



HV860DB1 Demonstration Board User's Guide

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NOTES:

Preface

NOTICE TO CUSTOMERS

All documentation becomes dated, and this manual is no exception. Microchip tools and documentation are constantly evolving to meet customer needs, so some actual dialogs and/or tool descriptions may differ from those in this document. Please refer to our website (www.microchip.com) to obtain the latest documentation available.

Documents are identified with a “DS” number. This number is located on the bottom of each page, in front of the page number. The numbering convention for the DS number is “DSXXXXXXXXA”, where “XXXXXXXX” is the document number and “A” is the revision level of the document.

For the most up-to-date information on development tools, see the MPLAB® IDE online help. Select the Help menu, and then Topics to open a list of available online help files.

INTRODUCTION

This chapter contains general information that will be useful to know before using the HV860DB1 Demo Board. Items discussed in this chapter include:

- [Document Layout](#)
- [Conventions Used in this Guide](#)
- [Recommended Reading](#)
- [The Microchip Website](#)
- [Customer Support](#)
- [Document Revision History](#)

DOCUMENT LAYOUT

This document describes how to use the HV860DB1 Demo Board as a development. The manual layout is as follows:

- **Chapter 1. “Product Overview”** – Important information about the HV860DB1 Demo Board.
- **Chapter 2. “Installation and Operation”** – Includes instructions on installing and using the HV860DB1 Demo Board.
- **Appendix A. “Schematic”** – Shows the schematic for the HV860DB1 Demo Board.
- **Appendix B. “Bill of Materials (BOM)”** – Lists the parts used to build the HV860DB1 Demo Board.

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CONVENTIONS USED IN THIS GUIDE

This manual uses the following documentation conventions:

DOCUMENTATION CONVENTIONS

Description	Represents	Examples
Arial font:		
Italic characters	Referenced books	<i>MPLAB® IDE User's Guide</i>
	Emphasized text	...is the <i>only</i> compiler...
Initial caps	A window	the Output window
	A dialog	the Settings dialog
	A menu selection	select Enable Programmer
Quotes	A field name in a window or dialog	"Save project before build"
Underlined, italic text with right angle bracket	A menu path	<u><i>File>Save</i></u>
Bold characters	A dialog button	Click OK
	A tab	Click the Power tab
N'Rnnnn	A number in verilog format, where N is the total number of digits, R is the radix and n is a digit.	4'b0010, 2'hF1
Text in angle brackets < >	A key on the keyboard	Press <Enter>, <F1>
Courier New font:		
Plain Courier New	Sample source code	#define START
	Filenames	autoexec.bat
	File paths	c:\mcc18\h
	Keywords	_asm, _endasm, static
	Command-line options	-Opa+, -Opa-
	Bit values	0, 1
	Constants	0xFF, 'A'
Italic Courier New	A variable argument	<i>file.o</i> , where <i>file</i> can be any valid filename
Square brackets []	Optional arguments	mcc18 [options] <i>file</i> [options]
Curly brackets and pipe character: { }	Choice of mutually exclusive arguments; an OR selection	errorlevel {0 1}
Ellipses...	Replaces repeated text	var_name [, var_name...]
	Represents code supplied by user	void main (void) { ... }

RECOMMENDED READING

This user's guide describes how to use the HV860DB1 Demo Board. Another useful document is listed below. The following Microchip document is available and recommended as a supplemental reference resource.

- **HV860 Data Sheet – “HV860 Low Noise, Dimmable EL Lamp Driver” (DSFP-HV860 C081209).**

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- **Product Support** – Data sheets and errata, application notes and sample programs, design resources, user's guides and hardware support documents, latest software releases and archived software
- **General Technical Support** – Frequently Asked Questions (FAQs), technical support requests, online discussion groups, Microchip consultant program member listing
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- Technical Support

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Technical support is available through the website at:
<https://www.microchip.com/support>.

DOCUMENT REVISION HISTORY

Revision A (August 2022)

- Converted Supertex document DSDB-HV860DB1 A032813 to Microchip format.
- Made minor corrections.
- Updated **Appendix B. “Bill of Materials (BOM)”**.

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NOTES:

Chapter 1. Product Overview

1.1 INTRODUCTION

This chapter provides an overview of the HV860DB1 and covers the following:

- [HV860DB1 Device Overview](#)
- [HV860DB1 Device Electrical Specifications](#)
- [HV860DB1 Demo Board Kit Contents](#)

1.2 HV860DB1 DEVICE OVERVIEW

The HV860DB1 Demo Board contains all necessary circuitry to demonstrate the features of the HV860 EL lamp driver. For EL lamp dimming, either a potentiometer or an N-channel open drain PWM signal can be used, but not both.

1.3 HV860DB1 DEVICE ELECTRICAL SPECIFICATIONS

Input Voltage	2.4V to 4.5V
VIN Inductor Supply Voltage	5.5V
Typical Supply Current	10 mA
Lamp Size	3.5 in ²
Lamp Frequency	200 Hz
Converter Frequency	150 kHz

1.4 HV860DB1 DEMO BOARD KIT CONTENTS

The HV860DB1 kit includes the following items:

- HV860DB1 Demo Board

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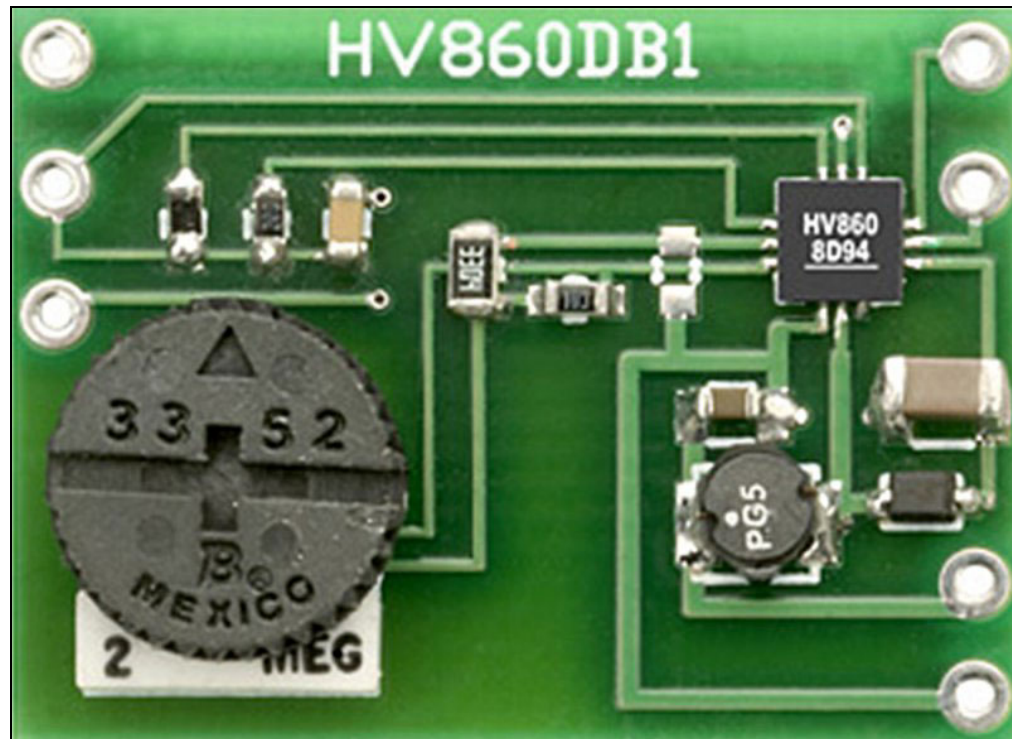


FIGURE 1-1: Typical HV860DB1 (Top 3D View).
Board Actual Dimensions: 20 mm × 25 mm.

Chapter 2. Installation and Operation

2.1 INTRODUCTION

The Microchip HV860DB1 Demo Board contains all necessary circuitry to demonstrate the features of the HV860 EL lamp driver.

Simply connect it to a power supply and a lamp as shown in [Figure A.2](#). For EL lamp dimming, either a potentiometer or an N-channel open drain PWM signal can be used, but not both.

The potentiometer is used as a variable voltage divider to change the voltage at the VREG pin. The V_{REF} is voltage divided to change the V_{REG} voltage thereby changing the VCS voltage. The V_{CS} voltage amplitude, and thereby the lamp brightness, increases when the potentiometer is rotated counter-clockwise, and the lamp brightness decreases when it is rotated clockwise.

2.2 HV860DB1 DEMO BOARD CONNECTION DIAGRAM

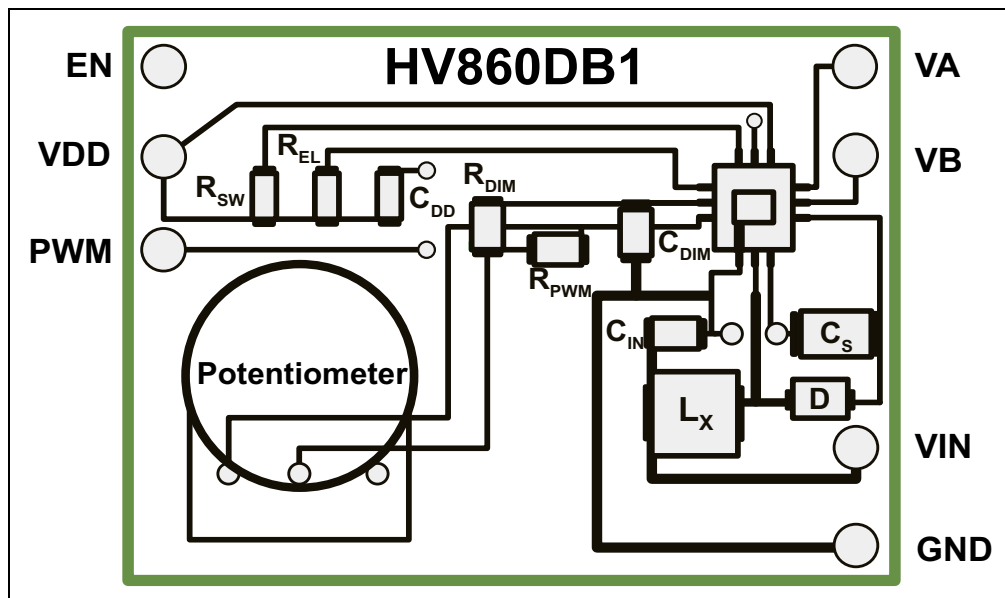


FIGURE 2-1: HV860DB1 Demo Board Connection Diagram.

2.2.1 Connections:

EN - (Enable Input)

A CMOS logic input which enables/disables the lamp driver. A logic high (1.5V) enables the driver and a logic low (connect to GND) disables the driver.

VDD - (IC Supply)

Supplies the HV860 EL driver IC. The supplied demo board is optimized for 3.0V operation, with an operating range from 2.4V to 4.5V. It connects to the positive terminal of a power supply.

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PWM - (PWM Input)

Supplies the PWM signal for dimming the EL lamp. The frequency of this signal can vary between 20 kHz and 100 kHz. For EL lamp dimming using the PWM input, either the potentiometer has to be removed or its value set to for maximum lamp brightness.

The N-channel open drain PWM signal pulls the 10 k Ω resistor to ground. When the duty cycle of this PWM signal is changed, the effective voltage on the VREG pin is changed. This changes the V_{CS} voltage, and hence the lamp brightness. The higher the duty cycle, the higher the lamp brightness, and vice versa.

VA and VB - (Lamp Connections)

They connect to the EL lamp terminals. Polarity is irrelevant.

VIN - (Inductor Supply)

Supplies the high voltage power converter. The demo board is optimized for 5.5V operation. It connects to the positive terminal of a power supply.

GND - (Circuit Ground)

Connect to VDD and VIN negative terminals. Supply bypass capacitor for both VDD and VIN are provided on the demo board. External supply bypass capacitors are not required.

Note: All of the above connections must be made before powering up the supply voltages. The VREG pin should not be touched after power-up.

2.3 HV860DB1 DEMO BOARD TYPICAL PERFORMANCE

Lamp Size (in ²)	V _{DD} (V)	V _{IN} (V)	I _{IN} (mA)	V _{CS} (V)	f _{EL} (Hz)	Brightness	
						ft-lm	cd/m ²
3.5	3	5.2	9	110	190	6.20	21.21
3.5	3	5.5	8.4	110	190	6.22	21.27
3.5	3	5.8	7.9	110	190	6.24	21.33

Note: The specific external components used in the circuit schematic are: $L_X = 220 \mu\text{H}$ Cooper (SD3114-221) or Wurth Elektronik (74404042221), $C_S = 3.3 \text{ nF}$ 200V NPO and the 2 M Ω potentiometer.



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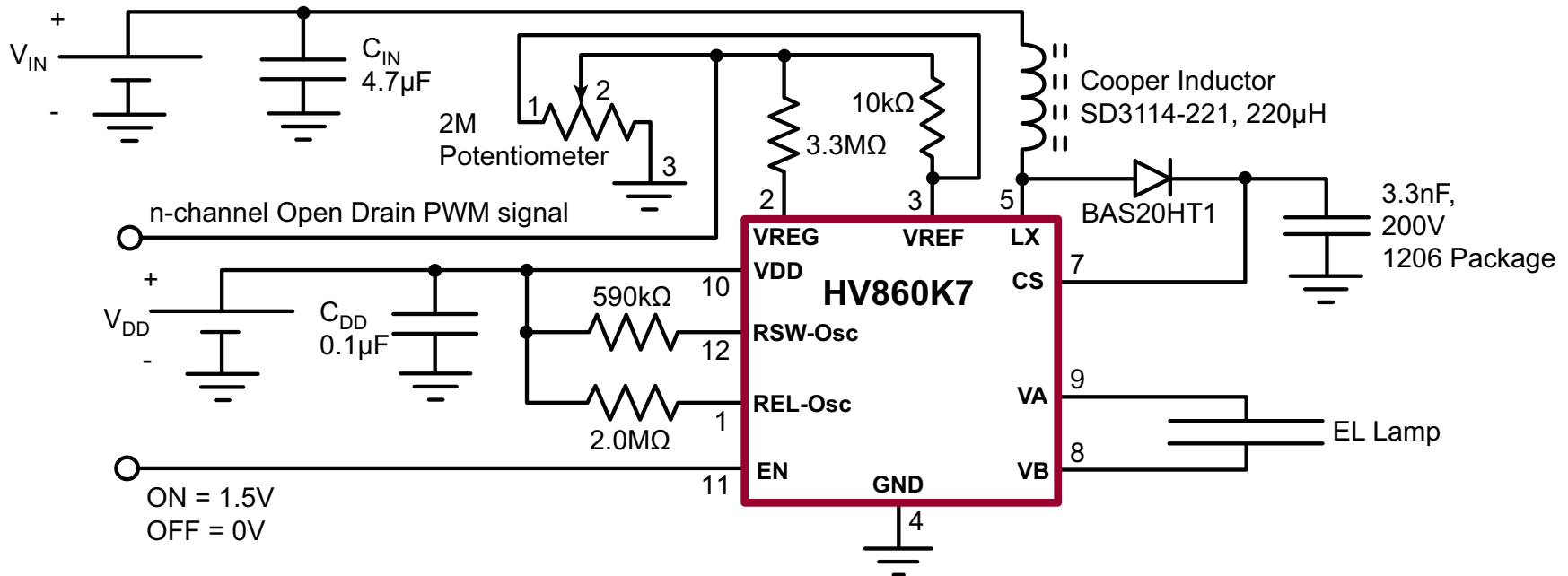
Appendix A. Schematic

A.1 INTRODUCTION

This appendix contains the schematics and layouts of the HV860DB1 Demo Board:

- [HV860DB1 Demo Board – Schematic](#)

A.2 HV860DB1 DEMO BOARD – SCHEMATIC



Note: The above circuit may be optimized further based on the specifications of the lamp used.

Appendix B. Bill of Materials (BOM)

TABLE B-1: BILL OF MATERIALS (BOM)

Component	Description	Package	Manufacturer	Part Number
L _X	220 μ H inductor	—	Cooper Industries	SD3114-221
			Würth Elektronik	74404042221
C _S	3.3 nF, 200V, NPO chip capacitor	1206	Tecate Industries	CMC-200/332JN1206T
R _{SW}	1%, 590 k Ω chip resistor	0603	Any	—
R _{EL}	1%, 2 M Ω chip resistor	0603	Any	—
R _{DIM}	5%, 3.3 M Ω chip resistor	0603	Any	—
R _{PWM}	1%, 10 k Ω chip resistor	0603	Any	—
C _{DIM}	Optional capacitor for dimming control	—	—	—
C _{IN}	4.7 μ F, 10V ceramic chip capacitor	0603	Any	—
C _{DD}	0.1 μ F, 16V ceramic chip capacitor	0603	Any	—
Diode	200V fast recovery diode	SOD-323	Diodes Incorporated®	BAS20HT1
POT	2 M Ω potentiometer	—	Bourns®, Inc.	3352T-205
U1	EL driver IC	12-Lead QFN	Microchip Technology, Inc. and its subsidiaries	HV860K7

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