



1W LED Driver

User's Guide

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1W LED Driver

NOTES:

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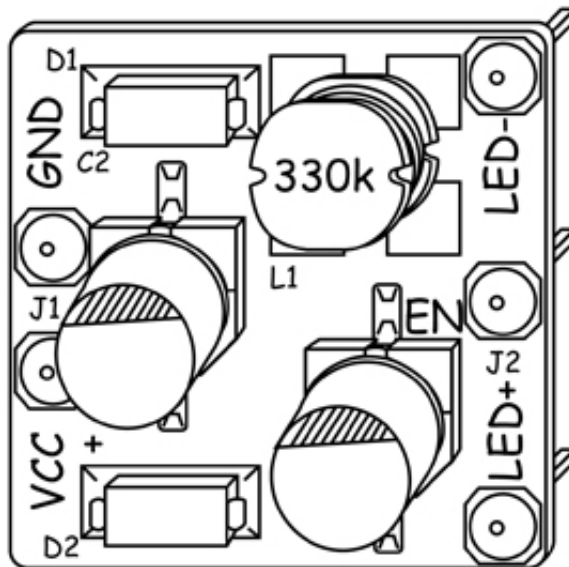
Chapter 1. Overview

1.1 Overview

Welcome to use LED driver series by Sure Electronics. This series provide users many choices: 0.5W, 1W, 3W, 5W and 10W, which integrate a MBI6651 chip by Macroblock – a high efficiency, constant current and step-down DC/DC converter. Featuring under voltage lock out (UVLO), over temperature protection, LED open-circuited protection and LED short-circuited protection, MBI6651 makes the drivers' application safer. Additionally, to ensure the system reliability, the MBI6651 builds thermal protection (TP) function inside. This function protects IC from overheating in various applications. Thus LED drivers shall serve for longer time.

This 1W driver features small size, high efficiency, stability, long service time and easy installation. LED dimming can be controlled via an extra pulse width modulation (PWM) through DIM pin. As many as 8 LEDs shall be connected in series.

FIGURE 1-1 FRONT VIEW



1W LED Driver

FIGURE 1-2 BACK VIEW

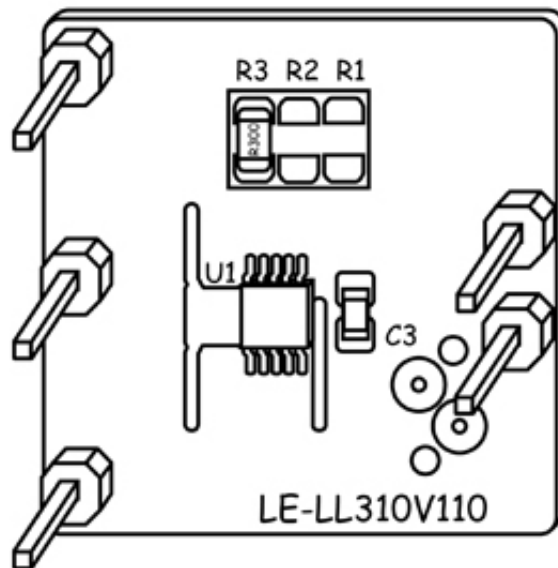
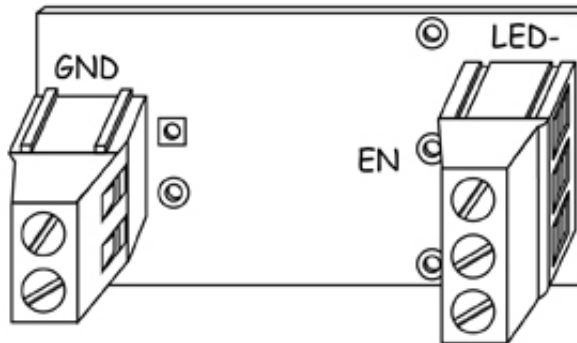


FIGURE 1-3 THE CONVERTER



1.2 Feature

- Minimized size, high efficiency
- Constant current output, stable LED lighting
- Input voltage: 9V-35V
- 96% efficiency @ input voltage 12V, 3 LEDs
- Number of LEDs allowed to be connected in series: 8 (Max)
- Full protection: Thermal/UVLO (Under Voltage Lock Out)/Start-Up/LED Open-/Short-Circuit
- Easy installation and long service life

1.3 Application

- Signage and Decorative LED Lighting
- Automotive LED Lighting
- High Power LED Lighting
- Constant Current Source

Chapter 2. Hardware Detail

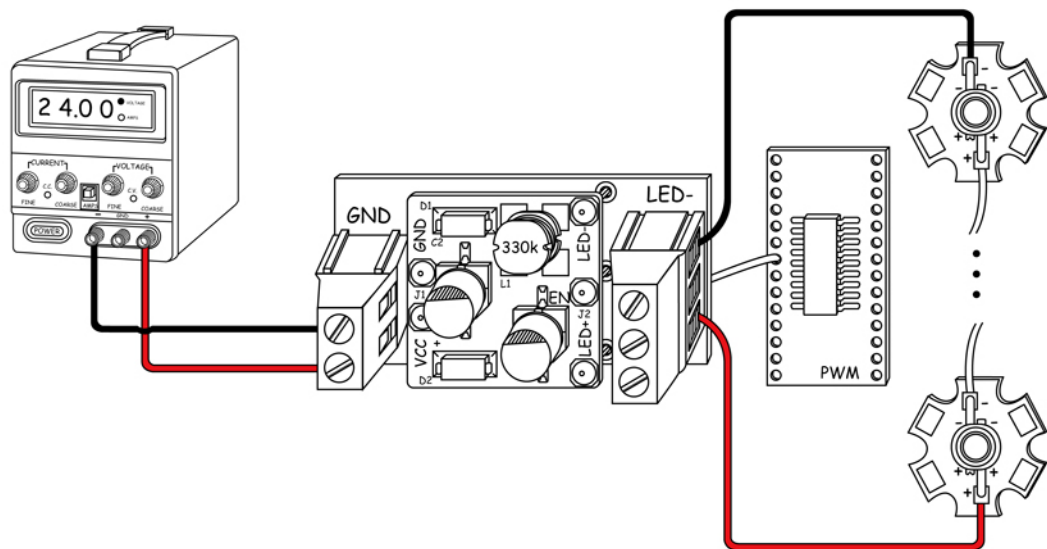
2.1 Port Definition

TABLE 2-1 PORT DEFINITION

Pin	Description
VIN	Positive terminal for 9V -35V DC Power supply
GND	Power Ground
LED+	Positive of LED terminal
LED-	Negative of LED terminal
EN	PWM terminal. (When applied with +5v or suspended, full amount of current will be output and when connected with ground, output current will be 0.)

2.2 Connection

FIGURE 2-1 CONNECTION SCHEMATICS

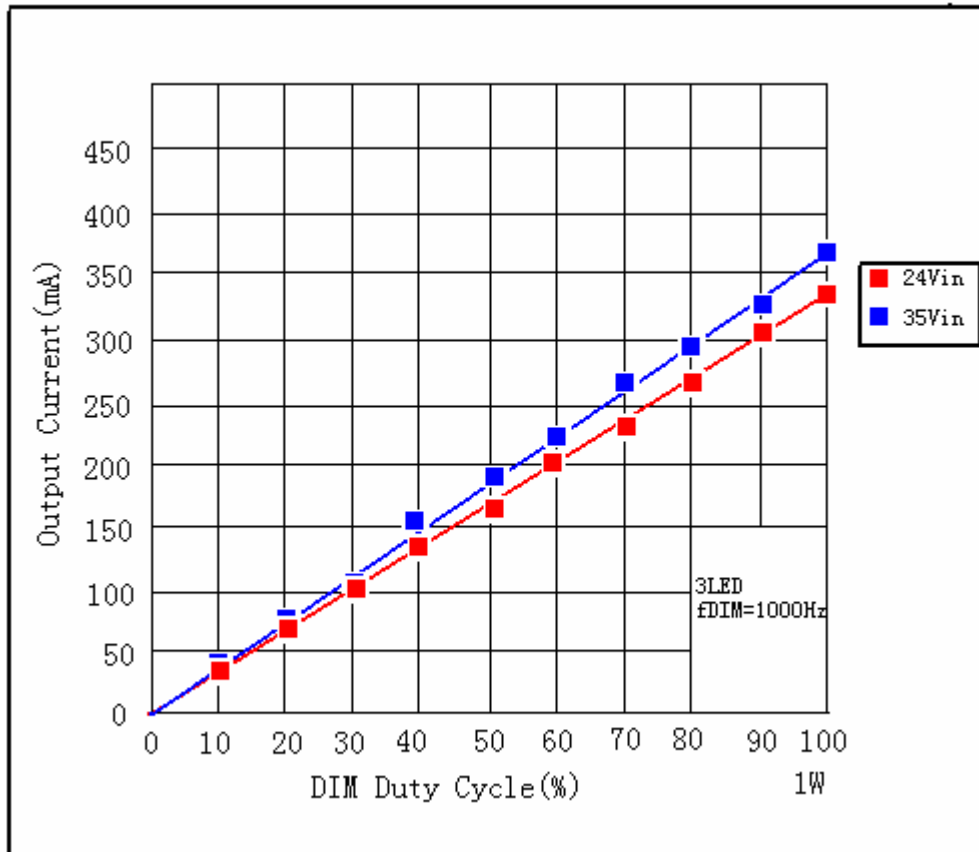


Note: Supply voltage range is 9 – 35V.

2.3 PWM Control Settings

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FIGURE 2-2 OUTPUT CURRENT/DIM DUTY CYCLE



Chapter 3. Electrical Characteristics

3.1 Specification

The typical parameters are listed in the table below.

Tested @ $V_{in}=24V$, 4 Luxeon White LEDs connected in series, $tem\ 18^{\circ}C$ (unless noted otherwise)

TABLE 3-1 SPECIFICATION

Parameters		Test Condition	Min.	Typ.	Max.	Unit
Supply Voltage		-	9	-	35	V
Supply Current (no load)		$V_{in}= 9\ V\sim 35V$	-	2	5	mA
Output Current		I_{out}	320	350	370	mA
Accuracy		-	-	± 3	± 10	%
Efficiency		$V_{in}=12V, 4LEDs$,	-	96	-	%
Input Voltage* (EN)	High Potential	-	3.5	-	-	V
	Low Potential	-	-	-	0.5	V
Minimum Turn-on Time*		-	100	350	450	ns
Minimum Closing Time*		-	100	350	450	ns
Maximum Operating Frequency* (Internal Frequency)		-	40	-	1000	KHz
Over Temperature Protection*		-	145	165	175	$^{\circ}C$
Over Temperature Protection Hysteretic State*		-	20	30	40	$^{\circ}C$
Under Voltage Lock Out*		-	7.7	8	8.3	V
Restart Voltage*		-	7.85	8.2	8.65	V
Duty Cycle of Running via PWM through DIM pin		PWM Frequency 1KHz	1	-	100	%

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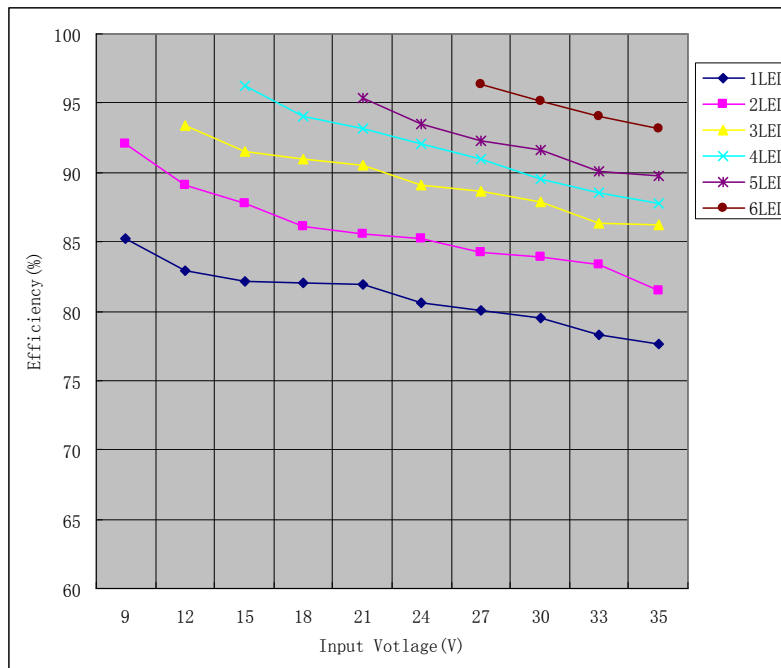
Operating Temperature	-	-10	20	50	°C
Storage Temperature	-	-55	20	+150	°C

Note: * from Data Sheet of MBI6651 chip. Please refer to the relevant documents for the details.

3.2 The General Performance Specifications

1. Efficiency Vs Input Voltage @ different number of LEDs connected in series

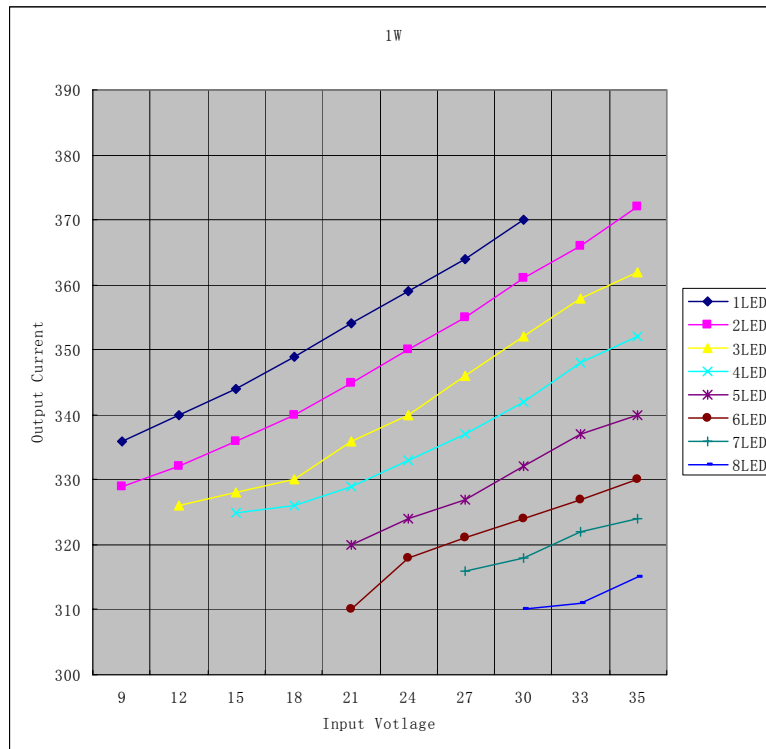
FIGURE 3-1 EFFICIENCY VS INPUT VOLTAGE @ DIFFERENT NUMBER OF LEDS CONNECTED IN SERIES



2. Output Current Vs Input Voltage @ different number of LEDs connected in series

Electrical Characteristics

FIGURE 3-2 OUTPUT CURRENT VS INPUT VOLTAGE @ DIFFERENT NUMBER OF LEDS CONNECTED IN SERIES



Output current corresponding to input voltage of the key points @ different number of LEDs connected in series is listed for reference in the following table.

TABLE 3-2 OUTPUT CURRENT OF SEVERAL KEY POINTS @ DIFFERENT NUMBER OF LEDS CONNECTED IN SERIES

LED \ Voltage	2LED	3LED	4LED	5LED	6LED	7LED	8LED
8.6V	359mA	-	-	-	-	-	-
10.6V	-	356mA	-	-	-	-	-
14.1V	-	-	359mA	-	-	-	-
17.9V	-	-	-	370mA	-	-	-
21.5V	-	-	-	-	365mA	-	-
24.1V	-	-	-	-	-	358mA	-
27.6V	-	-	-	-	-	-	361mA

LED drivers are the most efficient when they operate at the corresponding points listed above. Please refer to the manuals of LED and LED driver for details.

Note: The parameters above are for reference only. A range of tolerance shall exist for different batches of LED Driver Board.

3.3 The Number of LEDs Connected in Series VS Input Voltage

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TABLE 3-3 THE NUMBER OF LEDS CONNECTED IN SERIES VS INPUT VOLTAGE

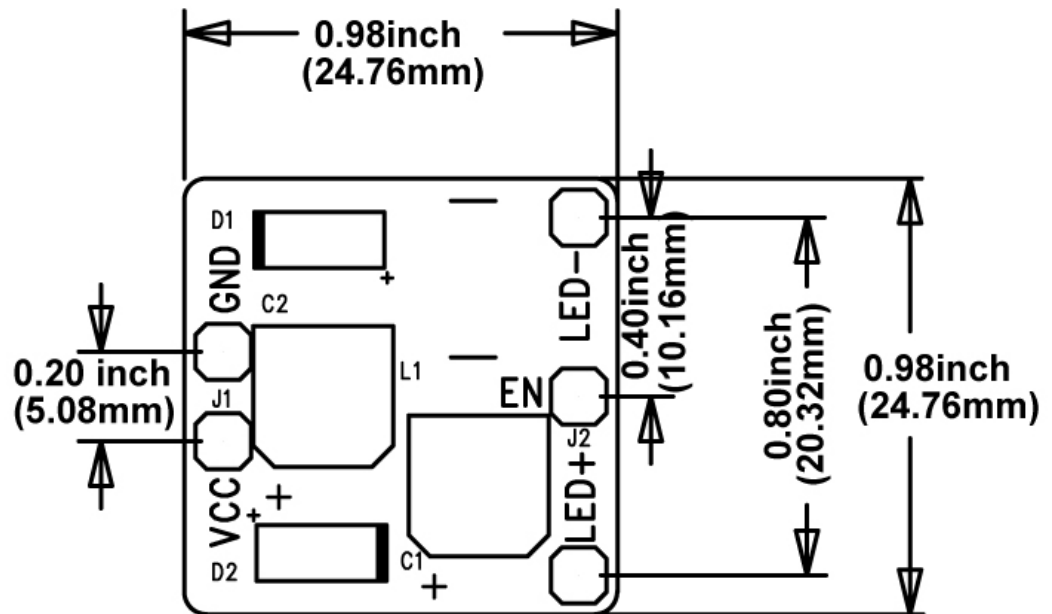
LED	1	2	3	4	5	6	7
Vin	9—30V	9-35V	12-35V	15-35V	21-35V	21-35V	27-35V

Please refer to figure 3-2 for output current @ different number of LEDs connected in series.

Note: Feeding one LED with over DC 30 power supply may damage the LED.

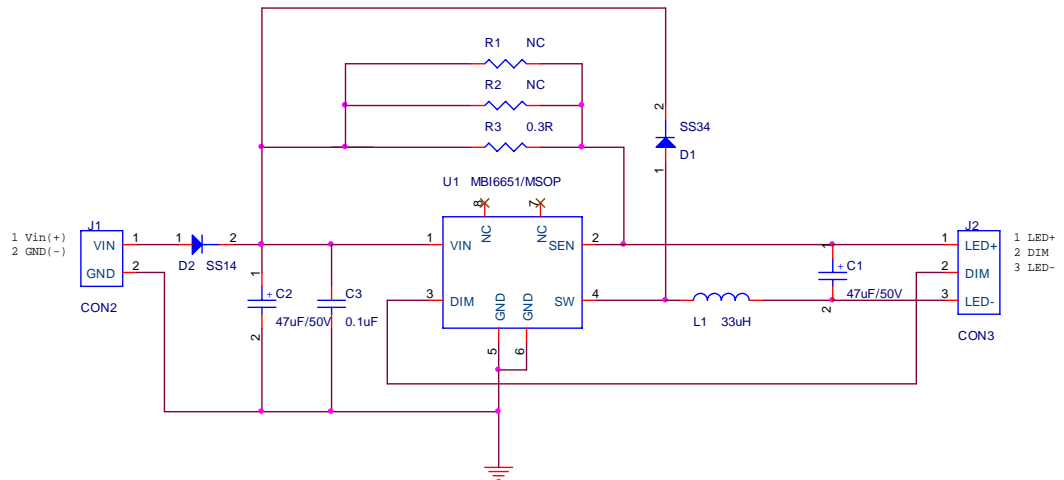
Chapter 4. Mechanical Drawing

FIGURE 4-1 MECHANICAL DRAWING



Chapter 5. Appendix

FIGURE 5-1 SCHEMATICS



Chapter 6. Contact Us

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