

ZXSC380 EV1

ZXSC380EV1 EVALUATION BOARD USER GUIDE

DESCRIPTION

The ZXSC380EV1, Figure 1, is a PCB for evaluating the simple ZXSC380 constant current pulse LED driver. Applications requiring step-up voltage from a low voltage source such as 1.2v or 1.5v button cells can use this chip with minimal components.

The ZXSC380 and a single small inductor are the only components needed to drive a higher voltage LED. Since the ZXSC380 part controls the current in this inductor (internal current sensing is used), it will operate without damage to the chip if the LED or load is removed. The flyback voltage (internal V_{ce} breakdown) multiplied by the current is not enough energy to damage the robust low saturation drive transistor.

The start-up voltage for the ZXSC380 is 1 volt. Typical applications include flashlights and torches and because of its high efficiency, wind-up products needing a step-up voltage source will benefit from this low cost part.

Power between 1 and 6 volts can be applied at J8 (positive) and J4 (negative). With the jumper J5 in place, the left most led will illuminate. Moving the jumper through J6 and J7 shows 2 and 3 LEDs illuminated respectively. With no jumper inserted, an external LED can be connected at A and K (anode / cathode). If the ZXSC380 is to be used create a higher voltage supply (maybe for op-amps or similar), then a Zener diode and capacitor could be connected to A and K in place of the external LED.

The ZXSC380 controls the current peak in the inductor and will turn off the drive transistor when the current reaches 80mA approximately. The energy in the inductor is now released into the load and the inductor current will fall for around $2.2\mu s$, whereby the ZXSC380 drives the transistor again until the peak is reached. The frequency of operation is determined by the load conditions and will rise when the load is higher, up to a maximum of 200kHz.

To help integrate this part into larger designs, a small prototype area is included on the PCB, above the LEDs.

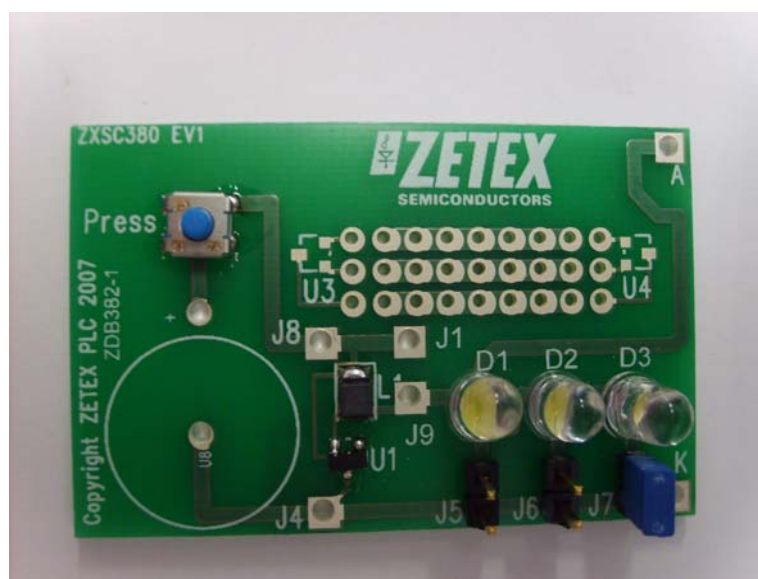


Figure 1: ZXSC380EV1 evaluation board

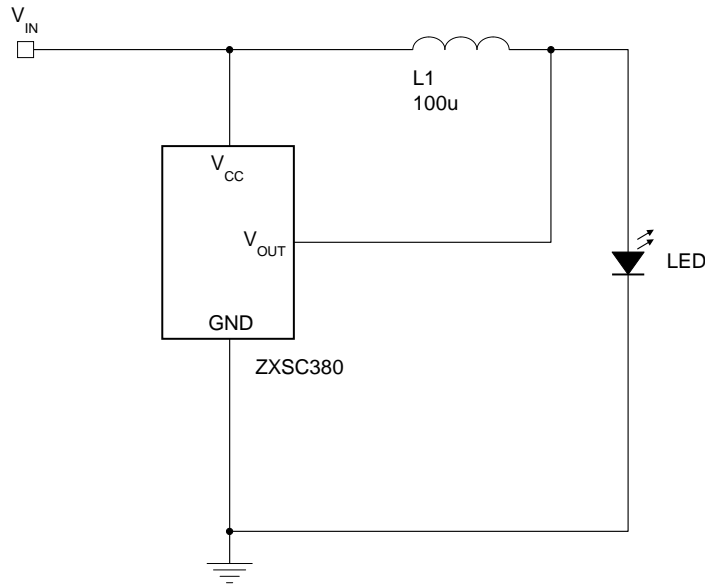


Fig 2 Basic Circuit

Internal device block diagram

The ZXSC380 is non-synchronous Pulse Frequency Modulation DC-DC controller IC, which, when combined with a high performance internal transistor, enables the production of a high efficiency boost converter for use in single cell applications.

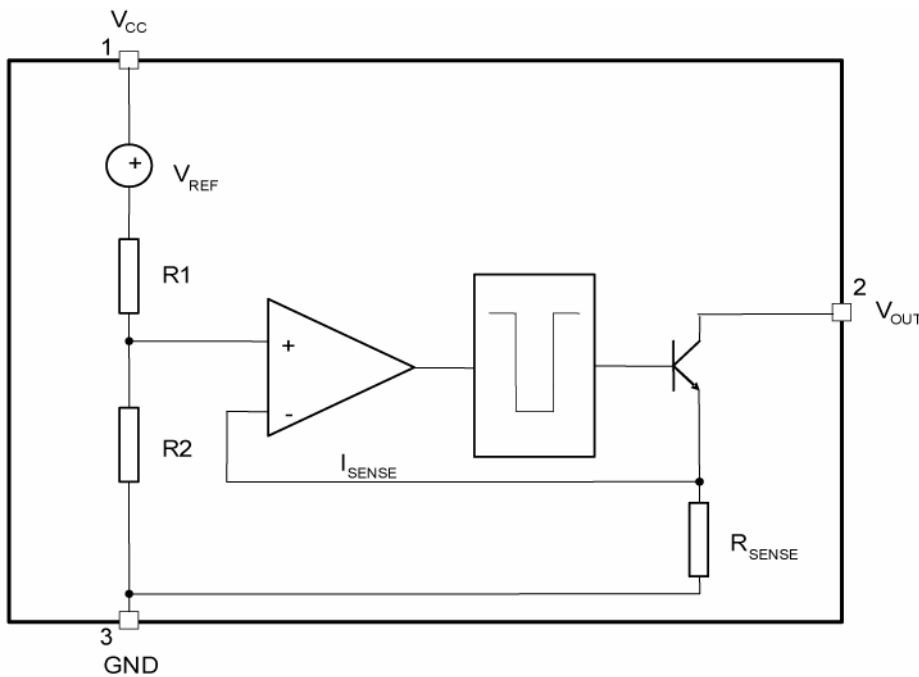


Fig 3. ZXSC380 Block Diagram

The on-chip comparator forces the driver circuit and therefore the internal switching transistor to switch off when the voltage at I_{SENSE} exceeds 20mV. This threshold is set by an internal reference circuit and divider. The voltage at I_{SENSE} is taken from a current sense resistor connected in series with the emitter of the switching transistor. This resistor is chosen to give an emitter current switching current of 80mA.

ZXSC380 EV1

A monostable following the output of the comparator forces the turn-off time of the output stage to be typically 2.2 μ s. This ensures that there is sufficient time to discharge a significant proportion of the energy stored in the inductor coil before the next 'on' period.

With every 'on' pulse the switching transistor is kept on until the voltage across the current-sense resistor exceeds the threshold of the I_{SENSE} input. The 'on' pulse length, and therefore the switching frequency, is determined by the programmed peak current, the input voltage and the input to output voltage differential. The driver circuit supplies the internal switching transistor with a fixed drive current. To maximise efficiency the internal transistor is switched quickly, typically being forced off within 30ns.

PIN DESCRIPTIONS

Pin No.	Name	Description
1	Gnd	Ground
2	V _{OUT}	Switch output external inductor/LED
3	V _{CC}	Supply voltage, generally Alkaline, NiMH or NiCd single cell

PINOUT DIAGRAM

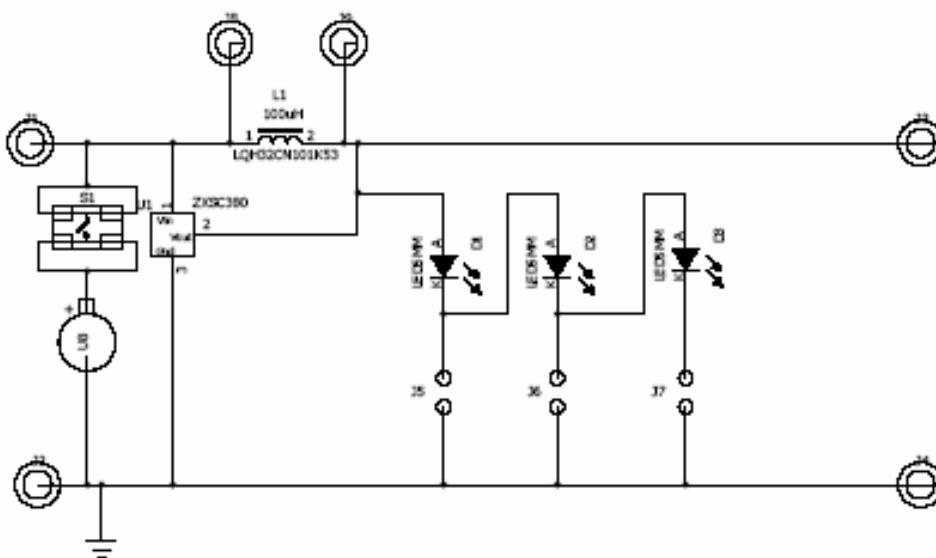
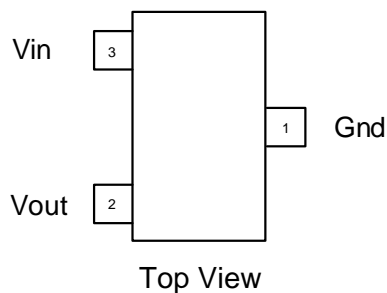


Figure 4 shows the schematic for the ZXSC380EV1 evaluation board.

ZXSC380 EV1



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