

Dimmable CC / CV IC for LED Lighting ADT6051

GENERAL DESCRIPTION

The ADT6051 is a constant current and constant voltage IC for stable LED driving in a secondary side. This IC is suitable for applications that require power line isolation for safety and reliability, high conversion efficiency, as well as high LED current accuracy.

The ADT6051 contains 1) a constant current regulating amplifier with 300mV threshold and within 1% current accuracy; 2) an VCC over voltage comparator to protect the IC when LED string is open or broken; 3) a PWM and analog dimming control for LED lighting system; 4) and a DC output pin for driving an opto-coupler or sourcing power for the other devices. The ADT6051 is offered in SOP8 package.

FEATURES

- Secondary side LED current regulation
- Operating range up to 60V
- LED Current accuracy $\leq \pm 1\%$
- Analog dimming control
- PWM dimming control
- DC 5V output
- DC 5V output short protection
- VCC over voltage protection
- Over temperature protection
- SOP8 package

APPLICATIONS

- Isolated LED lighting
- Dimmable LED lighting

TYPICAL APPLICATION CIRCUIT

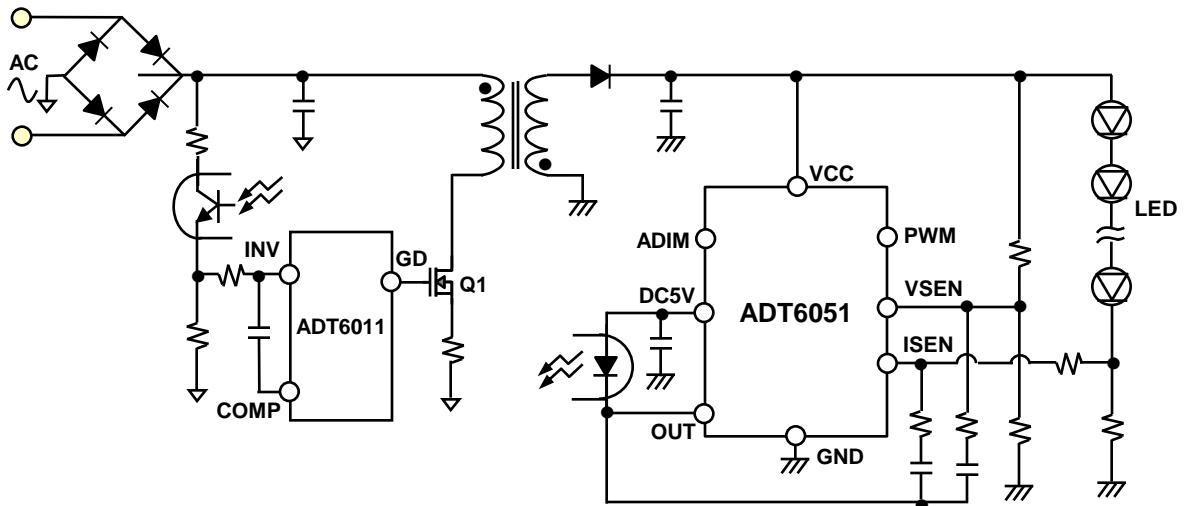


Figure 1. Typical Application Circuit

* This specifications are subject to be changed without notice

ABSOLUTE MAXIMUM RATINGS (Note1)

| Parameter | Symbol | Rating | Units |
|----------------------------|-----------------------------|-----------|-------|
| Ground Voltage | GND | -0.3 | V |
| Power Voltage | VCC | -0.3 ~ 60 | V |
| Open Drain Output | OUT | -0.3 ~ 60 | V |
| All Other pins | DC5V, VSEN, ISEN, PWM, ADIM | -0.3 ~ 6 | V |
| Junction Temperature | T _J | -40 ~ 150 | °C |
| Storage Temperature | T _{STG} | -65 ~ 150 | °C |
| Thermal Resistance (Note2) | θ _{JA} | 150 | °C/W |

Note1. Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device.

Note2. Measured on JESD51-7, 4-layer PCB

ELECTRICAL CHARACTERISTICS

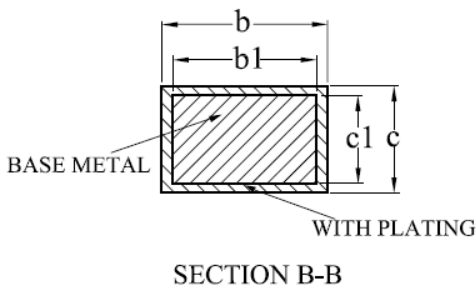
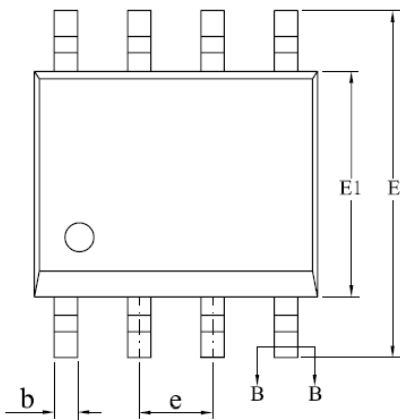
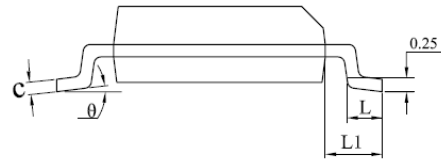
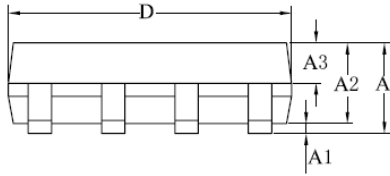
(VCC = 15V, Ta=25°C, unless otherwise specified)

| Parameter | | Conditions | Symbol | Min. | Typ. | Max. | Units |
|------------------------|---|------------------------|-----------------------|------|------|------|-------|
| Device supply | Power supply operating range | | V _{CC} | 8 | 15 | 55 | V |
| | VCC OVP | | VCCOVP | 55 | 58.5 | - | V |
| | LED off VCC | V(ADIM)=0V | VCC _{LEDOFF} | 8.5 | 10 | 11.5 | V |
| | VCC quiescent current | V(ISEN)=V(VSEN)=0V | I _{CC} | - | 0.5 | 1.0 | mA |
| PWM dimming | PWM input high level | | V _{PWMH} | 1.5 | - | - | V |
| | PWM input low level | | V _{PWML} | - | - | 0.8 | V |
| | PWM dimming frequency | | F _{PWM} | 0.1 | - | 100 | kHz |
| | PWM duty range | | D _{PWM} | 10 | - | 100 | % |
| | Threshold duty (LED OFF) (Note3) | | D _{OFF} | 3.7 | 6.7 | 9.7 | % |
| | Threshold duty (LED ON) (Note3) | | D _{ON} | 7 | 10 | 13 | % |
| | Pull up current | V(PWM)=0V | I _{PULLUP} | - | 9 | 15 | uA |
| Analog dimming | Analog dimming input voltage | | V _{ADIM} | 0.1 | - | 1.0 | V |
| | Threshold voltage (LED OFF) | | V _{OFF} | 37 | 67 | 97 | mV |
| | Threshold voltage (LED ON) | | V _{ON} | 70 | 100 | 130 | mV |
| | Pin input current | V(ADIM)=1V | I _{ADIM} | -3 | 0 | 3 | uA |
| Current control loop | Transconductance, Sink current only (Note3) | | G _{MISEN} | - | 9.5 | - | V/A |
| | Current sensing reference voltage | I(OUT)=100uA | V _{ISEN} | 297 | 300 | 303 | mV |
| | Pin input current | V(ISEN)=5V | I _{ISEN} | -1 | 0 | 1 | uA |
| Voltage control loop | Transconductance, Sink current only (Note3) | | G _{MVSEN} | - | 5.2 | - | V/A |
| | Voltage sensing reference voltage | I(OUT)=100uA | V _{VSEN} | 0.95 | 1.00 | 1.05 | V |
| | Pin input current | V(VSEN)=5V | I _{VSEN} | -1 | 0 | 1 | uA |
| Output stage | Lower output voltage, Sink current only | I(OUT)=1mA, V(ISEN)=1V | V _{OL} | - | 0.7 | 1.1 | V |
| | Output short circuit current. | V(OUT)=5V, V(ISEN)=1V | I _{OUTMAX} | 3 | 6 | 10 | mA |
| DC 5V output | DC 5V output voltage | I(DC5V)=5mA | V _{DC5V} | 4.5 | 5.0 | 5.5 | V |
| | Output short circuit current. | V(DC5V)=0V | I _{DC5Vmax} | 8 | 16 | 24 | mA |
| Temperature protection | Over temperature protection (Note3) | | OTP | - | 150 | - | °C |
| | OTP hysteresis (Note3) | | OTP _{HYS} | - | 40 | - | °C |

Note 3 : The parameter is guaranteed by design. It is not tested in production.

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PACKAGE DIMENSTION



| SYMBOL | MILLIMETER | | |
|--------|------------|------|------|
| | MIN | NOM | MAX |
| A | — | — | 1.77 |
| A1 | 0.08 | 0.18 | 0.28 |
| A2 | 1.20 | 1.40 | 1.60 |
| A3 | 0.55 | 0.65 | 0.75 |
| b | 0.39 | — | 0.48 |
| b1 | 0.38 | 0.41 | 0.43 |
| c | 0.21 | — | 0.26 |
| c1 | 0.19 | 0.20 | 0.21 |
| D | 4.70 | 4.90 | 5.10 |
| E | 5.80 | 6.00 | 6.20 |
| E1 | 3.70 | 3.90 | 4.10 |
| e | 1.27BSC | | |
| L | 0.50 | 0.65 | 0.80 |
| L1 | 1.05BSC | | |
| θ | 0 | — | 8° |

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