High Voltage EL Lamp Driver IC

Features

- Processed with HVCMOS® 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

General Description

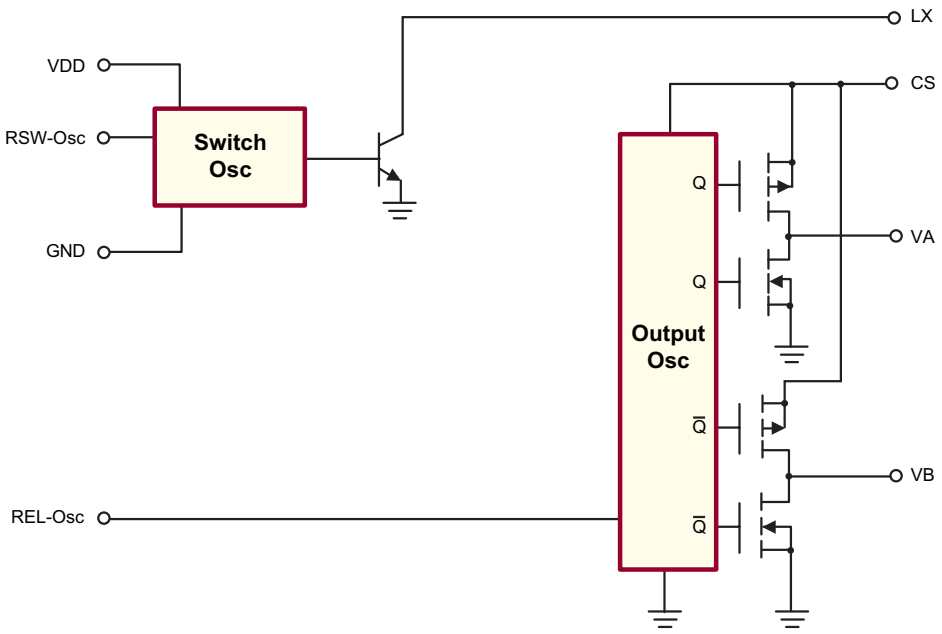
The Supertex HV825 is a high voltage driver designed for driving EL lamps typically up to 6nF. The input supply voltage range is from 1.0V to 1.6V. The device uses a single inductor and a minimum number of passive components. The typical output voltage that can be applied to the EL lamp is ±56V.

The HV825 can be enabled/disabled by connecting the $R_{SW\text{-}Osc}$ resistor to V_{DD}/GND.

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 RSW-Osc pin and the VDD supply pin. The EL lamp driver frequency is set by an external resistor connected between REL-Osc pin and the VDD pin. An external inductor is connected between the LX and VDD pins. A 0.01 to 0.1µF, 100V capacitor is connected between the CS pin and the GND pin. The EL lamp is connected between the VA pin and the VB pin.

The switching BJT charges the external inductor and discharges it into the 0.01 to 0.1µF, 100V capacitor at the CS pin. The voltage at the CS pin will start to increase. The outputs VA and VB 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.

HV825 Block Diagram



Ordering Information

Device	Package Options			
	8-Lead SO		8-Lead MSOP	
HV825	HV825LG	HV825LG-G	HV825MG	HV825MG-G

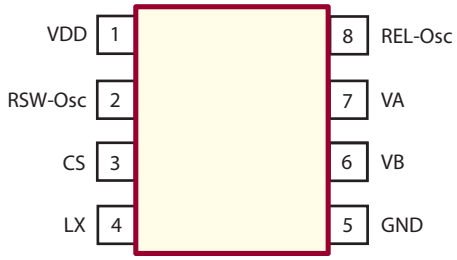
-G indicates package is RoHS compliant ('Green')

Absolute Maximum Ratings

Parameter	Value
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

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.

Pin Configuration



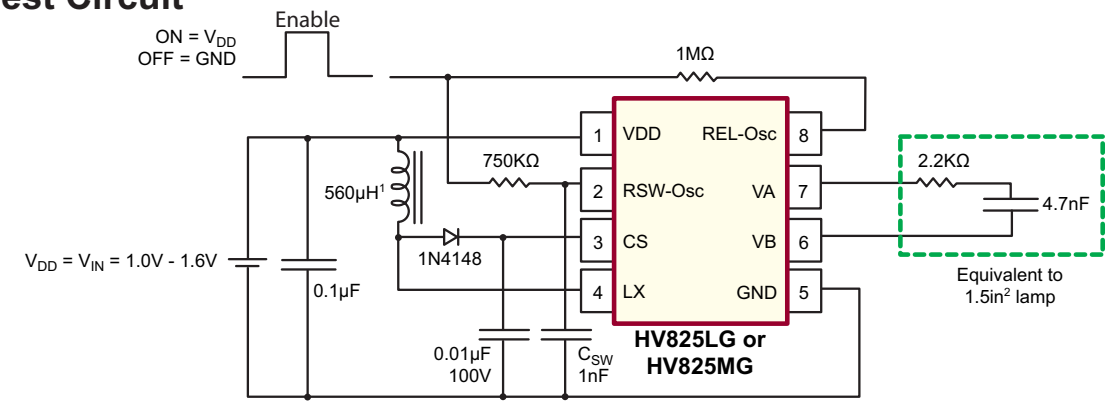
HV825
(top view)

Electrical Characteristics

DC Characteristics *(Over recommended operating conditions unless otherwise specified - T_A=25°C)*

Symbol	Parameter	Min	Typ	Max	Units	Conditions
$R_{DS(ON)}$	On-resistance of switching transistor	-	-	15	Ω	I = 50mA
I_{IN}	V_{DD} supply current (including inductor current)	-	30	38	mA	V_{DD}=1.5V. See test circuit
I_{DDQ}	Quiescent V_{DD} supply current	-	-	1.0	µA	R_{SW-osc} = GND
V_{CS}	Output voltage on V_{CS}	52	56	68	V	V_{DD} = 1.5V. See test circuit
V_{A-B}	Differential output voltage across lamp	104	112	136	V	V_{DD} = 1.5V. See test circuit
f_{EL}	V_{A-B} output drive frequency	400	-	-	Hz	V_{DD} = 1.5V. See test circuit
f_{SW}	Switching transistor frequency	-	30	-	KHz	V_{DD} = 1.5V. See test circuit
D	Switching transistor duty cycle	-	88	-	%	---
Recommended Operating Conditions						
V_{DD}	Supply voltage	1.0	-	1.6	V	---
C_L	Load Capacitance	0	6.0	-	nF	---
T_A	Operating temperature	-25	-	+85	°C	---
Enable/Disable Table						
V_{IL}	Low level input voltage to R_{SW-osc} resistor	0	-	0.2	V	V_{DD} = 1.0V-1.6V
V_{IH}	High level input voltage to R_{SW-osc} resistor	V_{DD}-0.5	-	V_{DD}	V	V_{DD} = 1.0V-1.6V

Test Circuit



Typical Performance

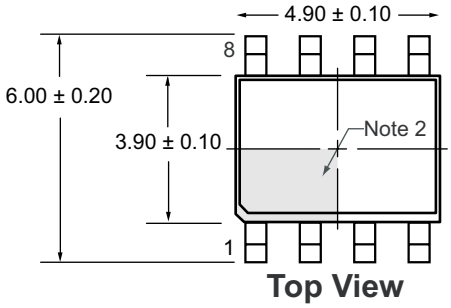
Lamp Size	V_{IN}	I_{DD}	V_{CS}	f_{EL}	Brightness
1.5in²	1.5V	30mA	56V	450Hz	3.65ft-lm

Notes: *1. Murata part # LQH4N561K04 (DC resistance < 14.5Ω)*

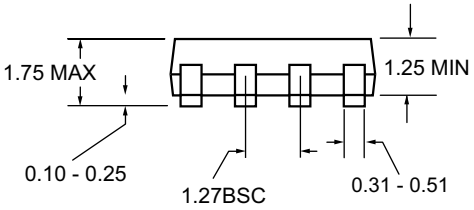
External Component Description

External Component	Selection Guide Line
Diode	Fast reverse recovery, 1N4148 or equivalent.
C_S Capacitor	0.01 to 0.1µF, 100V capacitor to GND is used to store the energy transferred from the inductor.
R_{EL-Osc} Resistor	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. In general, as the lamp size increases, a 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.
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	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. The test circuit uses a Murata (LQH4N561) 560µH inductor. Using different inductor values or inductors from different manufacturers will affect the performance. As the inductor value decreases, smaller R_{SW-Osc} values should be used. This will prevent inductor saturation. An 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.
C_{SW} Capacitor	A 1nF capacitor is recommended from RSW-Osc pin to GND. This capacitor is used to shunt any switching noise that may couple into the RSW-Osc pin.

8-Lead SOIC (Narrow Body) Package (LG)



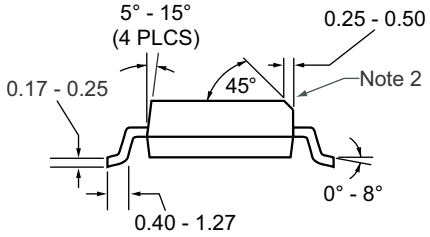
Top View



Side View

Notes:

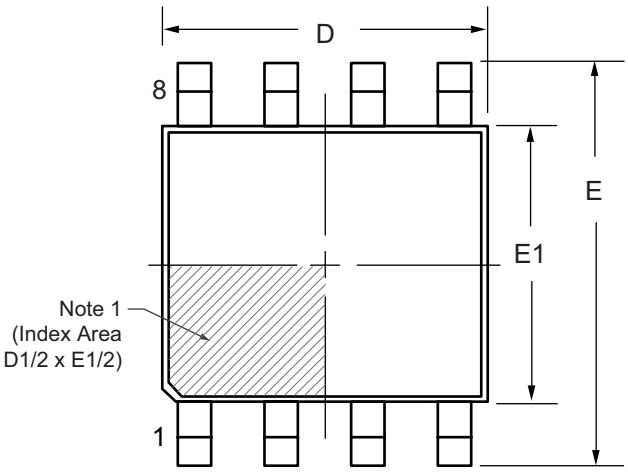
1. All dimensions in millimeters. Angles in degrees.
2. If the corner is not chamfered, then a Pin 1 identifier must be located within the area indicated.



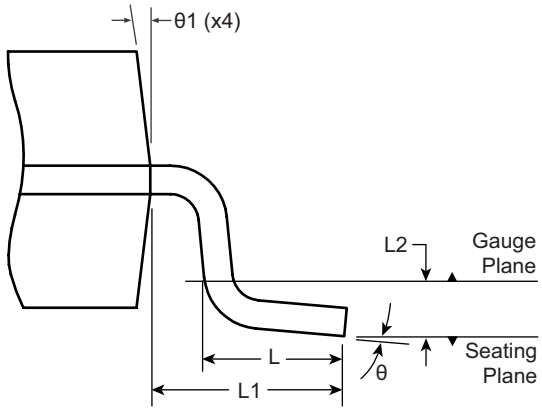
End View

8-Lead MSOP Package Outline (MG)

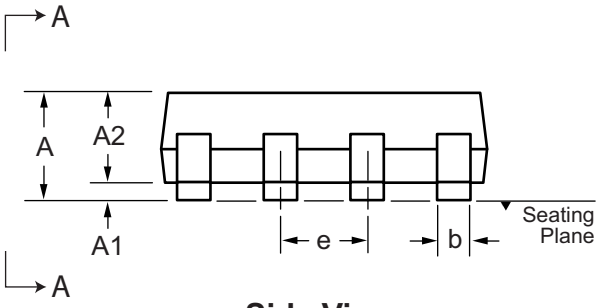
3x3mm body, 1.10mm height (max), 0.65mm pitch



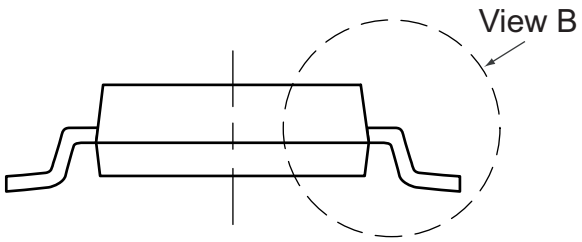
Top View



View B



Side View



View A-A

Note 1:

A Pin 1 identifier must be located in the index area indicated. The Pin 1 identifier may be either a mold, or an embedded metal or marked feature.

Symbol		A	A1	A2	b	D	E	E1	e	L	L1	L2	θ	θ1
Dimension (mm)	MIN	0.75	0.00	0.75	0.22	2.80	4.65	2.80	0.65 BSC	0.40	0.95 REF	0.25 BSC	0°	5°
	NOM	-	-	0.85	-	3.00	4.90	3.00		0.60			-	-
	MAX	1.10	0.15	0.95	0.38	3.20	5.15	3.20		0.80			8°	15°

JEDEC Registration MO-187, Variation AA, Issue E, Dec. 2004.

Drawings not to scale.

(The package drawing(s) in this data sheet may not reflect the most current specifications. For the latest package outline information go to http://www.supertex.com/packaging.html.)

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