AT6331

BOOST or SEPIC DC-DC Controller

Immense Advance Tech.

FEATURES

- Wide Input Voltage Range: 2.7V to 5.5V
- Boost or SEPIC DC-DC Mode Controller
- VCC Under Voltage Lockout
- SOT-26 Lead-free Package

APPLICATION

- Handheld Electronics
- MR-16
- Lighting Divice

DESCRIPTION

The AT6331 are integrated, high-efficiency white or RGB LED drivers. They are designed for LED lighting applications.
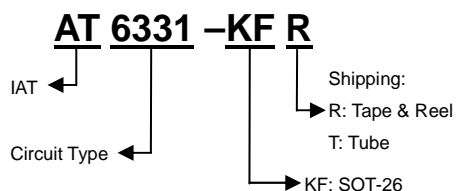
The AT6331 it can be used with boost or buck-boost (SEPIC) topologies. The constant- current outputs are single resistor or PWM programmable and the LED current can be adjusted.
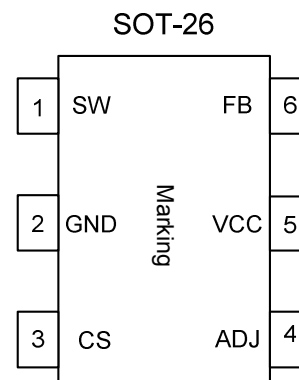
The AT6331 is available in SOT-26 Lead-free package.

ORDER INFORMATION

AT 6331 −KF R

IAT

Circuit Type

Shipping:
- R: Tape & Reel
- T: Tube

KF: SOT-26

PIN CONFIGURATIONS (TOP VIEW)

SOT-26

1	SW	FB	6
2	GND	VCC	5
3	CS	ADJ	4

Marking

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PIN DESCRIPTIONS

Pin Symbol	Pin Description
FB	Voltage Feed Back pin.
VCC	Power Supply
ADJ	Dimming pin
CS	Switch Current Sense
GND	Ground
SW	Connected to external MOSFET gate pin

TYPICAL APPLICATION CIRCUITS

TOPOLOGY: SEPIC
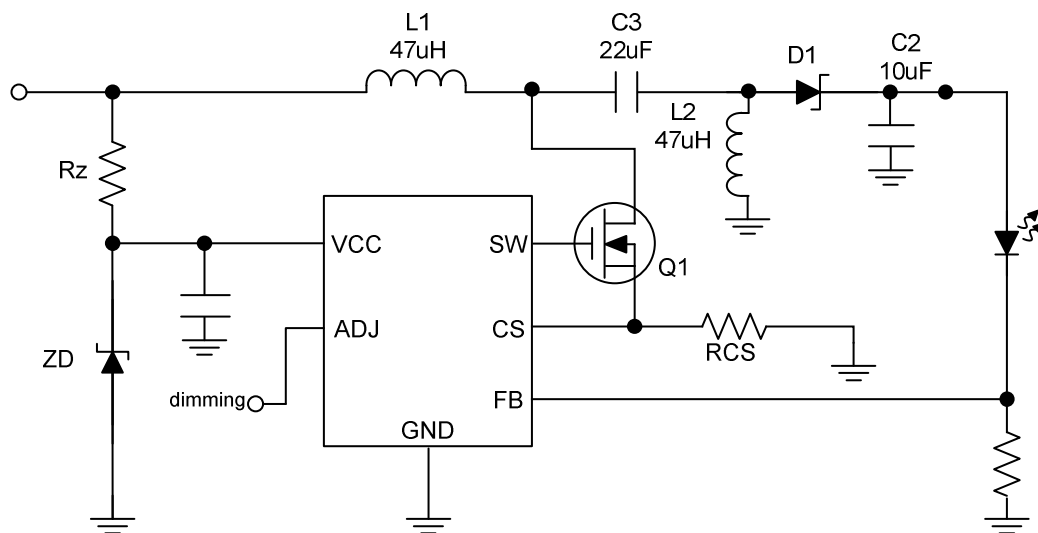
Figure 1.

TOPOLOGY: BOOST

Figure 2.

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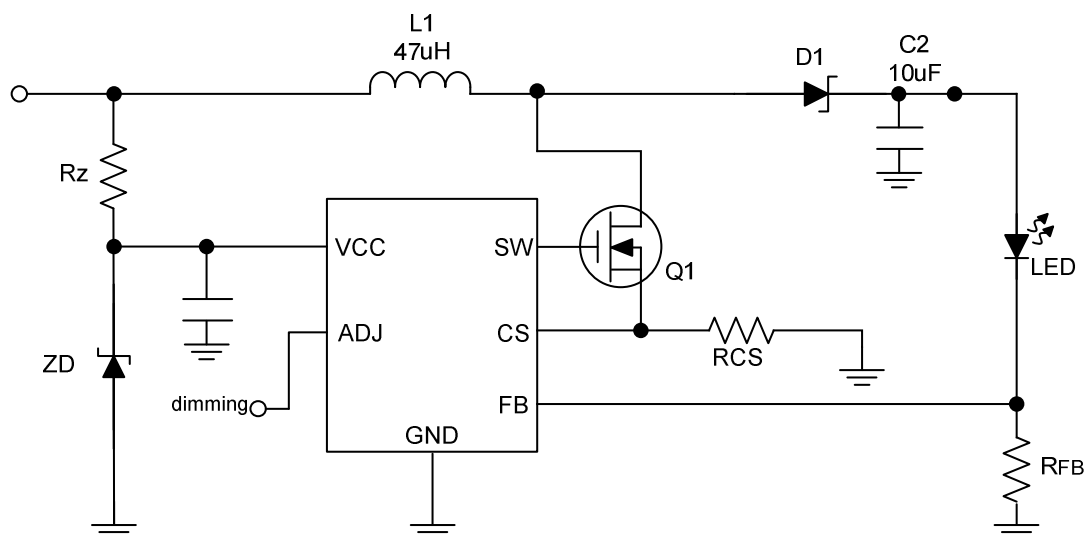
ABSOLUTE MAXIMUM RATINGS (Note 1)

Parameter	Symbol	Max Value	Unit
Voltage on any pin relative to GND	V_{IN}	-0.3 to 7	V
Junction Temperature	T_J	-40 to 150	℃
Storage Temperature Range	T_{STG}	-65 to +150	℃
Lead Temperature(Soldering) 10 Sec.	T_{LEAD}	300	℃
Power Dissipation, P_D @ T_A=25℃ (Note 2)	P_D	300	mW
Thermal Resistance Junction to Ambient	θ_{JA}	333	℃/ W
Thermal Resistance Junction to Case	θ_{JC}	106.6	℃/ W

RECOMMENDED OPERATING CONDITIONS (Note 3)

Parameter	Symbol	Operation Conditions	Unit
Supply Voltage, V_{IN}	V_{IN}	2.7 to 5.5	V
Operating Junction Temperature Range	T_J	-40 to +125	℃
Operating Ambient Temperature Range	T_A	-40 to +85	℃

Note 1: Stresses listed as the above "Absolute Maximum Ratings" may cause permanent damage to the device. These are for stress ratings. Functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may remain possibility to affect device reliability.

Note 2: Thermal Resistance is specified with the component mounted on a low effective thermal conductivity test board in free air at T_A=25℃.

Note 3: The device is not guaranteed to function outside its operating conditions.

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ELECTRICAL CHARACTERISTICS

T_A = -40 to 85℃ unless otherwise noted. Typical valu es are at T_A =25℃, V_{CC} =5V

Function Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
Operating voltage range	V_{CC}	power supply input		2.7	—	5.5	V
VCC Under Voltage Lockout	V_{UVLO}			—	2.7	—	V
FB pin voltage	V_{FB}			—	0.15	—	V
Switching Frequency	t_{SW}			—	500	—	KHz
Switch Off Current	I_{cc}			—	300	—	µA
ADJ turn off Current	I_{OFF}			—		30	µA
LED sink current	I_{LED}	V_{CC} = 2.7V~5.5V	RFB=1 ohm	—	150	—	mA
			RFB=0.214 ohm	—	700	—	
LED leakage current in shutdown	I_{LSD}	VLED= 3.3V, V_{CC}=0V,T_A=+25℃		—	—	1	µA
CS pin Peak Switch Current	I_{CS}	Limit= 0.1/Rcs , Rcs=0.05 ohm		—	2		A
External control voltage range	V_{ADJ}	On ADJ pin for DC brightness control		0	—	1.2	V
Duty cycle range of PWM signal applied to ADJ pin during high frequency PWM dimming mode	D_{PWMH}	PWM frequency>1KHz PWM amplitude = VREF Measured on ADJ pin		0.16	—	1	
Brightness control range				—	6:1	—	

FUNCTIONAL DESCRIPTION

The AT6331 are integrated, high-efficiency white or RGB LED drivers. They are designed for LED lighting applications.

The AT6331 it can be used with boost or buck-boost (SEPIC) topologies.The constant-current outputs are single resistor or PWM programmable and the LED current can be adjusted.

Setting the Output Current

FB controls the LED bias current. greater than the current flowing into RSET. Set the output current as follows:

ILED = (0.15V / RFB)

Output current adjustment by external DC control voltage

The ADJ pin can be driven by an external dc voltage (VADJ), as shown, to adjust the output current to a value above or below the nominal average value defined by RFB.

The nominal average output current in this case is given by:

IOUTdc = (VADJ /1.2) x (0.15V / RFB), [for 0 < VADJ <1.2V]

Note that 100% brightness setting corresponds to VADJ $\geq$ VREF. When driving the ADJ pin above 1.2V.

## Output current adjustment by PWM control

A Pulse Width Modulated (PWM) signal with duty cycle DPWM can be applied to the ADJ pin, as shown below, to adjust the output current to a value above or below the nominal average value

set by resistor RFB:
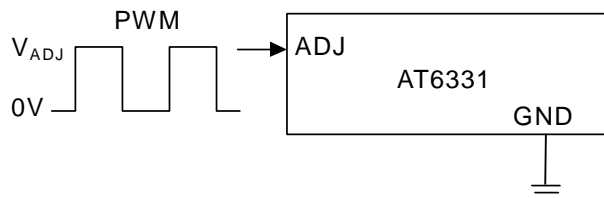
Driving the ADJ input from a microcontroller

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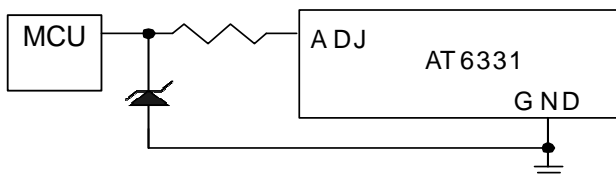

If the NMOS transistor within the microcontroller has high Drain / Source capacitance, this arrangement can inject a negative spike into ADJ input of the AT6331 and cause erratic operation but the addition of a Schottky clamp diode (cathode to ADJ) to ground and inclusion of a series resistor (10K) will prevent this. See the section on PWM dimming for more details of the various modes of control using high frequency and low frequency PWM signals.

Peak Switch current Protection

If external connection MOSFET the instantaneous switch current is large, over MOSFET the specification, then MOSFET will burn out, to prevent the instantaneous switch the large current, may use CS-pin to make the protection. CS pin Peak Switch Current Limit=0.1/Rcs

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PACKAGE OUTLINE DIMENSIONS
SOT-26 PACKAGE OUTLINE DIMENSIONS
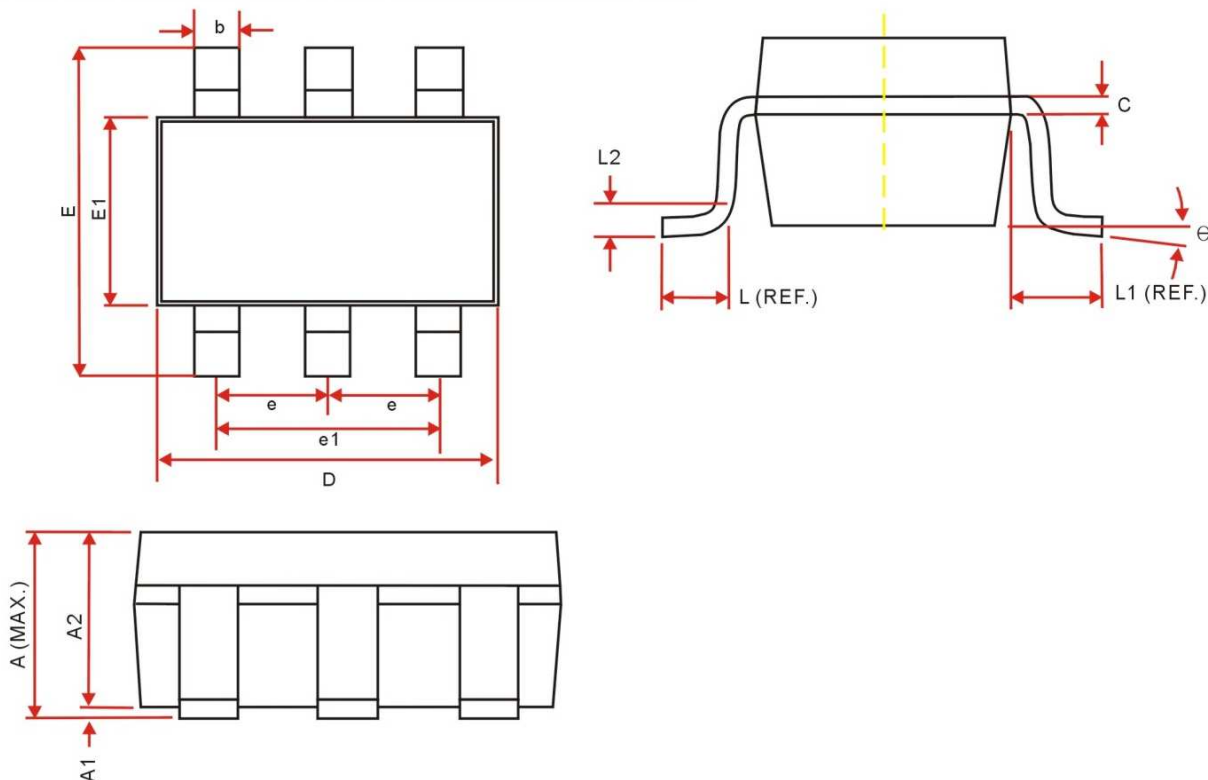
Symbol	Dimensions In Millimeters	
	Min	Max
A	1.45MAX.	
A1	0	0.15
A2	0.90	1.30
C	0.08	0.22
D	2.8	3.0
E	2.65	2.95
E1	1.5	1.7
L	0.30	0.60
L1	0.60 REF.	
L2	0.25 REF.	
θ	0˚	10˚
b	0.30	0.50
e	0.95 REF.	
e1	1.90 REF.	

Note :

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