



## High Voltage Dual EL Lamp Drivers

### Features

- ❑ Independent input control for lamp selection
- ❑ Split supply capability
- ❑ Patented output timing
- ❑ One miniature inductor to power both lamps
- ❑ 150nA shutdown current
- ❑ Wide input voltage range (2.0V to 5.0V)
- ❑ Output voltage regulation
- ❑ No SCR output
- ❑ Small package 10-pin MSOP dual EL driver IC
- ❑ Low audible noise via Patent Pending technology

### Applications

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

### General Description

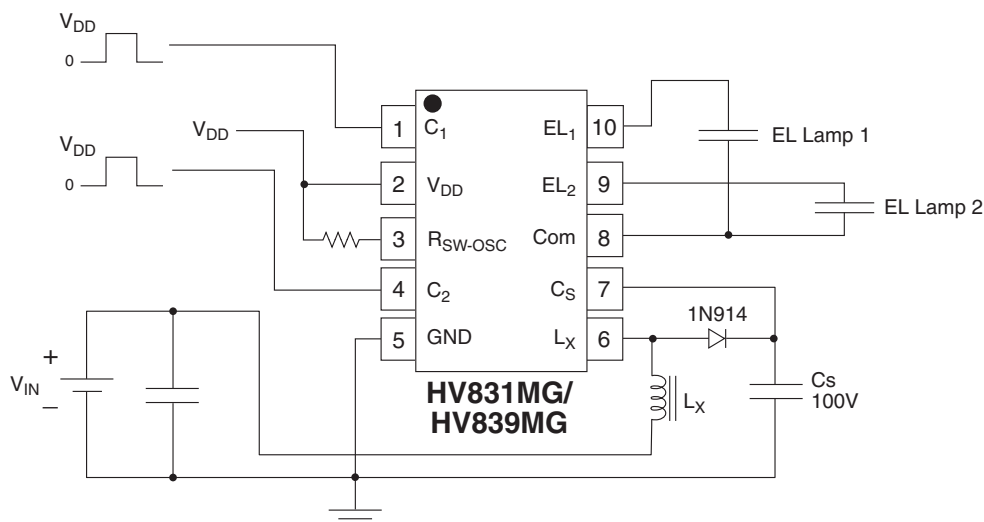
The Supertex HV831 and HV839 are high voltage drivers designed for driving two EL lamps with a combined area of 3.5 square inches. The input supply voltage range is from 2.0V to 5.0V. The device is designed to reduce the amount of audible noise emitted by the lamp. These devices use a single inductor and a minimum number of passive components. The nominal regulated output voltage that is applied to the EL lamp is  $\pm 80V$  for HV831 and  $\pm 90V$  for HV839. HV839 will provide higher brightness due to its higher output voltage regulation. The chip can be disabled by connecting  $C_1$  and  $C_2$  (pins 1 and 4) to GND.

The HV831 and HV839 have an internal oscillator, a switching MOSFET, and two high voltage EL lamp drivers. The frequency for the switching MOSFET is set by an external resistor connected between the  $R_{SW-OSC}$  pin and the voltage supply pin  $V_{DD}$ . The EL lamp driver frequency is set by dividing the MOSFET switching frequency by 128. An external inductor is connected between the  $L_X$  and  $V_{DD}$  pins. Depending on EL lamp size, 0.001 to 0.01 $\mu F$ , 100V capacitor is connected between  $C_S$  and Ground. The EL lamps are connected between  $EL_1$  to Com and  $EL_2$  to Com.

Two input control pins ( $C_1$  and  $C_2$ ) are available to select various modes of the device. The device can be disabled by applying GND to both  $C_1$  and  $C_2$  (pins 1 and 4).  $C_1$  and  $C_2$  control the ON/OFF states of  $EL_1$  and  $EL_2$ , respectively.  $EL_1$  will be ON when  $C_1$  is at  $V_{DD}$  and  $EL_2$  will be ON when  $C_2$  is at  $V_{DD}$ .  $EL_1$  and  $EL_2$  will be ON when both  $C_1$  and  $C_2$  are at  $V_{DD}$ .

The switching MOSFET charges the external inductor and discharges it into the capacitor at  $C_S$ . The voltage at  $C_S$  will start to increase. Once the voltage at  $C_S$  reaches a nominal value of 80V for HV831 and 90V for HV839, the switching MOSFET is turned off to conserve power. The outputs  $EL_1$  to Com and  $EL_2$  to Com are configured as H bridges and are switching in opposite states to achieve 160/180V across the EL lamp for HV831/HV839.

### Typical Application Circuit



## Ordering Information

Device	Output Regulation Voltage	Package Options	
		MSOP-10	Die
HV831	80V	HV831MG*	HV831X
HV839	90V	HV839MG*	HV839X

\* Product supplied on 2500 piece carrier tape reels only.

## Absolute Maximum Ratings\*

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 Range	-65°C to +150°C
10 Pin MSOP Power Dissipation	250mW

\* 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.

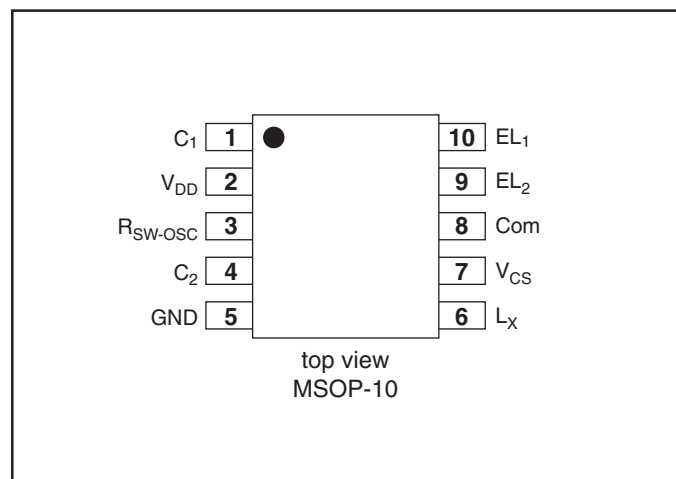
## Recommended Operating Conditions

Symbol	Parameter	Min	Typ	Max	Units	Conditions
$V_{DD}$	Supply voltage	2.0		5.0	V	
$T_A$	Operating temperature	-40		85	°C	

## Function Table

$C_1$	$C_2$	$EL_1$	$EL_2$	Com	IC
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

## Pin Configuration

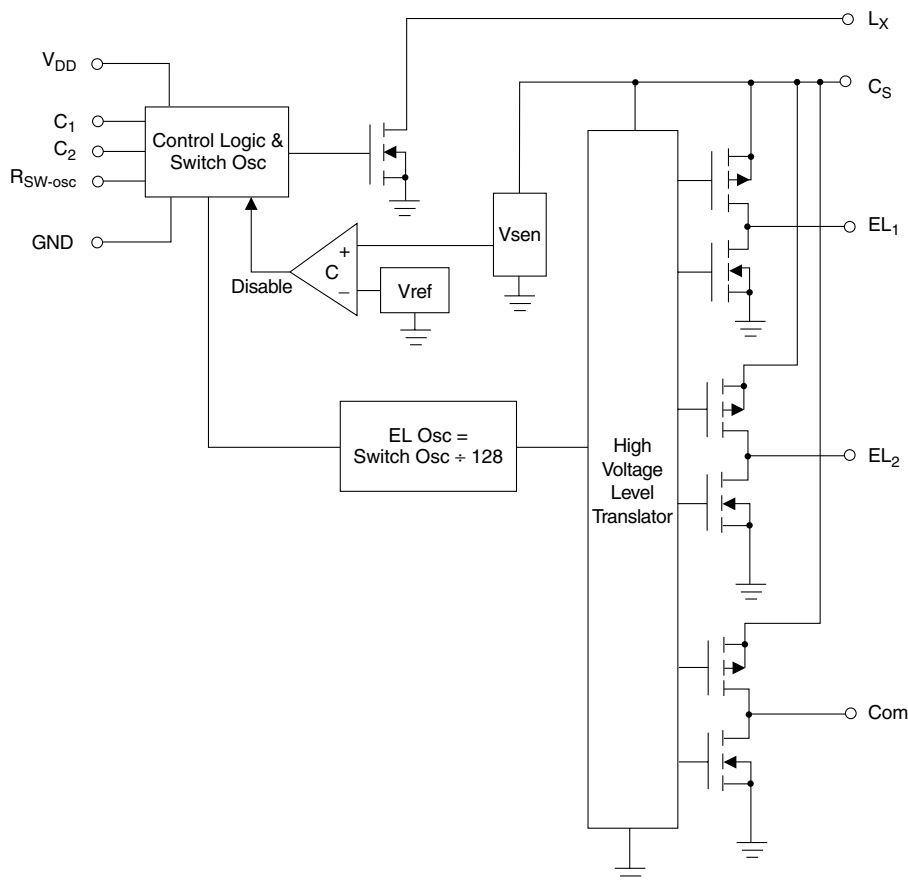


# HV831 Electrical Characteristics

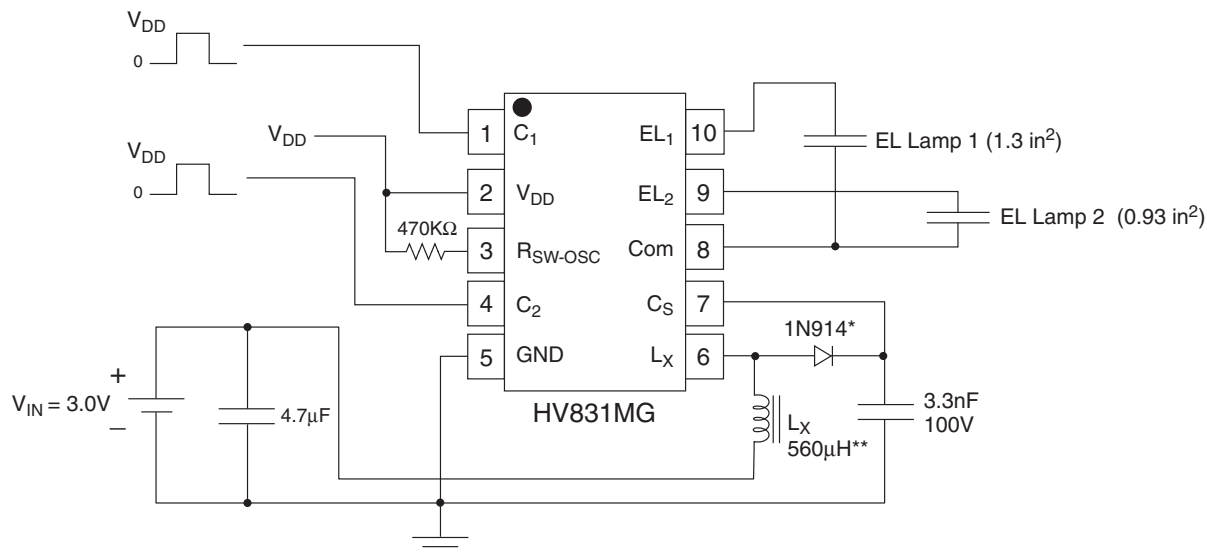
**DC Characteristics** (Over recommended operating conditions unless otherwise specified,  $T_A = 25^\circ\text{C}$ )

Symbol	Parameter	Min	Typ	Max	Unit	Condition
$R_{DS(ON)}$	On-resistance of switching transistor			6.0	$\Omega$	$I = 100\text{mA}$
$V_{DD}$	Input voltage range	2.0		5.0	V	
$V_{CS}$	Output regulation voltage	72	80	88	V	$V_{DD} = 2.0\text{V to } 5.0\text{V}$
$V_{DIFF}$	Differential output peak to peak voltage (EL <sub>1</sub> to Com, EL <sub>2</sub> to Com)	144	160	176	V	$V_{DD} = 2.0\text{V to } 5.0\text{V}$
$I_{DDQ}$	Quiescent $V_{DD}$ supply current			150	nA	$C_1 = C_2 = 0\text{V}$
$I_{DD}$	Input current into $V_{DD}$ pin			150	$\mu\text{A}$	$V_{DD} = 2.0\text{V to } 5.0\text{V}$
$I_{IN}$	Input current including inductor current when driving both lamps			45	mA	$V_{IN} = 3.0\text{V}$ . $T_A = -40^\circ\text{C to } +85^\circ\text{C}$ . See Figure 1.
			26.5	35		$V_{IN} = 3.0\text{V}$ . $T_A = 25^\circ\text{C}$ . See Figure 1.
$V_{CS}$	Output voltage on $V_{CS}$ when driving both lamps		67.8		V	$V_{IN} = 3.0\text{V}$ . See Figure 1.
$V_{DIFF}$	Differential output peak to peak voltage across each lamp (EL <sub>1</sub> to COM, EL <sub>2</sub> to COM)		135.6		V	$V_{IN} = 3.0\text{V}$ . See Figure 1.
$f_{EL}$	$V_{diff}$ output drive frequency	215	244	270	KHz	$V_{IN} = 3.0\text{V}$ . See Figure 1.
$f_{SW}$	Switching transistor frequency	27.5	31.2	35	KHz	$V_{IN} = 3.0\text{V}$ . See Figure 1.
$f_{SW\text{Drift}}$	Switching transistor frequency Drift			$\pm 5.0$	KHz	$T_A = -40^\circ\text{C to } +85^\circ\text{C}$
D	Switching transistor duty cycle	85		89	%	
$I_{IL}$	Input logic low current going into the control pin			-0.6	$\mu\text{A}$	$V_{DD} = 2.0\text{V to } 5.0\text{V}$ . See Figure 1.
$I_{IH}$	Input logic high current going into the control pin			0.6		
$V_{IL}$	Logic input low voltage			$0.2V_{DD}$	V	
$V_{IH}$	Logic input high voltage	$0.8V_{DD}$		$V_{DD}$	V	

# HV831 and HV839 Functional Block Diagram



## HV831 Typical Application Circuit (Figure 1)



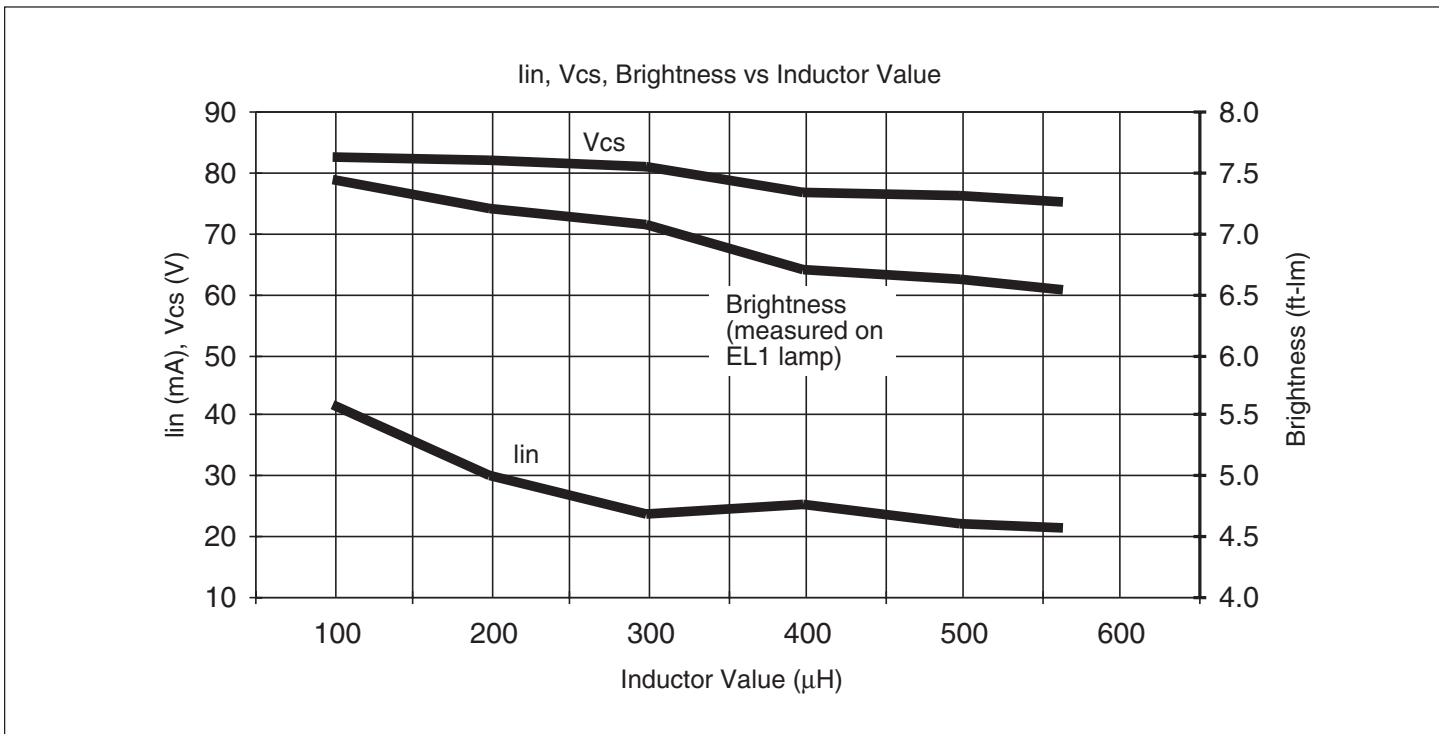
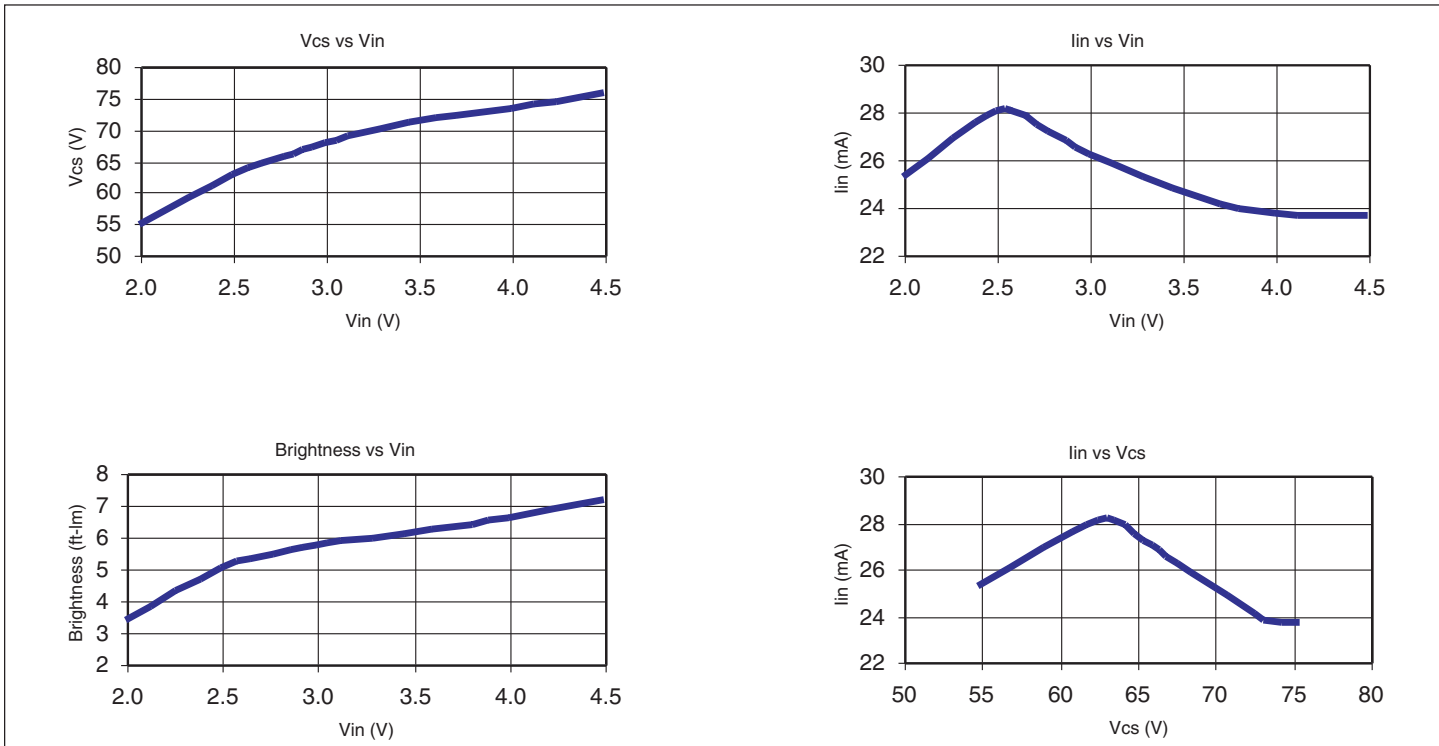
\* or any (equivalent or better) >90V, fast reverse recovery diode

\*\* Murata LQH32CN561K21

Device	Lamp	V <sub>DD</sub>	I <sub>DD</sub>	V <sub>CS</sub>	f <sub>EL</sub>	Brightness
HV831MG	EL <sub>1</sub>	3.0V	17.3mA	74.8V	244Hz	5.9ft-lm
	Both EL <sub>1</sub> and EL <sub>2</sub> ON		26.5mA	67.8V		5.5ft-lm

# Typical HV831 Performance Curves for Figure 1 (When driving both EL Lamps)

(EL1 Lamp = 1.3 in<sup>2</sup>, EL2 Lamp = 0.93 in<sup>2</sup>, V<sub>DD</sub> = 3.0V).

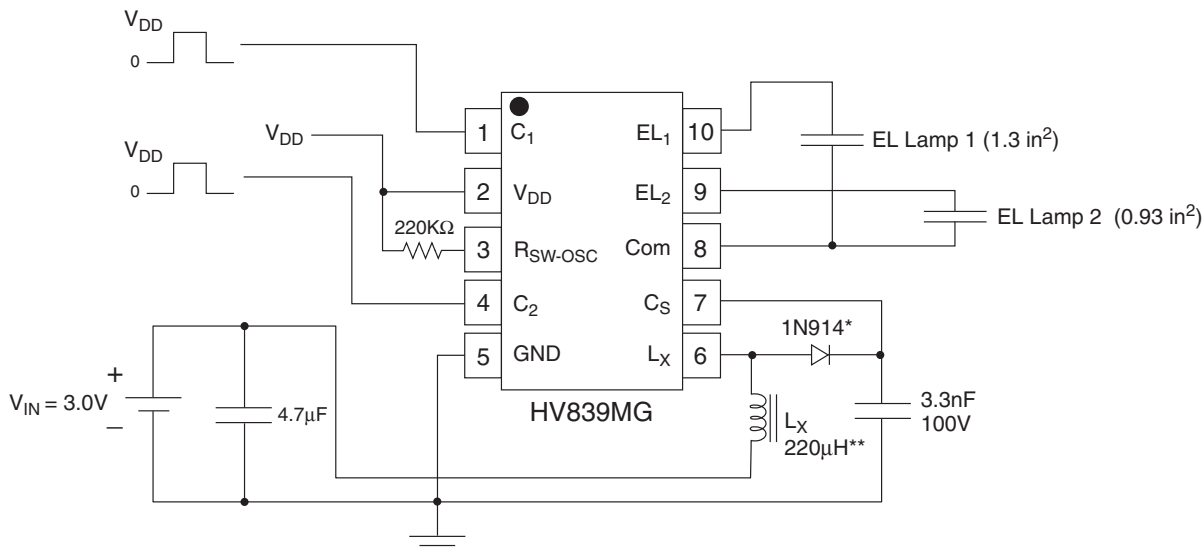


# HV839 Electrical Characteristics

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

Symbol	Parameter	Min	Typ	Max	Units	Condition
$R_{DS(ON)}$	On-resistance of switching transistor			6.0	$\Omega$	$I = 100\text{mA}$
$V_{DD}$	Input voltage range	2.0		5.0	V	
$V_{CS}$	Output regulation voltage	80	90	100	V	$V_{DD} = 2.0\text{V to } 5.0\text{V}$
$V_{DIFF}$	Differential output peak to peak voltage (EL <sub>1</sub> to Com, EL <sub>2</sub> to Com)	160	180	200	V	$V_{DD} = 2.0\text{V to } 5.0\text{V}$
$I_{DDQ}$	Quiescent $V_{DD}$ supply current			150	nA	$C_1 = C_2 = 0\text{V}$
$I_{DD}$	Input current into $V_{DD}$ pin			150	$\mu\text{A}$	$V_{DD} = 2.0\text{V to } 5.0\text{V}$
$I_{IN}$	Input current including inductor current when driving both lamps			60	mA	$V_{IN} = 3.0\text{V}$ . $T_A = -40^\circ\text{C to } +85^\circ\text{C}$ . See Figure 2.
			45	53		$V_{IN} = 3.0\text{V}$ . $T_A = 25^\circ\text{C}$ . See Figure 2, both lamps
$V_{CS}$	Output voltage on $V_{CS}$ when driving both lamps		76.2		V	$V_{IN} = 3.0\text{V}$ . See Figure 2, both lamps
$V_{DIFF}$	Differential output peak to peak voltage across each lamp (EL <sub>1</sub> to COM, EL <sub>2</sub> to COM)		152.4		V	$V_{IN} = 3.0\text{V}$ . See Figure 2, both lamps
$f_{EL}$	$V_{diff}$ output drive frequency	440	50	560	HV	$V_{IN} = 3.0\text{V}$ . See Figure 2.
$f_{SW}$	Switching transistor frequency	56.3	64	71.7	KHz	$V_{IN} = 3.0\text{V}$ . See Figure 2.
$f_{SW\text{ Drift}}$	Switching transistor frequency Drift			$\pm 5.0$	KHz	$T_A = -40^\circ\text{C to } +85^\circ\text{C}$
D	Switching transistor duty cycl	85		89	%	
$I_{IL}$	Input logic low current going into the control pin			-0.6	$\mu\text{A}$	$V_{DD} = 2.0\text{V to } 5.0\text{V}$ . See Figure 2.
$I_{IH}$	Input logic high current going into the control pin			0.6		
$V_{IL}$	Logic input low voltage			$0.2V_{DD}$	V	
$V_{IH}$	Logic input high voltage	$0.8V_{DD}$		$V_{DD}$	V	

### HV839 Typical Application Circuit (Figure 2)

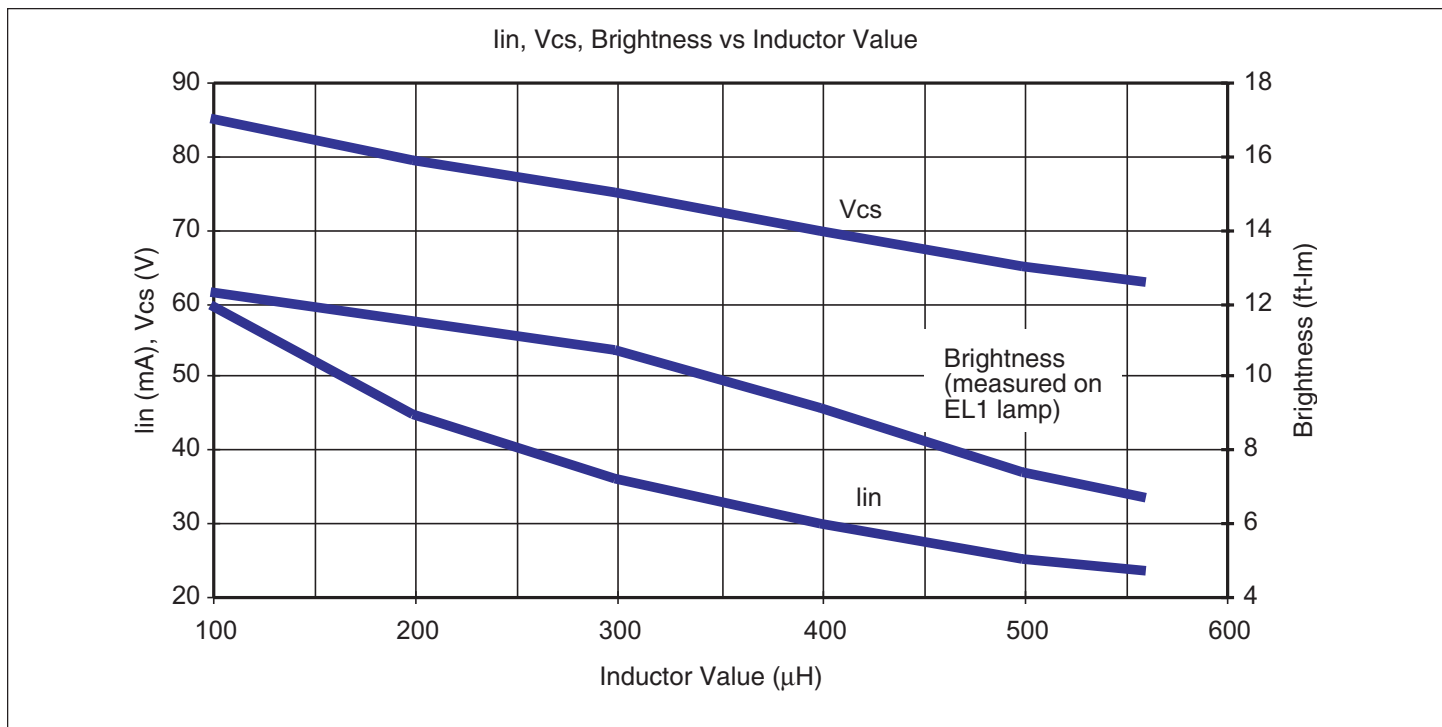
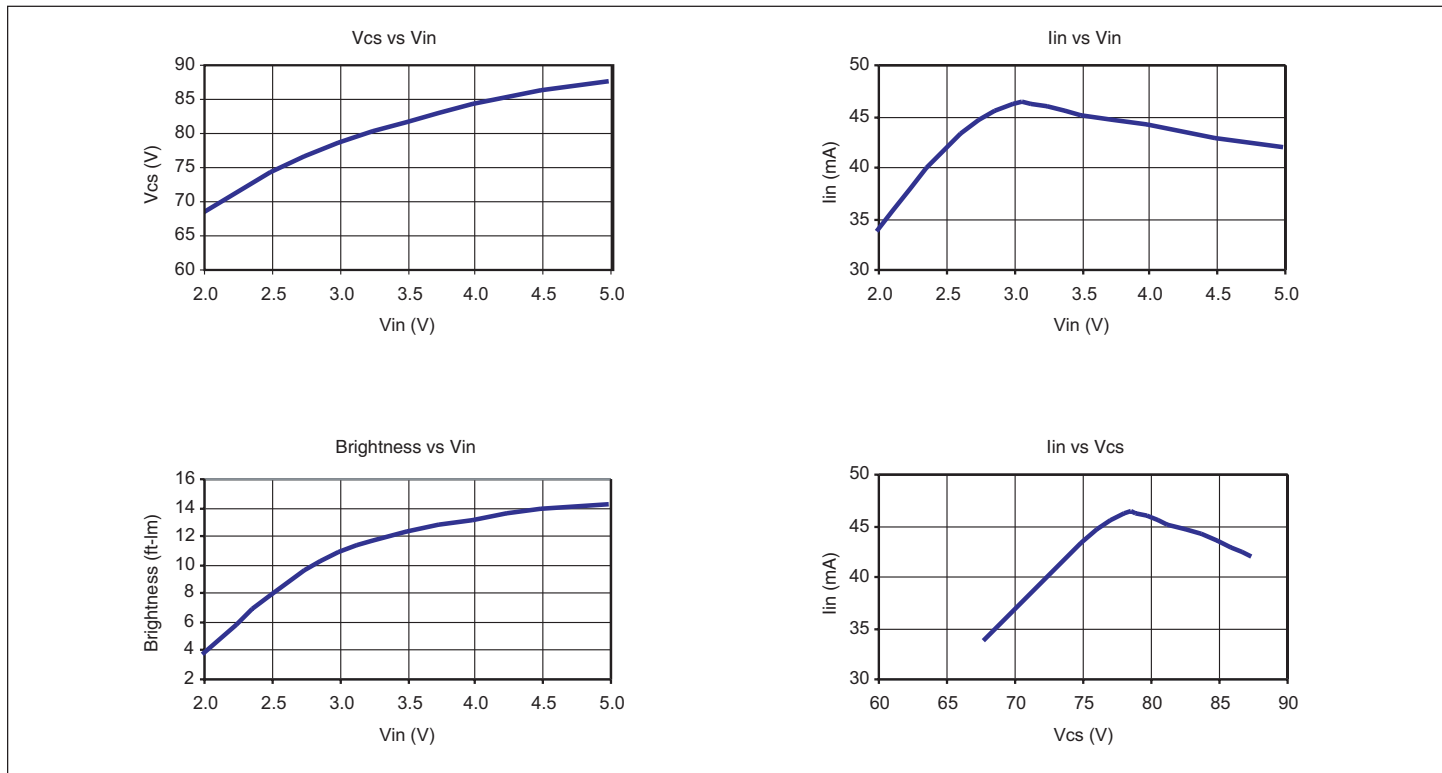


\* or any (equivalent or better) >90V, fast reverse recovery diode  
 \*\* Murata LQH32CN221K21

Device	Lamp	V <sub>DD</sub>	I <sub>DD</sub>	V <sub>CS</sub>	f <sub>EL</sub>	Brightness
HV839MG	EL <sub>1</sub>	3.0V	29.6mA	85.8V	500Hz	13.68ft-lm
	Both EL <sub>1</sub> and EL <sub>2</sub> ON		45.0mA	76.2V		12.66ft-lm

# Typical HV839 Performance Curves for Figure 2 (When driving both EL Lamps)

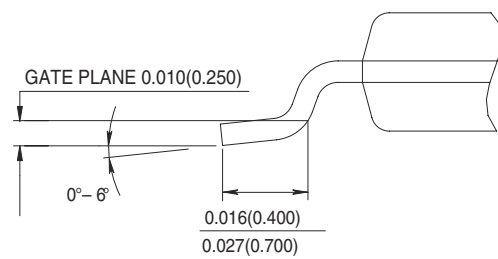
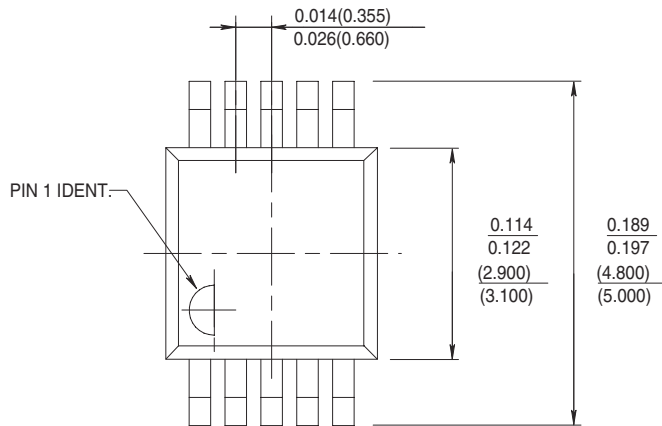
(EL1 Lamp = 1.3 in<sup>2</sup>, EL2 Lamp = 0.93 in<sup>2</sup>, V<sub>DD</sub> = 3.0V).



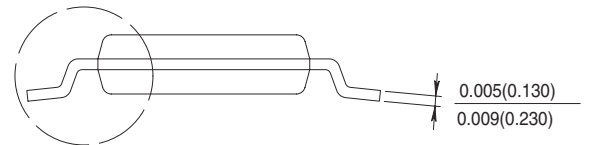
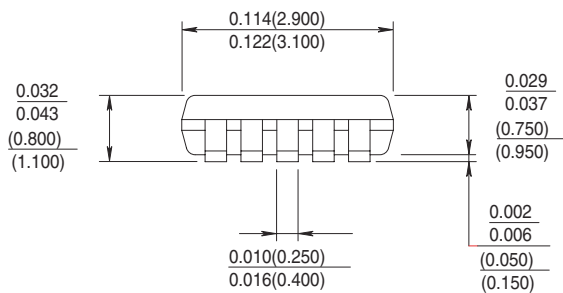
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## 10-Lead MSOP Package Outline (MG)



DETAIL A



SEE DETAIL A

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