HV809

Offline High-Voltage EL Lamp Driver

Features

- Up to 200V DC Input Voltage
- 400V Peak-to-Peak Output Voltage
- Up to 350 nF Output Load
  (100 in^2 for 3.5 nF/in^2 Lamp)
- Adjustable Output Lamp Frequency
- Adjustable On/Off Pulsing Frequency

Applications

- Electronic Organizers
- Handheld Portable Computers
- Display Signs
- Portable Instrumentation Equipment

General Description

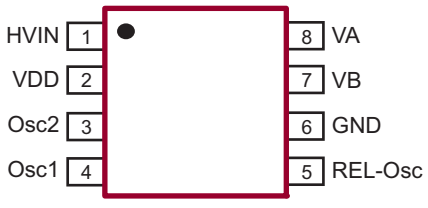
The HV809 is an offline high-voltage EL lamp driver integrated circuit designed for driving EL lamps of up to 350 nF at 400 Hz. The input supply voltage can be a rectified nominal 120V AC source or any other DC source up to 200V. The HV809 supplies the EL lamp with an AC square wave with a peak-to-peak voltage of twice the input DC voltage.

The HV809 has two internal oscillators, a low-voltage output linear regulator, and a high-voltage output H-bridge. The high-voltage output H-bridge frequency is set by an external resistor connected between the REL-Osc and GND pins. The EL lamp is connected between the V_A and V_B pins. For the HV809 in the 8-pin package, an external RC network can be connected between the oscillator's Osc1 and Osc2 pins to pulse the EL lamp on and off.

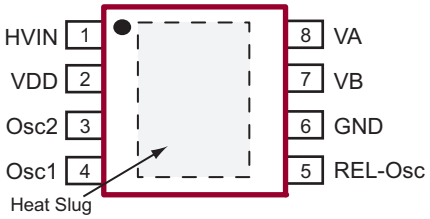
For detailed circuit and application information, please refer to Application Note, *AN-H36*.

Package Types

8-lead SOIC (Narrow Body)
(Top view)

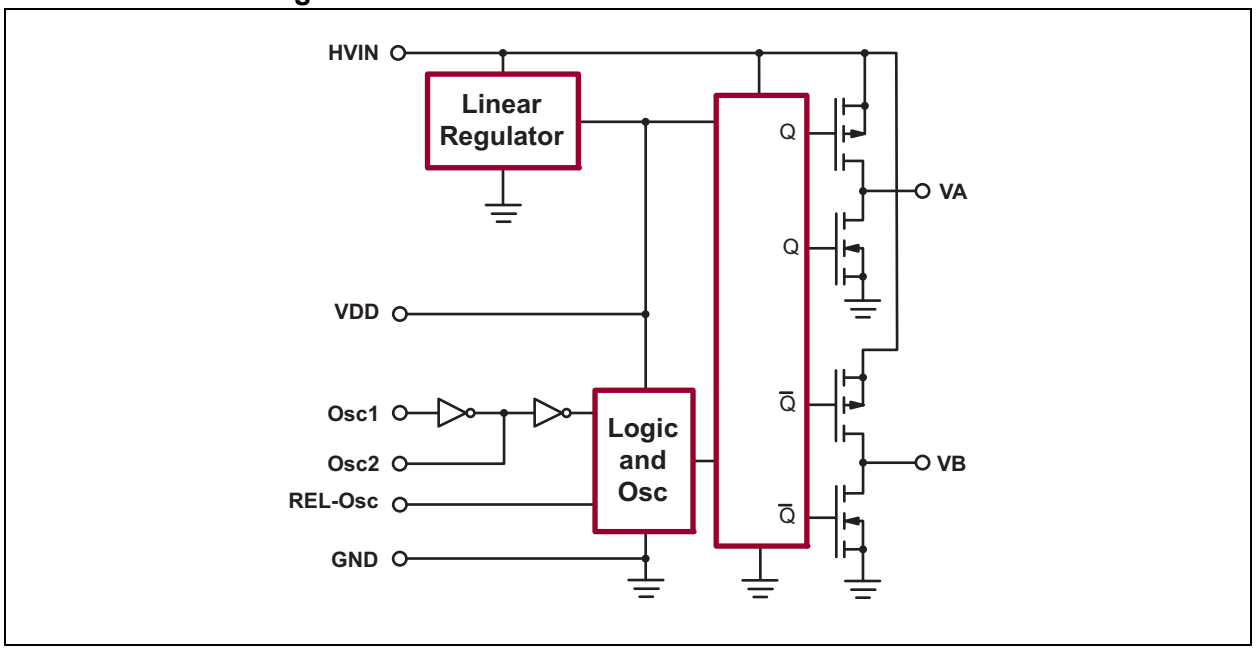


8-lead SOIC (with Heat Slug)
(Top view)



See Table 2-1 for pin information.

Functional Block Diagram



1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings†

High-Voltage Input, HV_{IN} ..... +210V
Internal Supply Voltage, V_{DD} ..... +15V
Maximum Junction Temperature, T_{JMAX} ..... +125°C
Storage Temperature, T_S ..... –55°C to +150°C
Power Dissipation:
8-lead SOIC ..... 500 mW
8-lead SOIC (with Heat Slug) .....1.5 Watts

† Notice: Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only, and functional operation of the device at those or any other conditions above those indicated in the operational sections of this specification is not intended. Exposure to maximum rating conditions for extended periods may affect device reliability.

RECOMMENDED OPERATING CONDITIONS

Parameter	Sym.	Min.	Typ.	Max.	Unit	Conditions
High-Voltage Input	HV_{IN}	50	—	200	V	
Load Capacitance	C_L	—	—	350	nF	R_{EL} = 1 MΩ, HV_{IN} = 170V
		—	—	150	nF	R_{EL} = 390 kΩ, HV_{IN} = 170V
Operating Temperature	T_A	–25	—	+85	°C	

DC ELECTRICAL CHARACTERISTICS

Electrical Specifications: Over recommended operating conditions unless otherwise indicated; T_A = 25°C

Parameter	Sym.	Min.	Typ.	Max.	Unit	Conditions
High-Voltage Supply Current	I_{IN}	—	—	70	mA	HV_{IN} = 170V, R_{EL} = 1 MΩ, CL = 350 nF
		—	—	9	mA	HV_{IN} = 170V, R_{EL} = 1 MΩ, CL = 50 nF
Quiescent Supply Current	I_{INQ}	—	—	400	µA	HV_{IN} = 170V, R_{EL} = 1 MΩ, Osc1 = GND, No load
		—	—	100	µA	HV_{IN} = 170V, R_{EL} = 1 MΩ, Osc1 = V_{DD}, No load
Osc2 Sink Current	I_{SINK}	—	300	—	µA	V_{Osc2} = 1V
Osc2 Source Current	I_{SOURCE}	—	100	—	µA	V_{Osc2} = V_{DD}–1V
Osc1 Logic Input Leakage Current	I_{Osc1}	—	±10	—	µA	V_{Osc1} = GND and V_{DD}
Osc1 Hysteresis Voltage	$V_{Osc1(HYST)}$	—	2.5	—	V	
Minimum Differential Output Voltage across Lamp	$V_{A–B}$	—	—	400	V	HV_{IN} = 200V
Internal Supply Voltage	V_{DD}	8	10	12	V	No load on V_{DD}

AC ELECTRICAL CHARACTERISTICS

Electrical Specifications: Over recommended operating conditions unless otherwise indicated; T_A = 25°C

Parameter	Sym.	Min.	Typ.	Max.	Unit	Conditions
V_{A-B} Output Drive Frequency	f_{EL}	320	400	480	Hz	R_{EL} = 1 MΩ, Osc1 = GND, C_L = 350 nF
		0.8	1	1.2	kHz	R_{EL} = 390 kΩ, Osc1 = GND, C_L = 150 nF
Output Rise Time	t_r	—	180	250	µs	C_L = 150 nF, HV_{IN} = 170V
Output Fall Time	t_f	—	50	100	µs	C_L = 150 nF, HV_{IN} = 170V

TEMPERATURE SPECIFICATIONS

Parameter	Sym.	Min.	Typ.	Max.	Unit	Conditions
TEMPERATURE RANGE						
Operating Ambient Temperature	T_A	–25	—	+85	°C	
Maximum Junction Temperature	T_{JMAX}	—	—	+125	°C	
Storage Temperature	T_S	–55	—	+150	°C	
PACKAGE THERMAL RESISTANCE						
8-lead SOIC	θ_{JA}	—	101	—	°C/W	
8-lead SOIC (with Heat Slug)	θ_{JA}	—	84	—	°C/W	

2.0 PIN DESCRIPTION

The details on the pins of HV809 8-lead SOIC (narrow body) and 8-lead SOIC (narrow body with heat slug) are listed on Table 2-1. See **Package Types** for the location of pins.

TABLE 2-1: PIN FUNCTION TABLE

Pin Number	Pin Name	Description
1	HVIN	High-voltage input supply pin
2	VDD	Internal supply voltage
3	Osc2	The RC network can be connected between the oscillator's Osc1 and Osc2 pins to pulse the EL lamp on and off.
4	Osc1	The Output H-bridge can be enabled and disabled by connecting the Osc1 pin to the GND and VDD pins. The output can be left enabled by connecting the Osc1 pin to GND.
5	REL-Osc	EL lamp frequency is controlled via an external REL resistor connected between the REL-Osc and GND pins of the device.
6	GND	Ground pin
7	VB	VB side of the EL lamp driver H-bridge. Connection for one of the EL lamp terminals.
8	VA	VA side of the EL lamp driver H-bridge. Connection for one of the EL lamp terminals.

Note 1: Heat slug is at ground potential.

3.0 FUNCTIONAL DESCRIPTION

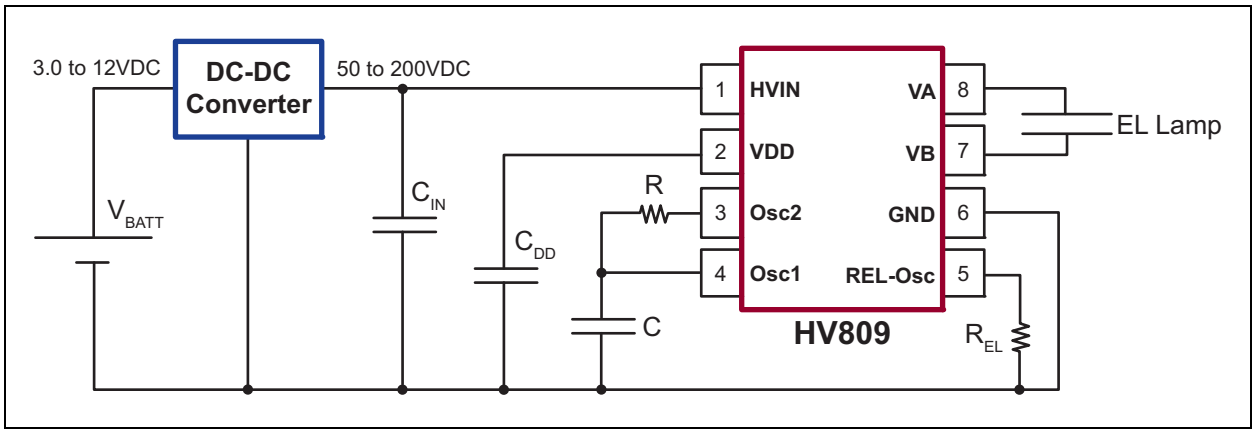


FIGURE 3-1: *Pulsing EL Lamp.*

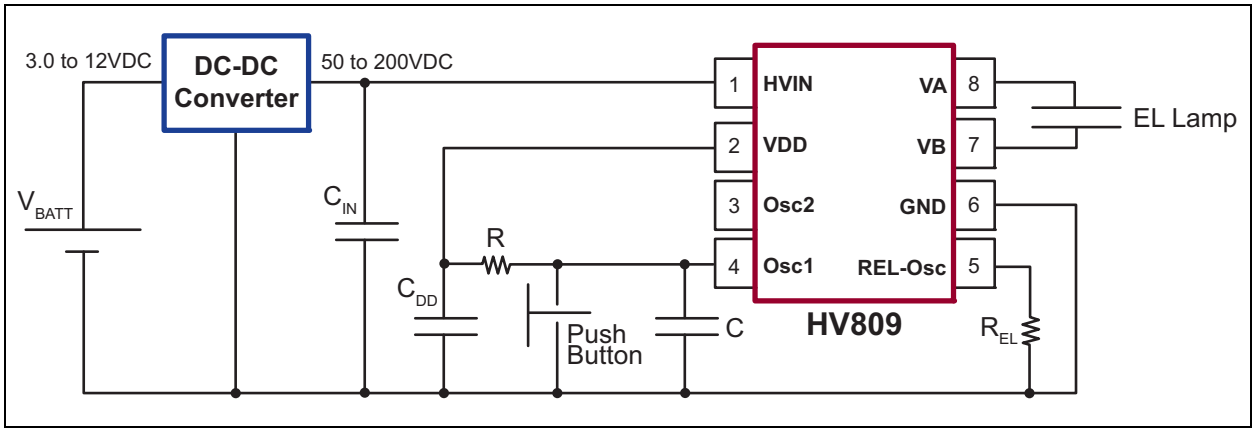


FIGURE 3-2: *Push-button, Delayed Turn-off.*

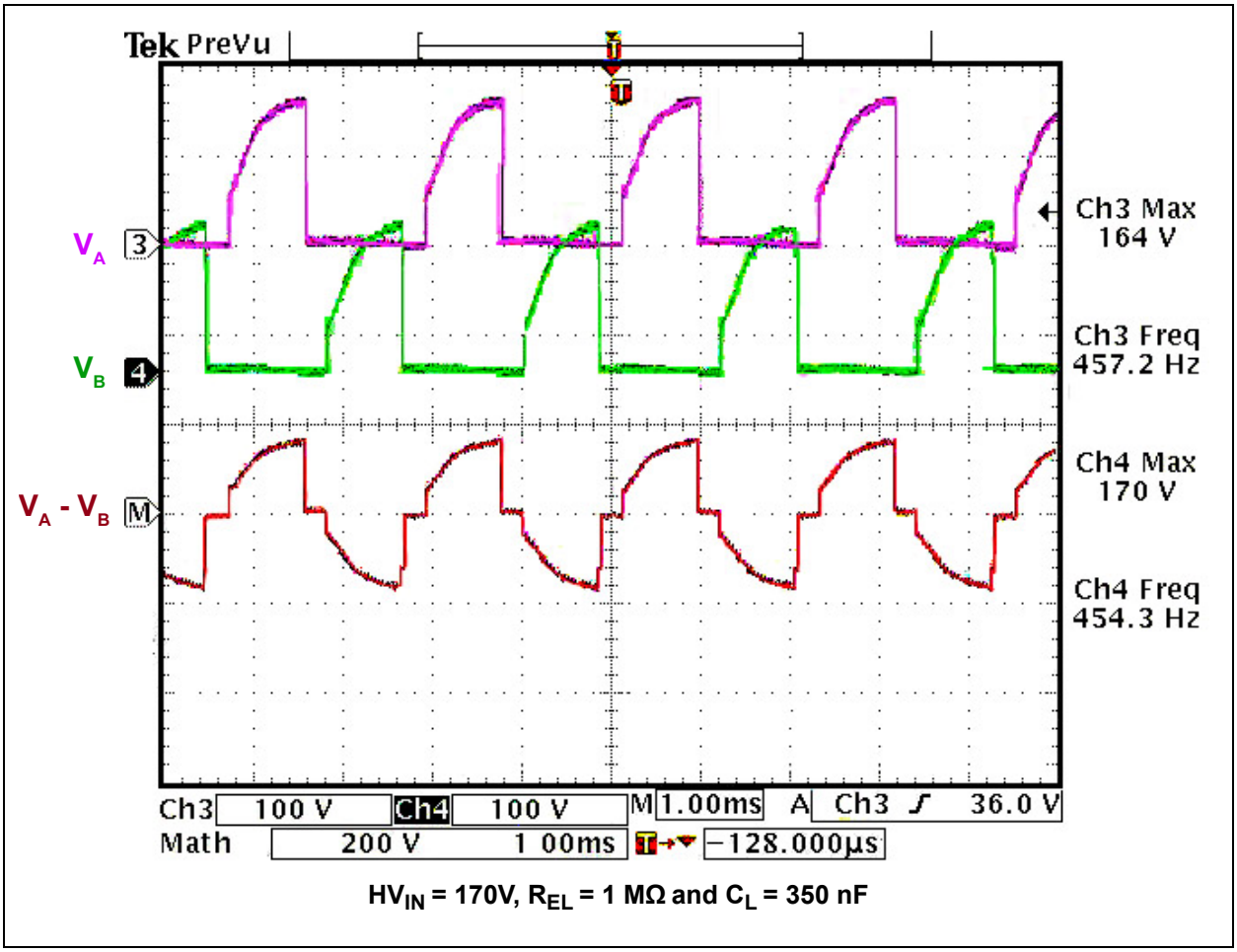


FIGURE 3-3: *Typical Waveform on V_A and V_B and Differential Waveform V_A–V_B.*

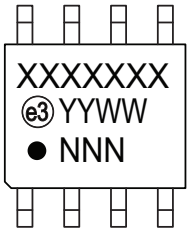
TABLE 3-1: FUNCTION TABLE

Inputs	Outputs	
Osc1	**V_A**	**V_B**
GND	Enabled	Enabled
V_{DD}	Disabled	Disabled

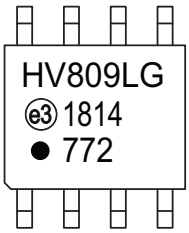
4.0 PACKAGING INFORMATION

4.1 Package Marking Information

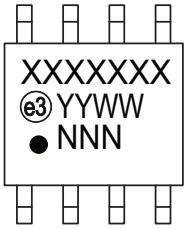
8-lead SOIC



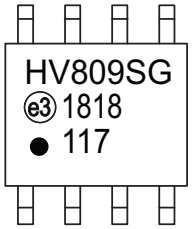
Example



8-lead SOIC



Example

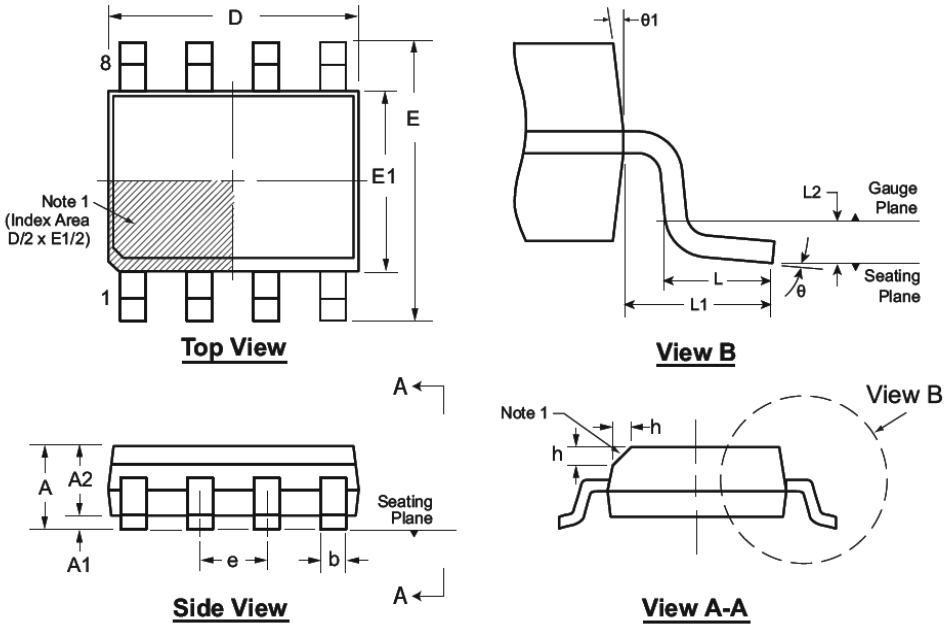


Legend:	XX...X	Product Code or Customer-specific information
	Y	Year code (last digit of calendar year)
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week ‘01’)
	NNN	Alphanumeric traceability code
	(e3)	Pb-free JEDEC® designator for Matte Tin (Sn)
	*	This package is Pb-free. The Pb-free JEDEC designator ((e3)) can be found on the outer packaging for this package.

Note: In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for product code or customer-specific information. Package may or not include the corporate logo.

8-Lead SOIC (Narrow Body) Package Outline (LG/TG)

4.90x3.90mm body, 1.75mm height (max), 1.27mm pitch



Note: For the most current package drawings, see the Microchip Packaging Specification at www.microchip.com/packaging.

Note:

1. *This chamfer feature is optional. A Pin 1 identifier must be located in the index area indicated. The Pin 1 identifier can be: a molded mark/identifier; an embedded metal marker; or a printed indicator.*

Symbol		A	A1	A2	b	D	E	E1	e	h	L	L1	L2	θ	θ1
Dimension (mm)	MIN	1.35*	0.10	1.25	0.31	4.80*	5.80*	3.80*	1.27 BSC	0.25	0.40	1.04 REF	0.25 BSC	0°	5°
	NOM	-	-	-	-	4.90	6.00	3.90		-	-			-	-
	MAX	1.75	0.25	1.65*	0.51	5.00*	6.20*	4.00*		0.50	1.27			8°	15°

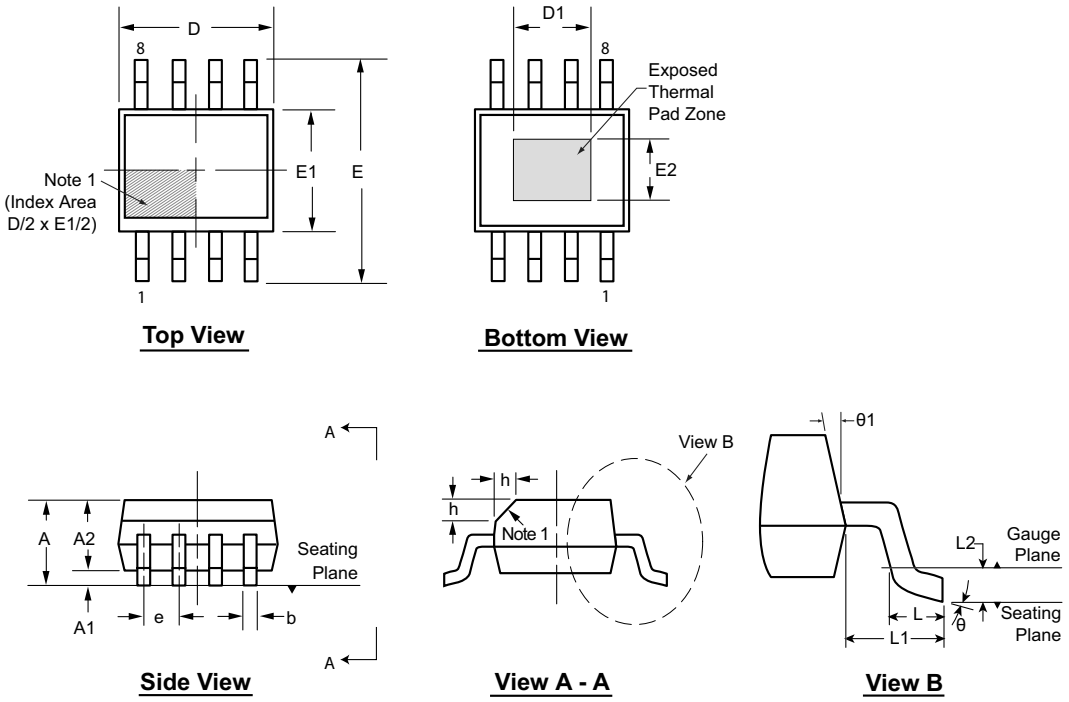
JEDEC Registration MS-012, Variation AA, Issue E, Sept. 2005.

** This dimension is not specified in the JEDEC drawing.*

Drawings are not to scale.

8-Lead SOIC (Narrow Body w/Heat Slug) Package Outline (SG)

4.90x3.90mm body, 1.70mm height (max), 1.27mm pitch



Note: For the most current package drawings, see the Microchip Packaging Specification at www.microchip.com/packaging.

Note:

1. *If optional chamfer feature is not present, a Pin 1 identifier must be located in the index area indicated. The Pin 1 identifier can be: a molded mark/ identifier; an embedded metal marker; or a printed indicator.*

Symbol		A	A1	A2	b	D	D1	E	E1	E2	e	h	L	L1	L2	θ	θ1
Dimension (mm)	MIN	1.25*	0.00	1.25	0.31	4.80*	3.30†	5.80*	3.80*	2.29†	1.27 BSC	0.25	0.40	1.04 REF	0.25 BSC	0°	5°
	NOM	-	-	-	-	4.90	-	6.00	3.90	-		-	-			-	-
	MAX	1.70	0.15	1.55*	0.51	5.00*	3.81†	6.20*	4.00*	2.79†		0.50	1.27			8°	15°

JEDEC Registration MS-012, Variation BA, Issue E, Sept. 2005.
** This dimension is not specified in the JEDEC drawing.*
† This dimension differs from the JEDEC drawing.
Drawings not to scale.

APPENDIX A: REVISION HISTORY

Revision A (August 2018)

- Converted Supertex Doc# DSFP-HV908 to Microchip DS20005630A
- Removed “Processed with HVCMOS® Technology” from the Features section
- Removed the “Output VDD Current” parameter from the DC Electrical Characteristics table
- Removed the 7-lead TO-220 package option
- Changed the quantity of the LG and SG packages from 2500/Reel to 3300/Reel
- Made minor text changes throughout the document

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, contact your local Microchip representative or sales office.

PART NO.	XX	-	X	-	X
Device	Package Options		Environmental		Media Type

Device:	HV809	=	Offline High-Voltage EL Lamp Driver
Packages:	LG	=	8-lead SOIC
	SG	=	8-lead SOIC (with Heat Slug)
Environmental:	G	=	Lead (Pb)-free/RoHS-compliant Package
Media Type:	(blank)	=	3300/Reel for an LG Package
	(blank)	=	3300/Reel for an SG Package

Examples:

a) HV809LG-G: Offline High-Voltage EL Lamp Driver, 8-lead SOICPackage, 3300/Reel

b) HV809SG-G: Offline High-Voltage EL Lamp Driver, 8-lead SOIC Package (with Heat Slug), 3300/Reel

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