

GP-LD3548-0B

350mA High Efficiency Step-UP LED Driver



Features

- RoHS-compliant 2"x1" case Package Power LED Driver
- Constant Current Output ($\pm 5\%$ Output Current Accuracy)
- LED Driver Rated Current 350mA
- Soft Start
- Wide Input Voltage Range: 9V to 36V (38V for 0.1sec.)
- Output Power to 16.8W
- Driver LED Strings of up to 48V (14V to 48V)
- High Efficiency (up to 94%)
- PWM/Digital Dimming and Analog Voltage Dimming
- Open Voltage Protection / Short LED Protection
- $-40^{\circ}\text{C} \sim 85^{\circ}\text{C}$ Operation Temperature Range

Application

- 12V and 24V Solar Lighting Systems
- Household/Commercial Lighting
- Suitable for High illumination LED
- Power Limited (battery) Lighting System

GP-LD3548-0B is a high efficiency step-up converter optimized to drive high current LEDs. The control algorithm allows highly efficient and accurate LED current regulation. The device operates from an input 9Vdc to 36Vdc and provides an externally adjustable output current of up to 350mA and output power up to 16.8 watts. Compact size of 2"x1" case allows designer to integrate this driver together with LED module. UL-94V0 grade molded case with high grade filling material provide excellent fire proof characteristics.

(Typical at $T_a = +25^{\circ}\text{C}$, nominal input voltage, rated output current unless otherwise specified.)

Electrical Specifications	
Input Voltage (V_{dc})	9V ~ 36V (38V for 0.1 sec.)
Input Filter	Capacitor
Output Voltage Range ($V_o - V_{in} \geq 5V$) (1)	14V to 48V
Output Current Range ($V_o - V_{in} \geq 5V$)	350mA
Output Current Accuracy	$\pm 5\%$
Output Power (2)	16.8W Max.
Ripple and Noise, (20 MHz bandwidth)	600mVp-p Max.
Efficiency	89.5% ~ 94%, 89.5% Min.
Capacitive Load (3)	100 μF Max.
Operating Frequency	380KHz typ.
Over Voltage Protection (OVP)	52.5V Max.
Short Circuit Protection (4)	Automatic Recovery (Cut-off output)
Under Voltage Protection (Cool Start) (5)	7.6V typ.
Soft Start Time (Not to increase additional output capacitor)	50mS Max.
Temperature Coefficient ($T_a = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$)	$\pm 0.03\%/^{\circ}\text{C}$ Max.
Thermal Impedance (Nature Convection)	$+15.9^{\circ}\text{C/W}$
Safety Standard : (designed to meet) IEC/EN 60950-1 UL8750 and IEC/EN61347-2-13	

Environmental Specifications	
Operating Temperature Range, T_a ($V_{in} 9V \sim 18V$)	-40°C to $+75^{\circ}\text{C}$
	($V_{in} 18V \sim 36V$) -40°C to $+85^{\circ}\text{C}$
Storage Temperature Range	-55°C to $+125^{\circ}\text{C}$
Humidity	95% rel H
Maximum Case Temperature	$+110^{\circ}\text{C}$
Cooling	Nature Convection
Reliability Calculated MTBF (MIL-HDBK-217 F)	$> 1.1\text{Mhrs}$
	($V_{in}=9V$ $V_{out}=48V$, $+25^{\circ}\text{C}$)
Soldering Temperature (1.5mm from case 10sec.)	$+260^{\circ}\text{C}$

EMC Specifications (designed to meet)	
EMI Radiated & Conducted Emissions	EN 55022 Class B

NOTE

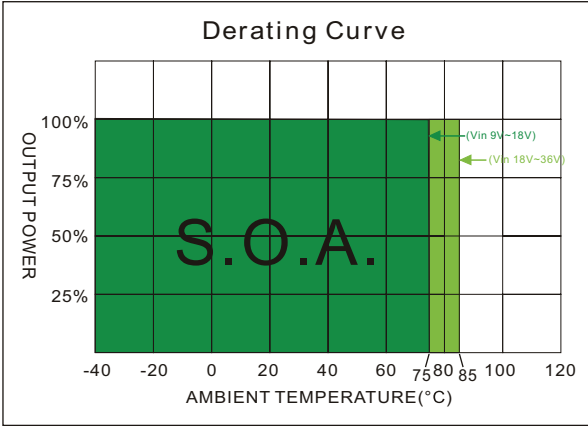
1. To prevent the burned out of driver, The output voltage must be 5.0Vdc higher than input voltage.
2. DO NOT operate the driver over 16.8W output.
3. The Output ripple has been rather low, it's recommended not to increase the additional output capacitor, otherwise there will be time delay while starting up under cool starting.
4. There is protection while output is shorted, after the short occurs, input current will be cut off and recover while short is removed.
5. The reference value of under voltage protection -- 7.6V means under the condition of cool start and full discharge of output, protection starts when input voltage is lower under 7.6V.
6. Please note, PWM dimming means PWM signals is converted into mimic analog voltage by internal circuits and then do the dimming. The advantage of such approach is to reduce the EMI.

GP-LD3548-0B

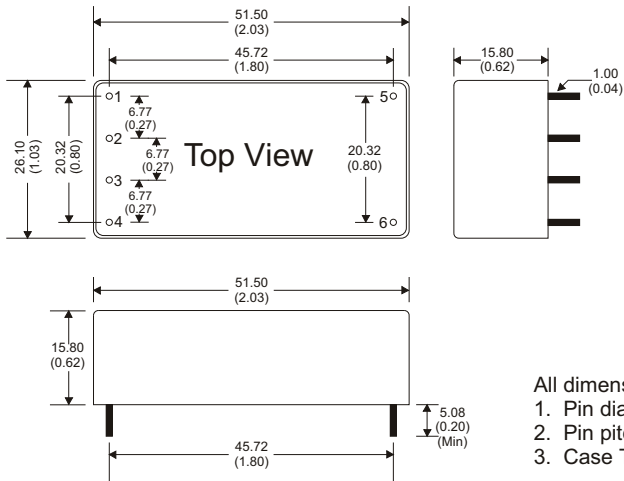
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Power Your Idea

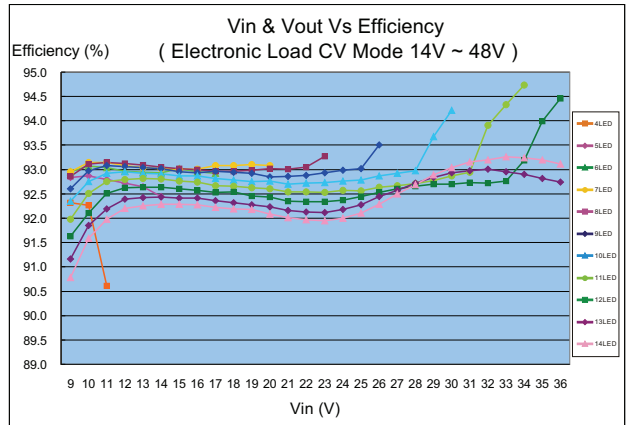
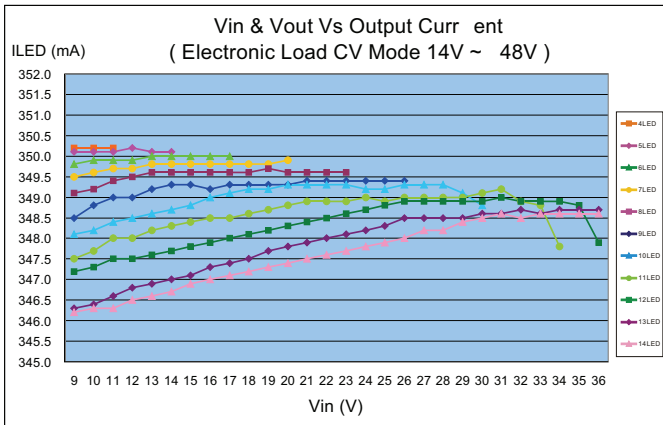


Mechanical Dimension



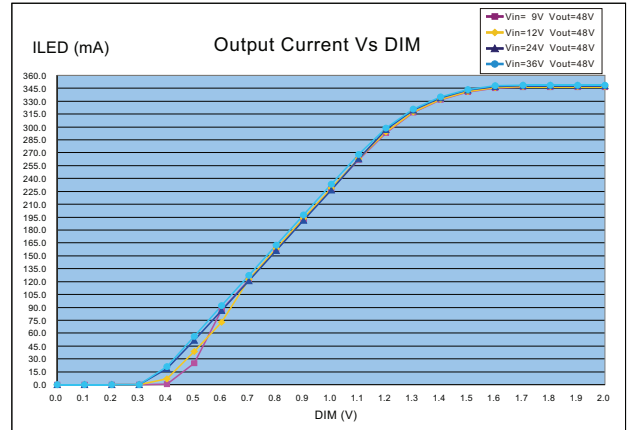
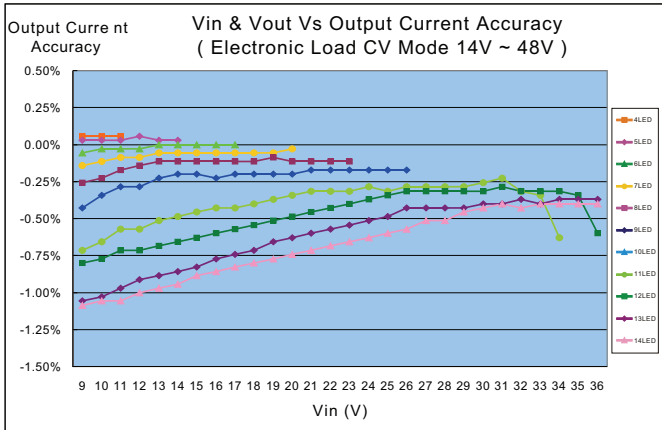
PIN CONNECTIONS		
PIN #	CONNECTIONS	
1	+Vi	+DC Supply
2	DIM	PWM/ Analog Dimming Control
3	EN	Remote ON/OFF
4	-Vi	-DC Supply (GND)
5	+ LED	LED Anode Connection
6	- LED	LED Cathode Connection

Typical Operating Conditions



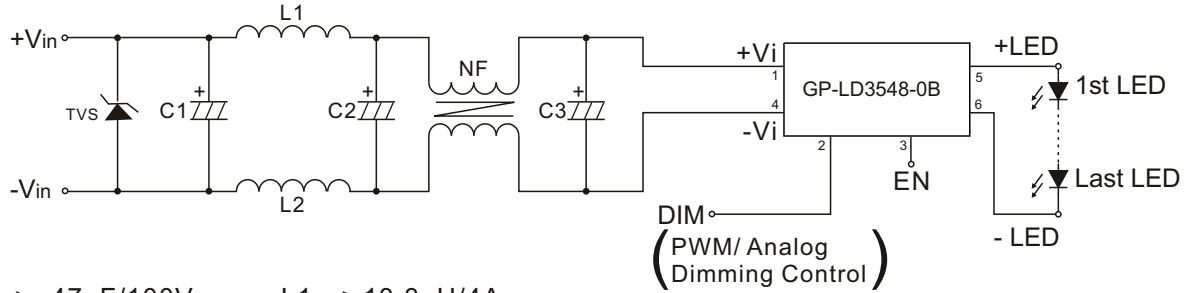
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EMC Characteristics meet EN55022

EN55022 Class B Filter Suggestion:

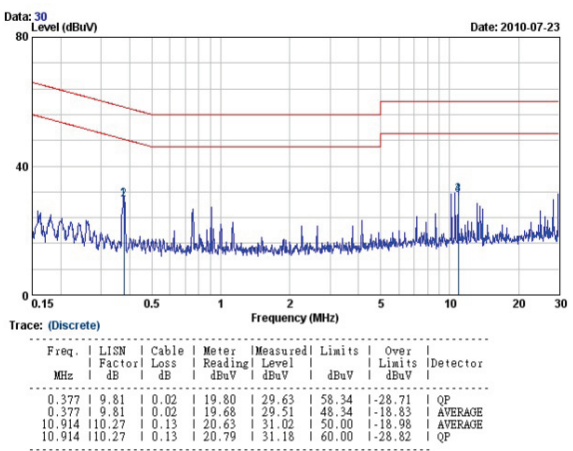


- C1 ----> 47uF/100V
- C2 ----> 330uF/100V
- C3 ----> 330uF/100V
- TVS --> 38V
- L1 --> 13.3uH/4A
- L2 --> 13.3uH/4A
- NF--> 3.0mH/4A(Command choke)

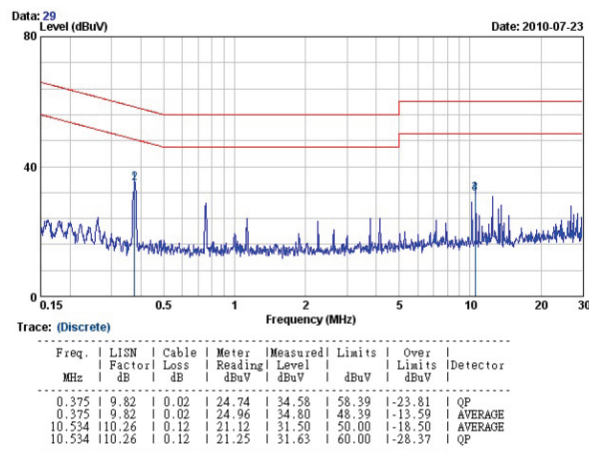
Conduction Test Data

Vin=12V Vout=48V(LED Load Vf=3.5V , 14LED ≐ 48V)
POLARITY:NEUTRAL

Vin=12V Vout=48V(LED Load Vf=3.5V , 14LED ≐ 48V)
POLARITY:LINE

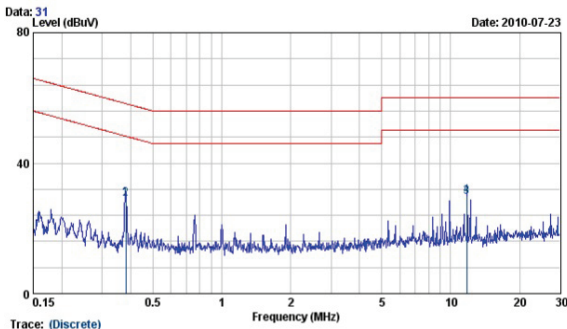


REMARKS: 1.Level(dBuV)=Read Level(dBuV)+LISN Factor(dB)+Cable loss(dB)
2.Over Limit value(dB)=Level(dBuV)-Limit Line(dBuV)



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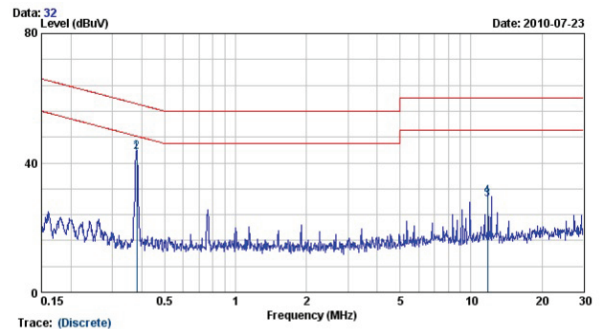
Vin=36V Vout=48V(LED Load Vf=3.5V , 14LED ≐ 48V)
POLARITY:NEUTRAL



Trace: (Discrete)	Freq. MHz	LISN Factor dB	Cable Loss dB	Meter Reading dBuV	Measured Level dBuV	Limits dBuV	Over Limits dBuV	Detector
	0.381	9.81	0.02	19.26	29.09	58.25	-29.17	QP
	0.381	9.81	0.02	19.15	28.98	48.25	-19.28	AVERAGE
	11.777	110.33	0.13	19.09	29.55	50.00	-20.45	AVERAGE
	11.777	110.33	0.13	19.38	29.84	60.00	-30.16	QP

REMARKS: 1.Level(dBuV)=Read Level(dBuV)+LISN Factor(dB)+Cable loss(dB)
2.Over Limit value(dB)=Level(dBuV)-Limit Line(dBuV)

Vin=36V Vout=48V(LED Load Vf=3.5V , 14LED ≐ 48V)
POLARITY:LINE

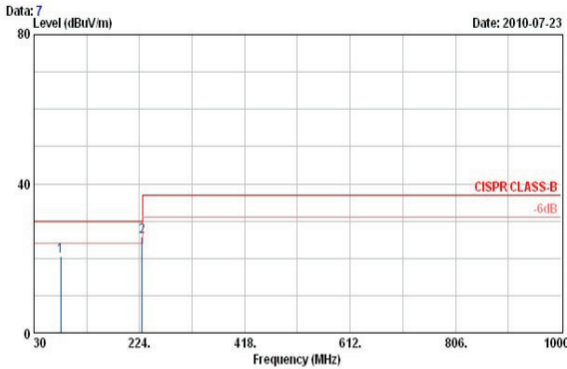


Trace: (Discrete)	Freq. MHz	LISN Factor dB	Cable Loss dB	Meter Reading dBuV	Measured Level dBuV	Limits dBuV	Over Limits dBuV	Detector
	0.381	9.82	0.02	33.14	42.98	58.25	-15.28	QP
	0.381	9.82	0.02	33.55	43.39	48.25	-4.87	AVERAGE
	11.776	110.38	0.13	18.17	28.68	50.00	-21.32	AVERAGE
	11.776	110.38	0.13	19.01	29.52	60.00	-30.48	QP

REMARKS: 1.Level(dBuV)=Read Level(dBuV)+LISN Factor(dB)+Cable loss(dB)
2.Over Limit value(dB)=Level(dBuV)-Limit Line(dBuV)

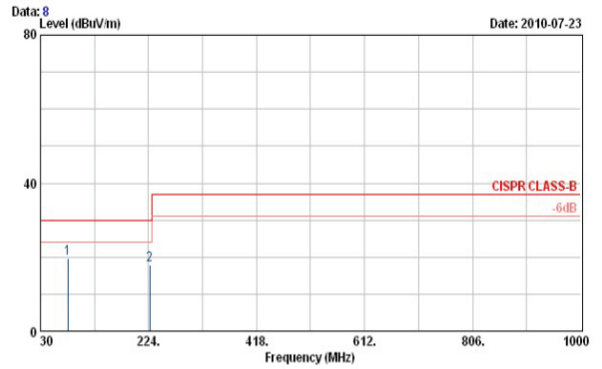
Conduction Test Data

Vin=12V Vout=48V(LED Load Vf=3.5V , 14LED ≐ 48V)
POLARITY:HORIZONTAL



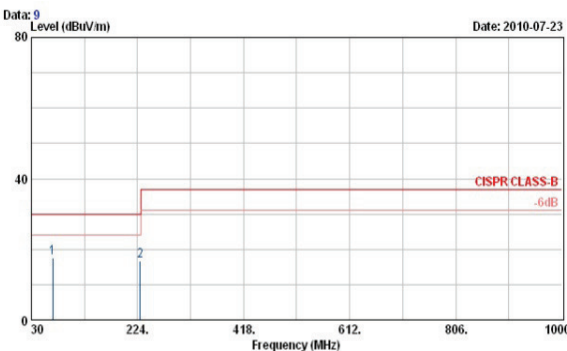
Trace: (Discrete)	Freq. MHz	Reading dBuV	Antenna Factor dB/m	Cable Loss dB	Measure dBuV/m	Limit dBuV/m	Over Limit dBuV/m	Detector
	79.48	11.00	7.83	1.70	20.53	30.00	-9.47	QP
	228.80	10.00	12.17	3.67	25.84	30.00	-4.16	QP

Vin=24V Vout=48V(LED Load Vf=3.5V , 14LED ≐ 48V)
POLARITY:HORIZONTAL



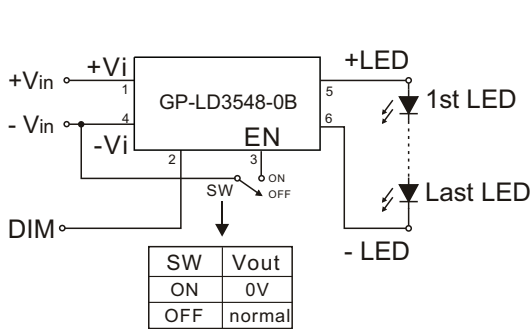
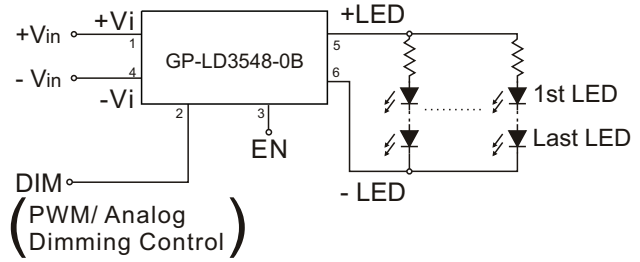
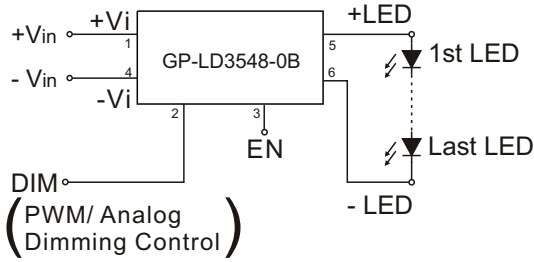
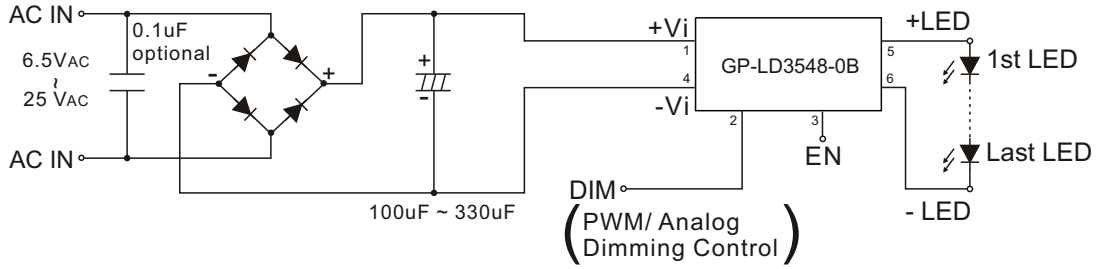
Trace: (Discrete)	Freq. MHz	Reading dBuV	Antenna Factor dB/m	Cable Loss dB	Measure dBuV/m	Limit dBuV/m	Over Limit dBuV/m	Detector
	79.54	10.11	7.83	1.70	19.64	30.00	-10.36	QP
	226.54	2.00	12.21	3.66	17.87	30.00	-12.13	QP

Vin=36V Vout=48V(LED Load Vf=3.5V , 14LED ≐ 48V)
POLARITY:HORIZONTAL

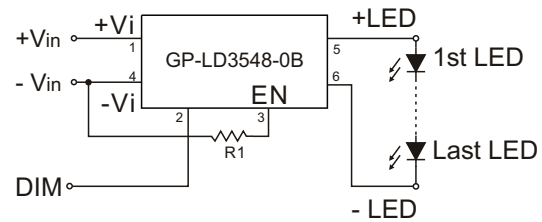


Trace: (Discrete)	Freq. MHz	Reading dBuV	Antenna Factor dB/m	Cable Loss dB	Measure dBuV/m	Limit dBuV/m	Over Limit dBuV/m	Detector
	68.54	7.85	8.06	1.68	17.59	30.00	-12.41	QP
	229.00	1.00	12.17	3.67	16.84	30.00	-13.16	QP

Typical Application



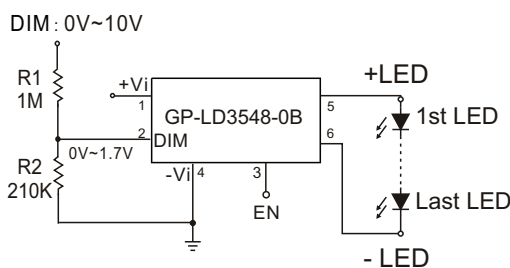
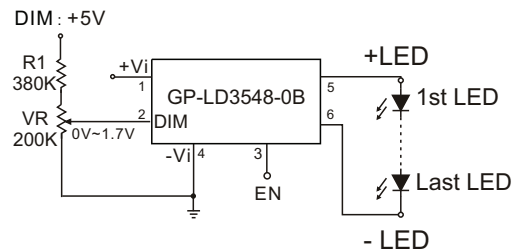
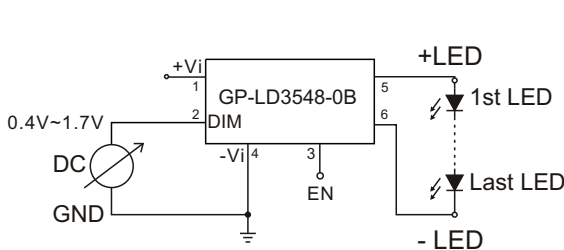
Under Voltage Protection



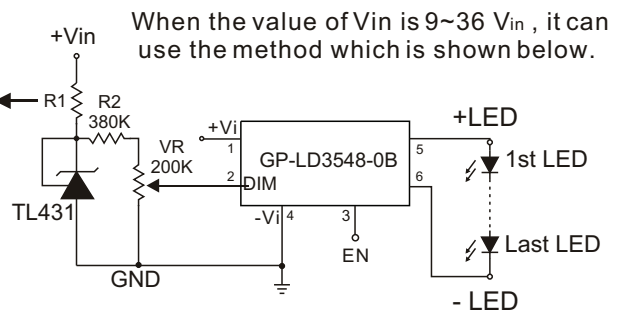
R1	Under Voltage Protection
X	7.6V
12K	10.8V
10K	11.6V
7.5K	13.0V
4.7K	16.5V
3.3K	21.0V
2.7K	24.1V
2.4K	26.2V
2.0K	29.8V
1.8K	32.4V

The R1 Value Only Supplies The Reference

Output Current Adjustment Control By External DC Control Voltage



Vin	R1
5V	4.7K
12V	18K
24V	43K
36V	62K



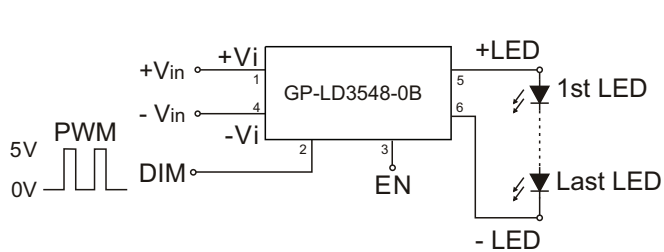
When the value of Vin is 9~36 Vin, it can use the method which is shown below.

Typical Application

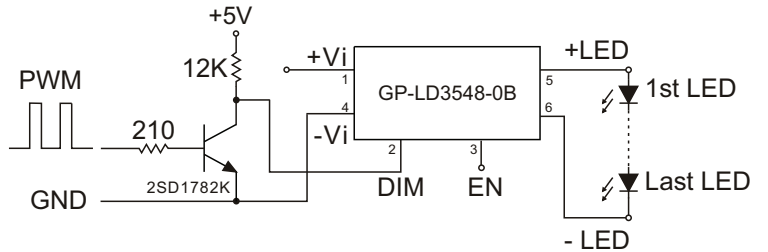
Output Current Adjustment Control By PWM Control

Directly driving DIM input

A Pulse Width Modulated (PWM) signal can be applied to the DIM pin, as shown below

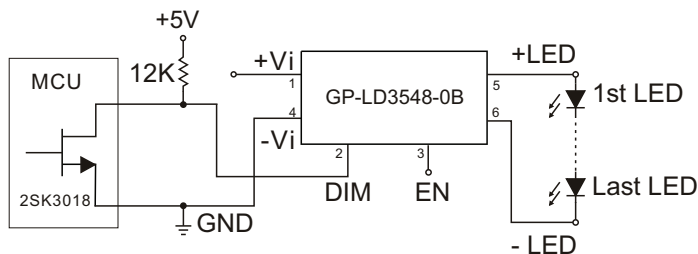


Driving the DIM input via open collector transistor



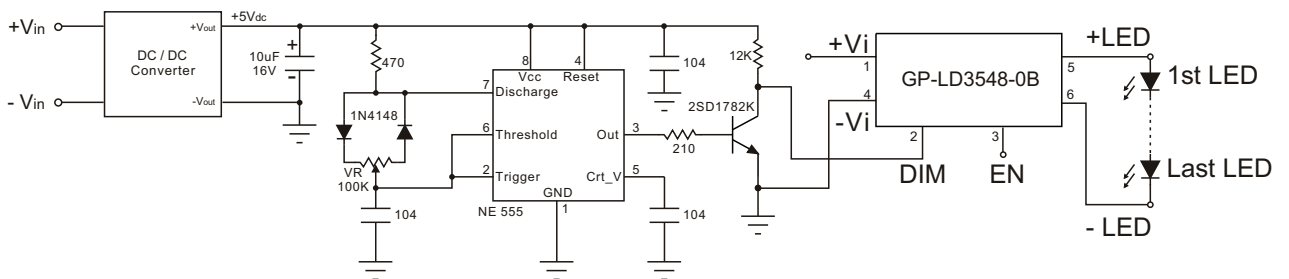
Driving the DIM input from a microcontroller

Another possibility is to drive the device from the open drain output of a microcontroller. The diagram below shows one method of doing this:



Output Current Adjustment By PWM Control (Dimming)

To avoid visible flicker the PWM signal must be greater than 100Hz.



Output Current Adjustment By PWM Control (Flash)

