ZXLD1370EV1 BUCK LED DRIVER
USER GUIDE

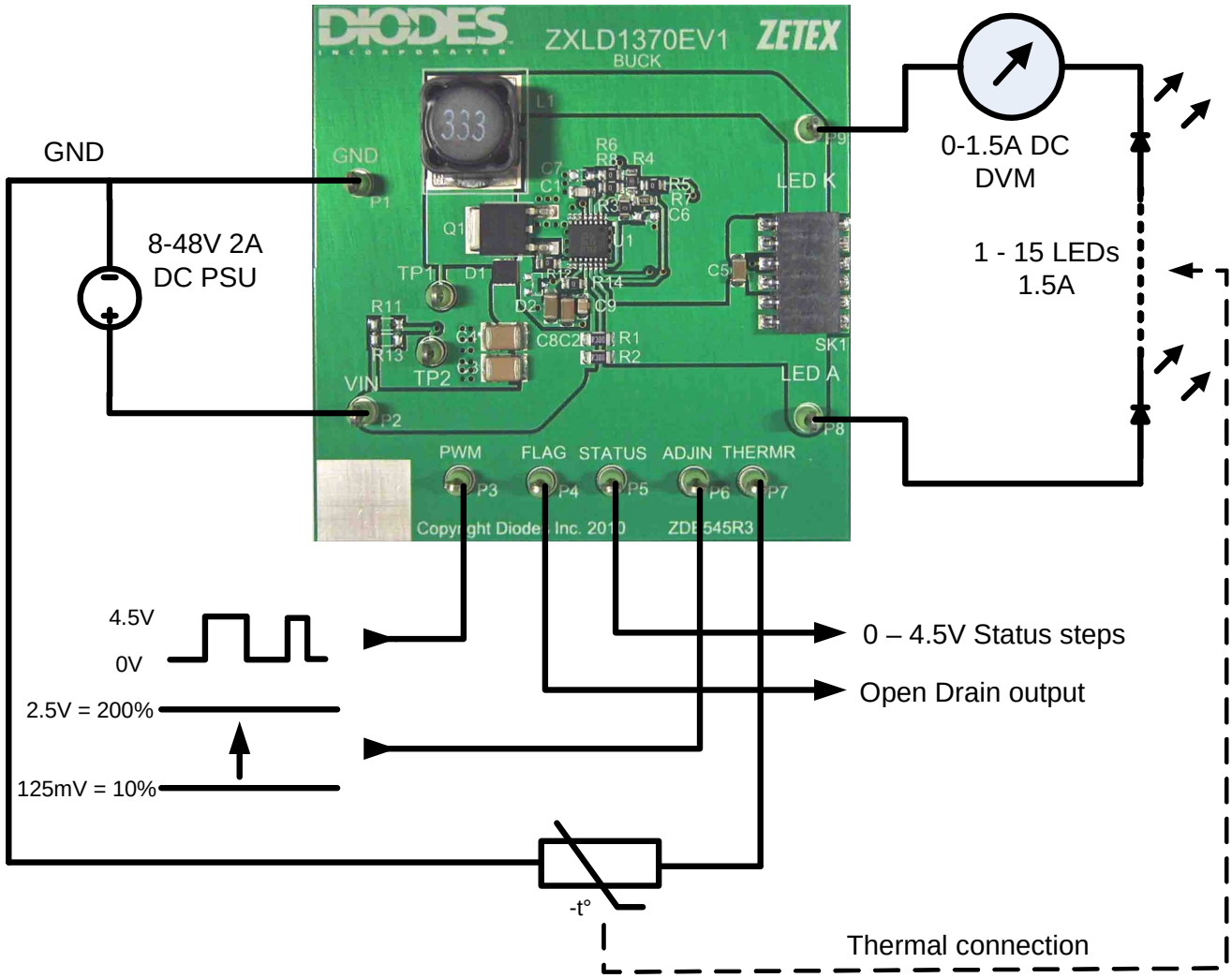


Fig. 1 ZXLD1370EV1 Evaluation board connection diagram

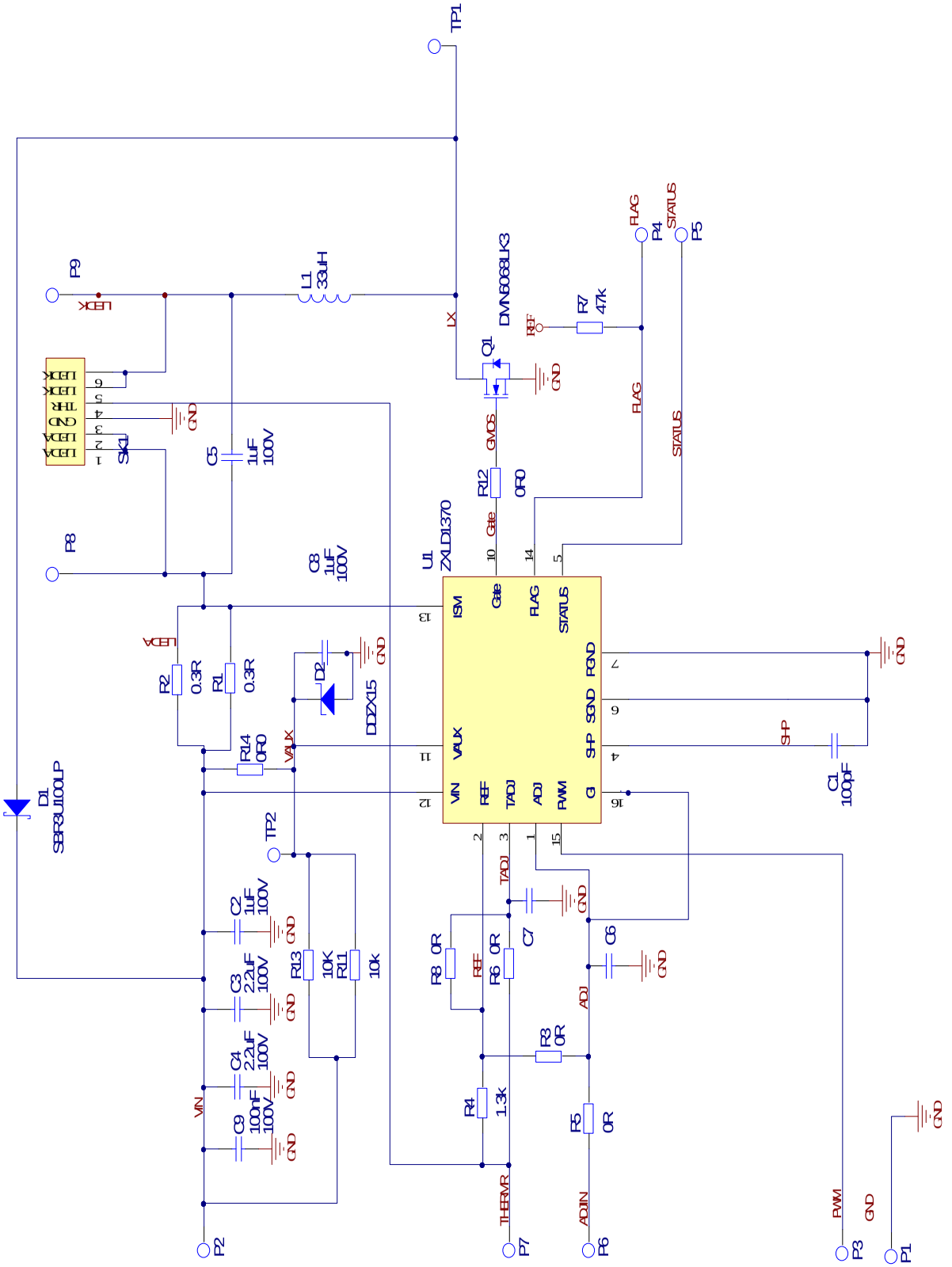


Fig. 2 ZXLD1370EV1 Schematic Diagram

PARTS LIST

Ref	Value	Package	Part Number	Manufacturer	Contact Details
U1	LED Driver Controller	TSSOP16 L- EP	ZXLD1370	Diodes	www.diodes.com
Q1	60V N-ch MOSFET	DPAK	DMN6068LK3	Diodes	www.diodes.com
D1	Freewheeling diode 3A 100V	DFN3030	SBR3U100LP	Diodes	www.diodes.com
D2	NOT FITTED	SOT23	DDZX15	Diodes	www.diodes.com
L1	33uH 2.3A		MS1246-333MLB NPIS24H330MTRF 744-7715330	Coilcraft NIC Comps. Wurth	www.coilcraft.com www.niccomp.com www.we-online.com
C1	100pF 10V	0805			
C2 C5 C8	1uF 100V X7R	1206	GRM31CR72A105KA01L	Murata	www.murata.com
C3 C4	2.2uF 100V X7R	1812	GRM43ER72A225KA01L	Murata	www.murata.com
C6 C7	NOT FITTED				
C9	100nF 100V X7R	0805			
R1 R2	0R3	1206			
R3 R5 R6 R8 R14	0R	0805			
R4	1K3	0805			
R7	47K	0805			
R11, R13	NOT FITTED	1206			
R12	0R	1206			

NOTES

The PCB is supplied with R3 and R8 0R0 resistors fitted.
The 'ADJ' pin and the 'TADJ' pin are disabled.
'VIN' and 'VAUX' are shorted on ZXLD1370EV1
The LED current of the ZXLD1370EV1 boards = 1.5A with 2x // 0R3 = 0R15 (R1 & R2)

The ZXLD1370 'VAUX' pin can be driven from a separate supply instead of the 'VIN' voltage.
To do this, remove R14, fit R11 = 10k0, fit R13 = 10k0.
Use Zener diode D2 to keep 'VAUX' pin <15V.

For other reference designs or more applications information, please see the ZXLD1370 datasheet.

OPERATION

In Buck mode, the LED current is sensed by the resistor (R1 // R2). An output from the control loop responsible for sensing this current drives the input of an internal comparator. The comparator drives the gate of the external NMOS switch transistor through the 'GATE' pin. When the NMOS switch is on, current flows from 'VIN', through (R1 // R2), the LED, the inductor and the switch to ground, and increases until a high value is reached. Then, 'GATE' goes low, the switch turns off and the current flows through (R1 // R2), the LED, the inductor and D1, back to 'VIN'. When the inductor current has gone low, 'GATE' goes high, the switch turns on, and the cycle repeats resulting in the circuit oscillates. The average current in the LED equals the average of the maximum and minimum threshold currents. The ripple current (hysteresis) is equal to the difference between the thresholds. The control loop keeps the average LED current at the level set by the voltage on the 'ADJ' pin. Loop compensation is achieved by C1.

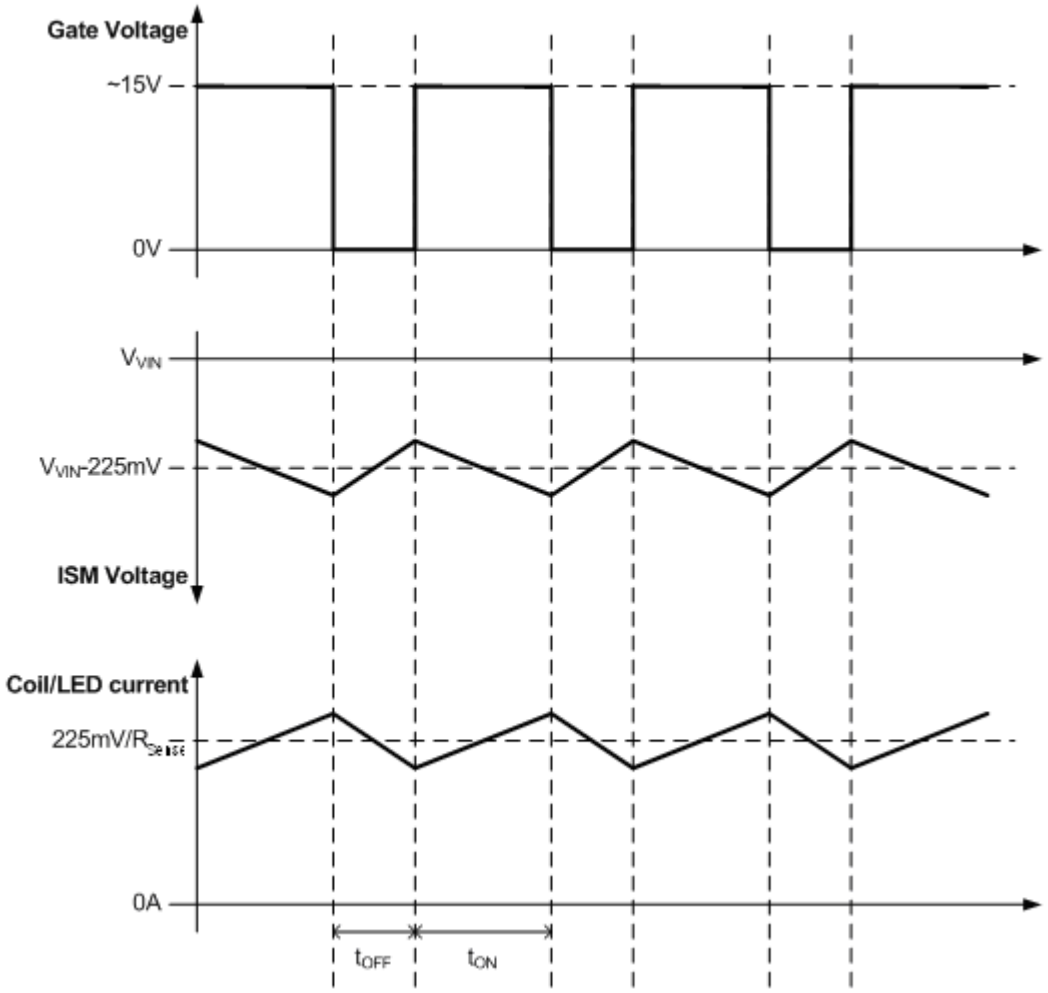


Fig. 3 Waveforms

ADJ Terminal (DC output current adjustment)
On the ZXLD1370EV1, R3 connects the 'ADJ' pin to 'V_{REF}' to give 100% LED current.
The 'ADJ' pin can be driven with an external DC voltage >=125mV and <=2.5V to adjust the LED current to >=10% and <=200% of the nominal value.
To do this, remove R3, fit R5 and apply an external DC voltage between 'ADJIN' and 'GND'.

The voltage 'V_{ADJ}' can be derived from a resistor-divider connected between 'REF' and 'GND'.

'ADJ' has a high impedance within its normal operating voltage range. An internal 2.6V clamp protects the device against high input voltages and limits the maximum output current to about 4% above the maximum current set by 'V_{ADJ}' if the maximum input voltage is exceeded.

PWM Terminal (PWM output current control/dimming)
The LED current can be adjusted digitally, by applying a low frequency PWM logic signal to the 'PWM' pin to turn the controller on and off. This will produce an average output current proportional to the duty cycle of the control signal. During PWM operation, the device remains powered-up and only the output is switched by the control signal.

The device can be shut down by taking the 'PWM' pin to to <0.4V for >15ms with a short to 0V or suitable open collector NPN, or open drain NMOS transistor. In shutdown, most of the circuitry inside the device is off and the quiescent current will be typically 90µA.

TADJ Terminal (Thermal control of LED current)

The Thermal control circuit monitors the voltage on the 'TADJ' pin and reduces the output current linearly if the voltage on 'TADJ' < 625mV. An NTC thermistor and resistor can be connected to set the voltage on the 'TADJ' pin = 625mV at the required threshold temperature. This will give 100% LED current below the threshold temperature and <100% current above it as shown in the graph. The temperature threshold can be changed by adjusting the value of Rth and/or the thermistor to suit the LED used.

On the ZXLD1370EV1, Rth is 1K3 (R4). To use Thermal control, remove R8, fit R6, and fit a 10K NTC (Negative Temperature Coefficient) type thermistor between 'TADJ' and 'GND'. This will set the threshold temperature to ~90ºC.

Thermal control by LED current reduction

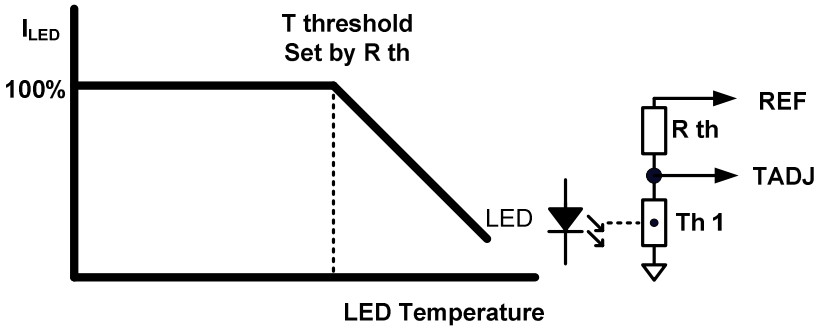
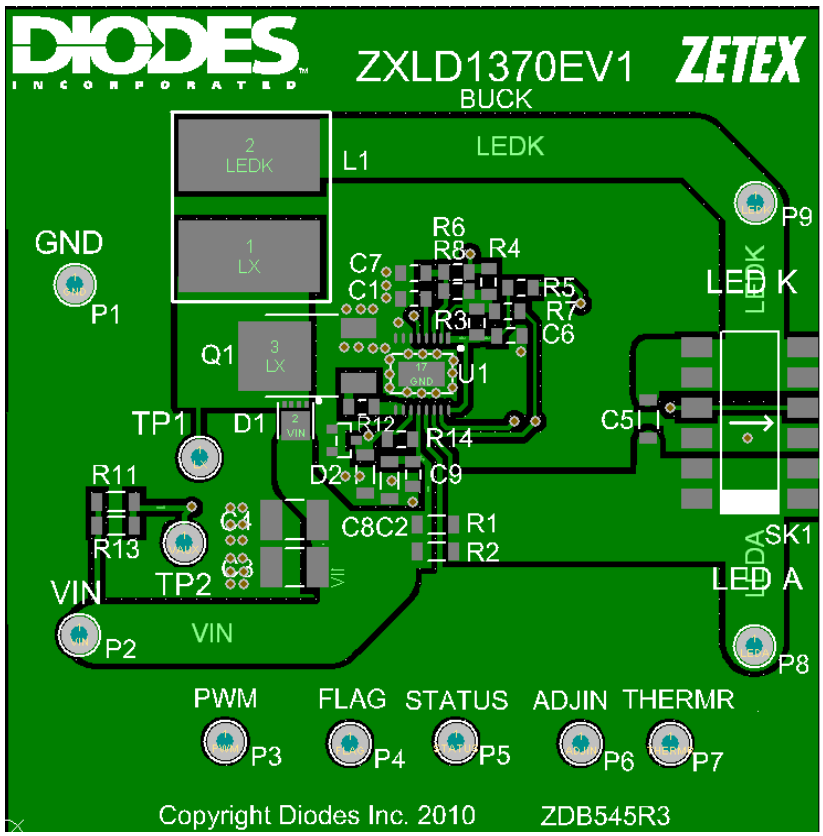
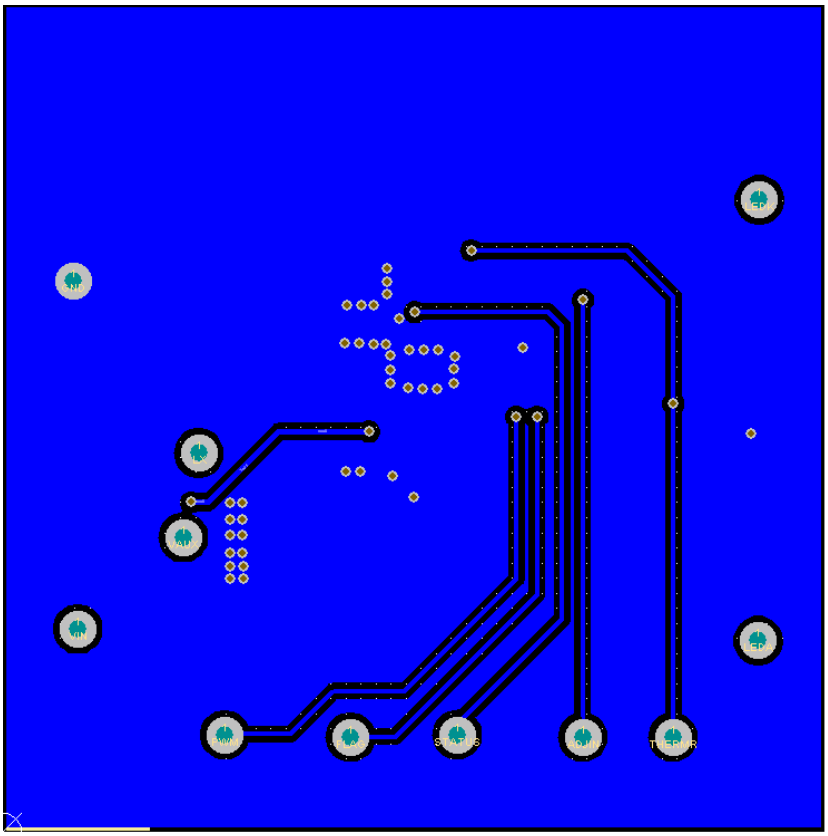


Fig. 4 Thermal control

The Thermal Control feature can be disabled by connecting 'TADJ' to 'REF' through the jumper resistor R8.

BOARD LAYOUT





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