GP-LD7048-0B

700mA High Efficiency Step-UP LED Driver

Power Your Idea

Features

- RoHS-compliant 2"x1" case Package Power LED Driver
- Constant Current Output (±5% Output Current Accuracy)
- LED Driver Rated Current 700mA
- Soft Start
- Wide Input Voltage Range:9V to 36V (38V for 0.1sec.)
- Output Power to 33.6W
- Driver LED Strings of up to 48V (14V to 48V)
- High Efficiency (up to 95%)
- PWM/Digital Dimming and Analog Voltage Dimming
- Open Voltage Protection / Short LED Protection
- -40°C ~ 75°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-LD7048-0B 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 700mA and output power up to 33.6 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 Ta = +25°C, nominal input voltage, rated output current unless otherwise specified.)

Electrical Specifications

Input Voltage (Vdc)	9V ~ 36V (38V for 0.1 sec.)
Input Filter	Capacitor
Output Voltage Range (Vo - Vin ≥5V) (1) (Vin 9V~18V)	14V to 32V
(Vo - Vin≥ 5V) (1)(Vin 18V~36V)	23V to 48V
Output Current Range (Vo - Vin 5V)	700mA
Output Current Accuracy	±5%
Output Power (2)	33.6W Max.
Ripple and Noise, (20 MHz bandwidth)	700mVp-p Max.
Efficiency	91.5% ~ 95%,91.5% Min.
Capacitive Load (3)	47uF Max.
Operating Frequency	360KHz 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 (Ta = -40°C to +75°C)	±0.03%/°C Max.
Thermal Impedance (Nature Convection)	+16.5°C/W

Safety Standard : (designed to meet) IEC/EN 60950-1 UL8750 and IEC/EN61347-2-13

ON/OFF Control (Leave Open if Not Used): (EN)

DC/DC ON	Open
DC/DC OFF (Shutdown)	0V
Remote Pin Drive Current ($V_{EN} \leq 3V$)	<1.5uA
Quiescent Input Current in Shutdown Mode (Vin 9V~32V)	1.3mA Max.
(Vin 32V~36V)	8mA Max.

Analog and PWM Dimming Control (Leave Open if Not Used): (DIM)

Absolute Maximum Ratings	8V
Analog Dimming Control	
DIM Input Voltage Range	0.4V to 1.7V
Adjust Output Current	0% to 100%
DIM Pin Drive Current (0.3V≤V_{DIM}≤1.3V)	<1.5uA
PWM Dimming Control (6)	
PWM Control Voltage Range Limits	(1.7V ≤ V_{DIM} ≤ 5.0V)
Recommended Operation Frequency	100Hz~100KHz
Adjust Output Current	0% to 100%

Environmental Specifications

Operating Temperature Range, Ta (Vin 9V~18V)	-40°C to +70°C
(Vin 18V~36V)	-40°C to +75°C
Storage Temperature Range	-55°C to +125°C
Humidity	95% rel H
Maximum Case Tempeature	+105°C
Cooling	Nature Convection
Reliability Calculated MTBF(MIL-HDBK-217 F) (Vin=9V Vout=32V ,+25°C)	>970Khrs
Soldering Temperature (1.5mm from case 10sec.)	+260°C

Physical Specifications

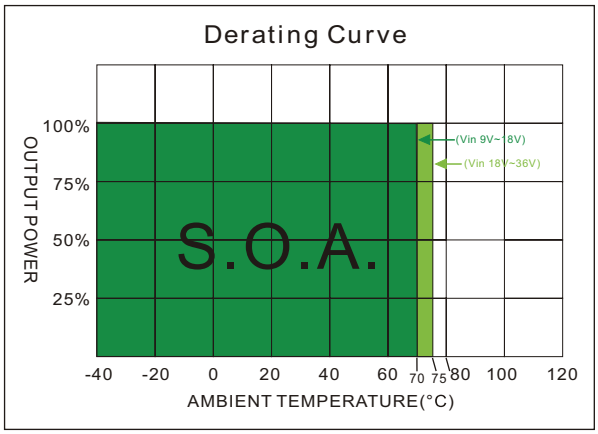
Case Material	Non-conductive Black Plastic(UL94V-0 rated)
Potting Material	Epoxy (UL94V-0 rated)
	Silicon (UL94V-0 rated)
Pin Material	¨ 1.0mm Brass Solder-coated
Weight	38g
Dimensions	51.5(L)"x26.1(W)"x15.8(H)"mm

EMC Specifications (designed to meet)

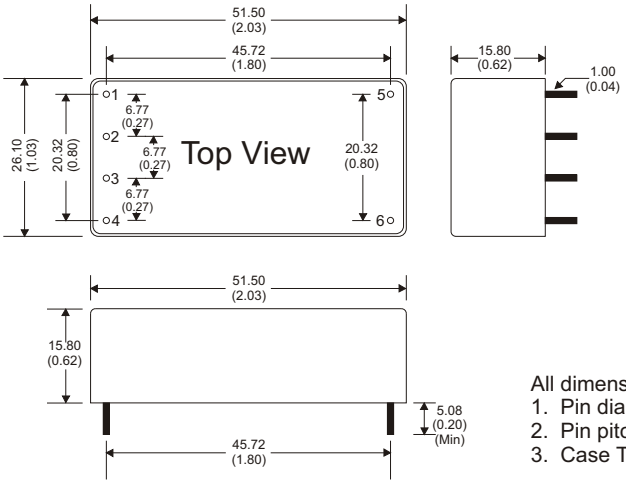
EMI Radiated & Conducted Emissions EN 55022 Class B

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 33.6W 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.



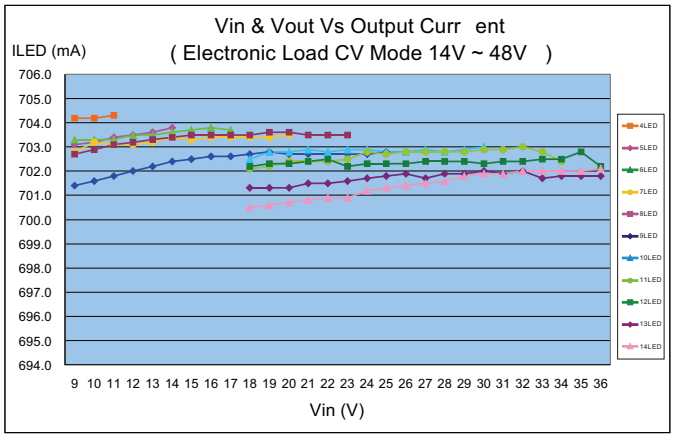
Mechanical Dimension

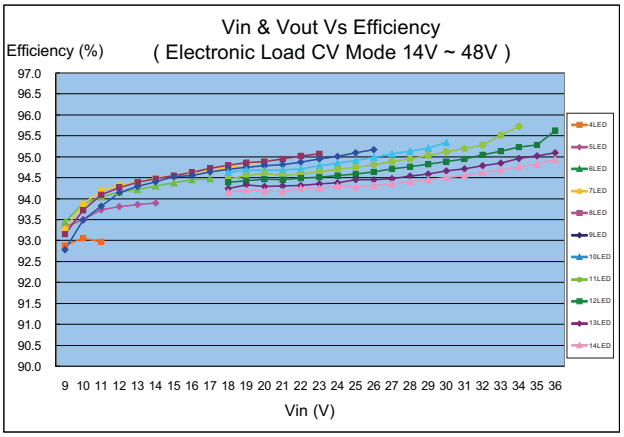


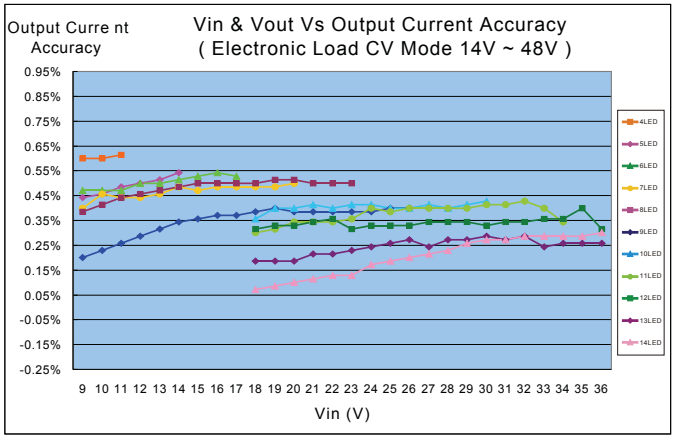
PIN CONNECTIONS		
PIN #	CONNECTIONS	
1	+Vi	+DC Supply
2	DIM	PWM/ Analog Dimming Control
3	EN	Remote ON/OFF
4	-Vi	-DC Supply (GND)
5	+ LED	LED Anode Connection
6	- LED	LED Cathode Connection

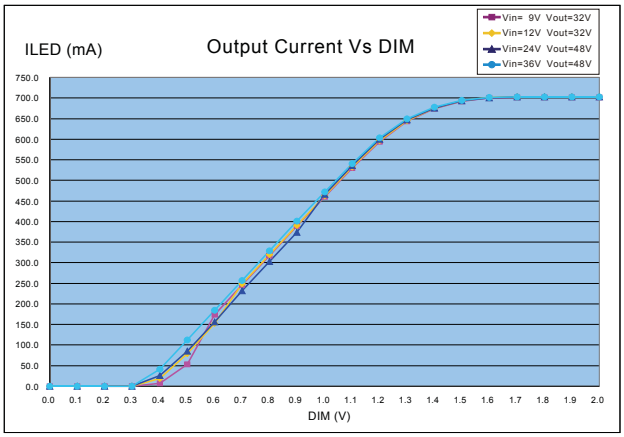
All dimensions are typical in millimeters (inches)
1. Pin diameter: 1.0 ±0.05 (0.04 ±0.002)
2. Pin pitch tolerance: ±0.35 (±0.014)
3. Case Tolerance: ±0.5 (±0.02)

Typical Operating Conditions



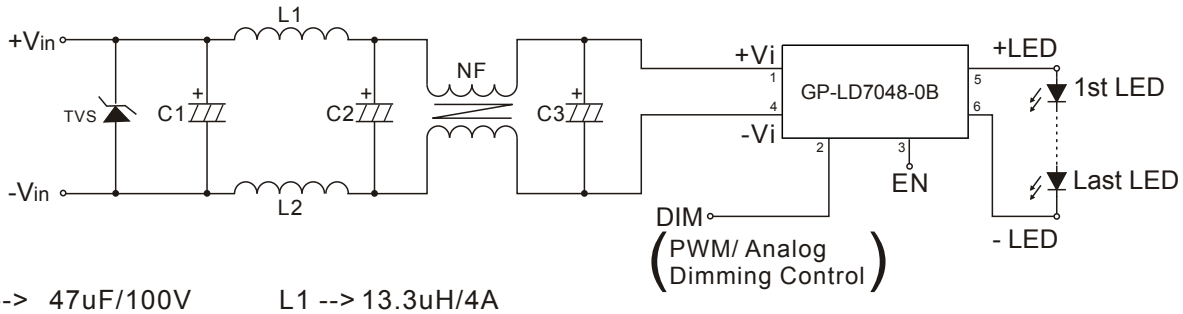






EMC Characteristics meet EN55022

EN55022 Class B Filter Suggestion:

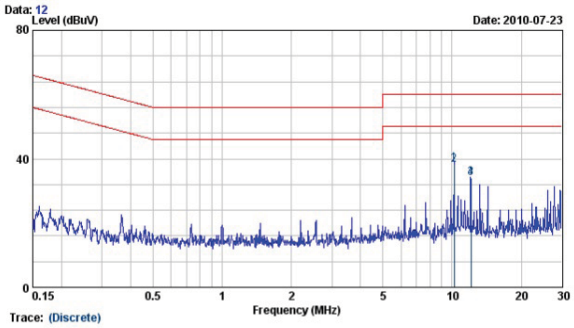


C1 ----> 47uF/100V
C2 ----> 330uF/100V
C3 ----> 330uF/100V
TVS --> 38V

L1 --> 13.3uH/4A
L2 --> 13.3uH/4A
NF--> 3.9mH/4A(Command choke)

Radiation Test Data

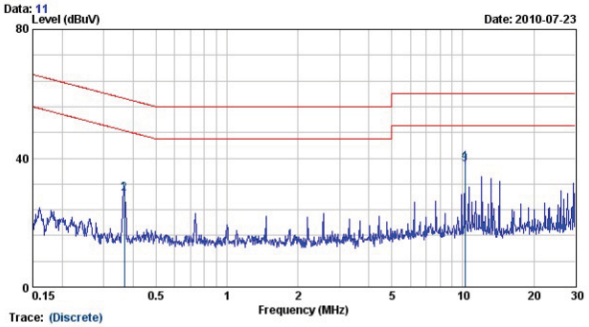
Vin=12V Vout=32V(LED Load Vf=3.5V ， 9LED≒32V)
POLARITY:NEUTRAL



Freq. MHz	LISN Factor dB	Cable Loss dB	Meter Reading dBuV	Measured Level dBuV	Limits dBuV	Over Limits dBuV	Detector
10.238	10.22	0.12	28.01	38.35	60.00	-21.65	QP
10.238	10.22	0.12	27.87	38.21	50.00	-11.79	AVERAGE
12.068	10.34	0.13	23.39	33.87	50.00	-16.13	AVERAGE
12.068	10.34	0.13	23.63	34.11	60.00	-25.89	QP

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

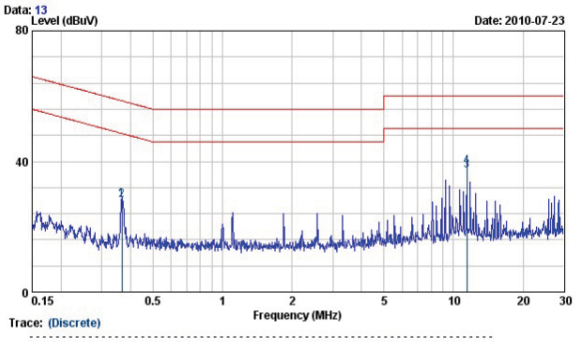
Vin=12V Vout=32V(LED Load Vf=3.5V ， 9LED≒32V)
POLARITY:LINE



Freq. MHz	LISN Factor dB	Cable Loss dB	Meter Reading dBuV	Measured Level dBuV	Limits dBuV	Over Limits dBuV	Detector
0.367	9.82	0.02	19.14	28.98	58.56	-29.59	QP
0.367	9.82	0.02	19.25	29.09	48.56	-19.48	AVERAGE
10.240	10.23	0.12	27.83	38.18	50.00	-11.82	AVERAGE
10.240	10.23	0.12	28.24	38.59	60.00	-21.41	QP

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

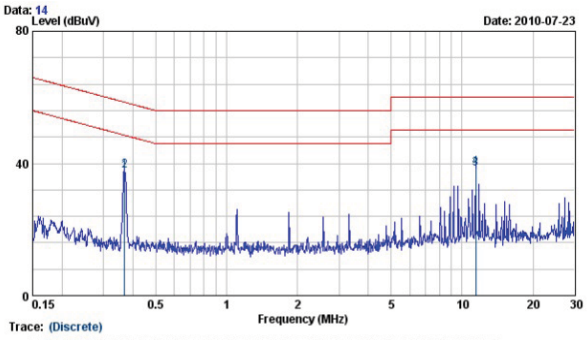
Vin=24V Vout=48V(LED Load Vf=3.5V ， 14LED≒48V)
POLARITY:NEUTRAL



Freq. MHz	LISN Factor dB	Cable Loss dB	Meter Reading dBuV	Measured Level dBuV	Limits dBuV	Over Limits dBuV	Detector
0.367	9.81	0.02	18.39	28.22	58.56	-30.35	QP
0.367	9.81	0.02	18.34	28.17	48.56	-20.40	AVERAGE
11.405	10.30	0.13	26.73	37.16	50.00	-12.84	AVERAGE
11.405	10.30	0.13	27.92	38.35	60.00	-21.65	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=24V Vout=48V(LED Load Vf=3.5V ， 14LED≒48V)
POLARITY:LINE

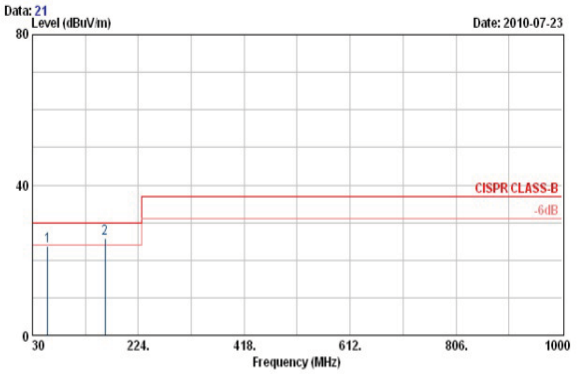


Freq. MHz	LISN Factor dB	Cable Loss dB	Meter Reading dBuV	Measured Level dBuV	Limits dBuV	Over Limits dBuV	Detector
0.369	9.82	0.02	27.72	37.56	58.52	-20.96	QP
0.369	9.82	0.02	28.11	37.95	48.52	-10.57	AVERAGE
11.409	10.35	0.13	27.87	38.35	50.00	-11.65	AVERAGE
11.409	10.35	0.13	28.32	38.80	60.00	-21.20	QP

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

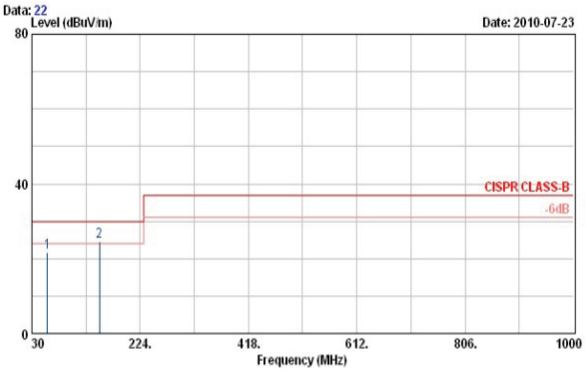
Radiation Test Data

Vin=12V Vout=32V(LED Load Vf=3.5V ， 9LED≒32V)
POLARITY:HORIZONTAL



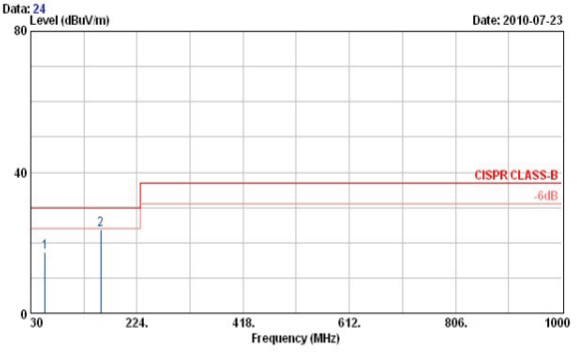
Freq. MHz	Reading Level dBuV	Antenna Factor dB/m	Cable Loss dB	Measure Level dBuV/m	Limit dBuV/m	Over Limit dBuV/m	Detector
57.50	14.48	7.88	1.41	23.77	30.00	-6.23	QP
162.88	10.46	12.21	3.03	25.70	30.00	-4.30	QP

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



Freq. MHz	Reading Level dBuV	Antenna Factor dB/m	Cable Loss dB	Measure Level dBuV/m	Limit dBuV/m	Over Limit dBuV/m	Detector
57.83	12.47	7.82	1.44	21.73	30.00	-8.27	QP
150.90	9.12	12.74	2.87	24.73	30.00	-5.27	QP

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



Freq. MHz	Reading Level dBuV	Antenna Factor dB/m	Cable Loss dB	Measure Level dBuV/m	Limit dBuV/m	Over Limit dBuV/m	Detector
55.70	8.02	8.00	1.35	17.37	30.00	-12.63	QP
157.83	8.31	12.48	2.97	23.76	30.00	-6.24	QP

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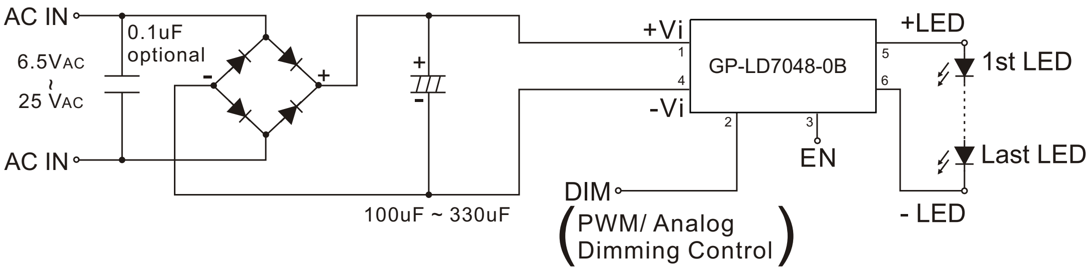
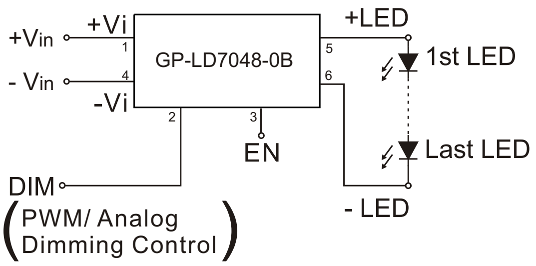
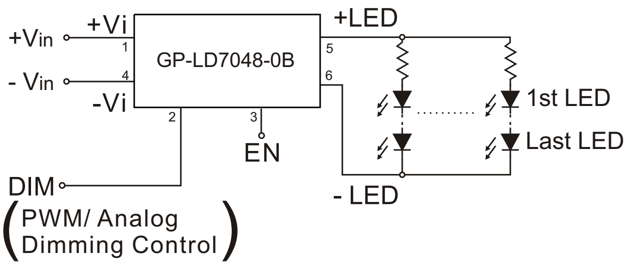
700mA High Efficiency Step-UP LED Driver

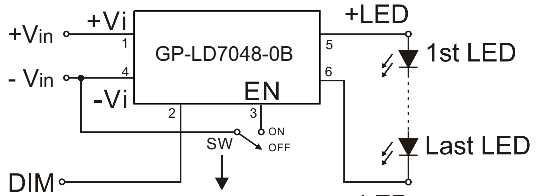
GlacialPower®
Power Your Idea

Typical Application



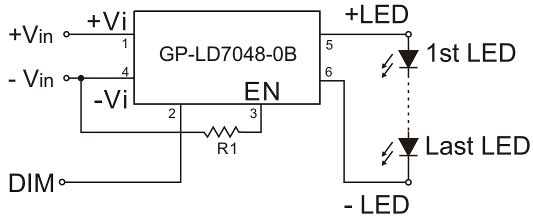






SW	Vout
ON	0V
OFF	normal

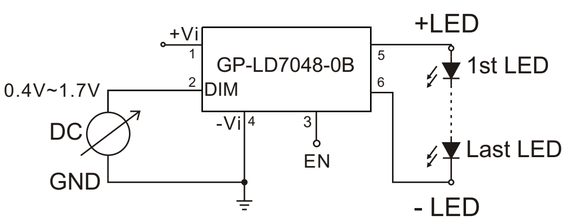
Under VoltageProtection

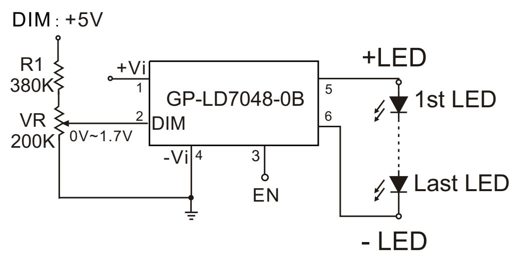


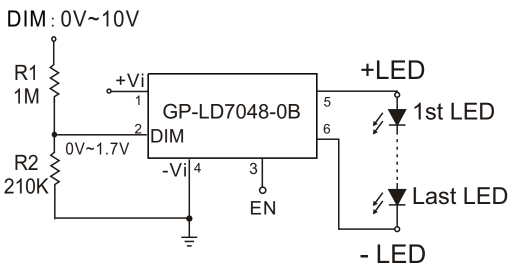
R1	Under Voltage Protection
X	7.6V
12K	10.8V
10K	11.6V
7.5K	13.0V
4.7K	16.5V
3.3K	21.0V
2.7K	24.1V
2.4K	26.2V
2.0K	29.8V
1.8K	32.4V

The R1 Value Only Supplies The Reference

Output Current Adjustment Control By External DC Control Voltage

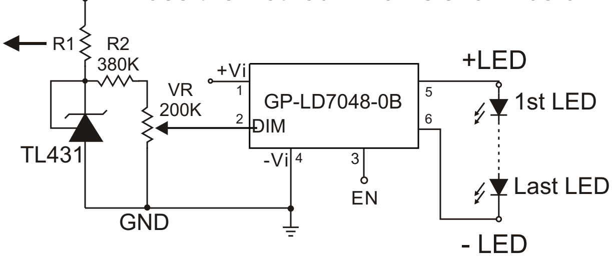






Vin	R1
5V	4.7K
12V	18K
24V	43K
36V	62K

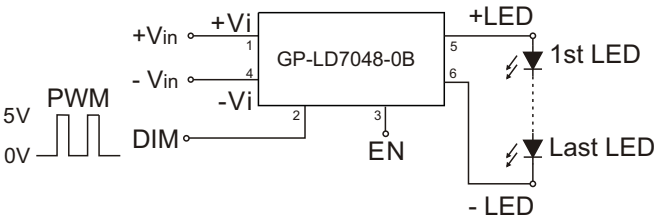
When the value of Vin is 9~36 Vin , it can use the method which is shown below.



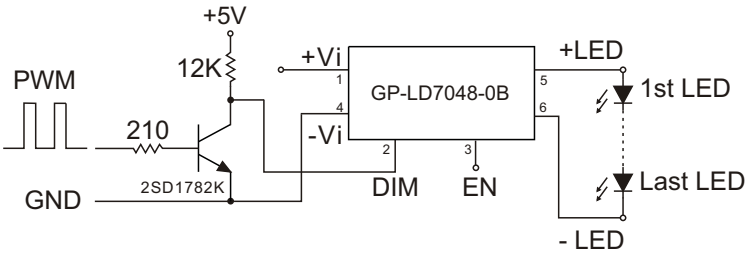
Typical Application

Output Current Adjustment Control By PWM Control

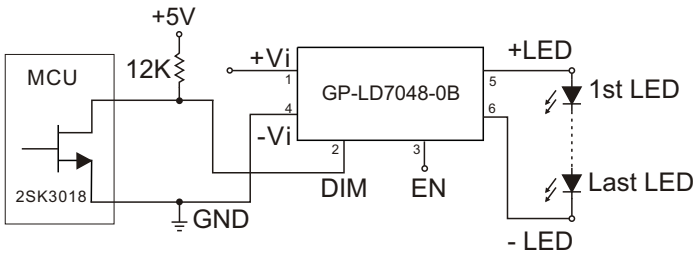
Directly driving DIM input
A Pulse Width Modulated (PWM) signal
can be applied to the DIM pin, as shown below



Driving the DIM input via open collector transistor

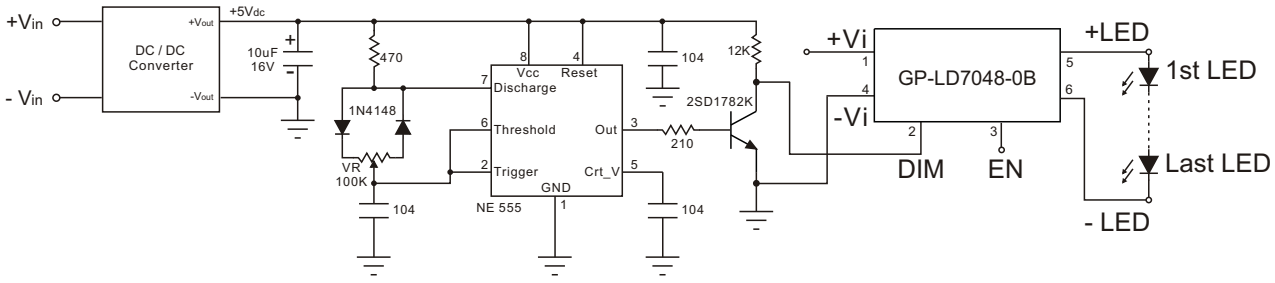


Driving the DIM input from a microcontroller
Another possibility is to drive the device from the open drain output
of a microcontroller. The diagram below shows one method of doing this:



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)