{DS(ON)}$	On-resistance of switching transistor	-	-	10	Ω	I = 100mA
V_{DD}	Input voltage range	2.0	-	5.8	V	---
V_{CS}	Output regulation voltage	80	90	100	V	V_{DD} = 2.0V to 5.8V
V_{DIFF}	Differential output peak to peak voltage (EL_1 to COM, EL_2 to COM)	160	180	200	V	V_{DD} = 2.0V to 5.8V
I_{DDQ}	Quiescent V_{DD} supply current	-	-	150	nA	$C_1 = C_2$ = 0.1V
		-	-	250	nA	$C_1 = C_2$ = 0.3V
I_{DD}	Input current into the V_{DD} pin	-	-	250	µA	V_{DD} = 5.8V
I_{IN}	Average input current including inductor current when driving both lamps	-	20	30	mA	V_{IN} = 5.5V (See Figure 1)
V_{CS}	Output voltage on V_{CS} when driving both lamps	-	87	-	V	V_{IN} = 5.5V (See Figure 1)

Electrical Characteristics (cont.)

Symbol	Parameter	Min	Typ	Max	Units	Conditions
V_{DIF}	Differential output peak to peak voltage across each lamp (EL_1 to COM1, EL_2 to COM2)	160	180	200	V	V_{IN} = 5.5V (See Figure 1)
f_{EL}	V_{DIFF} output drive frequency	170	200	230	Hz	R_{SW} = 845kΩ
f_{SW}	Switching transistor frequency	87	102	118	kHz	R_{SW} = 845kΩ
$f_{SW\ temp}$	Switching transistor frequency tempco	-	15	-	%	T_A = -40°C to +85°C
D	Switching transistor duty cycle	-	85	-	%	T_A = -40°C to +85°C
I_{IL}	Input logic low current	-	-	1.0	µA	V_{DD} = 2.0V to 5.8V
I_{IH}	Input logic low current	-	-	1.0	µA	V_{DD} = 2.0V to 5.8V
V_{IL}	Logic input low voltage	0	-	0.3	V	---
V_{IH}	Logic input high voltage	1.5	-	V_{DD}	V	---

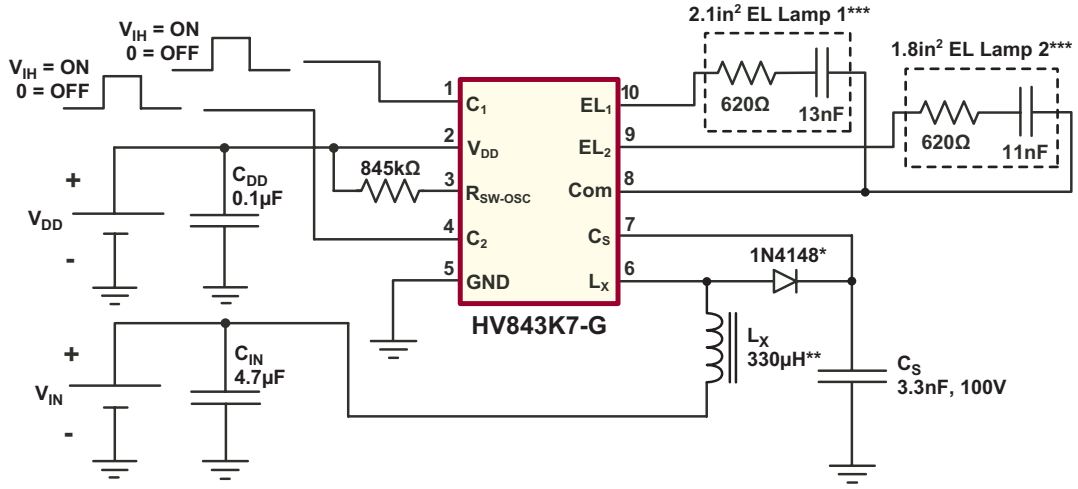
Functional Block Diagram



Function Table

Logic Inputs		Outputs			Device
C_1	C_2	EL_1	EL_2	COM	
0	0	Hi Z	Hi Z	Hi Z	OFF
0	1	Hi Z	ON	ON	ON
1	0	ON	Hi Z	ON	ON
1	1	ON	ON	ON	ON

Figure 1 - Test Circuit



* or any (equivalent or better) > 90V, fast recovery diode
** Cooper LPO6610-334MLB
*** The bigger sized lamp should be tied to EL1 and the smaller sized lamp to EL2 (pins 10 and 9 respectively)

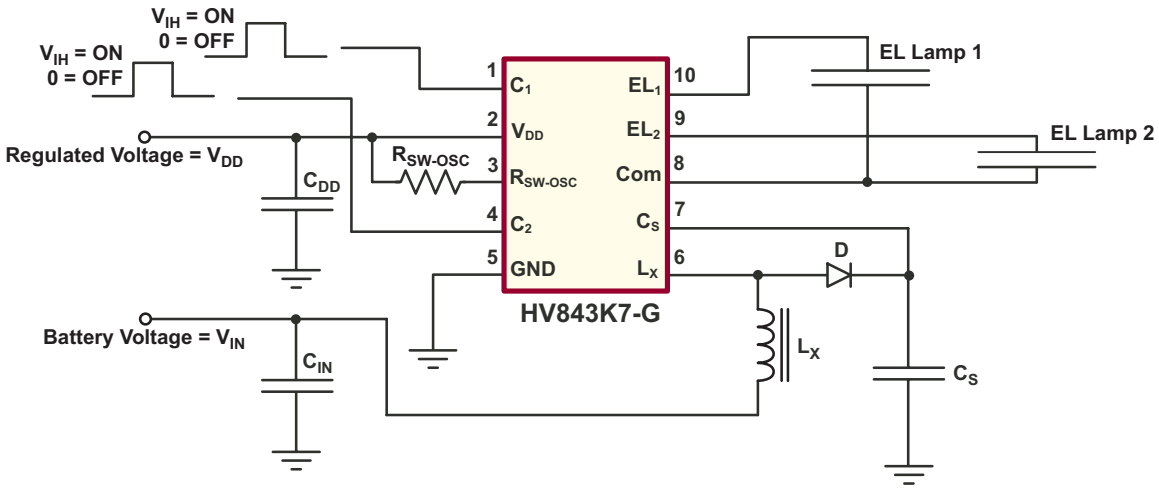
Typical Performance

Lamp	V_{DD} (V)	V_{IN} (V)	I_{IN} (mA)	V_{CS} (V_{PEAK})	f_{EL} (Hz)	Lamp Brightness (cd/m²)	
						EL_1	EL_2
EL_1 ON	3.0V	5.2V	7.96	88	195	13.89	-
EL_2 ON			6.91			-	12.89
Both EL_1 and EL_2 ON			13.93			13.02	11.24
EL_1 ON		5.5V	7.47			13.93	-
EL_2 ON			6.42			-	13.22
Both EL_1 and EL_2 ON			13.42			13.30	12.05
EL_1 ON		5.8V	7.04			14.03	-
EL_2 ON			6.01			-	13.30
Both EL_1 and EL_2 ON			12.94			13.55	12.51

Split Supply Configuration

The HV843 can be used in applications operating from a battery where a regulated voltage is available. This is shown in Figure 2. The regulated voltage can be used to drive the internal logic of HV843. The amount of current used to drive the internal logic is less than 200µA. Therefore, the regulated voltage could easily provide the current without being loaded down.

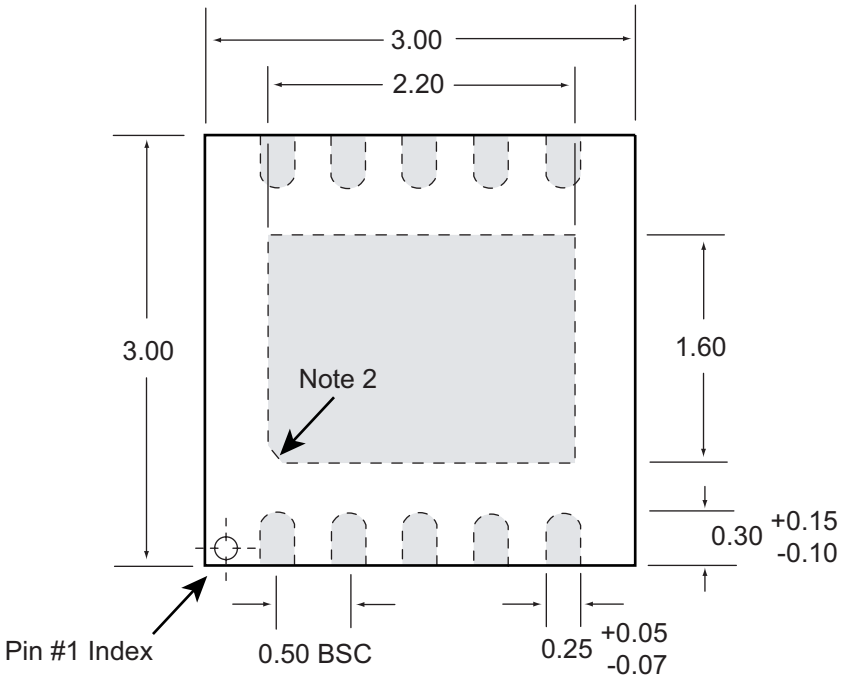
Figure 2 - Split Supply Configuration



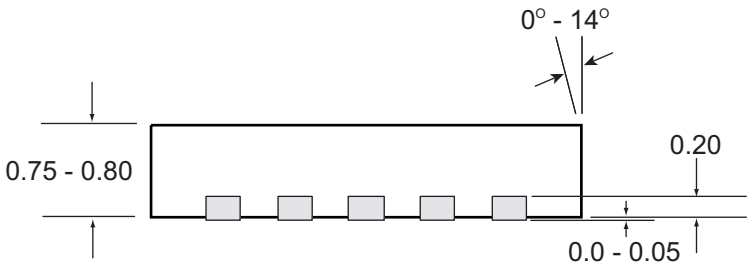
Pin Configuration and Description

Pin #	Function	Description
1	C_1	Enable input signal for EL Lamp 1. Logic high will turn ON the EL lamp 1 and logic low will turn it OFF. Refer to the function table.
2	V_{DD}	Input voltage supply pin.
3	R_{SW-OSC}	External resistor connection to set both the switching MOSFET frequency and EL Lamp frequency. The external resistor should be connected between V_{DD} and this pin. The EL lamp frequency is the switching frequency divided by 512. The switching frequency is inversely proportional to the resistor value. A 845kΩ resistor will provide a nominal switching frequency of 102kHz and an EL lamp frequency of 200Hz. To change the frequency to f_{EL1}, the value of the resistor $R_{SW-OSC1}$ can be determined as $R_{SW-OSC1}$ = (845 x 200) / f_{EL1} kΩ.
4	C_2	Enable input signal for EL Lamp 2. Logic high will turn ON the EL lamp 2 and logic low will turn it OFF. Refer to the function table.
5	GND	Device ground.
6	L_X	Drain of internal switching MOSFET. Connection for an external inductor. When the switching MOSFET is turned ON, the inductor is being charged. When the MOSFET is turned OFF, the energy stored in the inductor is transferred to the high voltage capacitor connected at the C_S pin.
7	C_S	Connect a 100V capacitor between this pin and GND. This capacitor stores the energy transferred from the inductor.
8	COM	Common lamp connection for both EL_1 and EL_2. Connect one end of both the lamps to this pin.
9	EL_2	EL lamp 2 connection. For optimum performance, the smaller of the two lamps should be connected to this pin.
10	EL_1	EL lamp 1 connection. For optimum performance, the larger of the two lamps should be connected to this pin.

10-Lead DFN/MLP Package Outline (K7)



Top View



Side View

Note:
1. All dimensions are in millimeters; angles in degrees
2. Corner shape may differ from drawing

Supertex inc.
1235 Bordeaux Drive, Sunnyvale, CA 94089
TEL: (408) 222-8888 / FAX: (408) 222-4895