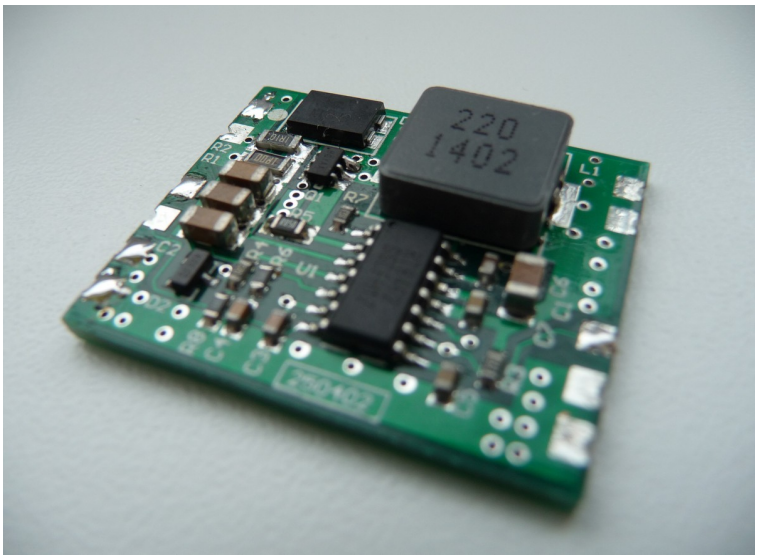
2504TN001

LD24BC Series

Low Cost, Analog & PWM Dimming,
Constant Current, DC/DC Boost LED Driver



Engeneering description

submitted by Mr. Pekar

KOŠICE 2015

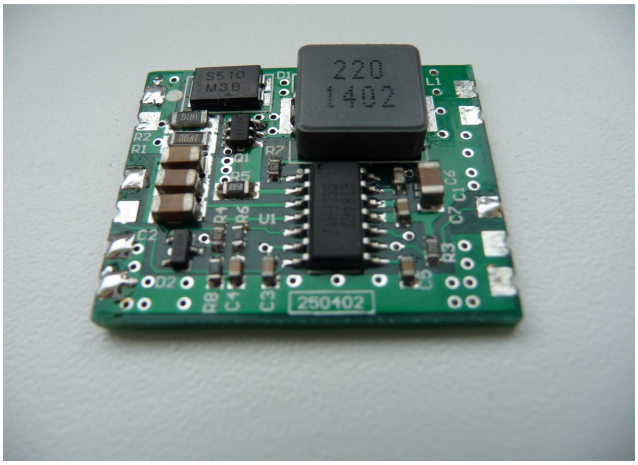
WWW.ELPEK.SK

ELPEK Electronics

Copyright

LD24BC Series

Low Cost, Analog & PWM Dimming, Constant Current, *DC/DC Boost LED Driver*



Key Features :

- Constant current output
- Step-Up (Boost) Design
- Wide input range of 8V to 36V
- Output to 42V
- Efficiency up to 95 %
- 5 to 33 W Output Power
- Operating temperature -40 ° C to + 85 ° C
- Analog & Digital PWM dimming
- Miniature size 30x25 mm , height 5.4 mm

LED Driver Board of **LD24BC Series**

is a highly effective continuous Step-Up converter optimized for managing one COB LED or string up to 10 High Power LEDs from a wide input range of 8V to 36V DC , nominal at standart 24V pover source. Control algorithm allows highly efficient and accurate control of COB LED or power LEDs . Depending on the components assembled on to board, supply voltage and configuration unit can provide up to 35 watts of output power .

The device has a Two special entries ADIM and PWM to manage output. Depending on the input circuit allows to realize analog or digital version dimming (Dimmer).
Applying a voltage from 0.2V to 1.2V on the input ADIM you can control output current from 0% to 100 % of output current range.
A digital PWM signal on the PWM input control either directly or using a transistor with open collector (OC) and management of the microcontroller. To avoide visible flicker, the PWM signal should be greater than 100Hz (>200 Hz is recommended)

Permanent applied voltage of 0.3 V or lower the EN input turns out to state and switches off the device from the current state to the low-power standby mode. Left open if not used.

To meet the conducted emmissions requirements of EN 55022 class B circuit must include input filter..

Mechanical dimensions are minimized . Size plates mounted thereon a rectangular shape with a size 30x25mm and 5.6mm height, Including the PCB allows you to integrate this driver together with the LED module .

Also suitable to mobile lighting system .

Electrical Specifications

Specifications typical @ +25°C, nominal input voltage & rated output current, unless otherwise noted. Specifications subject to change without notice.

Input

Parameter	Conditions	Min.	Typ.	Max.	Units
Input Voltage Range		8.0	24.0	36.0	VDC
Max Input Voltage	0.1 Sec. Max			38.0	VDC
Under Voltage Lock Out			5		VDC
Soft Start Time				50	mS
Input Filter	Internal Capacitor				

Output

Parameter	Conditions	Min.	Typ.	Max.	Units
Output Voltage Range		13,0		42.0	VDC
Operating Frequency			350		kHz
Output Current	See Model Selection Guide				
Output Current Accuracy	Vin = 24V		±5.0	±8.0	%
Output Current Stability	Vin = 24V		±5.0	±10.0	%
Output Capacitive Load				47	µF
Output Short Circuit	Regulated At Rated Output Current				

General

Parameter	Conditions	Min.	Typ.	Max.	Units
Efficiency	See Model Selection Guide				
Operating Frequency	See Model Selection Guide				
Reliability Calculated MTBF	(MIL-HDBK-25°C)	1.29			Mhrs

Physical

Parameter	Conditions	Min.	Typ.	Max.	Units
Size			30.0 x 25.0		mm
Height	with 1.6mm PCB		5.4		mm
Case Material	FR4 Board (with Conductive Base)				
Weight			TBD		g

Environment

Parameter	Conditions	Min.	Typ.	Max.	Units
Operating Temperature		-40		+85	°C
Maximum Case Temperature				+100	°C
Storage Temperature		-55		+125	°C
Humidity				95	%
Cooling	Free Air Convection				

Remote On/Off Control

Parameter	Conditions	Min.	Typ.	Max.	Units
DC/DC On	EN pin	Open Or 2.0< Vcont		< 6.0	VDC
DC/DC Off	EN pin		Vcont	< 0.3	VDC
Remote Pin Drive Current			1		mA
Quiescent Input Current					mA

Analog Dimming

Parameter	Conditions	Min.	Typ.	Max.	Units
Absolute Maximum Rating	At ADIM Input	0.4		5.0	VDC
Control Voltage Range	ON	0.4		1.7	VDC
Output Current Adjustment		0.0		100	%
Control Voltage Range	OFF	0.0		0.30	VDC
Drive Current	VDIM = 0.40 to 1.7 V			1.5	uA

PWM Dimming

Parameter	Conditions	Min.	Typ.	Max.	Units
Operation Frequency	Recomended Maximum	0.1		100	kHz
On Control Voltage		0.4		5.0	VDC
Off Control Voltage		0.0		0.3	VDC

Specification Notes:

1. Exceeding 40V on the unit input could damage the unit
2. These are step-up devices, the maximum output open voltage is equal to the 42V
3. The ADIM input (Pin 4) should be left open if not used
4. The PWM input (Pin 5) should be left open if not used
5. Exceeding the specified maximum output power could cause damage to the unit.
6. In some noise sensitive applications, the adition of the input filter should be used.

Model Selection Guide

Model Number	Input		Output **		Dimming Control Analog/PWM	Efficiency (%, Max)	LEDs in string COB, WLED
	Voltage (VDC)		Voltage (VDC)	Current (mA)			
	Nominal	Range					
LD24BC-04-0120-UB	24	8 - 36	35 - 39	120	Y / Y	95	1, 10
LD24BC-07-0180-UB	24	8 - 36	35 - 39	180	Y / Y	95	1, 10
LD24BC-09-0240-UB	24	8 - 36	35 - 39	240	Y / Y	95	1, 10
LD24BC-11-0300-UB	24	8 - 36	35 - 39	300	Y / Y	95	1, 10
LD24BC-13-0360-UB	24	8 - 36	35 - 39	360	Y / Y	95	1, 10
LD24BC-17-0480-UB	24	15 - 36	35 - 39	480	Y / Y	95	1, 10
LD24BC-22-0600-UB	24	15 - 36	35 - 39	600	Y / Y	95	1, 10
LD24BC-25-0700-UB	24	15 - 36	35 - 39	700	Y / Y	95	1, 10
* LD24BC-33-0900-UB	24	24 - 36	35 - 39	900	Y / Y	95	1, 10
* LD24BC-38-1050-UB	24	24 - 36	35 - 39	1050	Y / Y	95	1, 10
* LD24BC-44-1200-UB	24	24 - 36	35 - 39	1200	Y / Y	95	1, 10
* LD24BC-55-1500-UB	24	24 - 36	35 - 39	1500	Y / Y	95	1, 10

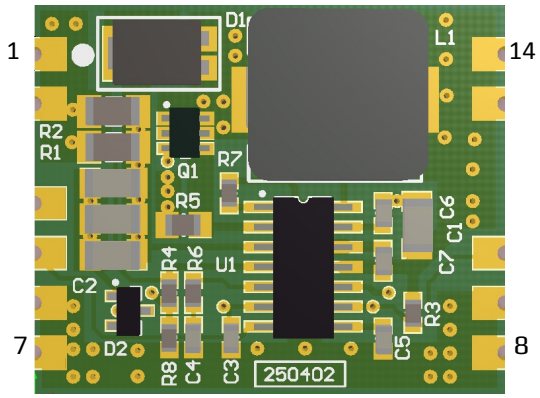
* in development

** User defined max. Output: 60 VDC / 1000 mA from Input 24 VDC
60 VDC / 1500 mA from Input 36 VDC

If you need other specifications, please ask.

Using a higher input voltage required to ensure sufficient cooling plate .
(Double -sided , thermoconductive adhesive pad.)

Package / Pinning

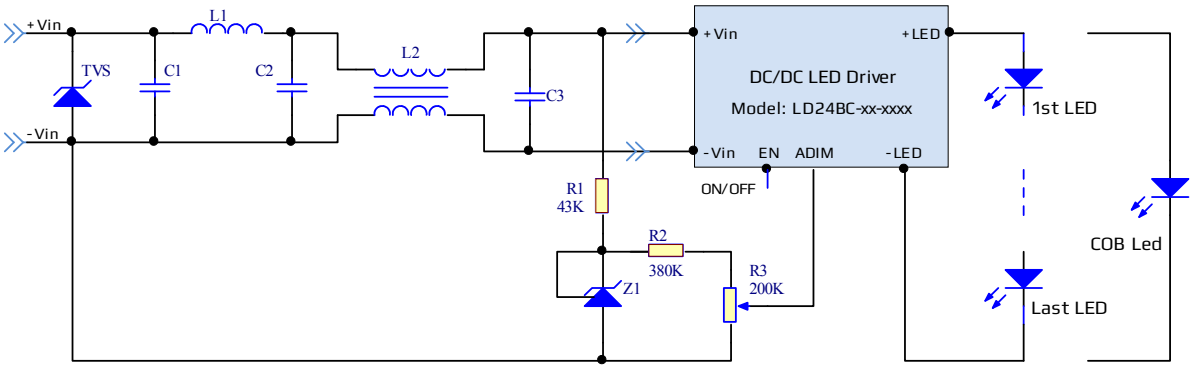


Pin Connection

Pin	Signal	Description
1, 2	+ LED	LED Anode Connection
3	NA	NOT Applicable
4	ADIM	Analog Dimming
5	PWM	PWM Dimming
6, 7	- LED	LED Catode Connection *
8, 9	- Vin	Negative Terminal of the Source
10	EN	Enable
11, 12	NA	NOT Applicable
13, 14	+ Vin	PositiveTerminal of the Source

* Internally connected to -Vin

Typical Analog Dimming Circuit



Connection Notes:

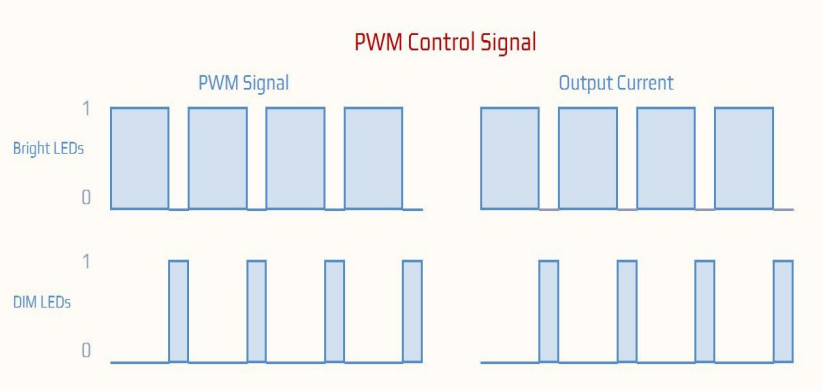
1. The input components (C1, L1,L2, C2, C3) are used to meet the conducted emmissions requirements of EN 55022 class B. Components values may need to be changed slightly depending upon application variables.

2. To comply with EN61000-4-5, a TVS should be instaled before the input filter components. The TVS max. clamping voltage (@ max peak pulse current Vc) must be less 38V.

3. As showns in the table (Analog Dimming) above, the output current of the unit can be set by adjusting voltage level on the ADIM input to a value between 0.2V and 1.2V (Iout will vary from 0% to 100% of rated output current. Care must be taken not to exceed 5.0V on this input. Value larger than this level may be damage the driver. In the circuit above, the voltage level at the ADIM input is set by a simple resistor network (R1, R2, R3). The regulator(Z1) define the voltage across R2 and R3 and will be less that 1.2V. The value of R1 is given for a 24V input

Output current adjustment by PWM control:

An LED operates at its maximum efficiency when operated at the rated drive current specified by the manufacturer. Operating an LED at lower than its rated forward current not only decreases the system efficiency; but may cause color (or wave-length) shifting. In illumination applications, this could cause visible changes to lighting.



A preferred method is using pulse width modulation (PWM). As shown at next, the output current is adjusted by applying a PWM signal to the PWM input. By varying the signal duty cycle the average output current is adjusted up or down. To avoid visible flicker, the PWM signal should be greater than 200 Hz.

For duty cycles (DPWM) between 0.1 and 1, the output current is derived by the formula:

IOUT = IRATED x DPWM

Where Iout = Required output current
Irated = Full rated output current for the unit
Dpwm = Duty cycle of the control signal.

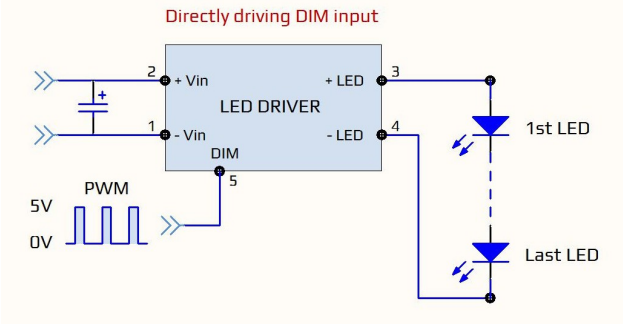
The signal can be generated by a microcontroller or a pulse generator with a duty cycle proportional to the amount of desired light output.

The PWM input may be driven via an open collector transistor (as shown). The diode and integrated resistor suppress high amplitude negative spikes that may be caused by the drain-source capacitance of the transistor. Negative spikes on the control input of the unit could cause errors in output current or erratic operation.

The PWM input can also be driven by the open drain output of a microcontroller. Again, any high amplitude negative spikes that may be caused by the drain-source capacitance of the FET must be supressed.

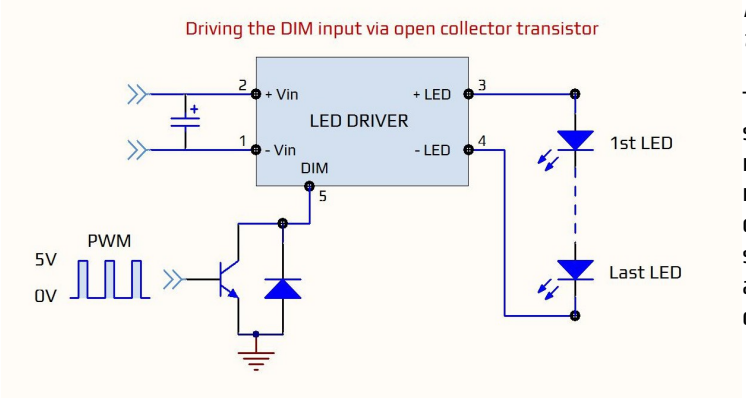
The diagram below show metod to doing this.

PWM Dimming Application



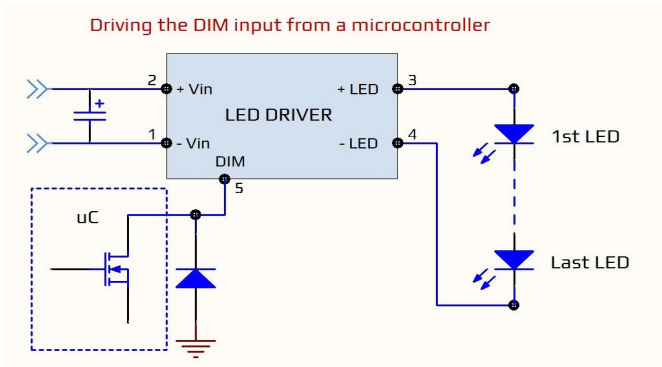
Directly driving DIM input

A pulse with modulated (PWM) signal with duty cycle DPWM can be applied to the DIM input as shown to left.



Driving the PWM input via open collector transistor

The diode and integrated resistor suppress possible high amplitude negative spikes on the PWM input resulting from the drain-source capacitance of the transistor. Negative spikes at the input to the device should be avoided as they may cause errors in output current, or erratic device operation.



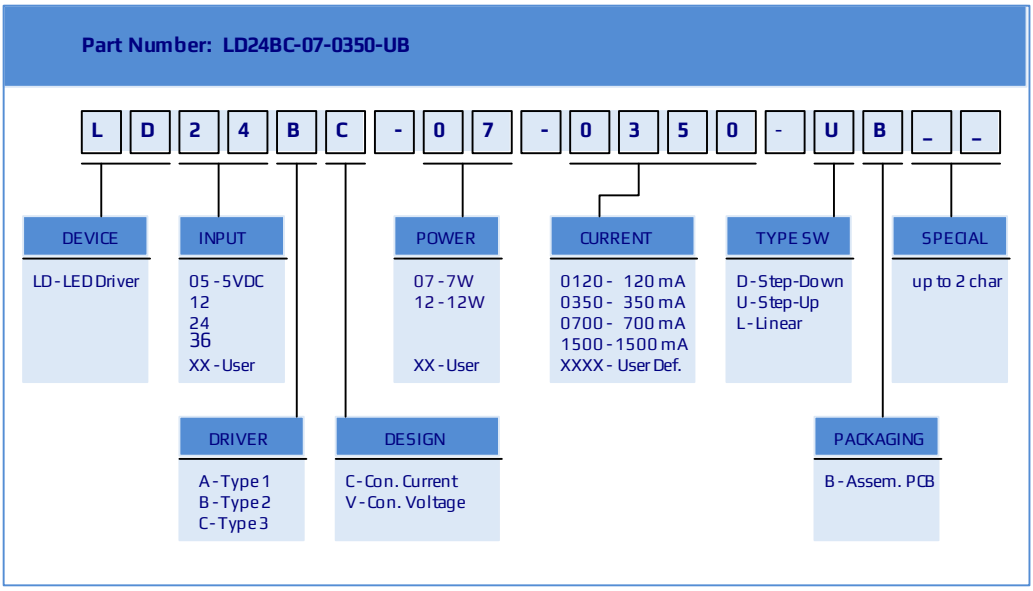
Driving the DIM input from a microcontroller

Another possibility is to drive the device from the open drain output of a microcontroller.

Leave the pin PWM opened while not in use , Grounded can shut the driver off and connect to Vin Power may burn the circuit.

The following table explains the method of encoding a component name , depending on the circuit Configuration.

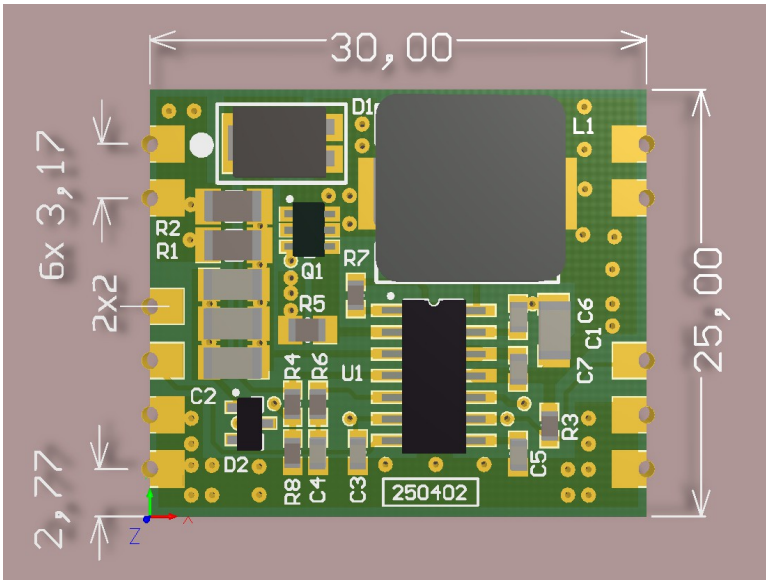
Parts Numbering



Version History:

Date	Version	Name	Description
05-january-2015	0.1	Ing. Pekar pekar@elpek.sk	Initial Version

Mechanical



Product was developed, manufactured, tested and distributed by

phone: 421 901 703687 email: info@elpek.sk

made in SLOVAKIA