

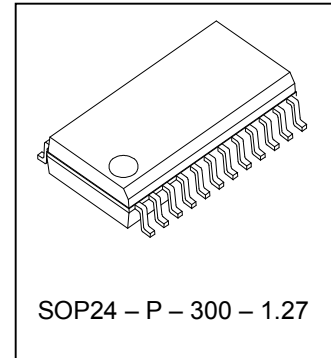
Transformerless AC/DC Constant Current Driver

MBI6001

January 2003,V1.0i

Features

- Directly powered by 110 VAC
- Constant output current and Transformerless, 18 mA
- Drive one chain of LEDs, V_{OUT} up to 60 V while applying 110V AC
- Reliable technology
- Small footprint 24-pin SOP24 package



Description

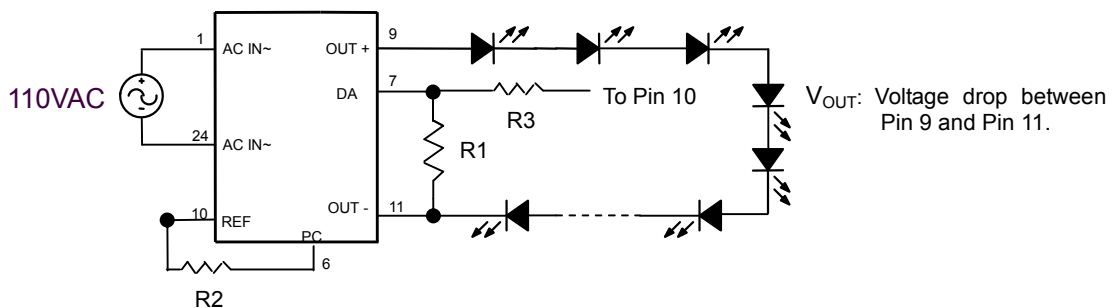
With the features of transformerless and small footprint, MBI6001 constant current driver is specifically designed for LED lighting.

The MBI6001 can be directly powered by 110 VAC and provide 18 mA constant current to the LEDs.

Applications

- LED Lamps
- LED Sign and Channel Letter
- Indication Sign
- Low Power LEDs Lighting, < 1.5W

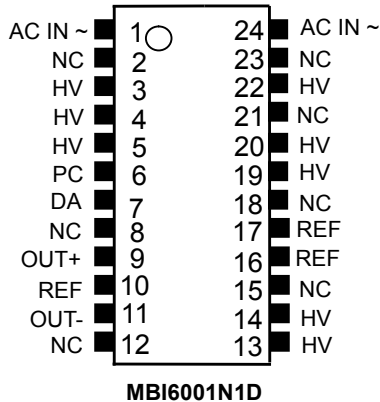
Typical Application Circuit



Note: There is no pin being connected to earth ground.

Pin Configuration

Ordering Information



Part	Blink	VAC Range	Package-Pin
MBI6001N1D	NA	100V ~ 120V	SOP-24

Pin Description (SOP24)

Pin	Name	I/O	Function
1	AC IN ~	In	AC voltage input node1.
2	NC	-	No connection.
3	HV	-	No connection.
4	HV	-	No connection.
5	HV	-	No connection.
6	PC	In	Peak current adjust.
7	DA	In	Duty adjust.
8	NC	-	No connection.
9	OUT+	Out	Connected to LED anode (+).
10	REF	-	Internal reference voltage low.
11	OUT-	Out	Connected to LED cathode (-).
12	NC	-	No connection.
13	HV	-	No connection.
14	HV	-	No connection.
15	NC	-	No connection.
16	REF	-	Internal reference voltage low.
17	REF	-	Internal reference voltage low.
18	NC	-	No connection.
19	HV	-	No connection.
20	HV	-	No connection.
21	NC	-	No connection.
22	HV	-	No connection.
23	NC	-	No connection.
24	AC IN ~	In	AC voltage input node2.

Note 1: These Pins should be kept away from touching by hands. (High voltage 110VAC)

Environmental Specification

Operation Temperature Range ---- -20°C to 50°C (LEDs are set in the temperature range: -20°C to 70°C)

Storage Temperature Range ----- -40°C to 150°C

Cooling----- Free Air or Thermally Conductive Adhesive

Absolute Maximum Ratings

AC Input Voltage----- 400V, transient

Power Dissipation ----- 1.5 W

Junction Temperature ----- 120°C

Electrical Characteristics

($V_{AC} = 110\text{V}$, $T_a = 25^{\circ}\text{C}$, unless otherwise noted)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT S	NOTE
AC Input Voltage	V_{AC}	100	110	120	V rms	See Applications Information
Output Voltage	V_{OUT}	8	-	60	V	
Output Current	I_{OUT}		18		mA	See Applications Information

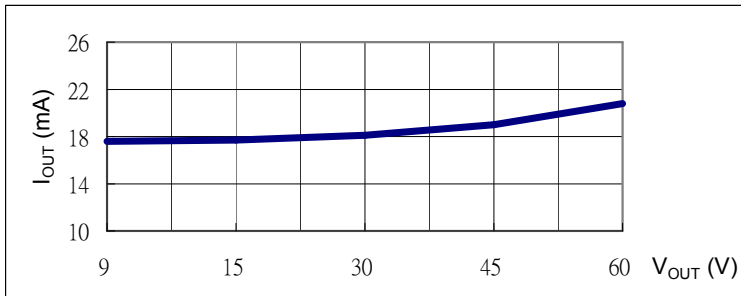
Applications Information

Output Current - I_{OUT}

With a selected resistor R1 being connected between DA and OUT- (refer to Typical Application Circuit), a constant output current I_{OUT} can be produced.

However, I_{OUT} will vary with V_{OUT} . While V_{OUT} is changed due to different number of LEDs being used and less than 60V, I_{OUT} will vary within the range of $\pm 15\%$. (see Fig. 1)

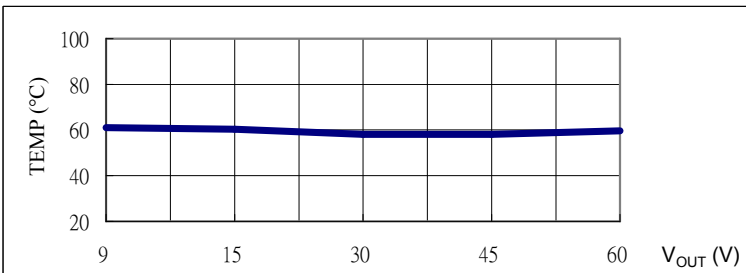
Fig. 1- I_{OUT} vs. V_{OUT} (@ 110 VAC, $T_a= 25^\circ\text{C}$)



Surface Temperature vs. V_{OUT}

The temperature on the surface of package will be around 60°C when V_{OUT} is smaller than 60V. Temperature will rise up while V_{OUT} is getting larger. (see Fig. 2)

Fig. 2- Temp. vs. V_{OUT} (@ 110 VAC, $T_a= 25^\circ\text{C}$)



Line Regulation

I_{OUT} will vary obviously with AC Input voltage. For instance, at $V_{OUT} = 50\text{ V}$, I_{OUT} will increase 20% while input voltage varies from 110 VAC to 100 VAC, but decrease 15% while input voltage varies from 110 VAC to 120 VAC. For input voltage is usually staying at lower than 100VAC, it is recommended to lower down the V_{OUT} in the application. Otherwise, I_{OUT} will rise up very quickly and the surface temperature of package will be getting higher than 90°C .

LEDs Selection Consideration

MBI6001 provides constant average output current to drive LEDs. The output to LEDs is actually a train of current pulses. Their peak value can be adjusted by a resistor R2 which connects from PC to V-. (refer to Typical Application Circuit) It is recommended to select LEDs with higher peak forward current $I_F(\text{peak})$.

Cautions

MBI6001 is directly power supplied by 110V AC. There are several pins with high AC voltage. Please don't touch any pin by hand(s) after voltage in. Also, it is important to keep preventing pins from short-circuit.

Outline Drawings

SOP24 – P – 300 – 1.27

