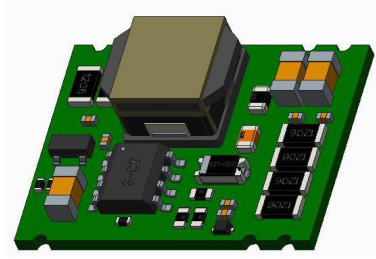


Constant current great power buck LED driver



## FEATURES

- High efficiency up to 94%
- Ultra-wide input voltage range (6-36VDC)
- Output current stability ( $\pm 1\%$ )
- Continuous short circuit protection
- Open frame and ultra-thin SMD package
- Analog dimming+PWM dimming
- RoHS Compliance
- EN62368 approved

CE Patent Protection RoHS



The KC24JT-xxxR3 series is a step-down constant current source designed for high power LED drivers. It features high efficiency, wide input voltage range, high temperature working environment and complete functions, which includes PWM dimming, analog dimming, and remote shutdown. They are widely used in backlights and 6V, 12V, 24V, 30V automotive lighting, landscape lighting, special lighting, commercial lighting, street lighting, home lighting and other lighting systems.

## Selection Guide

| Certification | Part No.     | Input Voltage (VDC) | Output       | Efficiency (%) Min/Typ. | Max. Capacitive Load(uF) |
|---------------|--------------|---------------------|--------------|-------------------------|--------------------------|
|               |              | Nominal (range)     | Current (mA) |                         |                          |
| CE            | KC24JT-300R3 | 24 (6-36)           | 300          | 91/94                   | 1000uF                   |
|               | KC24JT-700R3 |                     | 700          | 91/94                   |                          |

## Input Specifications

| Item                      | Operating Conditions | Min.               | Typ. | Max. | Unit |
|---------------------------|----------------------|--------------------|------|------|------|
| Input Voltage Limit       | $\leq 10$ seconds    | 0                  | --   | 40   | VDC  |
| Input-output Voltage Drop |                      | 2                  | 3    | --   |      |
| Input Filter              |                      | Capacitance filter |      |      |      |

## Output Specifications

| Item                       | Operating Conditions             | Min.                      | Typ.    | Max.       | Unit           |
|----------------------------|----------------------------------|---------------------------|---------|------------|----------------|
| Power                      | KC24JT-700R3, $I_o=700mA$        | 2.31                      | --      | 23.1       | W              |
|                            | KC24JT-300R3, $I_o=300mA$        | 0.99                      | --      | 9.9        |                |
| Current Accuracy           |                                  | --                        | $\pm 2$ | $\pm 5$    | %              |
| Current Stability          | $V_{in}=36V$ , 1-10LEDs          | --                        | --      | $\pm 1$    |                |
| Temperature Coefficient    | $-40^{\circ}C$ to $+71^{\circ}C$ | --                        | --      | $\pm 0.05$ | $\%/^{\circ}C$ |
| Ripple & Noise*            | $V_{in}=36V$ , 1-10LEDs          | --                        | --      | 150        | mVp-p          |
| Internal Power Dissipation | $V_{in}=24V$ , 5LEDs             | --                        | --      | 1.2        | W              |
| Short-circuit Protection   |                                  | Continuous, self-recovery |         |            |                |

Note: \* The "parallel cable" method is used for Ripple and Noise test, please refer to DC-DC Converter Application Notes for specific information.

## General Specifications

| Item                  | Operating Conditions         | Min. | Typ. | Max. | Unit        |
|-----------------------|------------------------------|------|------|------|-------------|
| Operating Temperature | See Fig. 1                   | -40  | --   | 71   | $^{\circ}C$ |
| Storage Temperature   |                              | -55  | --   | 125  |             |
| Switching Frequency   |                              | 450  | 500  | 550  | kHz         |
| MTBF                  | MIL-HDBK-217F@25 $^{\circ}C$ | 1500 | --   | --   | k hours     |

General Specifications

|                |                         |  |  |  |  |
|----------------|-------------------------|--|--|--|--|
| Dimensions     | 21.50 x 16.72 x 5.20 mm |  |  |  |  |
| Weight         | 2.2g (Typ.)             |  |  |  |  |
| Cooling Method | Free air convection     |  |  |  |  |

PWM Dimming

|  |                     |                 |     |     |    |
|--|---------------------|-----------------|-----|-----|----|
| Remote ON/OFF                            | ON                  | 0 < Vc < 0.75V  |     |     |    |
|  | OFF                 | Open or Vc > 5V |     |     |    |
| Remote pin current                       | Vc=5V               | --              | --  | 1   | mA |
| Quiescent input current in Shutdown mode | Vin=24V, Vc < 0.75V | --              | 400 | --  | uA |
| PWM frequency                            |                     | --              | --  | 200 | Hz |

Analogue dimming

|                       |           |              |  |  |  |
|-----------------------|-----------|--------------|--|--|--|
| Input voltage range   | Vin=6-36V | 0-15V        |  |  |  |
| Output current range  | Vin=6-36V | 0%-100%      |  |  |  |
| Control voltage range | Full on   | 0.75V ± 50mV |  |  |  |
|                       | Full off  | 4.7V ± 200mV |  |  |  |

Electromagnetic Compatibility (EMC)

|           |       |                  |  |  |                  |
|-----------|-------|------------------|--|--|------------------|
| Emissions | CE    | CISPR32/EN55032  | CLASS B (see Fig. 4-② for recommended circuit) |  |                  |
|           | RE    | CISPR32/EN55032  | CLASS B (see Fig. 4-② for recommended circuit) |  |                  |
| Immunity  | ESD   | IEC/EN 61000-4-2 | Contact ±4kV                                   |  | perf. Criteria B |
|           | RS    | IEC/EN 61000-4-3 | 10V/m  |  | perf. Criteria B |
|           | EFT   | IEC/EN 61000-4-4 | ±1kV (see Fig. 4-① for recommended circuit)    |  | perf. Criteria B |
|           | Surge | IEC/EN 61000-4-5 | ±1kV (see Fig. 4-① for recommended circuit)    |  | perf. Criteria B |
|           | CS    | IEC/EN 61000-4-6 | 3Vr.m.s  |  | perf. Criteria B |

Typical Characteristic Curves

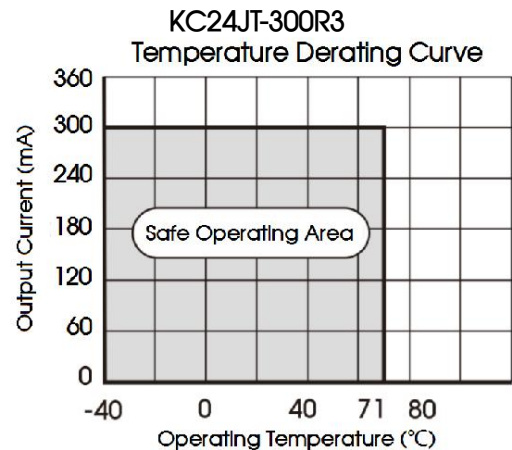
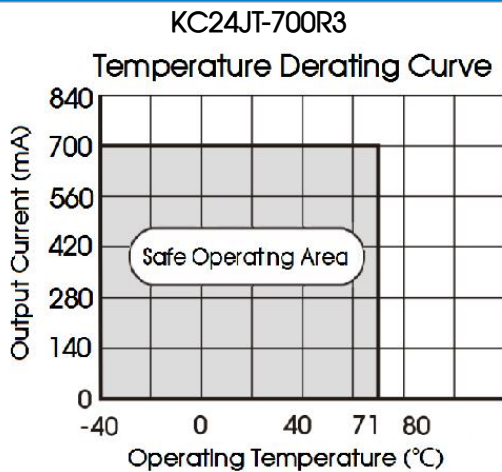


Fig. 1

Design Reference

1. Input/output relationship

| Input voltage (VDC) | Output voltage range (VDC) | Constant output current (mA) | Output power (W, Max.) |
|---------------------|----------------------------|------------------------------|------------------------|
| 36                  | 2.8-33.0                   | 700/300                      | 23.1/9.9               |
| 24                  | 2.8-18.0                   | 700/300                      | 15.2/5.4               |
| 6                   | 2.8-3.3                    | 700/300                      | 2.31/0.9               |

2. Typical application circuit

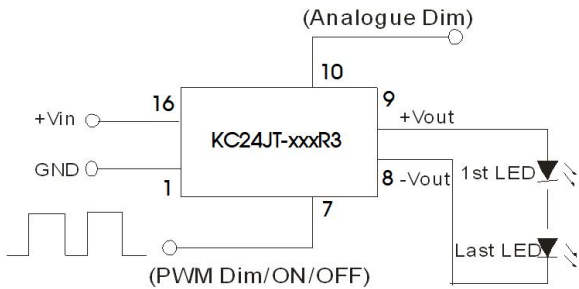


Fig. 2 Application circuits in series

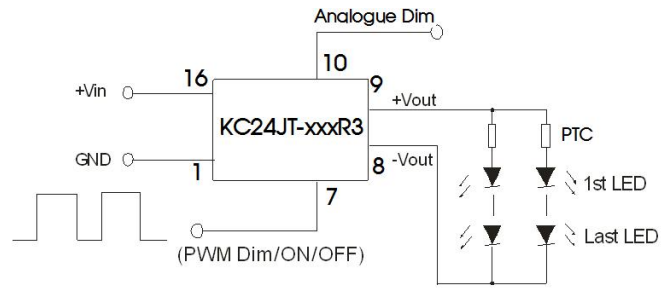
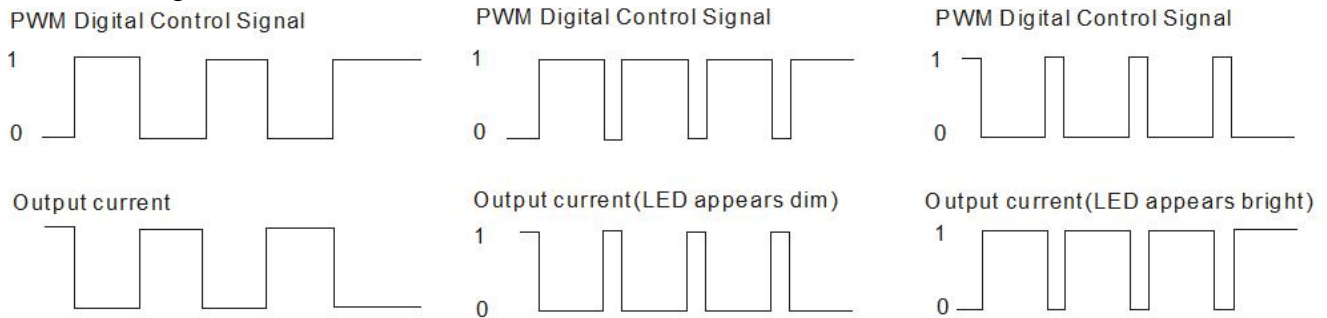


Fig. 3 Application circuits in series and parallel

If it is necessary to protect LED in actual application, you could connect a PTC to the input of every channel or all channels, as shown in Figure 3. Note: The negative output terminal can't connect GND, or the module may be damaged.

3. PWM dimming control



For a certain frequency of PWM dimming, the output current of the driver is inversely proportional to the duty cycle of the PWM signal. By adjusting the duty cycle of the PWM signal, the brightness of the LED can be adjusted. The formula is:

$$I_{o\_set} = I_{o\_nom} \times (1-D)$$

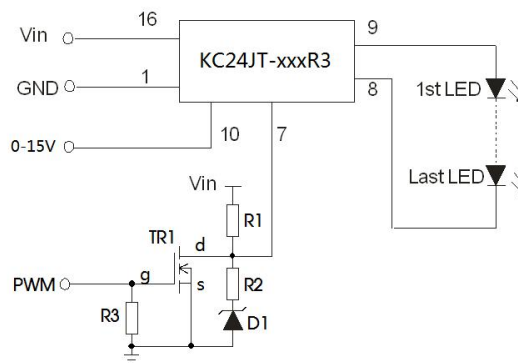
$I_{o\_set}$  refers to the wanted output current value.

$I_{o\_nom}$  refers to the rated output current

$D$  refers to the pulse width of the PWM signal

For example: we assume the rated output current is 700mA and wanted output current is 350mA, then the pulse width should be 0.5 from the equation above. That is say if we keep the pulse width of PWM signal at 0.5, the output current will be kept at 350mA. It is natural for the driver to generate a audibly noise in dimming process, because the frequency of the control circuit is within human audibly range (20Hz~20KHz). In order to avoid the human eye can observe the LED flashes, the PWM dimming frequency is recommended to set above 100Hz.

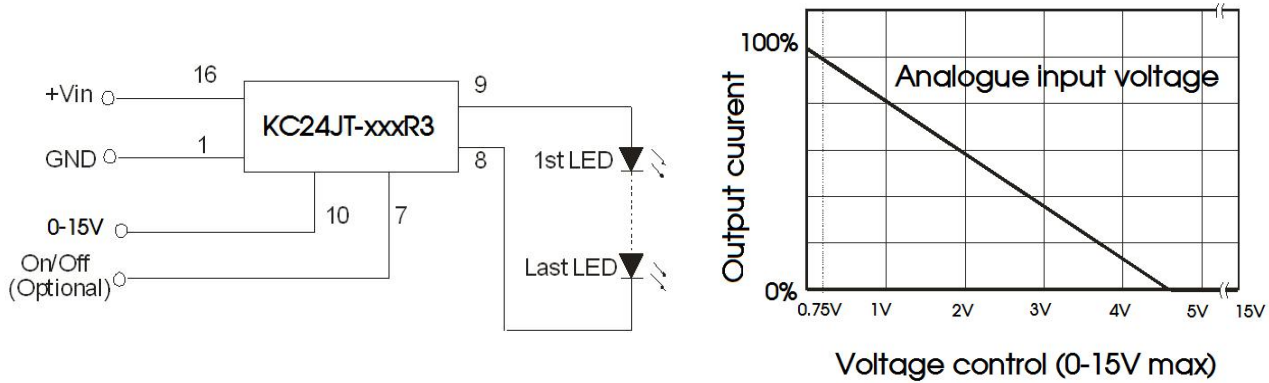
PWM dimming positive logic application recommended circuit



| Components      | KC24JT-xxxR3        |
|-----------------|---------------------|
| R1              | 8.2k $\Omega$ /0.5W |
| R2/R3           | 1k $\Omega$ /0.5W   |
| TR1 (N type)    | 40V/2A              |
| D1 (Zener tube) | 5.1V                |

For a certain frequency of PWM dimming, the output current of the driver is proportional to the duty cycle of the PWM signal.

4. Analogue dimming control and application example



5. EMC compliance circuit

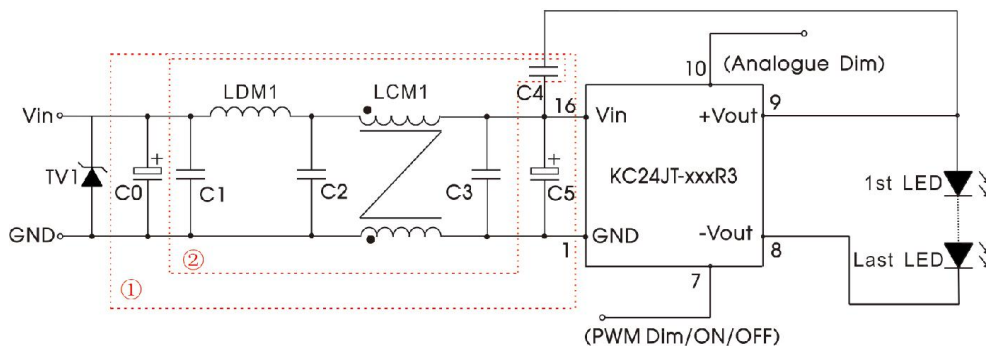


Fig. 4

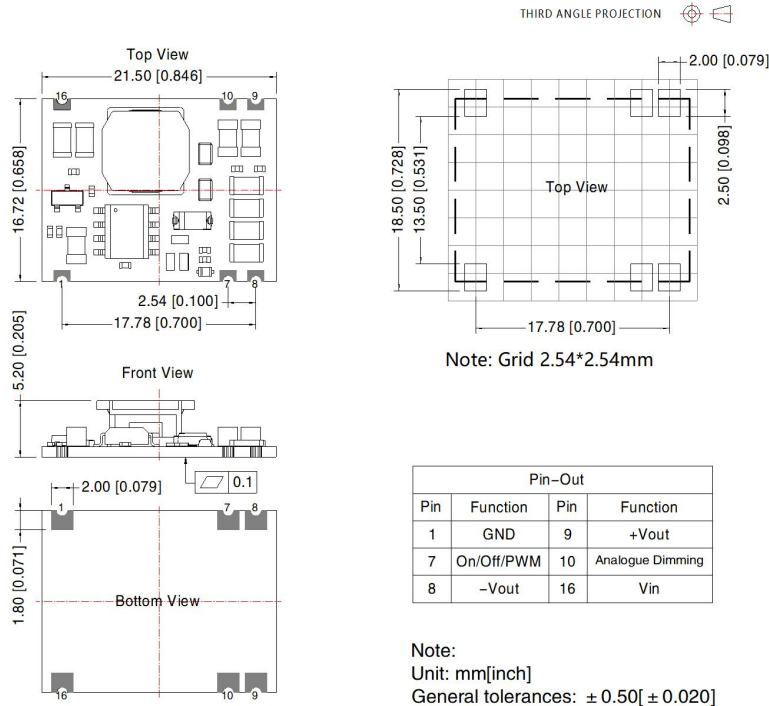
| Components | KC24JT-700R3              | KC24JT-300R3 |
|------------|---------------------------|--------------|
| TV1        | SMC51A,1500W (Brightking) |              |
| C0/C5      | 470uF/100V                |              |
| C1         | 15uF/50V                  |              |
| LDM1       | 10uH/1A                   |              |
| C2/C3/C4   | 4.7uF/50V                 |              |
| LCM1       | 235uH/1A                  | 320uH/1A     |

6. The voltage drop of all LEDs in the datasheet is 2.8-3.3V, during actual application, the number of LEDs can be confirmed based on the actual voltage drop and output voltage of LEDs.

7. This product does not support Hot-Plug use.

8. For additional information please refer to DC-DC converter application notes on [www.mornsun-power.com](http://www.mornsun-power.com)

Dimensions and Recommended Layout



Note:

1. For additional information on Product Packaging please refer to [www.mornsun-power.com](http://www.mornsun-power.com). Packaging bag number : 58210090;
2. Unless otherwise specified, parameters in this datasheet were measured under the conditions of  $T_a=25^{\circ}\text{C}$ , humidity<75%RH with nominal input voltage and half output load;
3. All index testing methods in this datasheet are based on company corporate standards;
4. We can provide product customization service, please contact our technicians directly for specific information;
5. Products are related to laws and regulations: see "Features" and "EMC";
6. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

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