# AMC7150

## 1.5A Power LED Driver

### DESCRIPTION

AMC7150 is a PWM power LED driver IC. The driving current from few milliamps up to 1.5A. It allows high brightness power LED operating at high efficiency from 4Vdc to 40Vdc. Up to 200KHz external controlled operation frequency. External resistor controlled the maximum output current to single LED or a LED string.

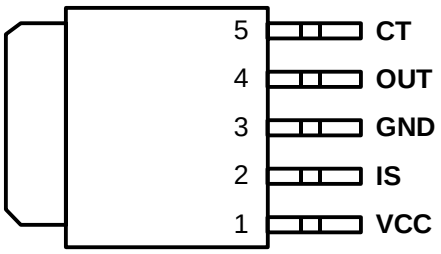
### FEATURES

- **Only 5 external components required.**
- **Output driving current up to 1.5A.**
- **4V~40V wide operation voltage range.**
- **High efficiency**
- **ESD protection HBM 2KV**
- **TO-252 5-pin power package.**

### APPLICATIONS

- DC/DC LED driver
- Automotive
- Lighting

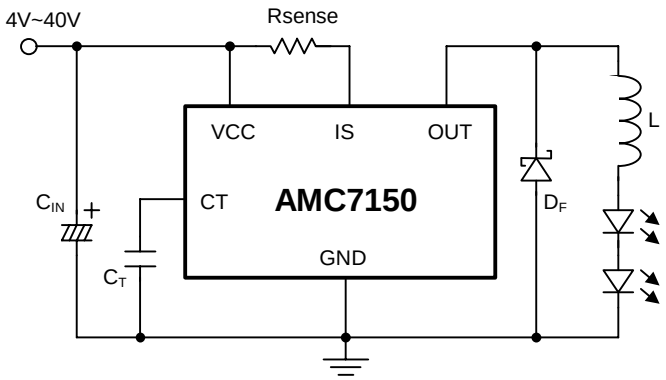
### PACKAGE PIN OUT



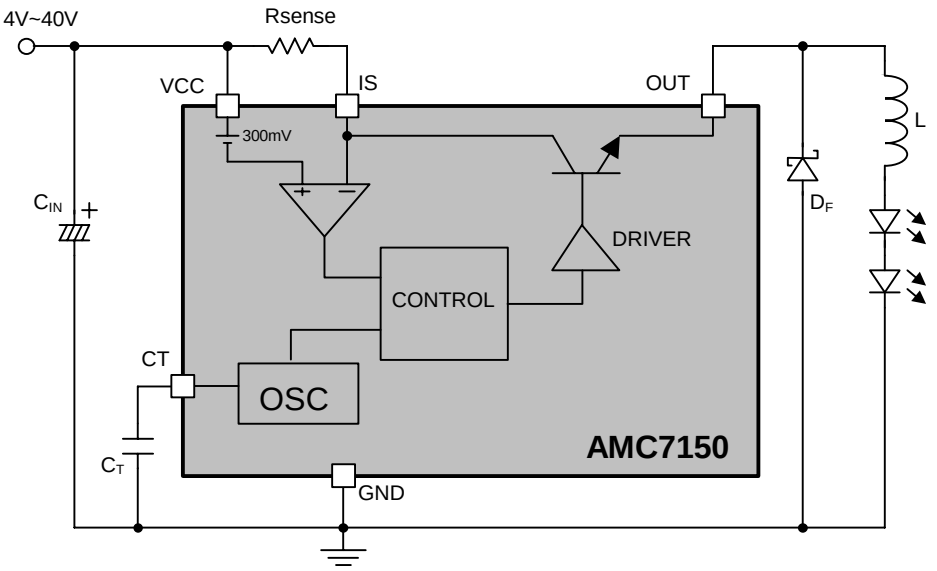

TO-252-5L (Top View)

PRODUCT PREVIEW

### TYPICAL APPLICATION



## BLOCK DIAGRAM




## PIN DESCRIPTION

| Pin Number | Pin Name | Pin Function |
|---|---|---|
| 4 | OUT | Driver output pin. |
| 2 | IS | Peak current senses pin. |
| 5 | CT | Oscillator timing capacitor. |
| 1 | VCC | Input Voltage 4V ~ 40V |
| 3 | GND | Ground |

## POWER DISSIPATION TABLE

| Package | $\theta_{JA}$ ( $^{O}$C W ) | Derating factor ( mW/$^{O}$C ) $T_A \geqq 25^{O}$C | $T_A \leqq 25^{O}$C Power rating (mW) | $T_A$=70 $^{O}$C Power rating (mW) | $T_A$= 85$^{O}$C Power rating (mW) |
|---|---|---|---|---|---|
| TO-252-5 | 80 | 12.5 | 1560 | 1000 | 812 |

Note :

Junction Temperature Calculation: $T_J = T_A + (P_D \times \theta_{JA})$.

$P_D$: Power Dissipation, $T_A$: Ambient temperature, $\theta_{JA}$: Thermal Resistance-Junction to Ambient

The $\theta_{JA}$ numbers are guidelines for the thermal performance of the device/PC-board system.

All of the above assume no ambient airflow.

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| ABSOLUTE MAXIMUM RATINGS | |
|---|---|
| Input Voltage, VCC | -0.3V to 40V |
| Output Voltage, OUT | -0.3V to 40V |
| Maximum Junction Temperature , $T_J$ | 150°C |
| Storage Temperature Range | -40°C to 150°C |
| Lead Temperature (soldering, 10 seconds) | 260°C |

Note:

Exceeding these ratings could cause damage to the device. All voltages are with respect to Ground. Currents are positive into, negative out of the specified terminal.

**RECOMMENDED OPERATING CONDITIONS**

| Parameter | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Supply Voltage | VCC | 4 | | 40 | V |
| Output current | $I_{OUT}$ | | | 1.5 | A |
| Operating free-air temperature range | Ta | -40 | | 85 | ℃ |

**ELECTRICAL CHARACTERISTICS**

VCC=5V, Ta=25°C. ( Unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit | Apply Pin |
|---|---|---|---|---|---|---|---|
| Supply Current | $I_{CC}$ | VCC=4~40V | | | 4 | mA | VCC |
| Output Drop-out Voltage | $V_{DP}$ | $I_{OUT}$=1A, $V_{IS}$-$V_{OUT}$ | | 1 | 1.3 | V | OUT |
| Output Leakage Current | $I_{LK}$ | $V_{IS}$-$V_{OUT}$= 40V | | 0.01 | 10 | μA | |
| Current Sense Voltage | $V_{CS}$ | VCC- $V_{IS}$ | 270 | 300 | 330 | mV | IS |
| Maximum duty cycle | $T_{DC}$ | $V_{IS}$=VCC | | 85 | | % | CT |
| CT Charge Current | $I_{CH}$ | | | 35 | | uA | |

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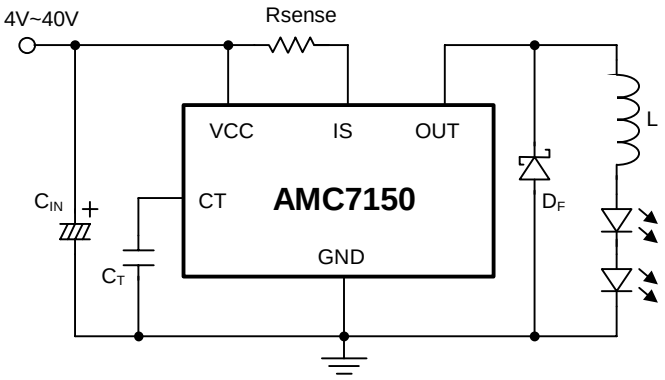
## Application Information

### Low Voltage DC/DC Application

The AMC7150 was design for power LED driving application. Only 5 external components was required for low voltage application. Fig.1 shows the typical application circuit for input voltage range from 4V to 40V. Buck power conversion topology was used and total forward voltage (at expecting current) of the LED string should lower than supply voltage.




**Input Bypass Capacitor**

The input by-pass capacitor $C_{IN}$ holds the input voltage and filtering the switching noise of AMC7150.

**Flywheel Diode**

The fast recovery diode was recommended for flywheel diode $D_F$.

**Inductor**

The Inductor L storages energy during switch turn-on period and discharge driving current to LEDs via flywheel diode while switch turn-off. In order to reduce the current ripple on LEDs, the L value should high enough to keep the system working at continue mode that Inductor current won't fall to zero.

**LED Driving Current**

The peak current $I_{PK}$ flow though LEDs was decided by:

$$\mathbf{I_{PK} = 300mV / Rsense}$$

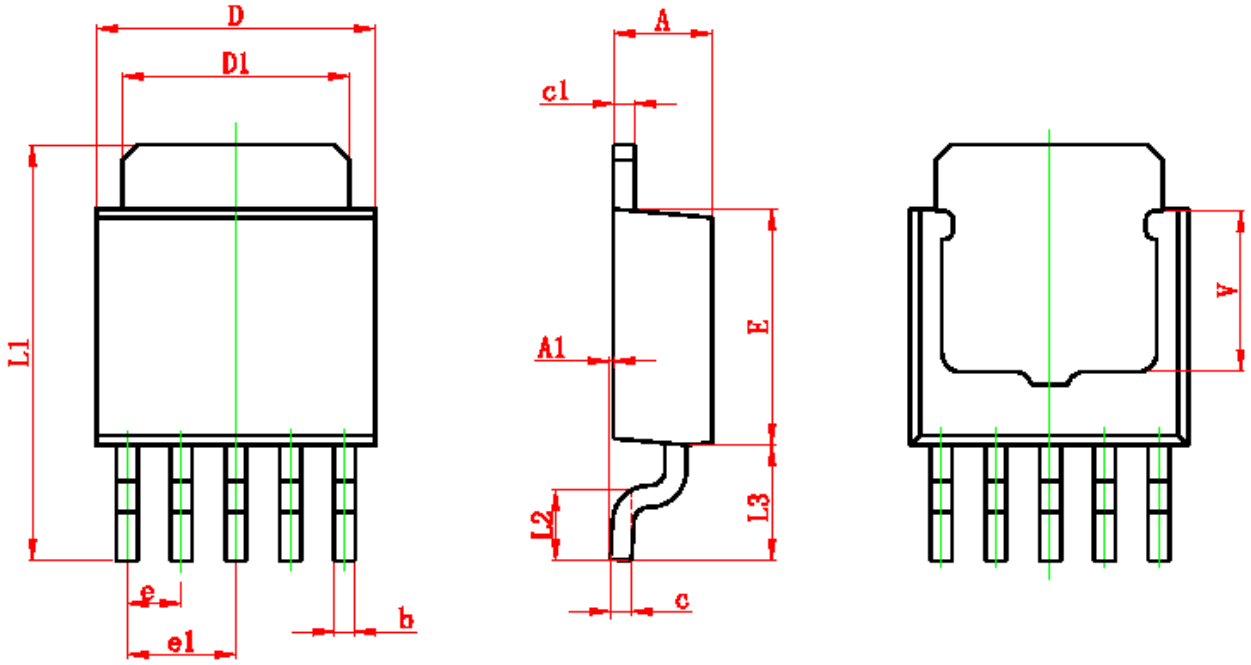
The average current on LEDs was decided by the peak-to-peak ripple current that decided by inductor L. Assume the target average current 550mA on LEDs and ripple current 100mA then the Rsense should be:

$$\mathbf{Rsense = 300mV / (550mA + 0.5*100mA) = 0.5\Omega}$$

The Rsense value should higher than 200mΩ so that driving current won't over the recommended maximum driving current 1.5A.

## PACKAGE

**TO-252-5L**




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 2.200 | 2.400 | 0.087 | 0.094 |
| A1 | 0.000 | 0.127 | 0.000 | 0.005 |
| b | 0.400 | 0.600 | 0.016 | 0.024 |
| c | 0.430 | 0.580 | 0.017 | 0.023 |
| c1 | 0.430 | 0.580 | 0.017 | 0.023 |
| D | 6.350 | 6.650 | 0.250 | 0.262 |
| D1 | 5.200 | 5.400 | 0.205 | 0.213 |
| E | 5.400 | 5.700 | 0.213 | 0.224 |
| e | 1.270 TYP | | 0.050 TYP | |
| e1 | 2.540 TYP | | 1.000 TYP | |
| L1 | 9.500 | 9.900 | 0.374 | 0.390 |
| L2 | 1.400 | 1.780 | 0.055 | 0.070 |
| L3 | 2.550 | 2.900 | 0.100 | 0.114 |
| V | 3.800 REF | | 0.150 REF | |

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