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ZXSC400 Driving 3W high power LEDs

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Description

This design note shows the ZXSC400 driving a single 3W LED. The input voltage ranges from 1.8V to 3.6V with constant output current of 700mA down to 2.6V with an overall 80% of efficiency.

Figure 1 shows typical constant current solution with ZXSC400 driving one 3W LED. The input voltage range allows the use of two alkaline batteries or one Lithium Ion cell (CR123A) for portable flashlight applications.

Q1 and Q2 forms a pseudo Darlington pair which provide enough current gain for a switching current up to 1.5A. In order to provide better switch off performance, a Schottky diode, D2, is used to drain the base current from the base of Q1 directly. In order to achieve higher efficiency, current monitor U2 is used to provide a low voltage drop LED current sensing through the low ohmic resistor, R2. The LED current is converted to 300mV feedback voltage through R3.

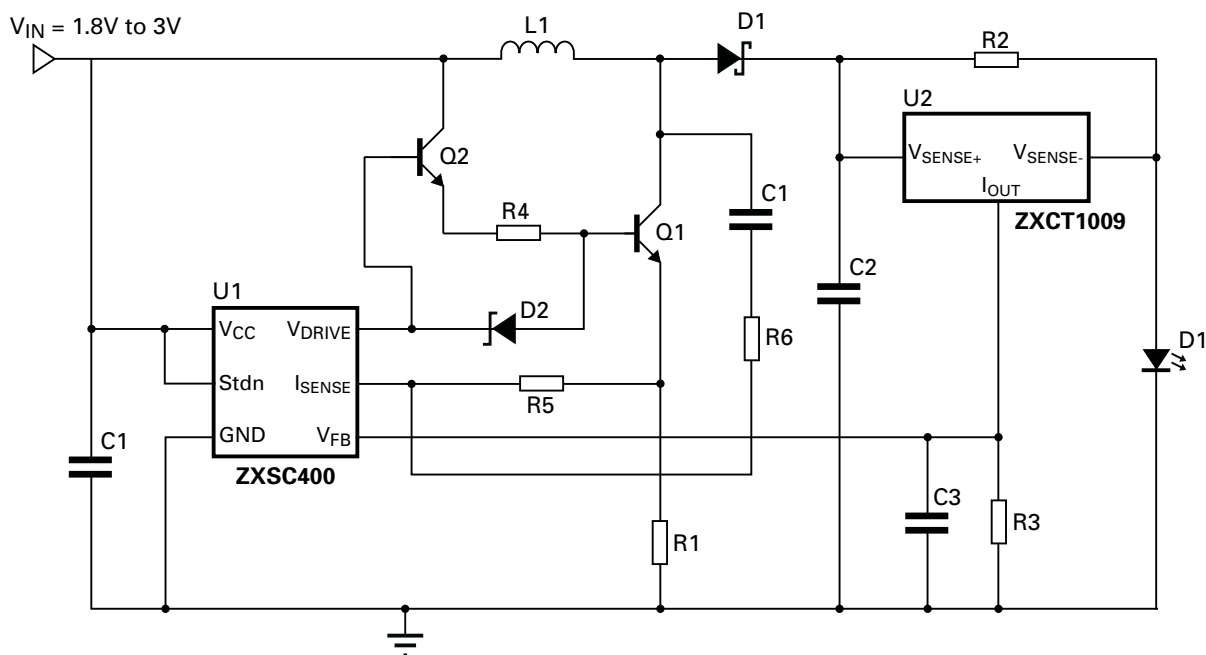


Figure 1 Schematic diagram

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| Ref. | Value | Part number | Manufacturer | Comments |
|------|---------------------|--------------|------------------|----------------------------|
| U1 | | ZXSC400E6 | Zetex | LED driver in SOT23-6 |
| U2 | | ZXCT1009 | Zetex | Current monitor in SOT23 |
| Q1 | | ZXTN25012EFH | Zetex | Low sat NPN in SOT23 |
| Q2 | | ZXTN25012EFL | Zetex | Low sat NPN in SOT23 |
| D1 | | ZHCS2000 | Zetex | 2A Schottky in SOT23 |
| D2 | | ZHCS400 | Zetex | 400mA Schottky |
| L1 | 15 μ H | 744 561 15 | Würth Elektronik | ISAT = 3A DCR=60m Ω |
| R1 | 20m Ω 1% | Generic | Generic | 0805 size low ohmic |
| R2 | 50m Ω 1% | Generic | Generic | 0805 size low ohmic |
| R3 | 820 Ω 1% | Generic | Generic | 0805 size |
| R4 | 82 Ω 5% | Generic | Generic | 0805 size |
| R5 | 4.7 Ω 5% | Generic | Generic | 0805 size |
| R6 | 10 Ω 5% | Generic | Generic | 0805 size |
| C1 | 22 μ F 10V 10% | Generic | Generic | 1206 size X7R/X5R |
| C2 | 4.7 μ F 10V 10% | Generic | Generic | 1206 size X7R/X5R |
| C3 | 0.22 μ F 16V | | | |
| 10% | Generic | Generic | | |
| C4 | 330pF/10V | Generic | Generic | 0805 size |

Table 1 Bill of materials

Typical operating characteristics

(For typical application circuit where $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated)

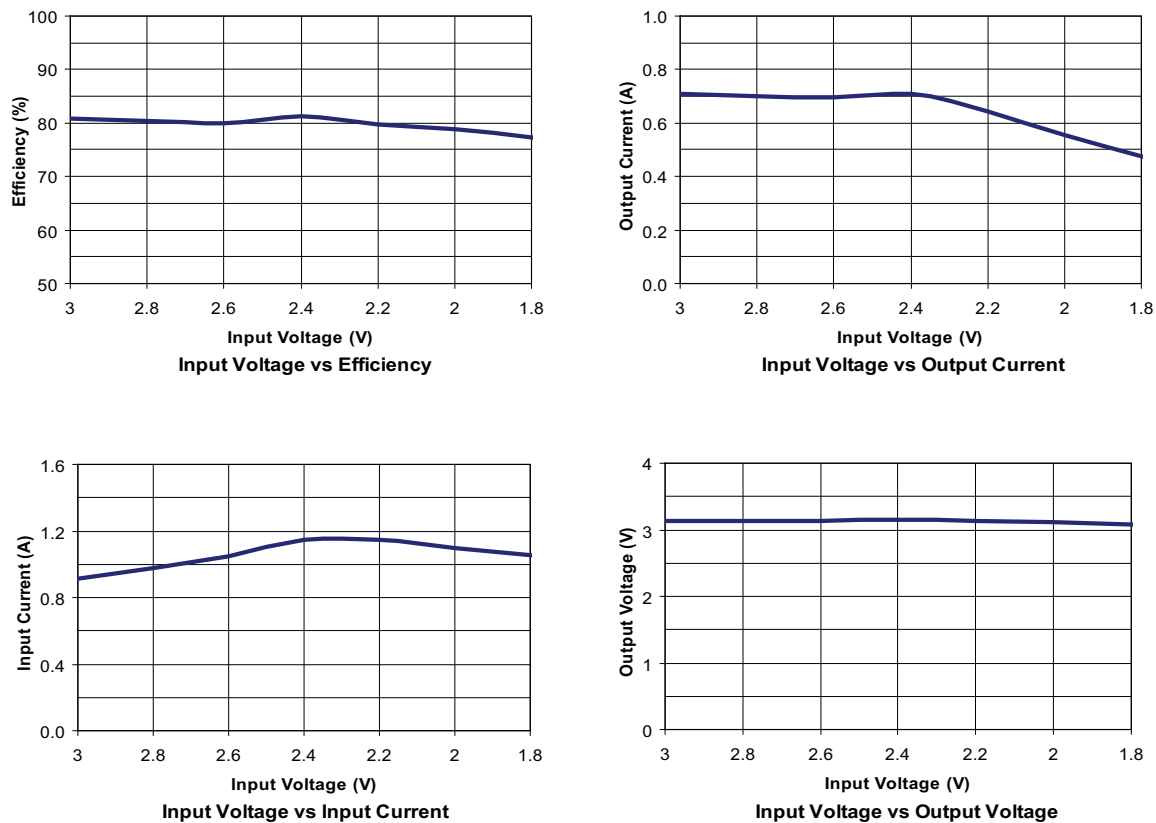


Figure 2 Performance graphs

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| | |
|-----------------------------------|--------------------------------------------------------------------------------|
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| "Active" | Product status recommended for new designs |
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| "Not recommended for new designs" | Device is still in production to support existing designs and production |
| "Obsolete" | Production has been discontinued |

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| | |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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