Important Notice

Restrictions in Use

IDT's ZSLS7025PCB-D1V1 Demonstration Kit hardware is designed for ZSLS7025 demonstration, evaluation, laboratory setup, and module development only. The ZSLS7025PCB-D1V1 Demonstration Kit hardware must not be used for module production or production test setups.

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1 Kit Contents

The ZSLS7025PCB-D1V1 Demonstration Kit includes the following:

- ZSLS7025PCB-D1V1 Demonstration Board v.X (where X refers to the current version)
- Five ZSLS7025 samples, SOP8
- ZLED-PCB10 Test PCB with 12 white 0.5W LEDs
- *ZSLS7025PCB-D1V1 Demonstration Kit Start-up Information*
- *Kit Disclaimer*

The ZSLS7025PCB-D1V1 Demonstration Kit is fully assembled and ready for immediate operation.

2 Kit Description

2.1. ZSLS7025 Overview

The ZSLS7025PCB-D1V1 Demonstration Kit provides a quick and easy method for evaluating the ZSLS7025 within its basic application circuit. Reading the *ZSLS7025 Data Sheet* before using the Demonstration Kit is recommended for understanding the operation of the ZSLS7025 and the Demonstration Board.

The ZSLS7025 is a constant current boost converter. Typical applications require an external MOSFET switch. The boost converter topology allows series connection of white LEDs so that the LED currents are identical for uniform brightness with an LED string voltage greater than the input supply voltage. The nominal output current can be set by an external resistor with the option to also dim the brightness of the LEDs with a PWM signal or DC control voltage. A low 0.3V (nominal) feedback voltage minimizes power loss in the current setting resistor for better efficiency. The over-voltage protection (OVP) circuit safeguards the chip and the system even if the load is not connected. The ZSLS7025 is available in an SOP-8 package.

The ZSLS7025 IC is designed for LED current drive applications of up to 2A or higher.

The main features of ZSLS7025 driver are

- 5VDC to 100VDC supply voltage
- High efficiency: up to 95 %
- PWM or DC voltage dimming control
- Adjustable over-voltage protection
- Over-temperature protection

2.2. ZSLS7025PCB-D1V1 Demonstration Kit Overview

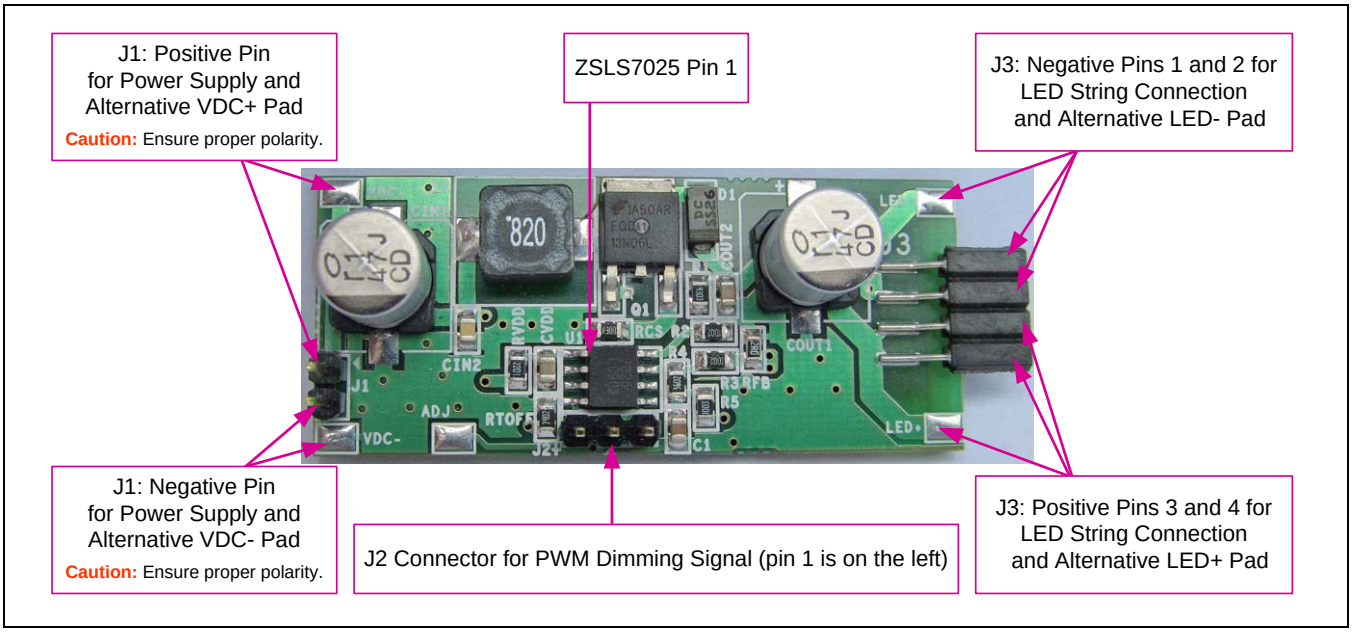
The Demonstration Board contains a standard 4-pin terminal connector to allow the user to easily connect and supply an LED board. The Demonstration Board also has two LED power pads (LED+ and LED-) to provide more flexibility in supplying a power LED or LED string.

The board includes an external power MOSFET switch. The layout with any switching regulator is crucial to minimize radiated EMI. A shielded inductor is selected to minimize radiated EMI. This reference design keeps the critical trace lengths to a minimum. The ground plane has been maximized around critical areas.

The Demonstration Board offers the following features and benefits:

- Wide input voltage range (see section 2.4)
- Standard 2.54mm 4-pin header for attaching LEDs and additional duplicate surface-mounted device (SMD) pads (LED- , LED+)
- Standard 2.54mm 2-pin male header and alternative duplicate SMD pads for power supply
- Standard 2.54mm 3-pin male header for dimming the LED brightness with an external PWM signal or DC control voltage
- All devices are SMD and on the same side of the board (as shown in the top view given in Figure 2.1)
- Maximized power ground copper on top and bottom sides to minimize radiated EMI
- Cooling pad (bottom layer) with many vias for the power MOSFET switch
- The high current paths are as short as possible to ensure system precision and efficiency
- No ground plane under the EMI radiated components to prevent noise injection in the ground plane

Figure 2.1 ZSLS7025PCB-D1V1 Demonstration Board (Top View)



2.3. Power Supply

The board requires a DC power supply of ≥5V for the LED string that also must be 3V lower than the normal working output voltage (the total forward voltage of the LED or the LED string). It can be connected either via J1 or alternative pads as described in Table 2.1. The maximum supply voltage of the ZSLS7025PCB-D1V1 is 19V due to the sizing of the components used on the boards. See the *ZSLS7025 Data Sheet* for information on designing the circuit to allow higher input DC power supply values.

Caution: Ensure proper polarity when making connections. The system is not reverse polarity protected.

2.4. Connections

Refer to Figure 2.1 for identification of the following connections for the Demonstration Board.

Table 2.1 Connections for the Demonstration Board

Connector	Description
J1	Standard 2.54mm 2-pin male header for power supply. Input voltage range: 5VDC to 19VDC. See section 2.3 for additional requirements. J1 is an alternative connection that can be used instead of the VDC+ and VDC- pads.
J2	Standard 2.54mm 3-pin male header for dimming the brightness of the LEDs with an external PWM signal or DC control voltage. Pin1: VDC(+) Pin 2: Dimming signal – PWM or DC Voltage Pin 3: GND
J3	Standard 2.54mm 4-pin female header with the following connections. Pins 1 and 2: LED- negative pole for voltage output to drive the LED string (also see LED- pad) Pins 3 and 4: LED+ positive pole for voltage output to drive the LED string (also see LED+ pad)
VDC+	Positive pad for an optional alternative connection for the power supply (instead of J1 positive pin).
VDC-	Negative pad for an optional alternative connection for the power supply (instead of J1 negative pin).
LED+	Positive pad for an optional alternative connection for the positive ZLED7025 driver supply voltage (instead of J3, pins 3 and 4).
LED-	Negative pad for an optional alternative connection for the negative ZLED7025 driver supply voltage (instead of J3, pins 1 and 2).

2.5. Circuit Operation

The nominal output current of the Demonstration Board is set to 150mA, but it can be adjusted by changing the set resistor R_{FB} according to the formula:

$$I_{LED} = V_{FB} / R_{FB}$$

Where

I_{LED} = Average output current through the LED(s) in amperes. I_{LED} = 0.15A for R_{FB} = 2Ω.

V_{FB} = Internal feedback reference voltage of the ZSLS7025: approx. 0.3V.

R_{FB}= Nominal current output setting resistor in ohms, which is approximately 2Ω on the Demonstration Board

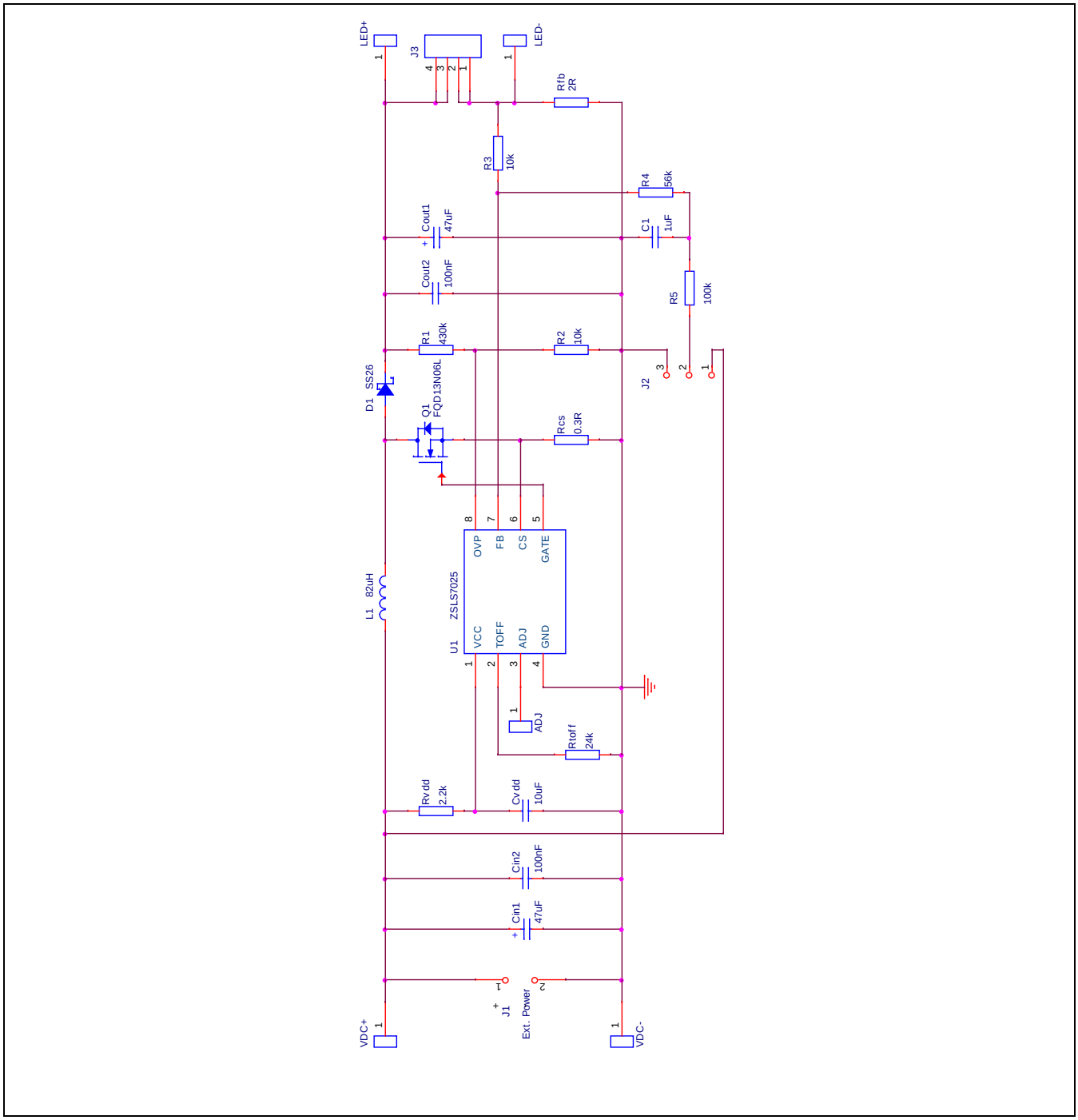
The over-voltage protection level is set to 44V for the Demonstration Board, which limits the maximum LED string voltage, is determined by the following formula for V_{OVP} in volts:

$$V_{OVP} = 1V * (R1+R2) / R2$$

V_{OVP} = 44V for R1 = 430 kΩ and R2= 10kΩ. Note that the capacitors must be re-designed for higher voltages if a higher over-voltage protection level is required. For detailed calculations related to switching frequency and dimming control, refer to the *ZSLS7025 Data Sheet.*

2.6. Schematic Diagram

Figure 2.2 ZSLS7025PCB-D1V1 Schematic Diagram



2.7. ZSLS7025-D1V1 Demonstration Kit Bill of Materials

Table 2.2 Components Used in the ZSLS7025-D1V1 Demonstration Board

Item	Manufacturer Part	Manufacturer	Description	Pkg	Type
U1	ZSLS7025	IDT	Converter IC	SOP8	
Q1	FQD13N06L	Fairchild	n-FET	D-PAK	60V / 7A / 4.8nC
D1	SS26	Vishay	Schottky diode	SMA	60V / 2A
Cin1			Electrolytic cap	d8 x 10 SMD	47u / 63V
Cvdd			MLCC	0805	10u / 16V / X5R
Cout1			Electrolytic cap	d8 x 10 SMD	47u / 63V
C1			MLCC	0805	1u / 16V / X5R
Cin2			MLCC	0805	100n / 50V / X7R
Cout2			MLCC	0805	100n / 100V / X7R
Rvdd			Chip resistor	0805	2.2kΩ / 1%
Rtoff			Chip resistor	0805	24kΩ / 1%
Rcs			Chip resistor	0805	0.3RΩ / 1%
R1			Chip resistor	0805	430kΩ / 1%
R2			Chip resistor	0805	10kΩ / 1%
R3			Chip resistor	0805	10kΩ / 1%
R4			Chip resistor	0805	56kΩ / 1%
R5			Chip resistor	0805	100kΩ / 1%
Rfb			Chip resistor	0805	2R / 1% / 100ppm
L1	744777182	Wurth	SMD inductor, shielded	7345	82uH / 0.9A sat / 0.26Ω
J1	SL 11 124	Fischer Elektronik	Header, male	2x1 / 2.54mm TH	2-pin / 0.63mm
J2	SL 11 124	Fischer Elektronik	Header, male	3x1 / 2.54mm TH	3-pin / 0.63mm
J3	BL17SMD.04Z	Fischer Elektronik	Header, female	4x1 / 2.54mm SMT	4-pin / 0.63mm

3 Ordering Information

Product Sales Code	Description
ZSLS7025PCB-D1V1	ZSLS7025PCB-D1V1 Demonstration Kit V1.0 includes 5 IC samples

4 Related Documents

Document
ZSLS7025 Datasheet

Visit www.IDT.com/ZSLS7025 or contact your nearest sales office for the latest version of these documents.

5 Glossary

Term	Description
LED	Light Emitted Diode
EMI	Electromagnetic Interference
MOSFET	Metal–Oxide–Semiconductor Field Effect Transistor
PCB	Printed Circuit Board
PWM	Pulse Width Modulation
SOP8	8-Pin Small Outline Package

6 Document Revision History

Revision	Date	Description
1.00	September 4, 2013	Initial release
	April 19, 2016	Changed to IDT branding.

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