

# 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

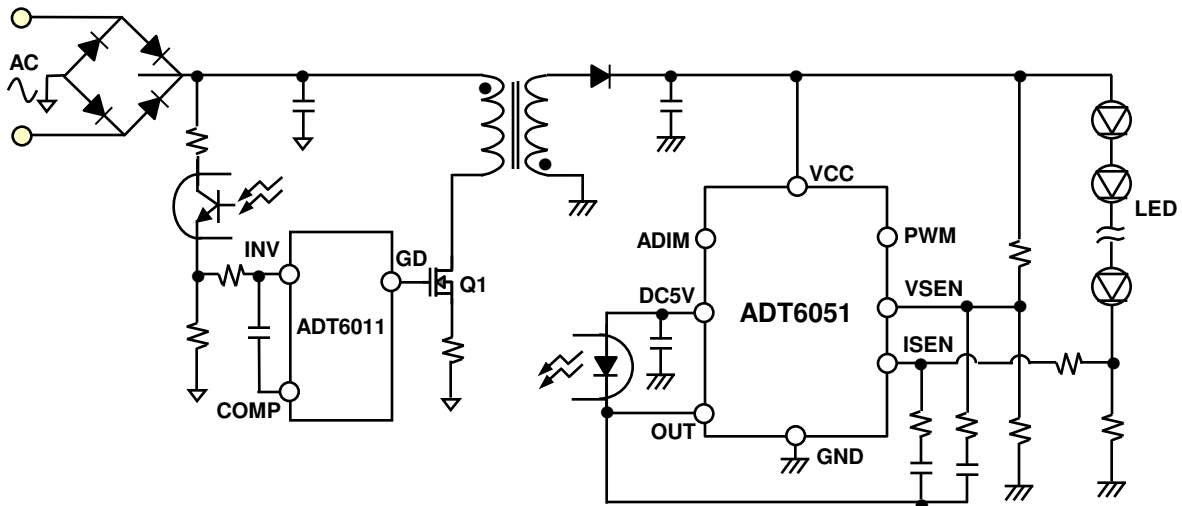
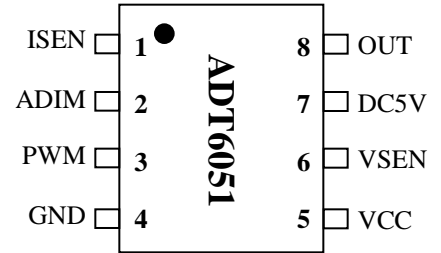


Figure 1. Typical Application Circuit

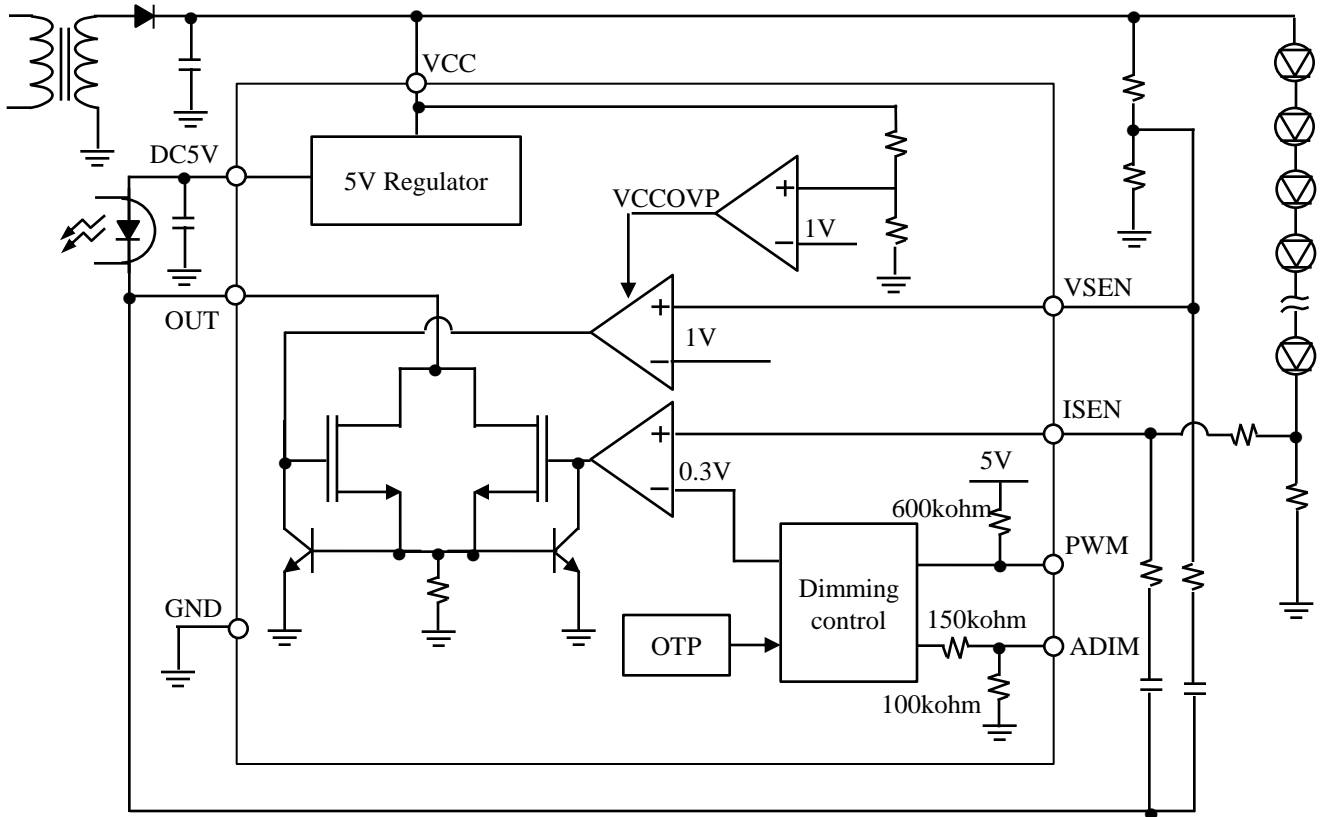
\* This specifications are subject to be changed without notice

### PIN CONFIGURATION

Pin No.	Pin Name	Description
1	ISEN	Constant current control input.
2	ADIM	Analog dimming input.
3	PWM	PWM dimming input.
4	GND	Ground.
5	VCC	Supply voltage input.
6	VSEN	Constant voltage control input
7	DC5V	5V LDO output
8	OUT	Open-drain output. Connects this pin to opto-coupler.



### SIMPLIFIED BLOCK DIAGRAM



\* 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 <sub>J</sub>	-40 ~ 150	°C
Storage Temperature	T <sub>STG</sub>	-65 ~ 150	°C
Thermal Resistance (Note2)	θ <sub>JA</sub>	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**

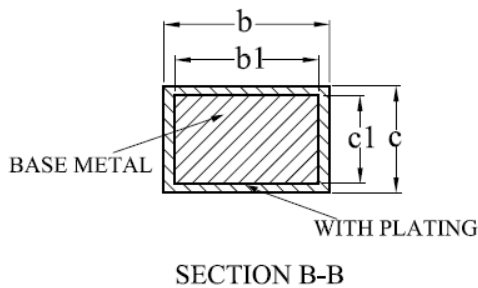
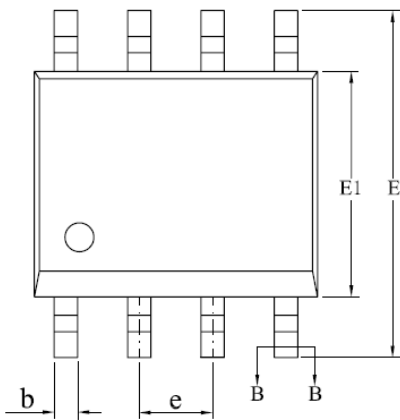
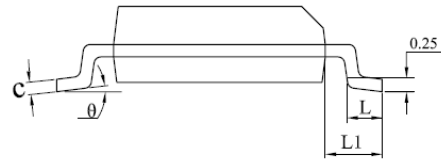
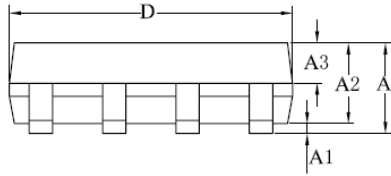
(VCC = 15V, Ta=25°C, unless otherwise specified)

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

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

\* This specifications are subject to be changed without notice

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°

\* This specifications are subject to be changed without notice