ZXSC400EV7 USER GUIDE

DESCRIPTION

The ZXSC400 is a voltage mode boost converter in a SOT23-6 package. The low feedback voltage VFB input allows the current in a chain of LEDs to be set accurately. The ZXSC400EV7 is designed to drive one or two 3W LEDs at a constant current of 700mA from an input voltage between 1.8V and 3.0V. The board is fitted with a socket for use with a variety of LED types. The board is open-circuit-LED protected and intended to be used with two alkaline, NiCad or NiMH batteries.

FEATURES

- Drives one or two 3W LEDs.
- Typical efficiency of 80%.
- Open-circuit-LED protected.
- High-sided current sensing.
- Compatible with Future LED boards.

APPLICATIONS

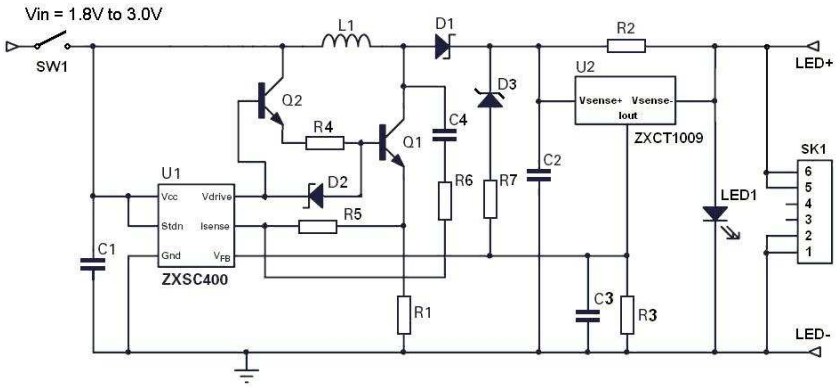
- LED torches and flashlights.
- Portable illumination.
- Emergency lights.

ORDERING INFORMATION

ORDER NUMBER
ZXSC400EV7

Please note evaluation boards are subject to availability and qualified leads.

TYPICAL APPLICATION CIRCUIT



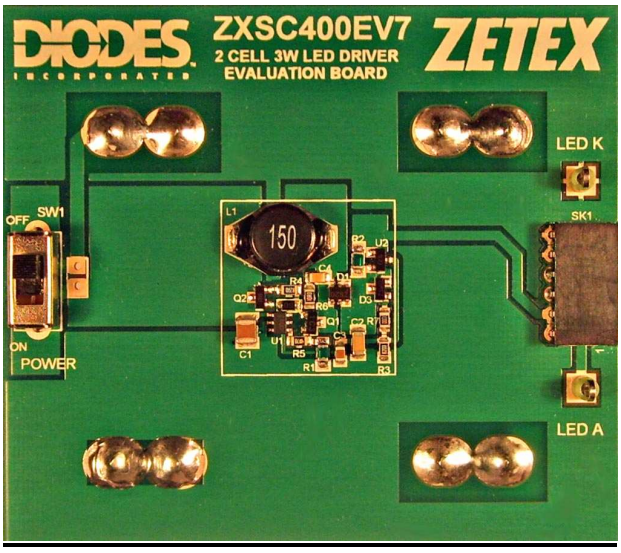


Figure 1. ZXSC400EV7 Evaluation Board.

REFERENCE DESIGN

The ZXSC400EV7 uses the circuit below. The target application is a 3W white LED being driven from two NiCd/NiMH batteries for torches, but the device is also excellent for general high powered LED driving.

Q1 and Q2 form a pseudo-Darlington pair, which provides enough current gain for switching currents of above 1.5A. The turnoff speed is enhanced by D2, which provides a discharge path for Q1.

The current monitor ZXCT1009 is used for monitoring the LED current flowing through the low-ohmic resistor R2. The resistor R2 transforms the LED current into an accurate and low-loss sensing voltage for the VFB pin of the ZXSC400. Open circuit protection is provided by Zener diode D3, which causes VFB to be held above 300mV when the output is over voltage.

Since the Isense threshold of ZXSC400 is quite low (typically 28mV), noise due to heavy collector switching currents may cause the system to work in unstable manner. In order to prevent this from happening, the waveform on the Isense pin is enhanced by adding the edges from the collector waveform via the high pass filter formed by C4 and R6.

The ZXSC400EV7 operates from a supply voltage between approximately 1.8V and 3.0V.

For other reference designs or further applications information, please refer to the ZXSC400 datasheet.

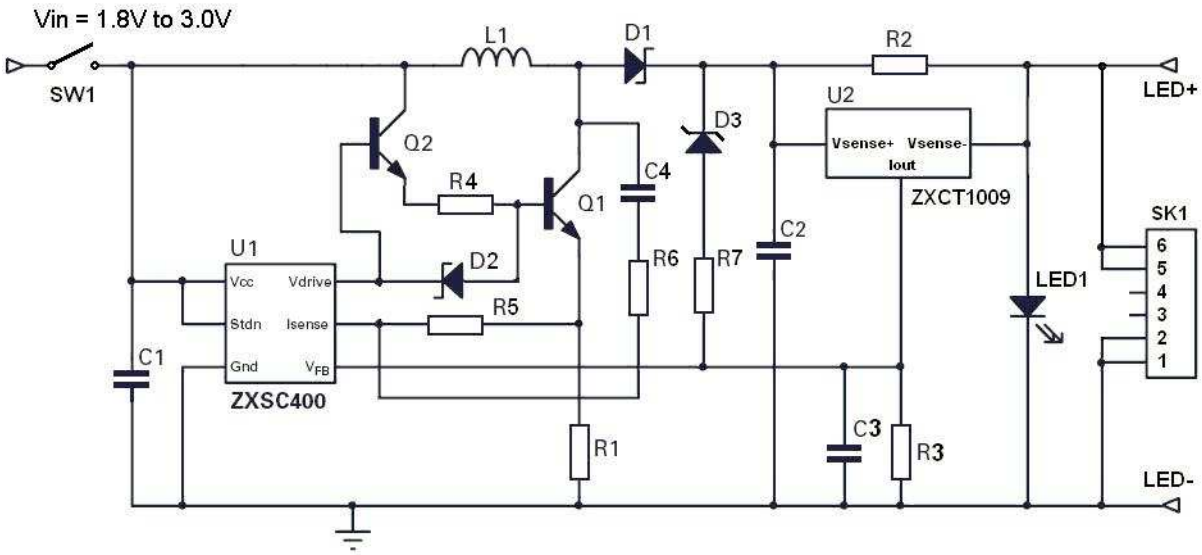


Figure 2. ZXSC400EV7 Schematic Diagram.

COMPONENTS LIST

Ref	Value	Package	Part Number	Manufacturer	Notes
U1	N/A	SOT23-6	ZXSC400E6	Diodes Zetex	Boost converter
U2	N/A	SOT23	ZXCT1009	Diodes Zetex	Current monitor
Q1	N/A	SOT23	ZXTN25012EFH	Diodes Zetex	Low sat. NPN transistor
Q2	N/A	SOT23	ZXTN25012EFL	Diodes Zetex	Low sat. NPN transistor
D1	40V/2A	SOT23-6	ZHCS2000	Diodes Zetex	40V/1A Schottky diode
D2	40V/400mA	SOD323	ZHCS400	Diodes Zetex	40V/400mA Schottky diode
D3	6.8V/0.25W	SOT23	BZX84-C6V8	Diodes Zetex	6.8V/ 0.25W Zener diode
L1	15uH/3A	N/A	DO3316P-153 NPI31W150MTRF 74456115	Coilcraft NIC Comps. Wurth	15uH/3A SMT Inductor
R1	20mΩ	0805		Generic	0805 +/-1% tolerance
R2	50mΩ	0805		Generic	0805 +/-1% tolerance
R3	820Ω	0805		Generic	0805 +/-1% tolerance
R4	82Ω	0805		Generic	0805 +/-5% tolerance
R5	4.7Ω	0805		Generic	0805 +/-5% tolerance
R6	10Ω	0805		Generic	0805 +/-5% tolerance
R7	100Ω	0805		Generic	0805 +/-5% tolerance
C1	22µF/16V	1210	GRM32ER61C226KE20L	Murata	X5R +/-10% tolerance
C2	4.7µF/10V	1206	C1206C475K8RAC GRM31CR71A475KA01L NMC1206X7R475K10	Kemet Murata NIC Comps	X7R +/-10% tolerance
C3	220nF/6V3	0805		Generic	X7R +/-10% tolerance
C4	330pF/6V3	0805		Generic	COG/NPO +/-5% tolerance

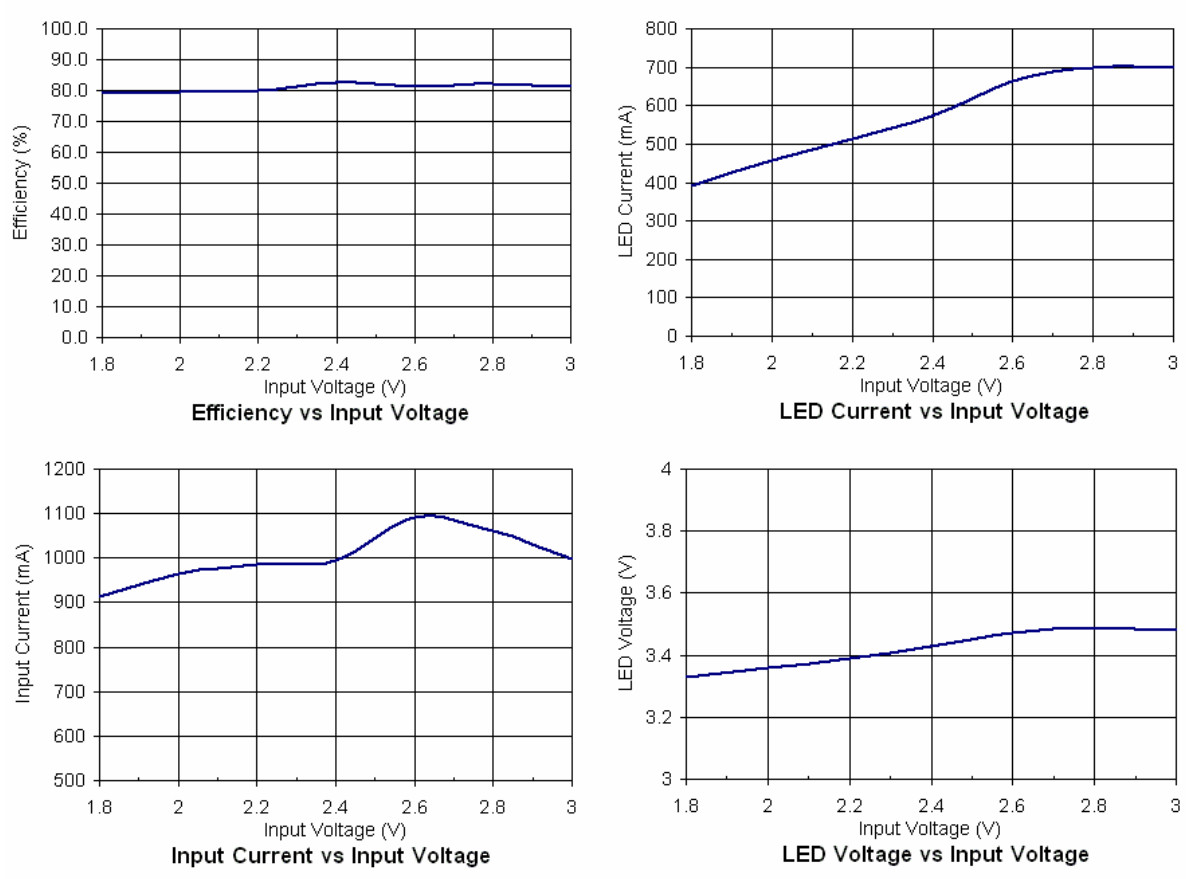


Figure 3. Performance graphs.

ZXSC400EV7 VERIFICATION

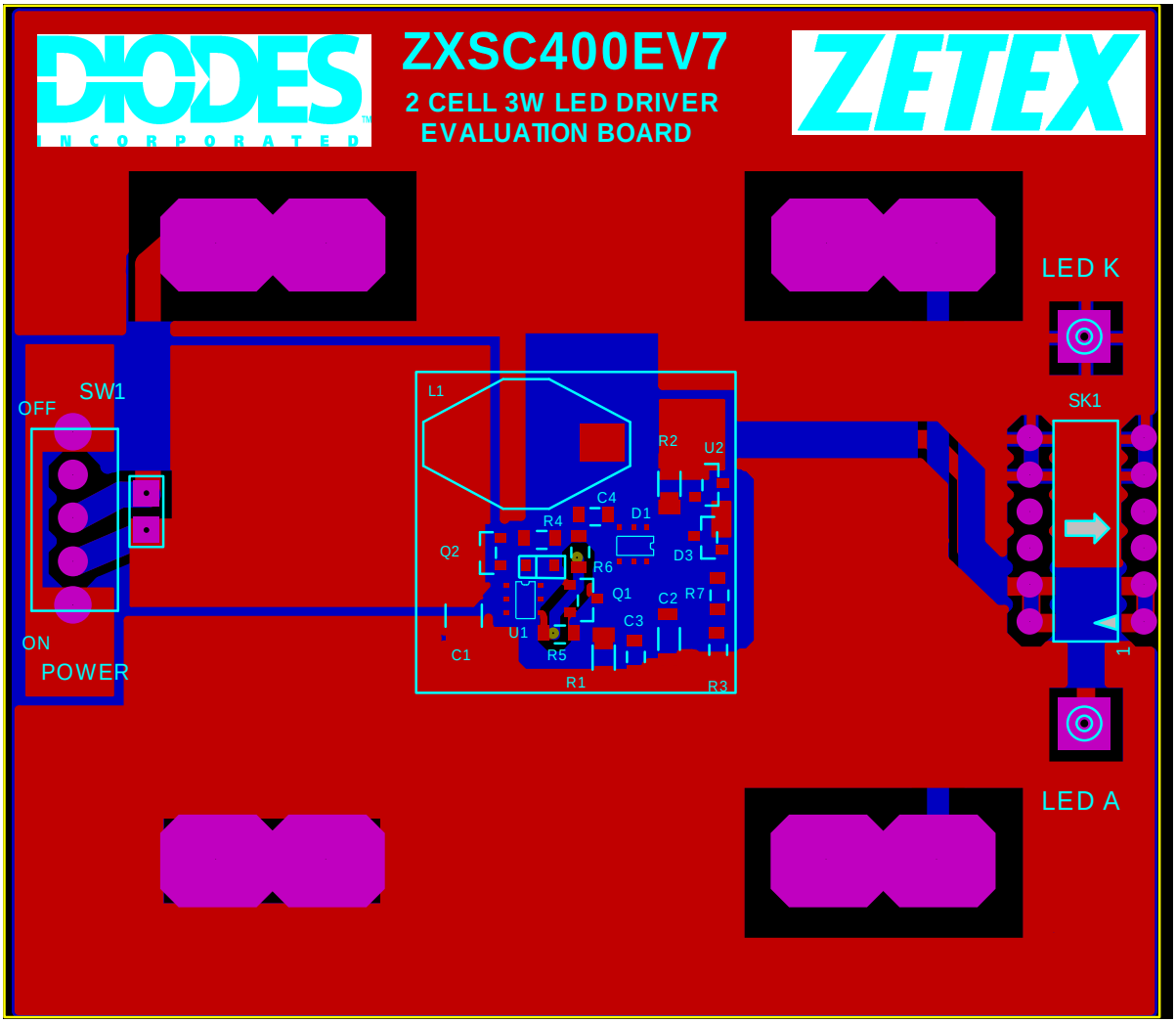


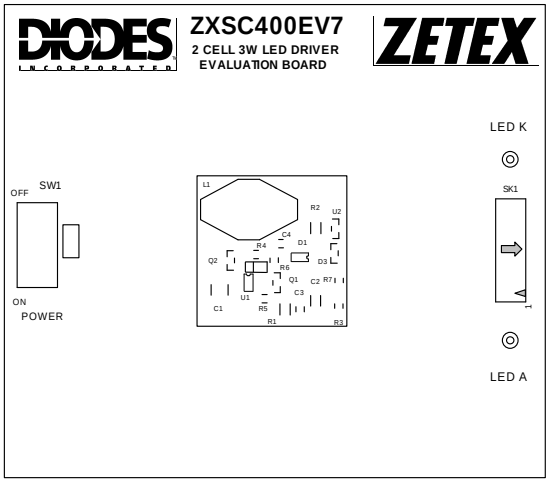
Figure 4. Evaluation PCB

ZXSC400EV7 Set-up and Test

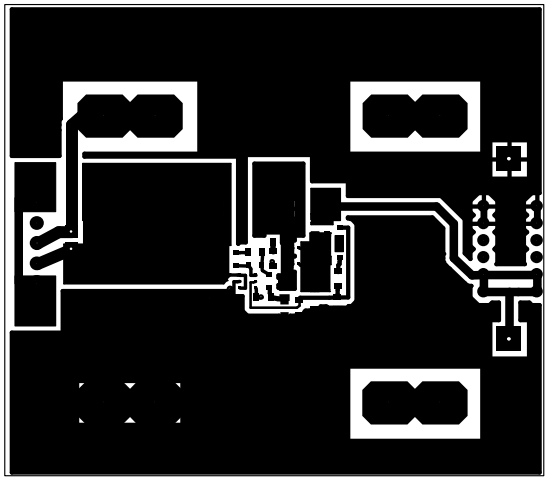
1. Connect V_{IN} and GND to positive and zero volts of PSU supply respectively.
2. Set the PSU to 3V.
3. Turn on PSU.
4. The LED should illuminate and be regulated at 700mA +/-5%.
5. The input current should measure between 1A ~ 1.2A
   THIS IS A FUNCTIONAL EVAL BOARD.

LAYOUT CONSIDERATIONS

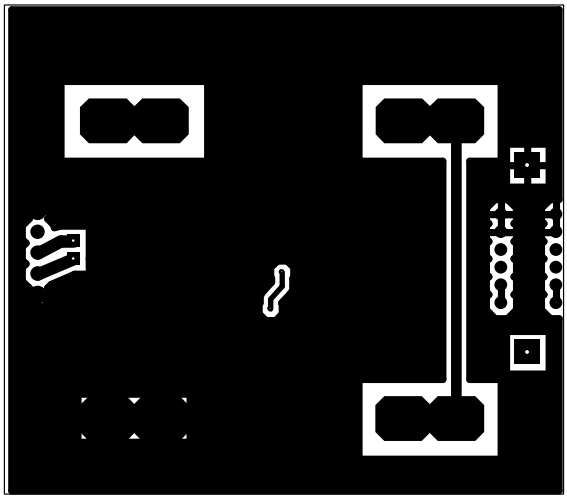
The PCB tracks have been kept as short as possible to minimise ground bounce, and the ground pin of the device is soldered directly to the ground plane. The inductor, and the input and output capacitors, have been mounted close to the device. This is particularly important in order to minimise the parasitic resistance and inductance, which would degrade efficiency. The Isense pin is a high impedance input, so PCB track lengths to pin this have been kept as short as possible to reduce noise pickup.



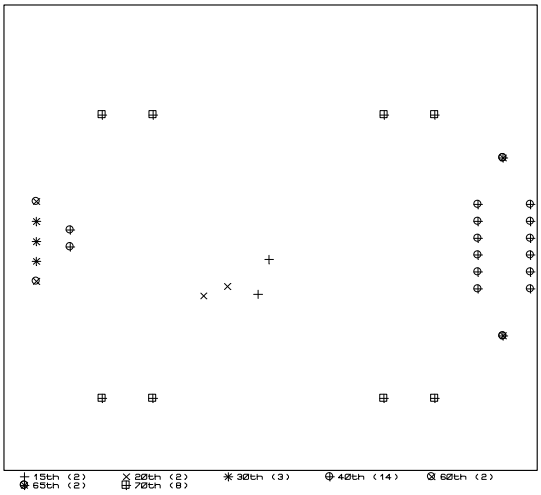
Top Silk



Top Copper



Bottom Copper



Drill File

Figure 5. Layout of the ZXSC400EV7.

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Sales offices

The Americas
3050 E. Hillcrest Drive
Westlake Village,
CA 91362-3154
Tel: (+1) 805 446 4800
Fax: (+1) 805 446 4850

Europe
Kustermannpark
Balanstraße 59,
D-81541 München
Germany
Tel: (+49) 894 549 490
Fax: (+49) 894 549 4949

Taiwan
7F, No. 50,
Min Chuan Road
Hsin-Tien
Taipei, Taiwan
Tel: (+886) 289 146 000
Fax: (+886) 289 146 639

Shanghai
Rm. 606, No.1158
Changning Road
Shanghai, China
Tel: (+86) 215 241 4882
Fax (+86) 215 241 4891

Shenzhen
Room A1103-04,
ANLIAN Plaza, #4018
Jintian Road
Futian CBD,
Shenzhen, China
Tel: (+86) 755 882 849 88
Fax: (+86) 755 882 849 99

Korea
6 Floor, Changhwa B/D,
1005-5 Yeongtong-dong,
Yeongtong-gu, Suwon-si,
Gyeonggi-do, Korea 443-813
Tel: (+82) 312 731 884
Fax: (+82) 312 731 885